WEA453e AP

Installation Manual

Disclaimer

Every effort has been made to eliminate errors and ambiguities in the information contained in this document. Any questions concerning information presented here should be directed to SAMSUNG ELECTRONICS AMERICA, 1301 E. Lookout Dr., Richardson, TX. 75082 telephone (972)889-6700. SAMSUNG ELECTRONICS AMERICA disclaims all liabilities for damages arising from the erroneous interpretation or use of information presented in this manual.

Publication Information

SAMSUNG ELECTRONICS AMERICA reserves the right without prior notice to revise information in this publication for any reason. SAMSUNG ELECTRONICS AMERICA also reserves the right without prior notice to make changes in design or components of equipment as engineering and manufacturing may warrant.

Copyright 2015

Trademarks

Product names mentioned in this manual may be trademarks and/or registered trademarks of their respective companies.

INTRODUCTION

Purpose

This manual covers how to connect and install the Wireless Enterprise Outdoor AP.

Document Content and Organization

This manual consists of 4 Chapters, 3 Annexes, and Abbreviation as follows.

CHAPTER 1. Preparation

Describes safety guidelines for installing and configuring the Outdoor AP.

CHAPTER 2. System Installation

Describes the installation procedure for the Outdoor AP.

CHAPTER 3. Cables Connect

Describes the connection procedure of cables to the installed Outdoor AP.

CHAPTER 4. Inspecting the Installation Status

Describes the procedure for checking the installation status of the system after installation when the cables have been connected.

ANNEX A. Connector Assembly

This annex describes the process for Connector Assembly.

ANNEX B. Pressure Terminal Assembly

This annex describes the process for Pressure Terminal Assembly.

ANNEX C. Standard Torque

This annex describes the for Standard Torque.

ABBREVIATIONS

This chapter provides definitions for the abbreviations used in this manual.

Conventions

The following types of paragraphs contain special information that must be carefully read and thoroughly understood. Such information may or may not be enclosed in a rectangular box, separating it from the main text, but is always preceded by an icon and/or a bold title.

WARNING

Provides information or instructions that the reader should follow in order to avoid personal injury or fatality.

CAUTION

Provides information or instructions that the reader should follow in order to avoid a service failure or damage to the system.

CHECKPOINT

Provides the operator with checkpoints for stable system operation.

NOTE

Indicates additional information as a reference.

Console Screen Output

- The lined box with '`Courier New`' font will be used to distinguish between the main content and console output screen text.
- '**`Bold Courier New`**' font will indicate the value entered by the operator on the console screen.

WEEE Symbol Information

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.

BATTERY Symbol Information

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.

Revision History

VERSION	DATE OF ISSUE	REMARKS
1.0	03. 2015.	For U.S. Market

SAFETY CONCERNS

The purpose of the Safety Concerns section is to ensure the safety of users and prevent property damage. Please read this document carefully for proper use.

Symbols

Caution

Indication of a general caution

Restriction

Indication for prohibiting an action for a product

Instruction

Indication for commanding a specifically required action

WARNING

When measures voltage

When measures the voltage, be careful not to short a circuit since the power is being supplied.

When mounts/demounts the SDP-U

Make sure to turn off the switch inside the stiffener when mounting/demounting SDP-U.

CAUTION

When measures voltage

When measures the voltage, be careful not to short a circuit since the power is being supplied.

When mounts/demounts the SDP-U

Make sure to turn off the switch inside the stiffener when mounting/demounting SDP-U.

Power and Feeder line

Avoid Contact with Wet Hands

Do not touch the electrical device with your wet hands in order to avoid the risk of an electric shock.

Turn Off the Power Switch

Make sure that the power is turned off when installing the Outdoor AP
If the power is on while installing the Outdoor AP, serious damages to the system and injury to the operator may occur.

Connect the Ground Cable

When connecting the cables, make sure to connect the ground cable first. If the other cables are connected without the ground cable connected first, it may cause an electric shock causing serious damage or severe injury.

Transportation and Storing

Beware of Fire or Burns

Since there is a risk of fire or burns, make sure to avoid contact with any flammable materials.

Use Caution When Moving the Product

When installing the product in a narrow space, do not apply any extreme force in order to avoid any injury caused by bumping into the adjacent equipment or wall.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

CHAPTER 1. Preparation

1.1 System Design and Interface

Design

The design of the Outdoor AP is as follows:

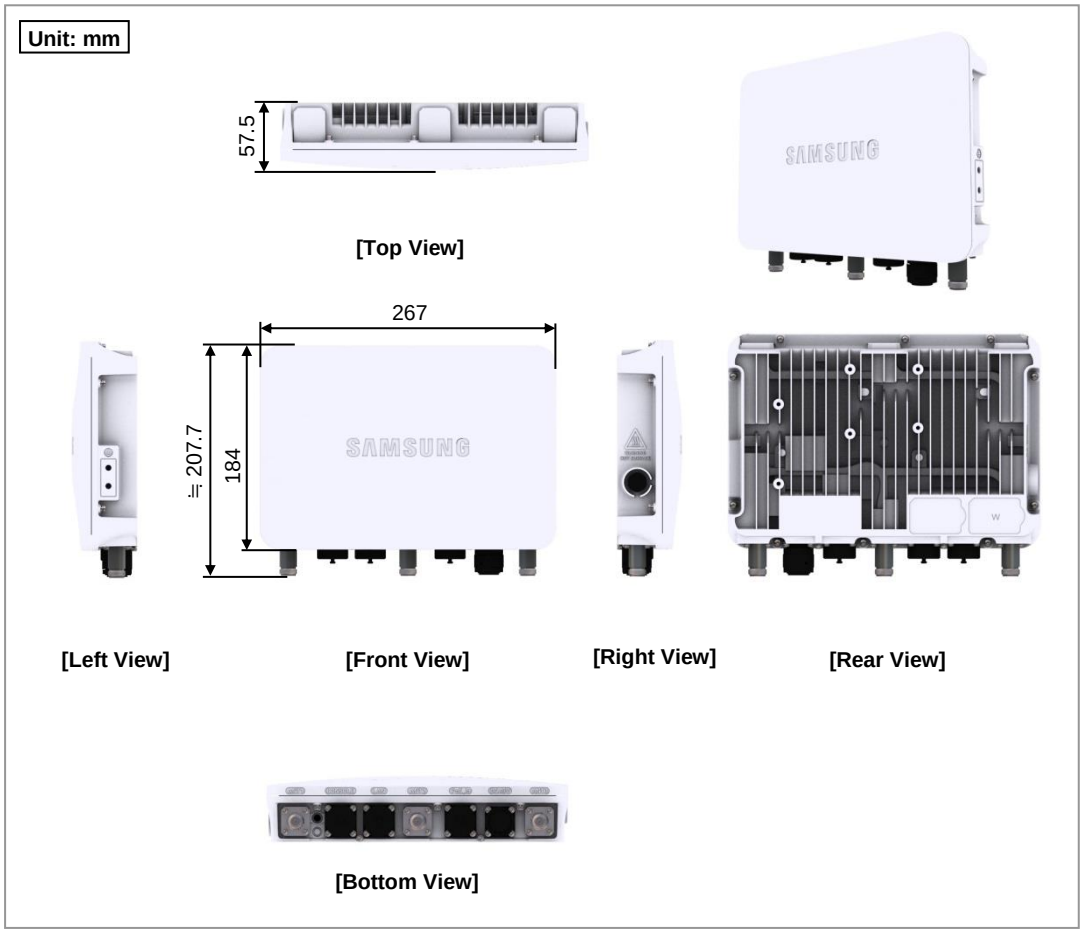


Figure 1. Outdoor AP Design

Interface

The interface and connections for the Outdoor AP are as follows:

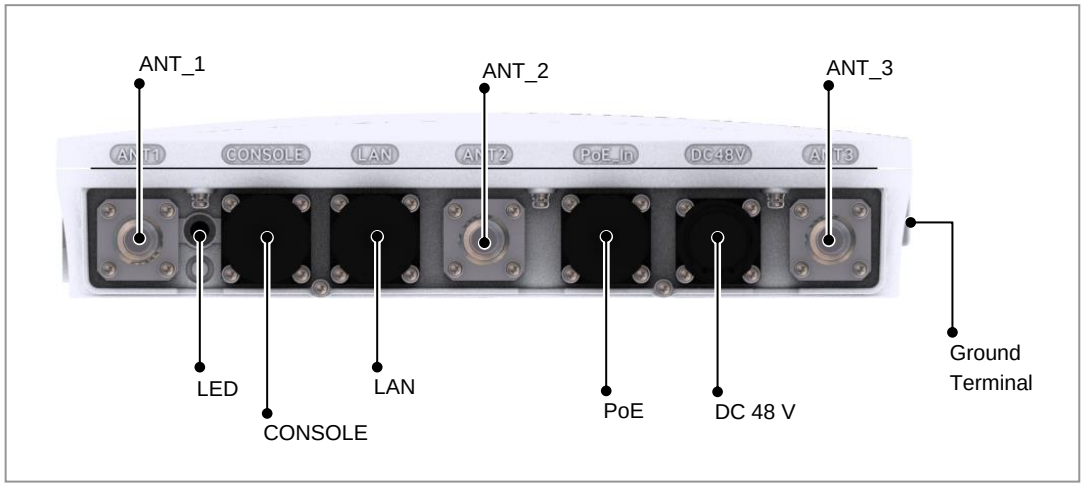


Figure 2. Outdoor AP Interface

1.2 System Specifications

Key Specifications

The key specifications of the Smart AP are as follows:

Table 1. Key Specifications

Item	Specifications
Operating Frequency	2.401-2.4835 GHz, 5.15-5.825 GHz
Radio Technology	IEEE 802.11ac/a/b/g/n
Channel Bandwidth	20, 40, 80 MHz
RF Power	Max 23 dBm (complies the regulatory domain for each country)

Power Specifications

The power specifications of the Smart AP are as follows:

Table 2. Power Specifications and Consumption

Item	Specifications
PoE	IEEE 802.3at
Adapter (optional)	100-240 VAC, 50 Hz, 48 VDC, 1 A
Power Consumption	25.5 W

Dimensions and Weight

The dimensions and weight of the Smart AP are as follows:

Table 3. Dimensions and Weight

Item	Specifications
Dimensions (mm)	267 × 184 × 57.5
Weight (kg)	3 kg or less

Environmental Conditions

The environmental conditions required for the Outdoor AP are as follows:

Table 4. Environmental Conditions

Item	Specifications
Operating Temperatures	-40°C to 55°C
Humidity	5-100 % (non-condensing)
Cooling Method	Ambient air
Resistance to Dust/Water	IP66 & IP67

1.3 Installation Safety Procedures

When installing the system, be cautious of the following in order to avoid any safety issues or accidents:

Before Installing the Product

- Post warning signs in the area where the high voltage cables are located.
- Post warning signs near the areas where a safety accident may occur.
- Block any open spaces, such as connections and scaffolding, by using guardrails or fences.

During Installation

- Proceed with the installation only after all system power has been completely shut off.
- When moving or installing the system, be careful not to damage or scratch the boards, or the cables between the boards, that are mounted on the system.

When installing the system, make sure that the power supply is turned off. Installing the system with the power turned on may cause serious damages or fatal injury.

When drilling into a wall, the operator must wear protective gloves and safety goggles to avoid any injuries caused by splinters.

Do not wear any metal accessories, such as watches or rings, in order to avoid an electric shock.

All unused ports must be covered with waterproof caps to prevent an inflow of any foreign substances.

Any outdoor materials (such as the metal band and the screws) must be stainless steel (STS 304). Otherwise, the metal can become corroded and rust.

After Completing the Installation

Clean up all of the waste materials that accumulated from the installation procedure and tidy up the area.

Be careful not to damage the cable installation area during the cleaning process.

Be careful to avoid any contact with the power supply by any foreign substance while cleaning up which may result in a product malfunction.

1.4 Installation Tools

Basic tools for installing the product are shown below. Besides these tools, any other tools necessary for the installation site should be prepared according to the site review before starting the installation.

Table 5. Basic Tools

No.	Name	Specification	Image
1	Torque Driver Set	No.0-+ No.3 (M2.6-M6 '+' Screwdriver) Torx Driver(T20H)) 1-50 kgf·cm	
2	Torque Wrench Set	M6-M14 - 10-30 kgf·cm - 490.5-4905 cN·m (100-500 kgf·cm) Replaceable head	
3	Drill/Bit Set	6-17 mm	
4	Heating Gun	50-300°C	
5	Power Extension Cable	30 m	
6	Tape Measure	5 m/50 m	
7	Cable Cutter	6-32 mm	
8	Silicon Gun/Silicon	Normal/Gray & Colorless	
9	Hammers	Still/Rubber/PVC	
10	Wrenches	10 mm, 13 mm, 17 mm 19 mm, 24 mm, 36 mm	
11	Wire Stripper	6-24 mm	


NOTE

These basic tools are subject to change based on the actual conditions of the installation site. Be prepared with any other necessary tools, such as a protractor, compass, ladder, and any additional safety or cleaning equipment that may be required in accordance with the site conditions.

CHAPTER 2. System Installation

2.1 Installation Procedure

The installation procedure for the Outdoor AP is as follows:

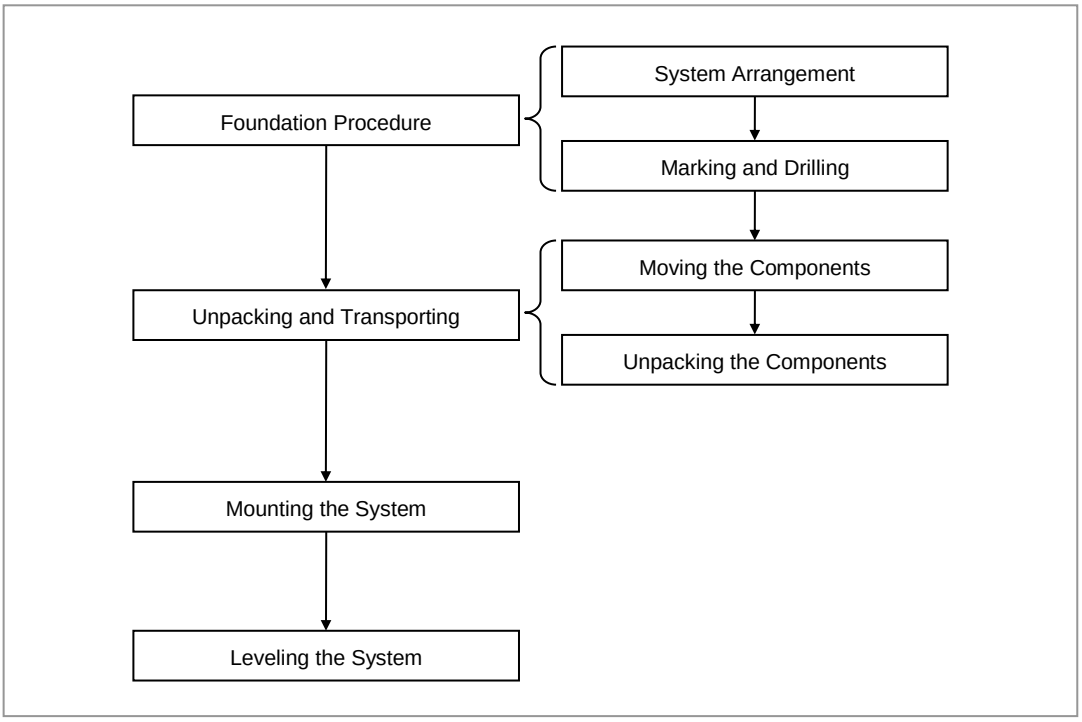


Figure 3. Installation Procedure for the Outdoor AP

2.2 Foundation Procedure

2.2.1 System Arrangement

In order to guarantee the least amount of space for installing, maintaining, or repairing the system, establish a clear distance from any obstructions.

Table 6. Recommended Clearance Distance When Installing the System

Product Area	Recommended Clearance Distance
Front/Rear	800 mm or further
Side	300 mm or further
Top/Bottom	1,000 mm or further

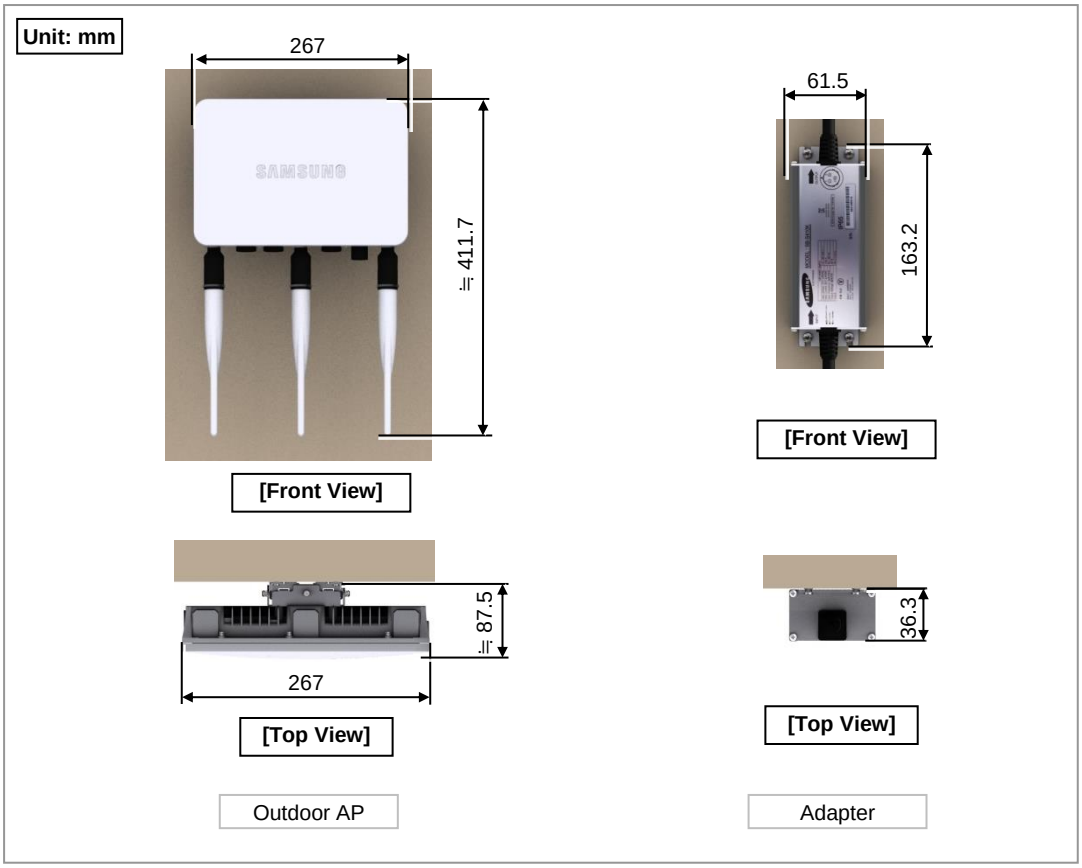


Figure 4. Wall Type Arrangement

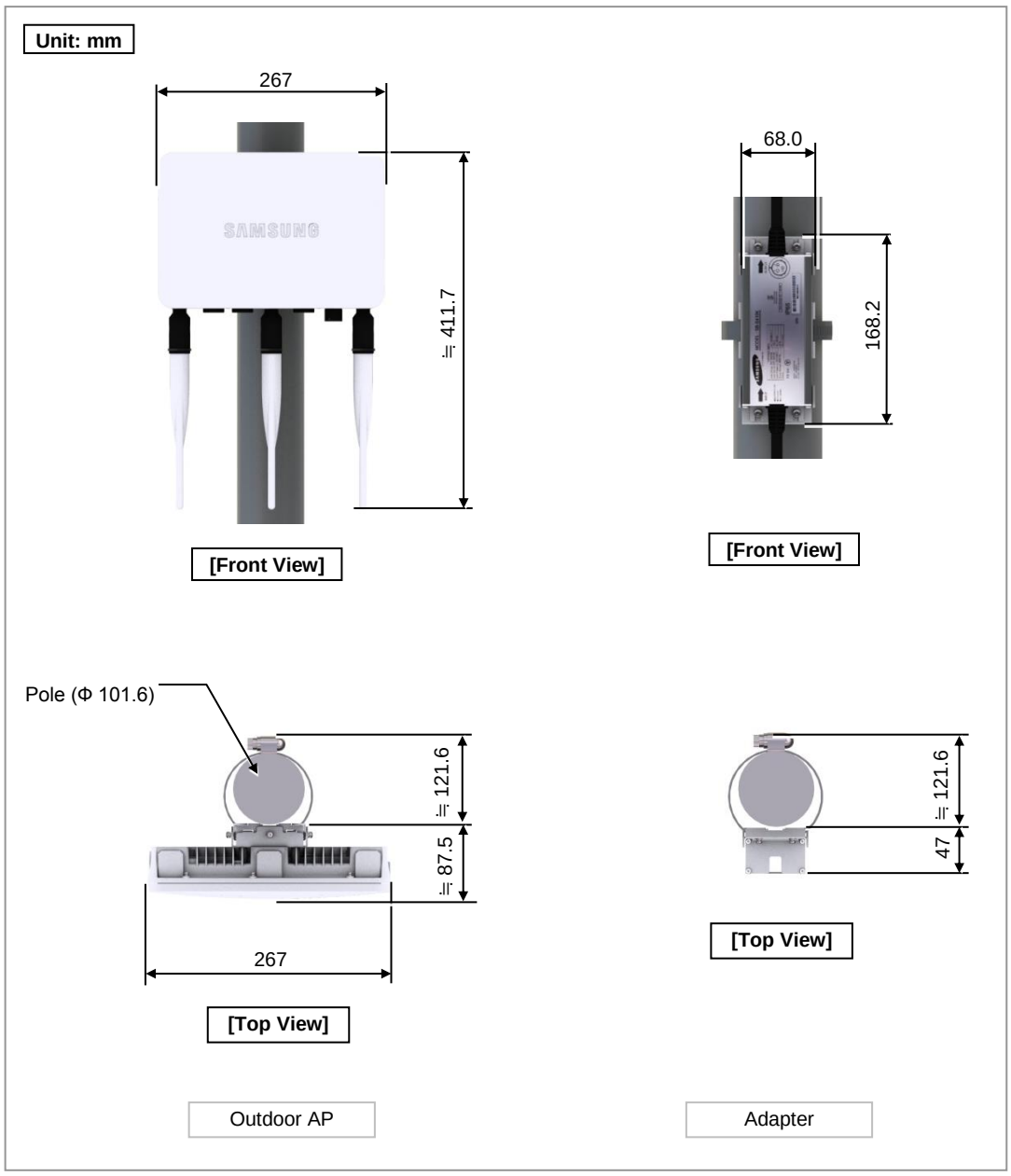


Figure 5. Pole Type Arrangement

NOTE

The top view of the above image is used when the diameter of the pole is 101.6 mm, however the measurement may differ depending on the pole diameter.

2.3 Carrying and Unpacking

This process outlines how to carry the system and other components to the installation site and how to unpack them.

2.3.1 Moving the Components

When bringing in the system components, keep in mind the following:

- Firmly secure the components in the transporting vehicle and do not exceed the valid vibration range (1-500 Hz) while transporting the system.
- When the operators carry the system components by hand, they must use a cart or a lift to move the system to the site and also have enough people to carry them.
- Clear an adequate space and remove all obstructions before moving the system.
- Avoid any physical impact, dust, humidity, or static electricity that may cause any system damage while moving it.

2.3.2 Unpacking the Components

When unpacking the components, keep in mind the following:

- Do not unpack the components until they arrive at the installation site.
- Sort the supplies by job specifications and store the components in a safe place where they will not disturb the installation.
- Start installing the system immediately after unpacking the components. If the installation cannot be completed immediately, store the system at the installation site.
- Unpack the external packaging first.
- Unpack the internal packaging after arranging the components in their respective installation positions.
- Do not recycle the unused materials. Dispose of the packaging materials in according with the local waste disposal regulations.

2.4 Mounting the System

The following procedure outlines the installation instructions for mounting the Outdoor AP and adapter to a wall or to a pole:

Assembling the Unit Bracket

1) Prepare the following components:

Table 7. Components and Tools for Assembling the Unit Bracket

Item	Description	
Components	Unit Bracket	1 EA
	M4 × L10 Torx Screw (WSP)	4 EA
Regulated Torque Value	M4 Torx Screw	9.52-14.28 kgf·cm
Required Tool	Torque Driver (T20H)	

2) Fix the unit bracket to the Outdoor AP by matching up each hole and screwing in the 4 torx screws (WSP).

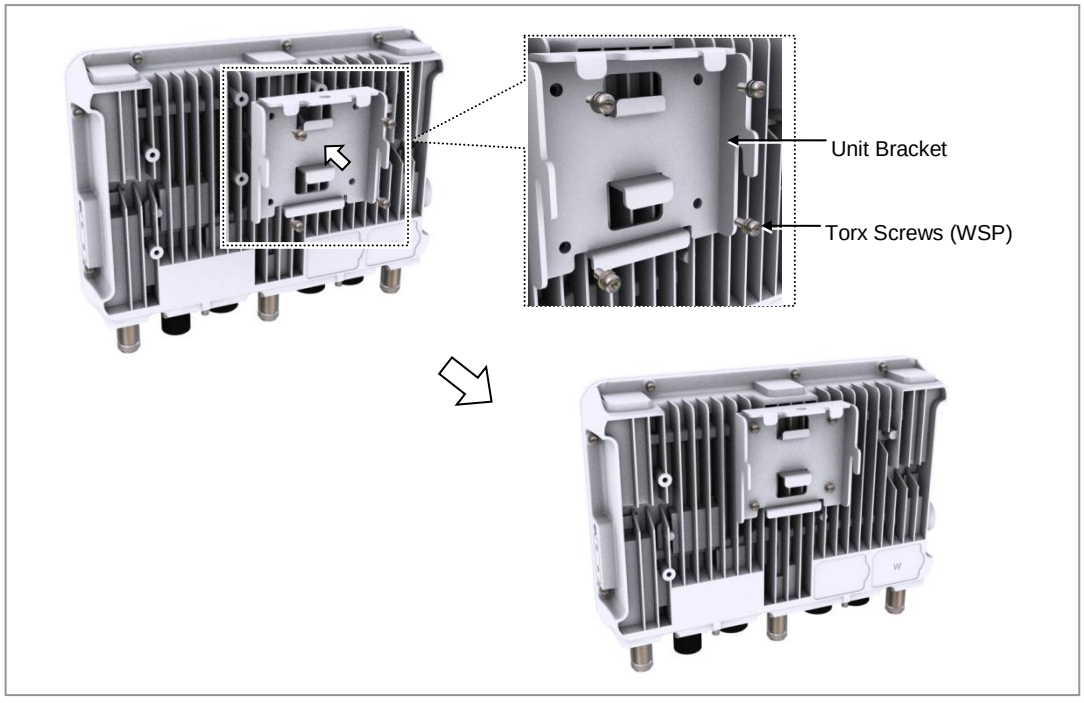


Figure 6. Assembling the Unit Bracket

Assembling the Dipole Antennas

1) Prepare the following components:

Table 8. Components and Tools for Assembling the Dipole Antennas

Item	Description	
Components	Dipole Antennas	3 EA
Connectors	Outdoor AP	N Type-Female
	Dipole Antenna	N Type-Male
Regulated Torque Value	N Type-Male	9-11.3 kgf·cm
Required Tool	Torque Wrench	

2) Connect the 3 dipole antennas to the Outdoor AP connectors (ANT1, ANT2, and ANT3).

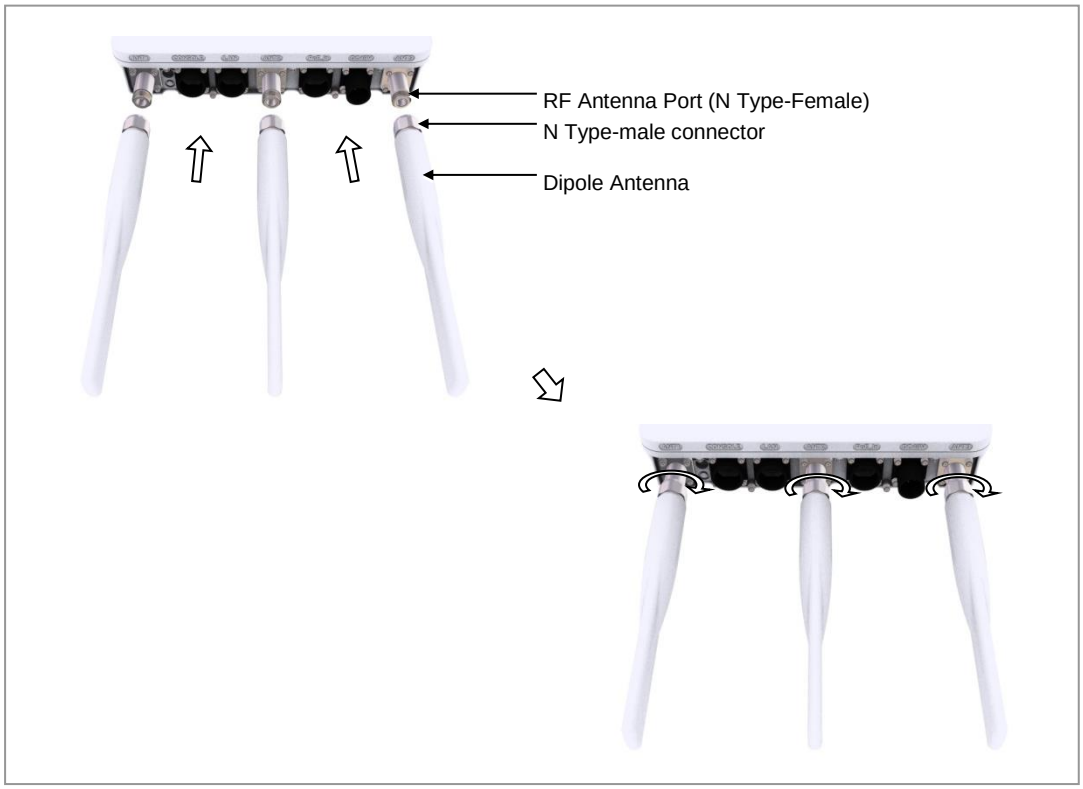


Figure 7. Assembling the Dipole Antennas (1)

3) Wrap the interlinked parts in at least two layers of insulating tape to cover the metal after attaching the connector.

4) Wrap insulating tape over the area in at least two layers of butyl tape, starting 10-20 mm down from the upper end to 10-20 mm below the heat shrink tube.

5) Wrap butyl tape over the area in at least two layers of insulating tape in the same manner.

6) Tie both ends of the insulating tape using cable ties to make sure they do not become unwrapped.

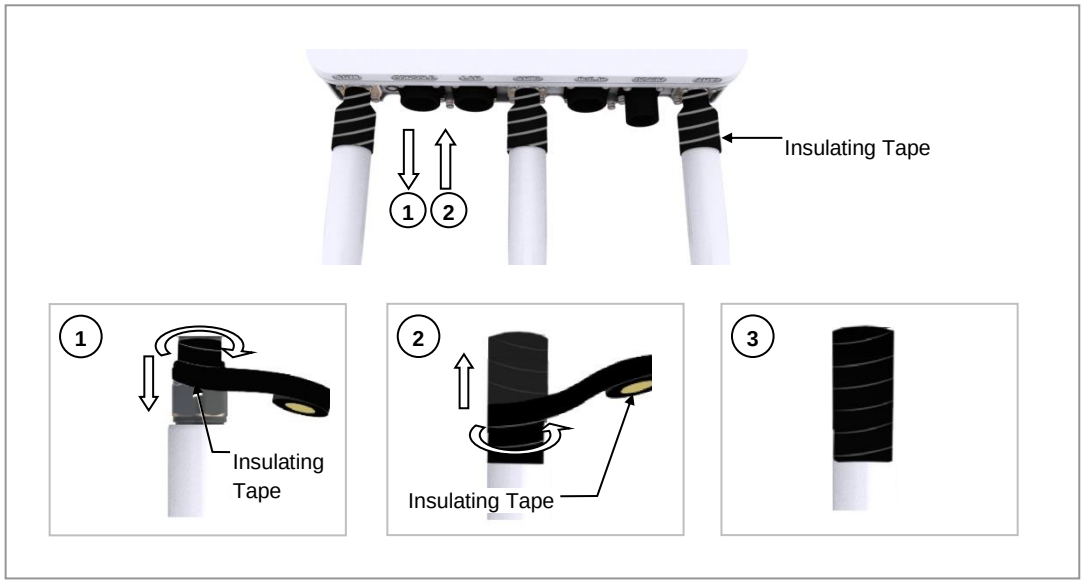


Figure 8. Assembling the Dipole Antennas (2)

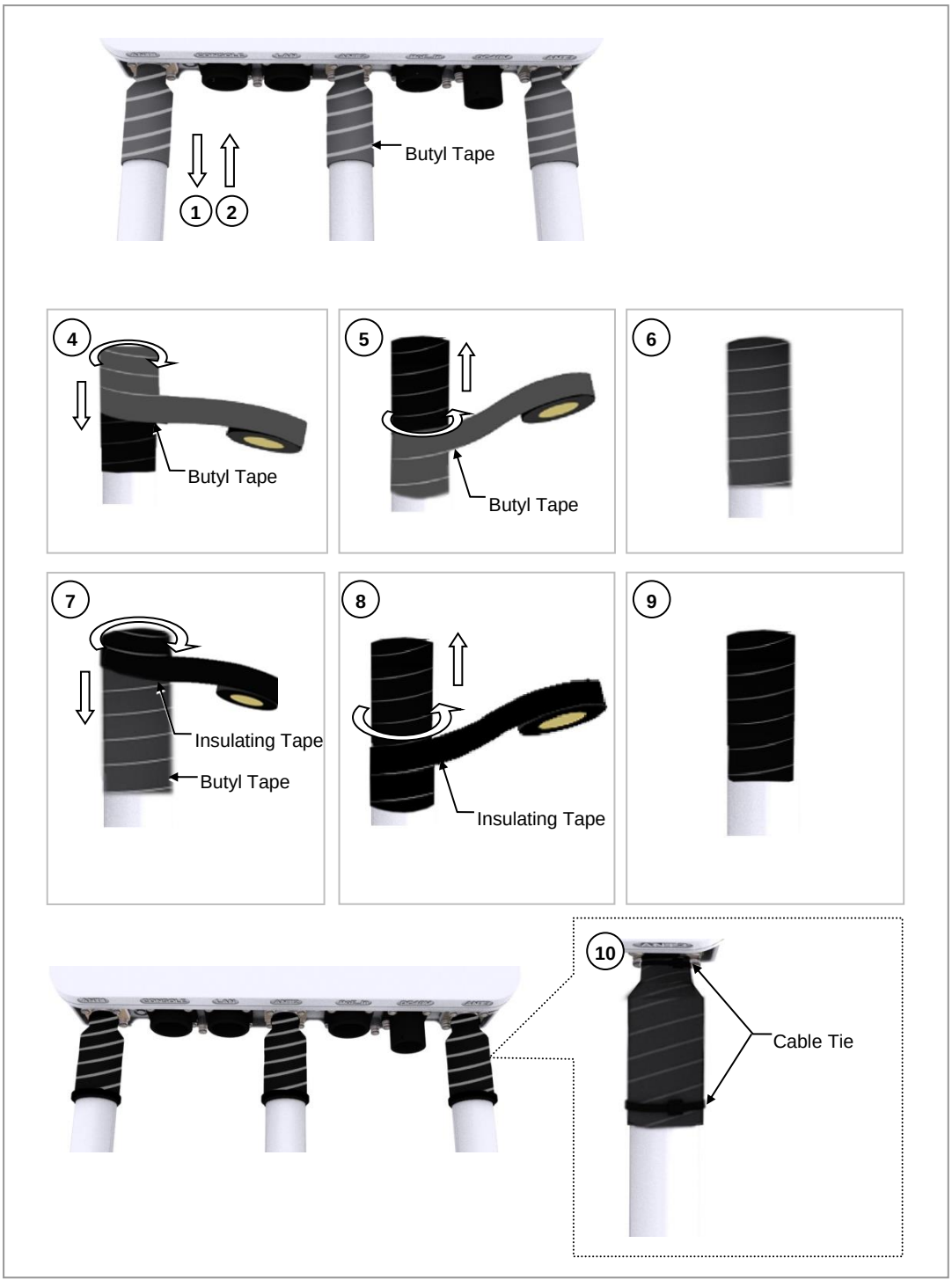


Figure 9. Assembling the Dipole Antennas (3)

2.4.1 Wall Mounting

Marking

Mark the points where the system is to be installed and the anchor bolts are to be fixed using an inking line or pen.

> **CAUTION**
>
> When drilling and anchoring the system on the wall without confirming the horizontal/vertical position of the marked points, the level can only be adjusted by a small amount.
> Then inspect the level of the marked points to check whether they are horizontal/vertical by referring to 'System Leveling', and adjust them accordingly.

> **NOTE**
>
> To minimize the margin of marking errors by the operator, it is recommended to determine the exact placement of the system first. Place the system in the appropriate place and then mark the locations to fix the anchor bolts using a pen.

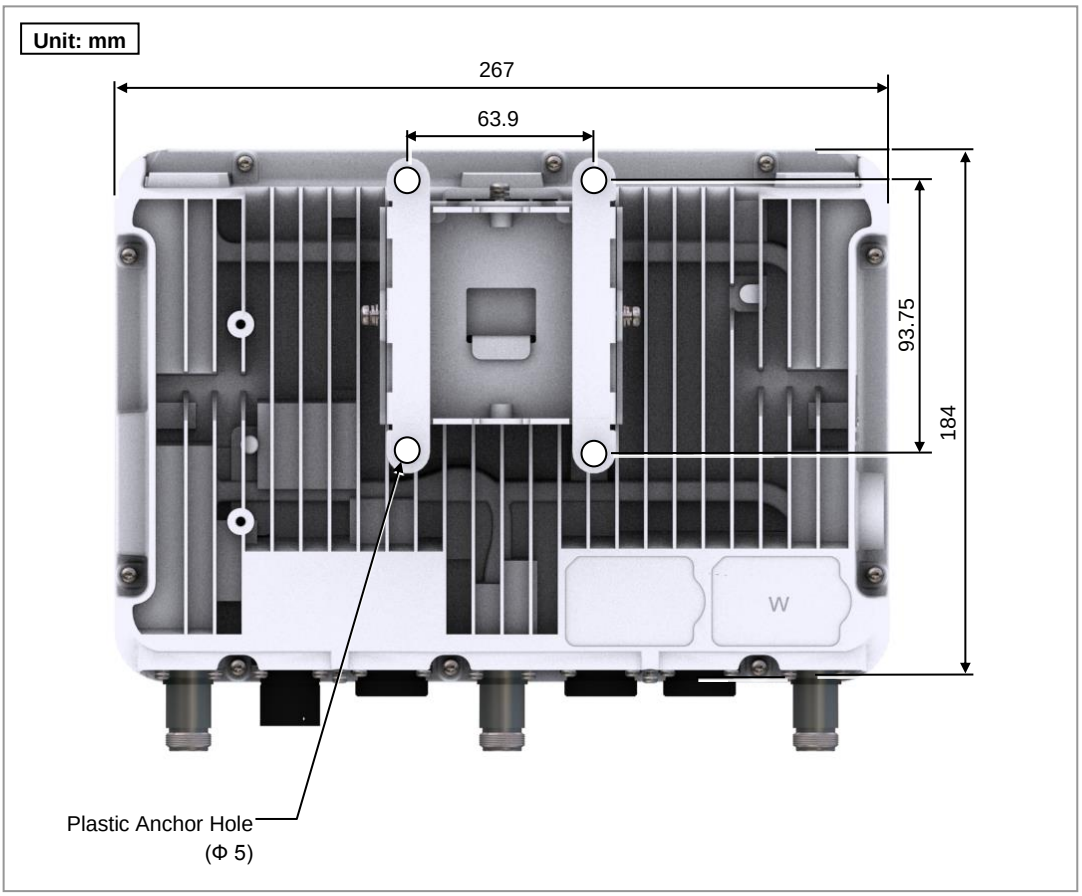


Figure 10. Marking the Outdoor AP

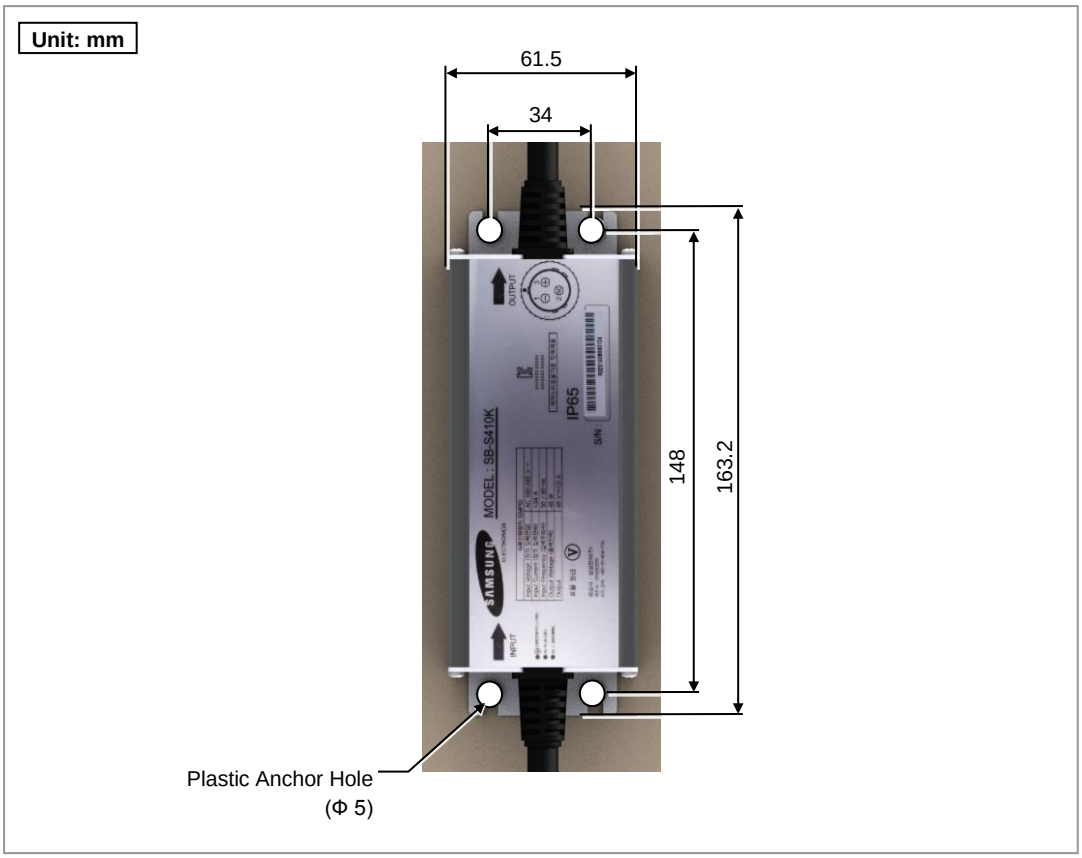


Figure 11. Marking the Adapter

1) After confirming the placement of the system and the correct distances between the holes, mark the positions on the wall.
2) Draw a horizontal line between the marked holes.
3) Verify the horizontal line is correct by using a spirit level. If it is not level, then adjust the marked points accordingly.

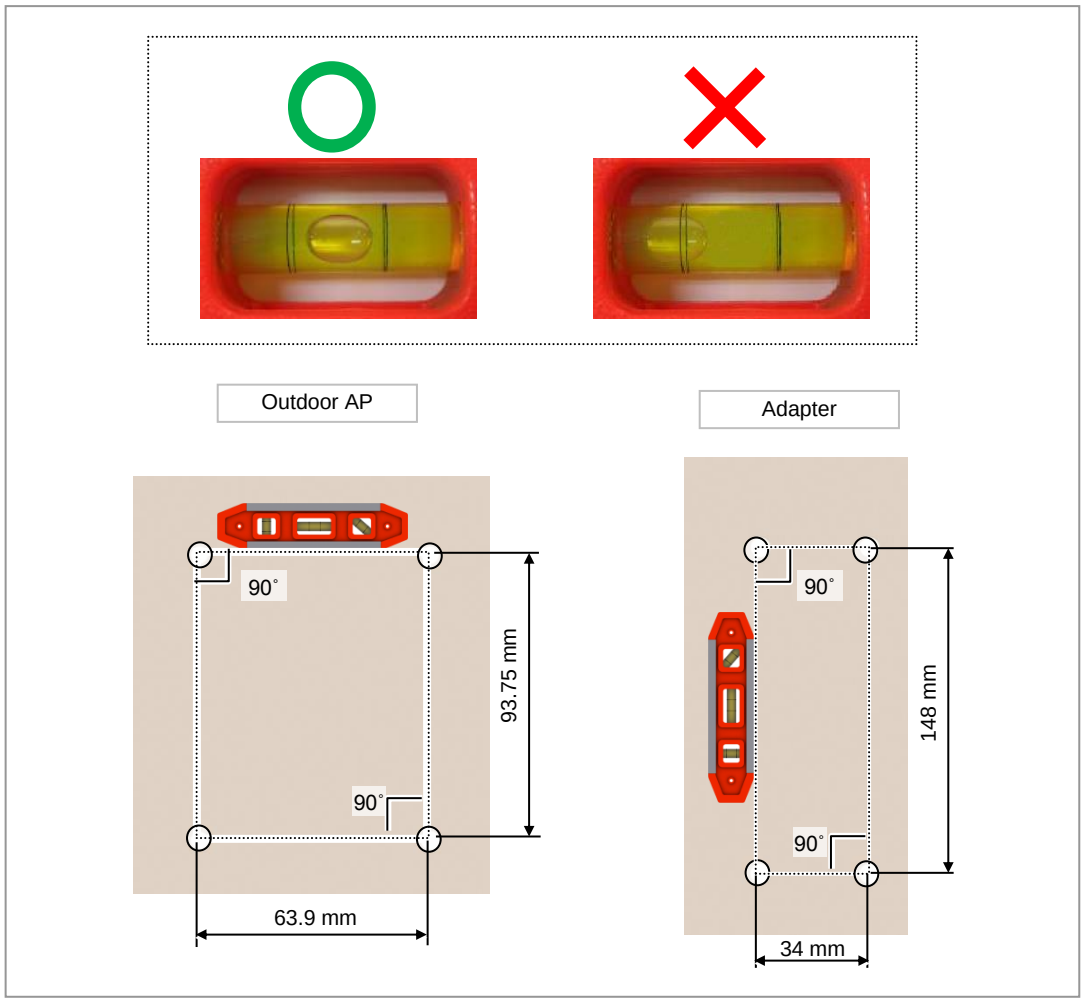


Figure 12. Marking Example

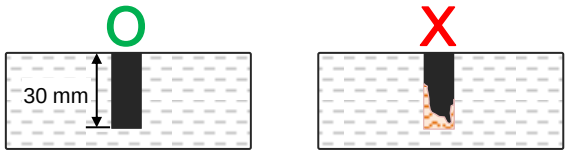
Drilling

Drill holes where the marked points are for fixing the plastic anchors.

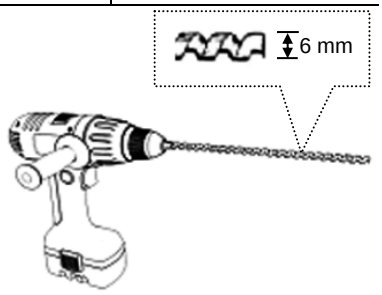
Table 9. Drill Bit and Hole Depth for Anchor Bolts

Item	Anchor Bolt	Drill Bit	Hole Depth
Outdoor AP	M4	6 mm	30 mm

[Cross Section of a Hole]



* Remove any foreign substances from inside the drilled hole.



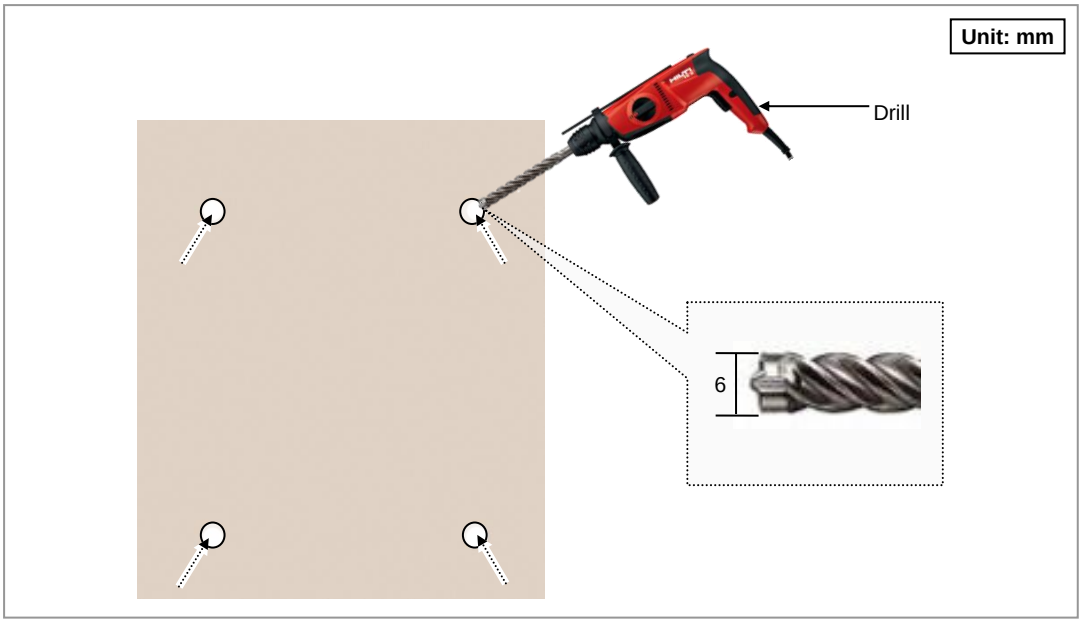


Figure 13. Drilling Example

Mounting the Mount Bracket to the Wall

1) Prepare the following components:

Table 10. Components and Tools for Mounting the Mount Bracket to the Wall

Item	Description	
Components	Mount Bracket	1 EA
	M6 × 30L Plastic Anchors	4 EA
	M4 × 25L Tapping Screws	4 EA
Regulated Torque Value	M4 Tapping Screw	9.52-14.28 kgf·cm
Required Tools	Drill, Hammer, Torque Driver, and Spirit Level	

2) Insert the plastic anchors into the drilled holes on the wall.

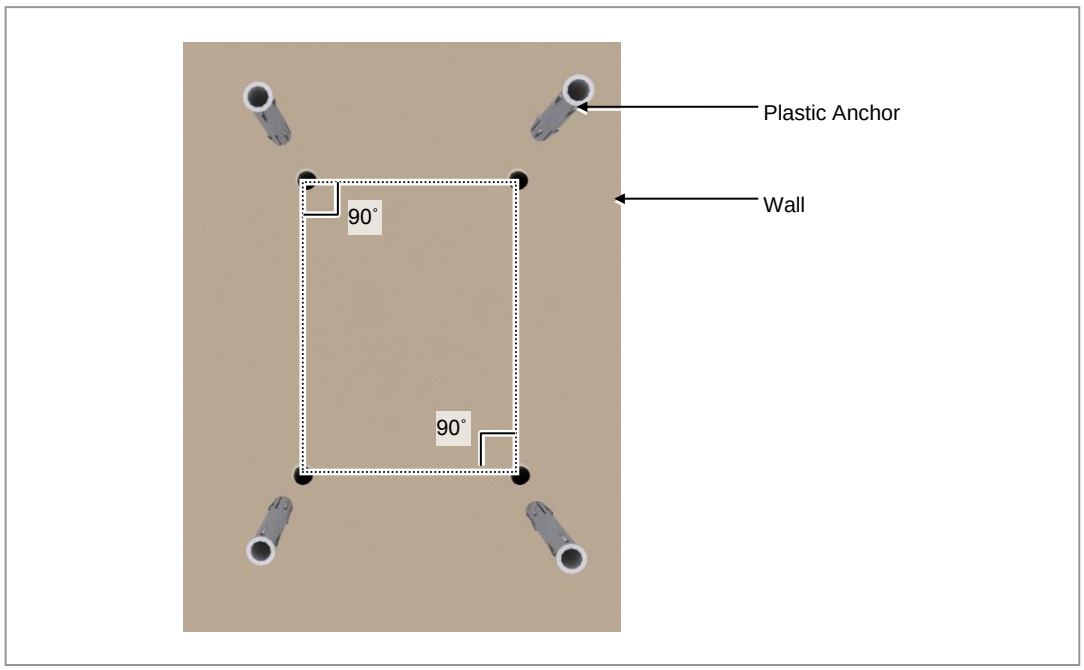


Figure 14. Mounting the Mount Bracket on the Wall (1)

3) Align the mount bracket with the plastic anchors and firmly attach it using the screws.

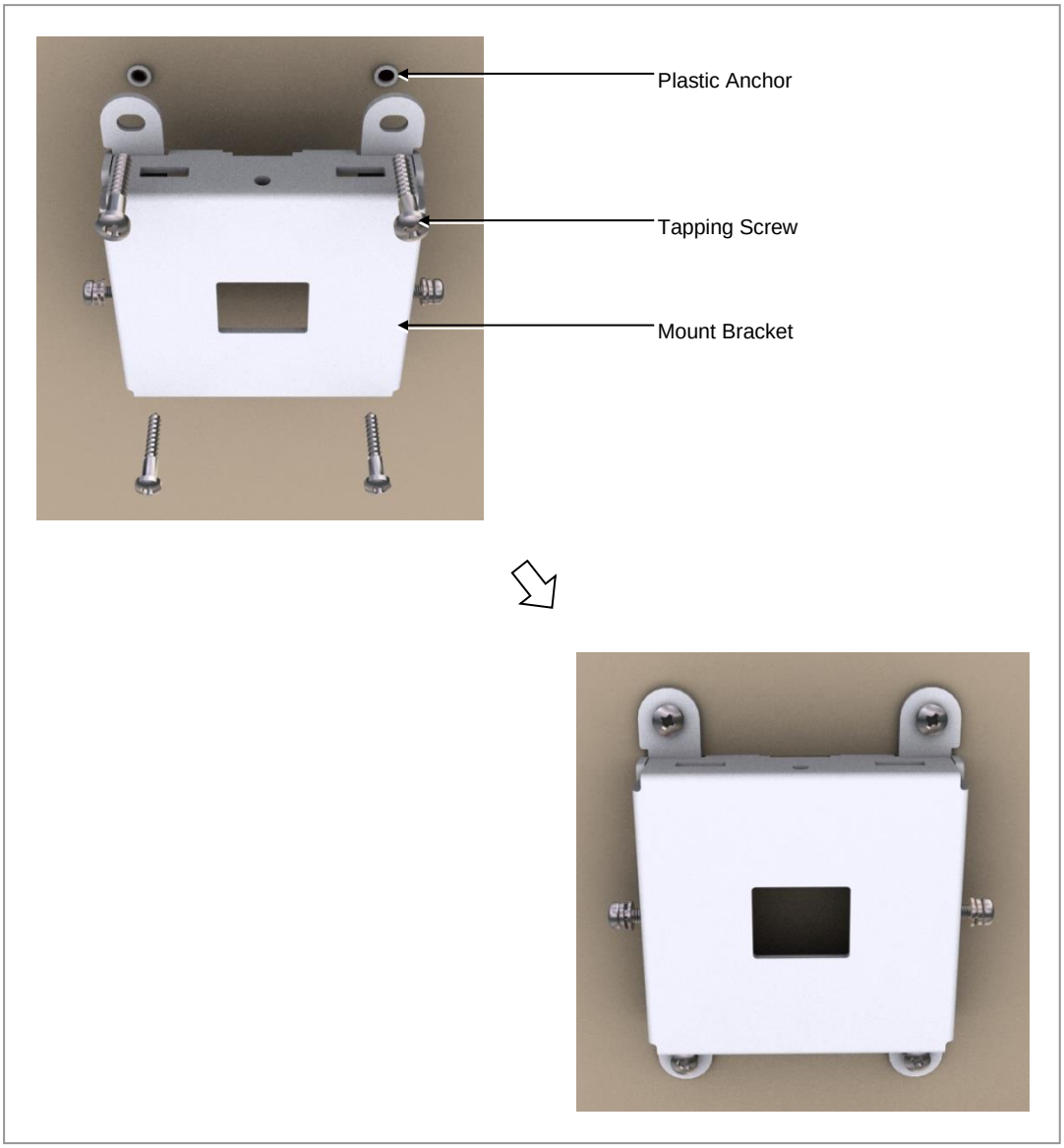


Figure 15. Mounting the Mount Bracket on the Wall (2)

Mounting the Outdoor AP

1) Preparing the following components:

Table 11. Components and Tools for Mounting the Outdoor AP

Item	Description	
Components	M4 Torx Screws (WSP)	3 EA
Regulated Torque Value	M4 Torx Screw	9.52-14.28 kgf·cm
Required Tool	Torque Driver (T20H)	

NOTE

The 2 M4 Torx Screws (WSP) should be tightened on the left and right sides of the bracket.

2) Hang the unit bracket with the groove aligned with the screws temporarily fixed to the mount bracket.

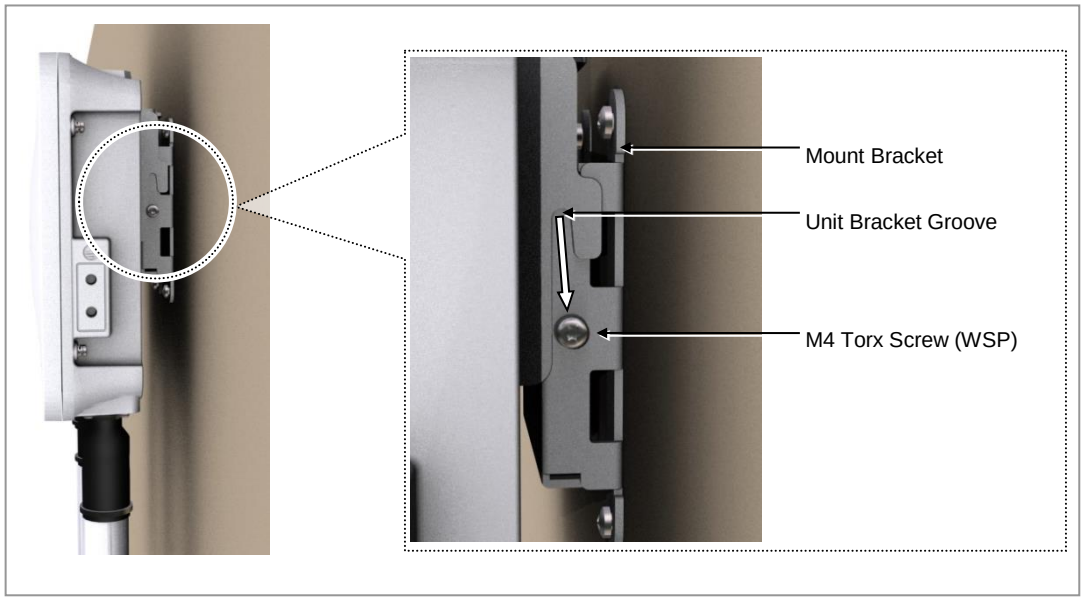


Figure 16. Mounting the Outdoor AP on the Wall (1)

3) Tighten each screw on both sides.

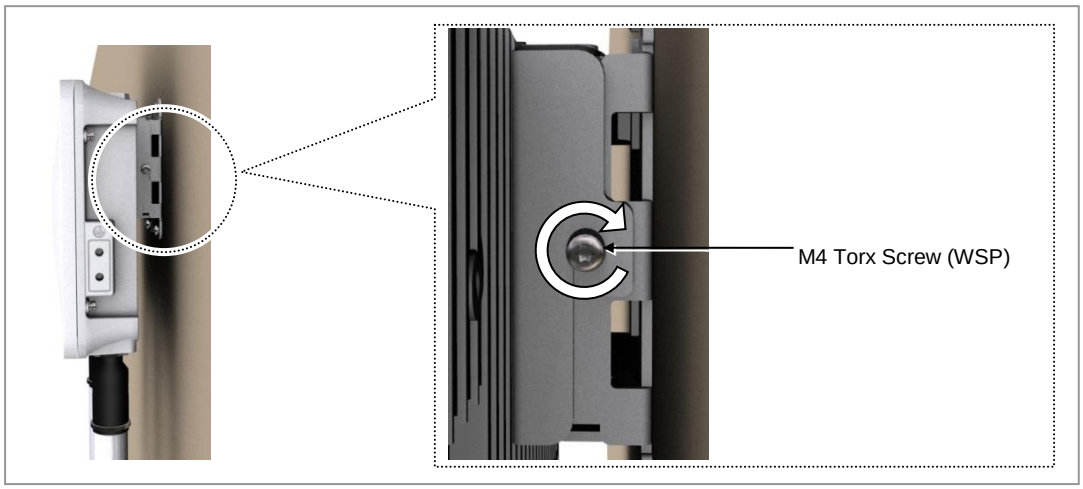


Figure 17. Mounting the Outdoor AP on the Wall (2)

4) Mount the top part using a screw.

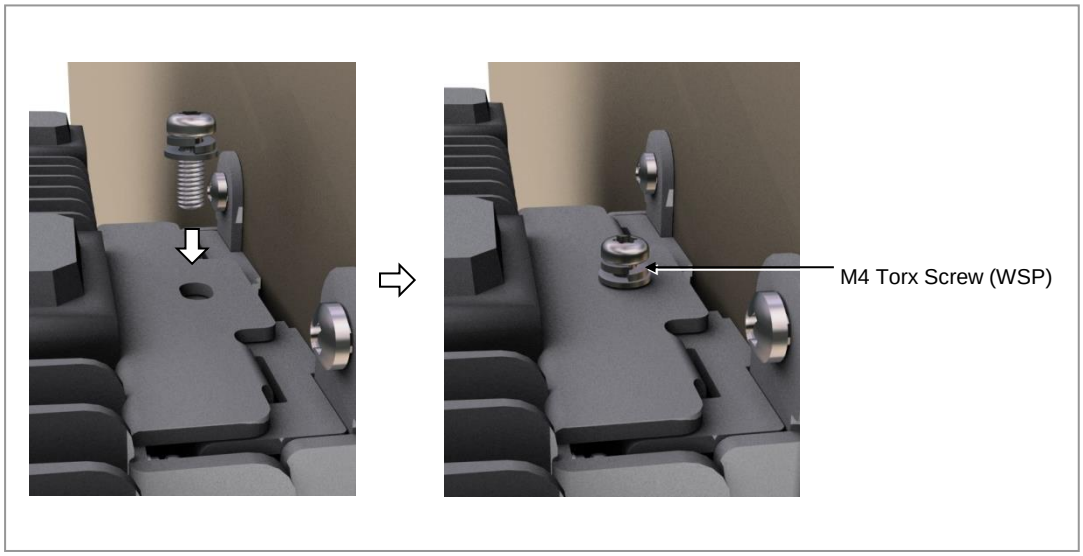


Figure 18. Mounting the Outdoor AP on the Wall (3)

Mounting the Adapter

1) Prepare the following components:

Table 12. Components and Tools for Mounting the Adapter on the Wall

Item	Description	
Components	M6 × 30L Plastic Anchors	4 EA
	M4 × 25L Tapping Screws	4 EA
Regulated Torque Value	M4 Tapping Screw	9.52-14.28 kgf·cm
Required Tools	Drill, Hammer, Torque Driver, and Spirit Level	

2) Insert the plastic anchors into the drilled holes on the wall.

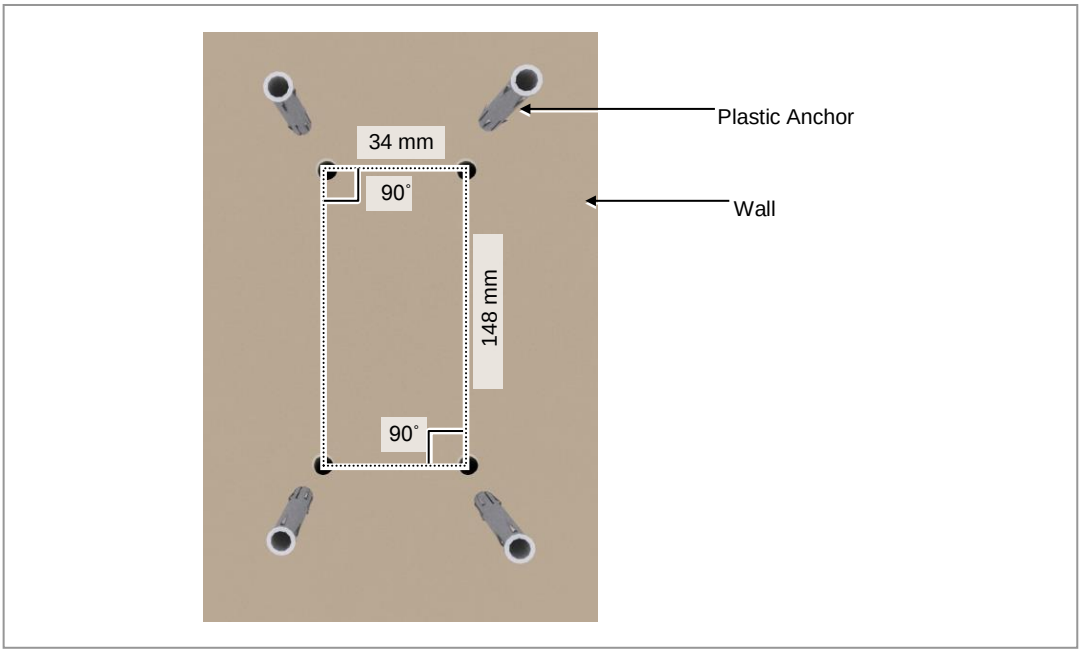


Figure 19. Mounting the Adapter (1)

3) Attach the adapter to the plastic anchors using screws.

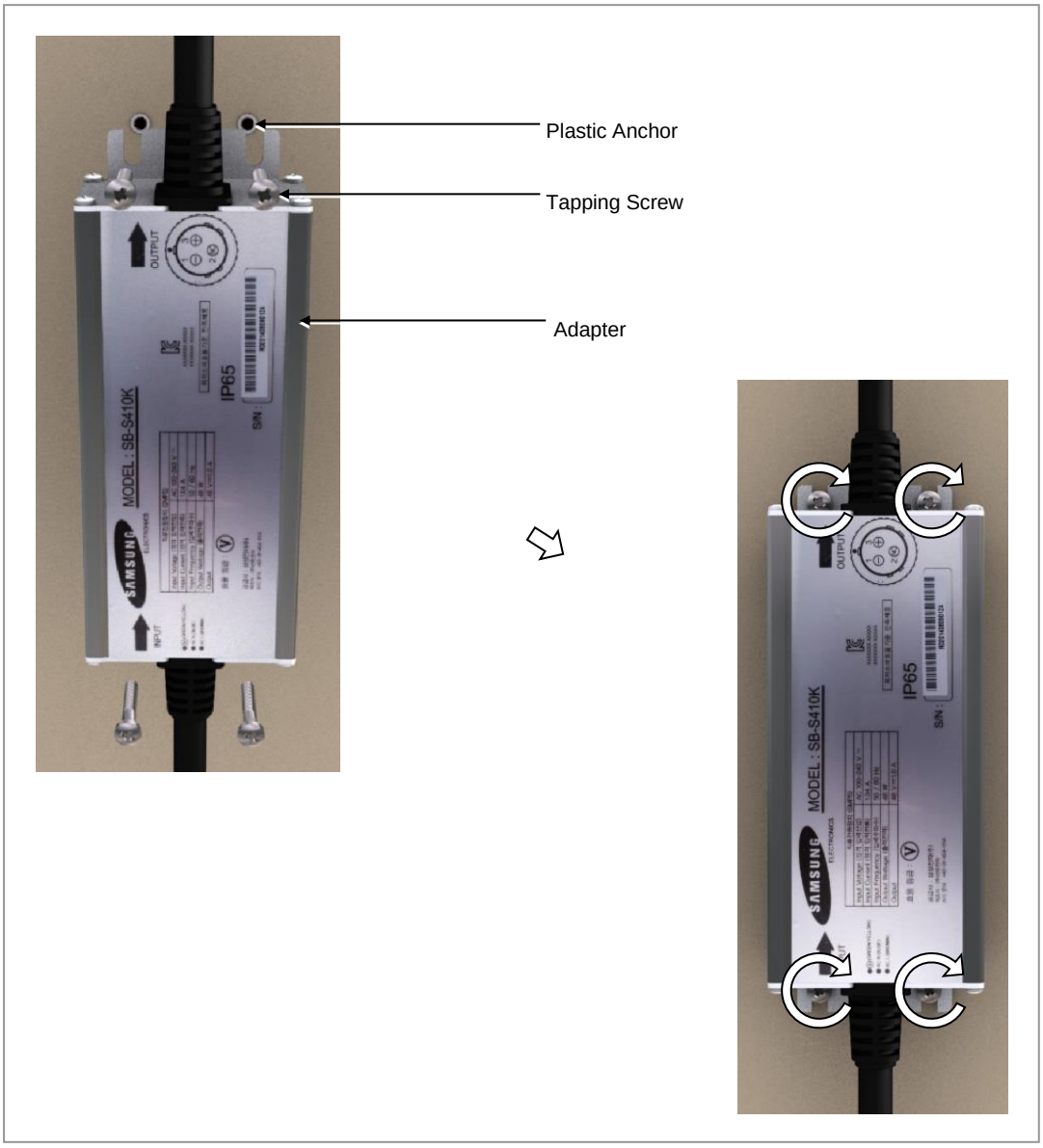


Figure 20. Mounting the Adapter (2)

NOTE

When mounting the wall-type adapter, place the adapter directly on the wall without using the adapter mount bracket.

2.4.2 Mounting to a Pole

Mounting the Outdoor AP to a Pole

1) Prepare the following components:

Table 13. Components and Tools for Mounting the Outdoor AP

Item	Description		
Components	Mount Bracket		1 EA
	Tightening Components	Metal Bands	2 EA
		M4 Torx Screws (WSP)	3 EA
Regulated Torque Value	M4 × L14 Torx Screw		9.52-14.28 kgf·cm
Required Tool	Torque Driver (T20H)		

NOTE

The metal band used for attaching the mount bracket to the pole must be made from an approved material and the screws should be stainless steel (STS 304).

If these regulations are not followed, the components can become corroded and rust.

The 2 M4 Torx Screws (WSP) should be tightened on the left and right sides of the bracket.

2) Attach the mount bracket to the pole using the metal bands.

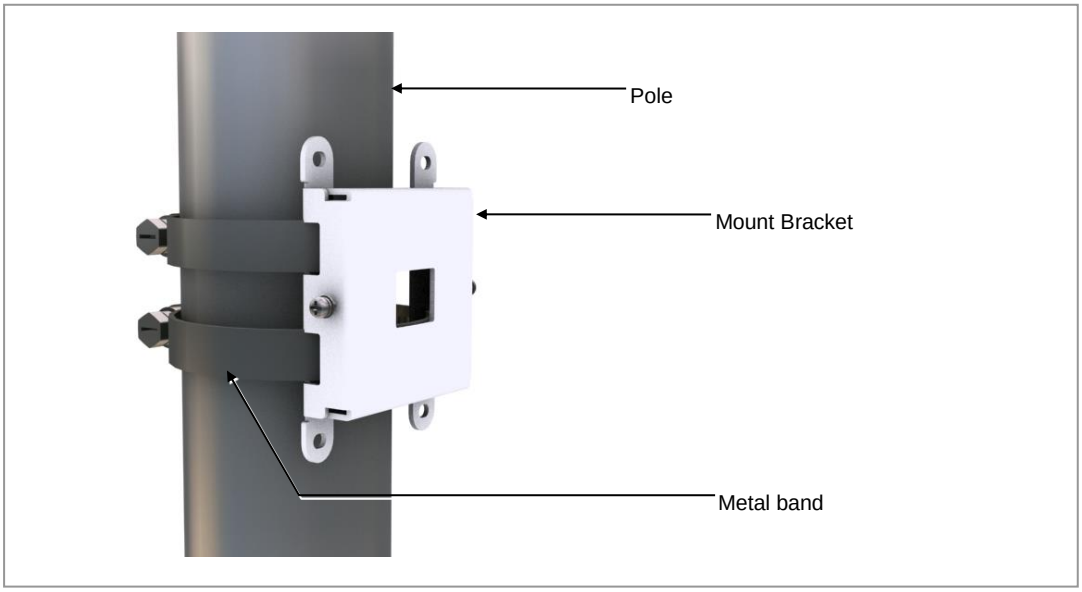


Figure 21. Mounting the Outdoor AP on a Pole (1)

3) Hang the unit bracket with the groove aligned with the screws temporarily fixed to the mount bracket.

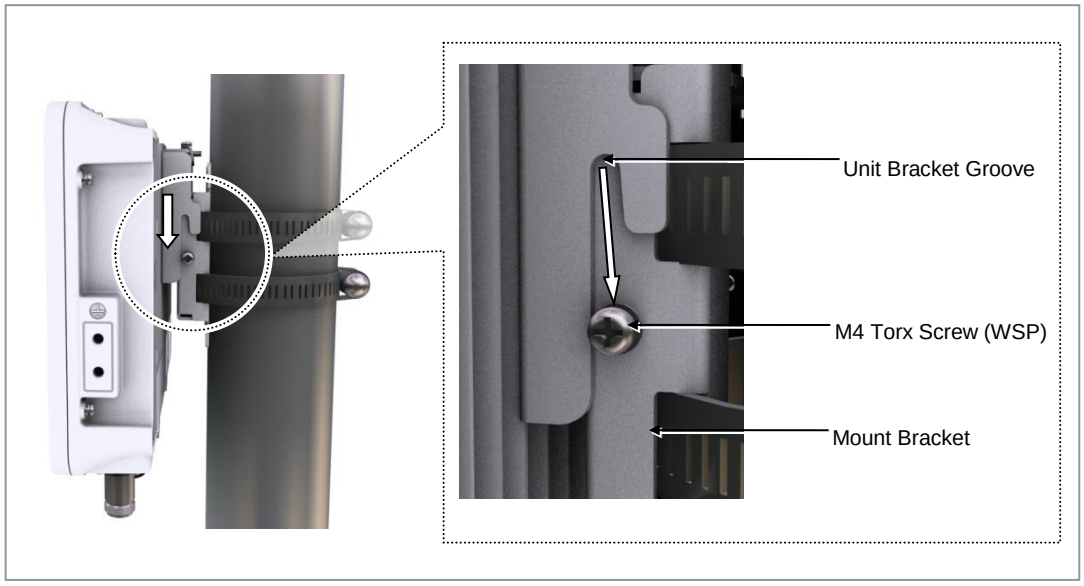


Figure 22. Mounting the Outdoor AP on a Pole (2)

4) Tighten each screw on both sides.

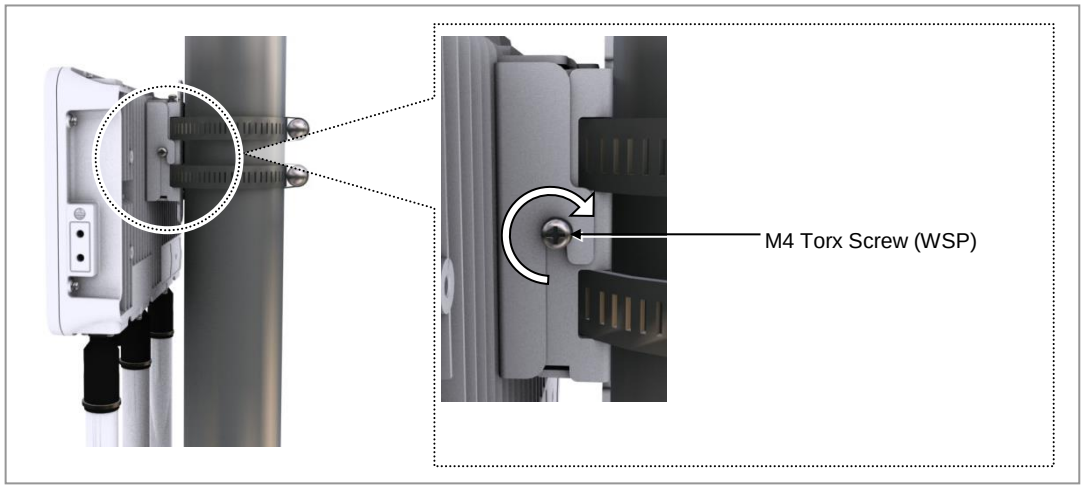


Figure 23. Mounting the Outdoor AP on a Pole (3)

5) Attach the top part using a screw.

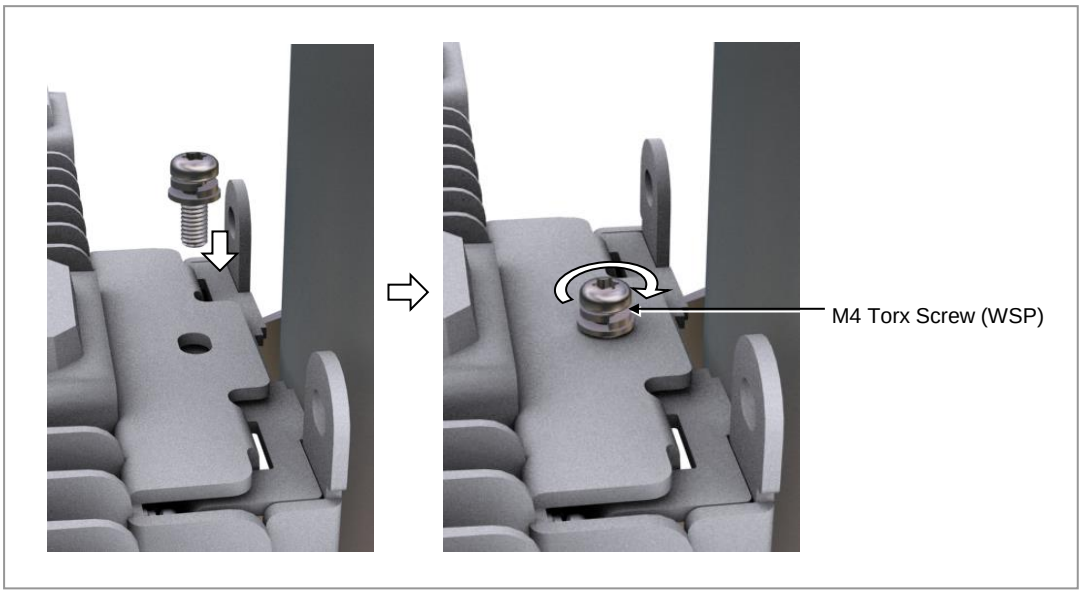


Figure 24. Mounting the Outdoor AP on a Pole (4)

Mounting the Adapter to a Pole

1) Prepare the following components:

Table 14. Materials and Tools for Mounting the Adapter to a Pole

Item	Description	
Components	Adapter Bracket	1 EA
	Metal Band	1 EA
	M4 '+' Screw(WSP)	4 EA
Regulated Torque Value	M4 Screw(WSP)	9.52-14.28 kgf·cm
Required Tool	'+' Driver	

NOTE

The tightening components that are used for mounting the adapter to a pole must be stainless steel (STS 304).
If this is not followed, the components can become corroded and rust.

2) Align the adapter screw holes with the Adapter bracket holes and secure the adapter using the 4 screw (WSP).

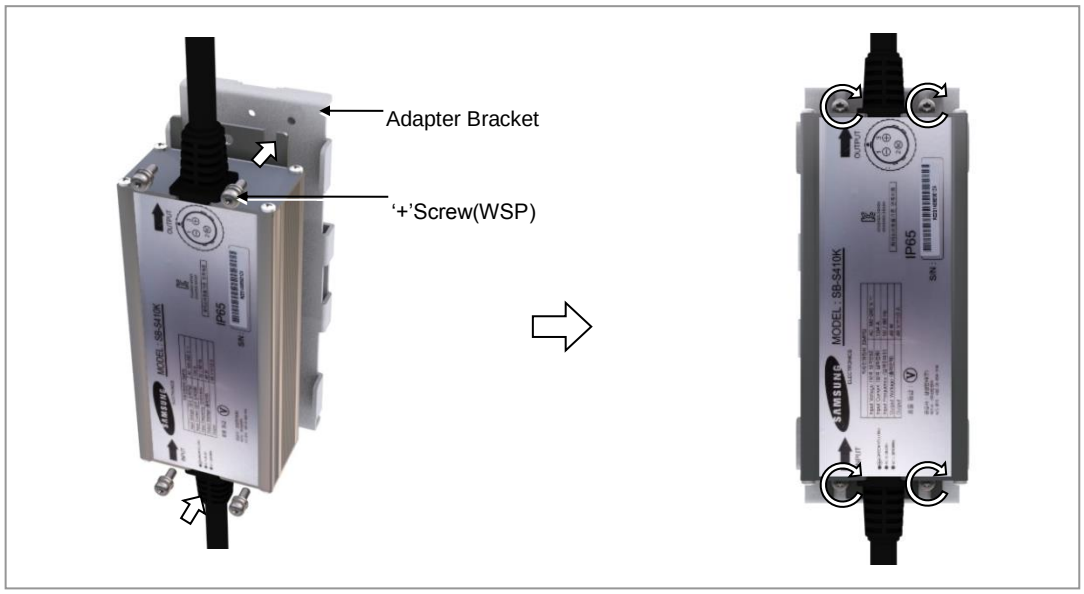


Figure 25. Mounting the Adapter on a Pole (1)

3) Secure the adapter mount bracket to the pole using the metal band.

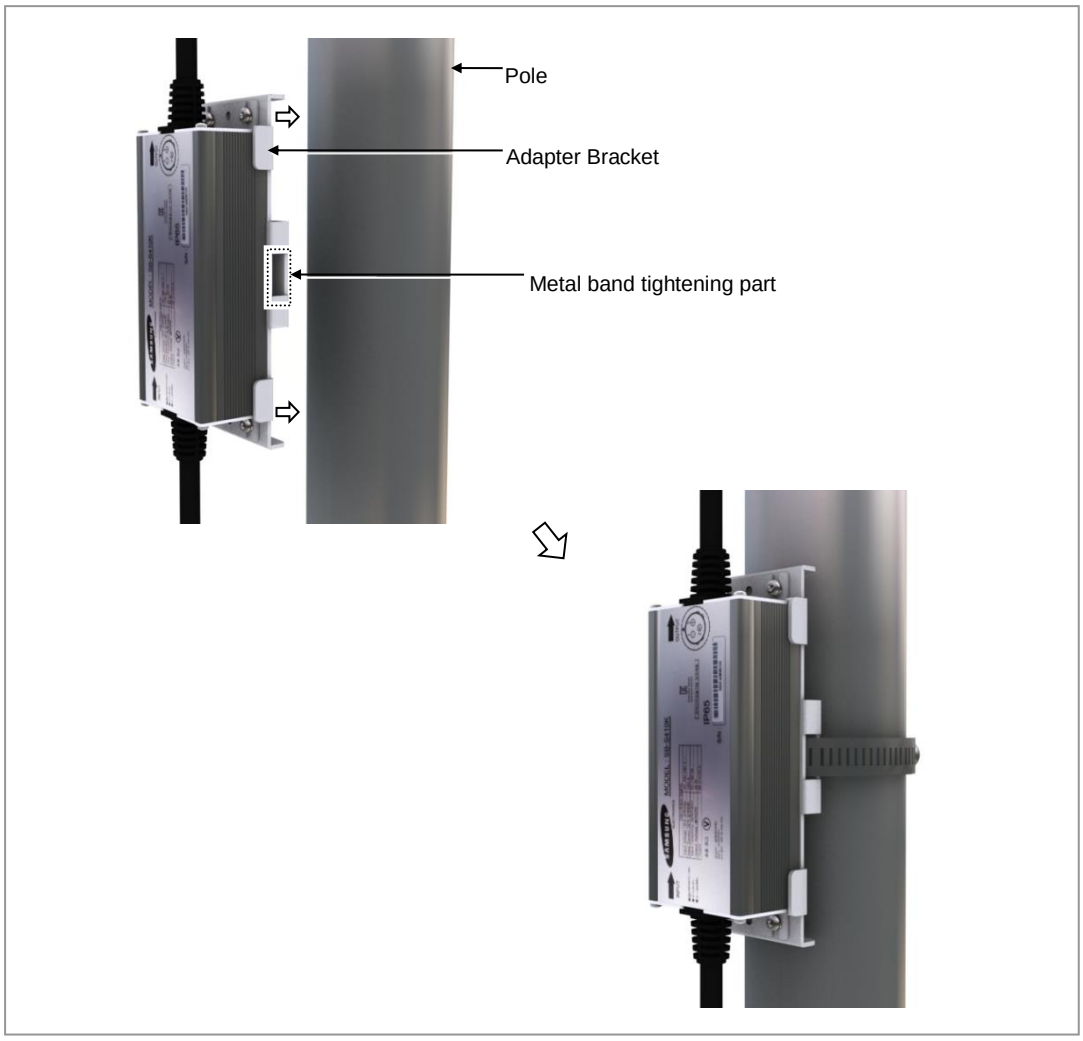


Figure 26. Mounting the Adapter on a Pole (2)

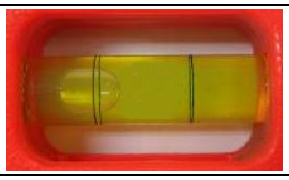
2.5 Leveling the System

Leveling is an adjustment procedure to correct the leveling difference and to maintain the horizontal and vertical accuracy of the device.
There are several methods for leveling, such as using a vinyl hose, weights, or a spirit level. This manual covers the general methods for using a spirit level.

Using a Spirit Level

The procedure for using a spirit level are as follows:

Table 15. Using a Spirit Level

Item	Description	
Inspection Method	Place the spirit level against the top and the sides of the system to check the location of the bubble.	
Criterion	**Level**	**Not Level**
		
	If the system is level, the bubble is located in the middle of the indicator lines.	
Not Level	Adjust the height by using Bakelite or other materials on the bottom of the system or some other kind of equipment. If there is a modulator in the system, adjust the height of it.	

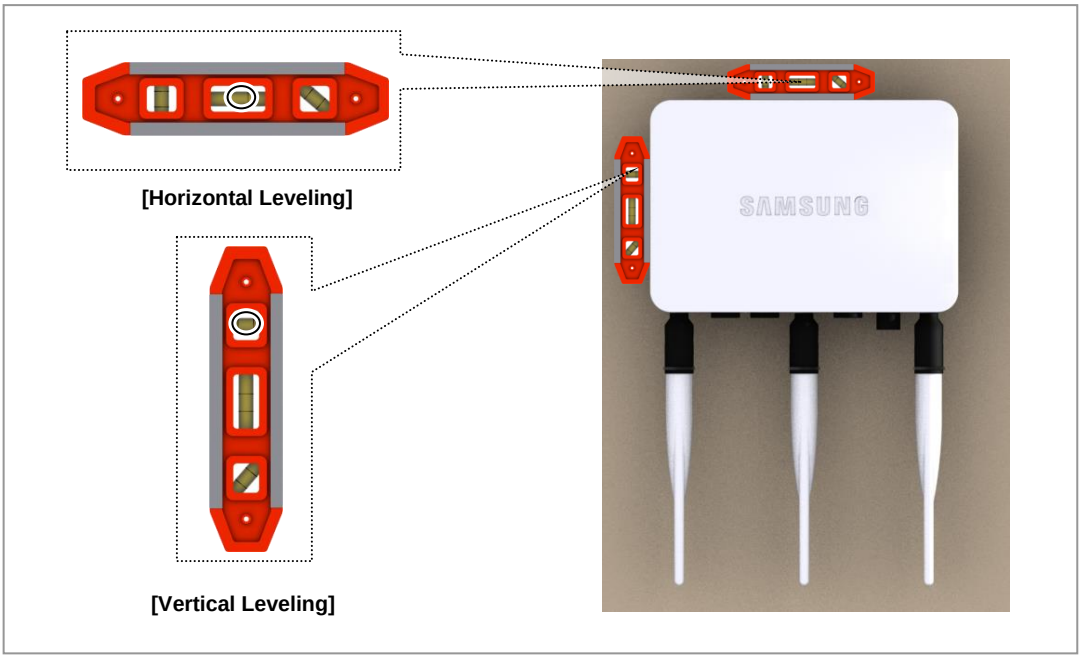


Figure 27. Using a Spirit Level on a Wall Mount (1)

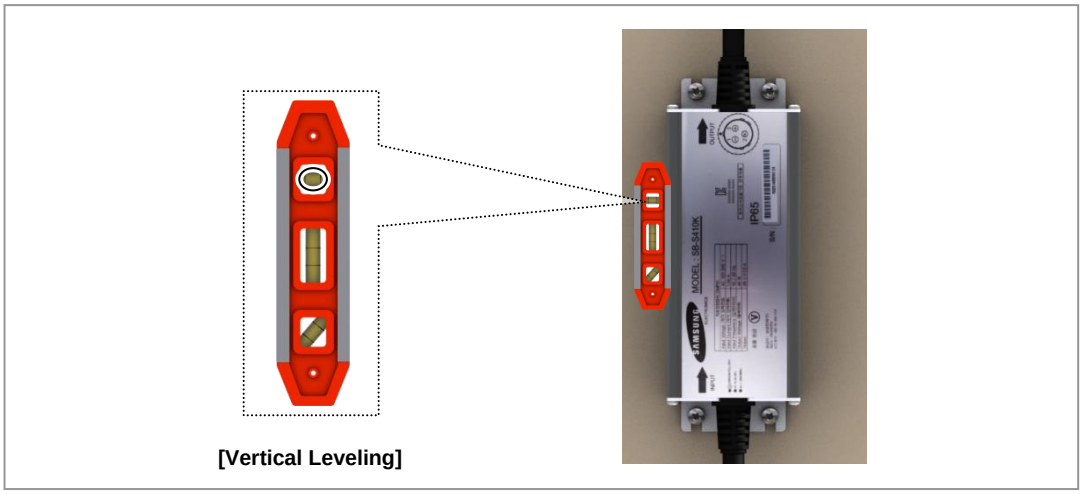


Figure 28. Using a Spirit Level on a Wall Mount (2)

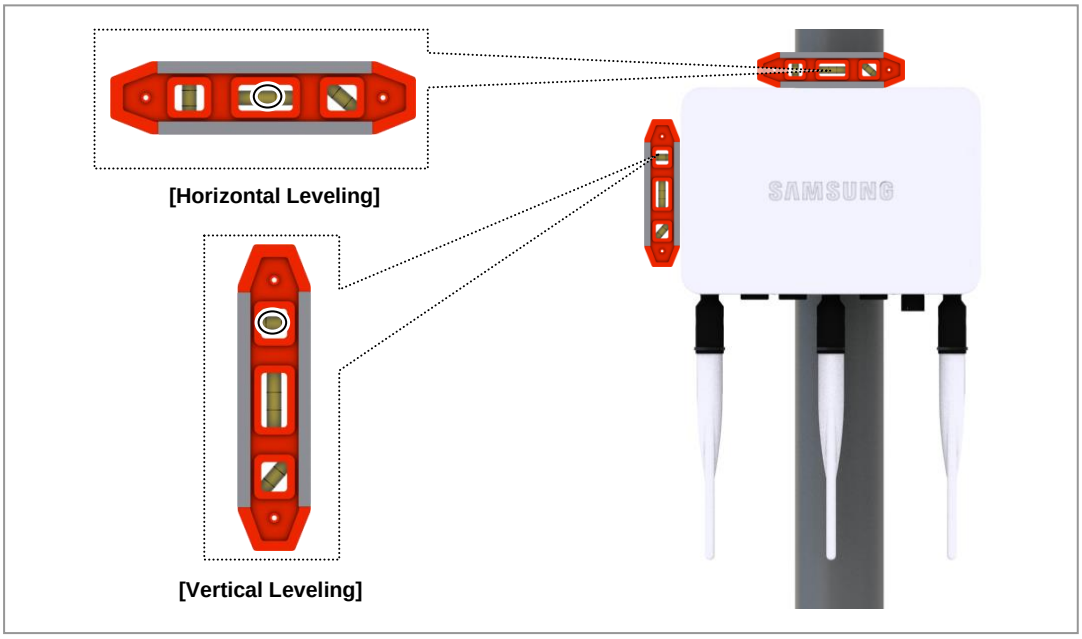


Figure 29. Using a Spirit Level on a Pole Mount (1)

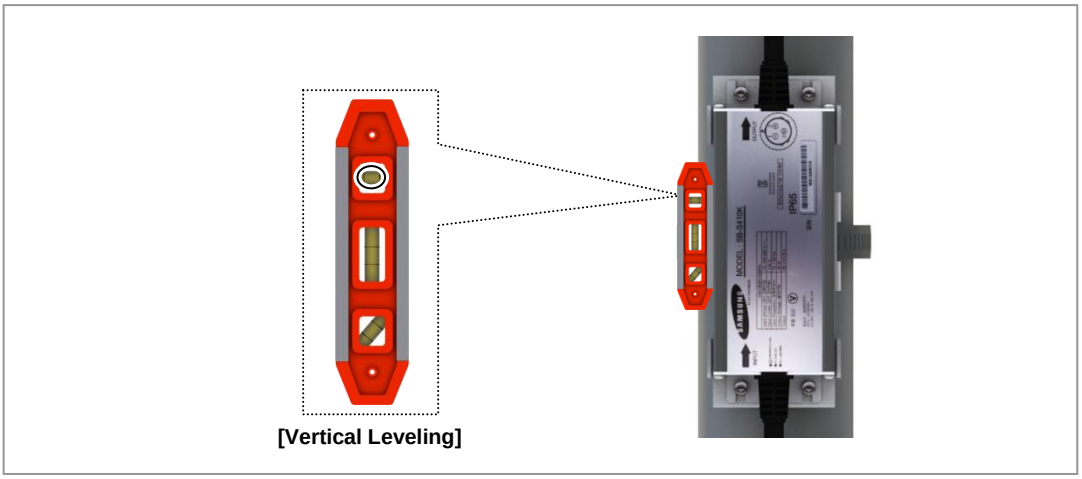


Figure 30. Using a Spirit Level on a Pole Mount (2)

CHAPTER 3. Cables Connect

3.1 Connecting the Cables

The procedure for connecting the cables to the system is as follows:

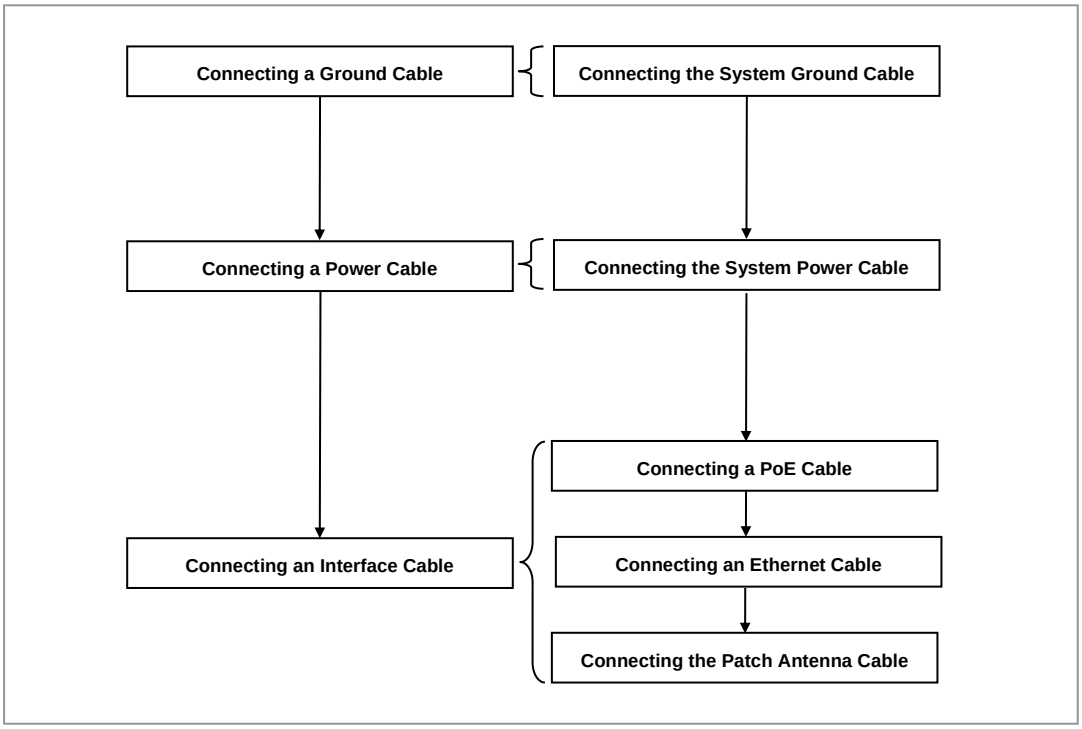


Figure 31. Connecting the System Cables

Instructions for Connecting the Cables

The procedure for connecting the cables is as follows:

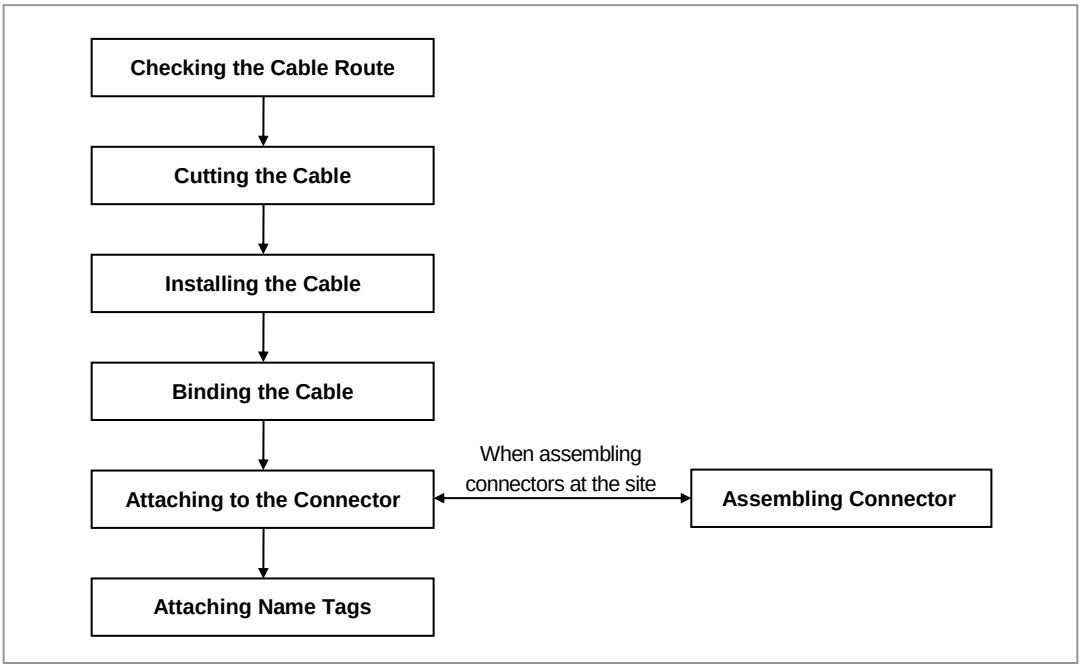


Figure 32. Procedure for Connecting the Cables

CAUTION

The system must not be connected with connectors when installing cables after cutting. When the system is connected with connectors while installing cables, it can cause damaged connectors or bad connections through tension or operator mishandling.

NOTE

The sequence for cutting the cables and installing the cables can be changed depending on the site situation, such as cutting after installing or installing after cutting.

Checking the Cable Route

When installing a cable between the Outdoor AP and other devices, such as the AC distribution box, MGB (main ground bar), or a switch (or router), you must check the cable route, length, and cable installation method.

Consider the following steps while checking the cable route:

- Select a minimum cable length within a range that does not affect cable installation or maintenance.
- The cable must be installed in a location where it will not be damaged by external factors, such as power lines, flooding, footpaths, etc.

- In areas where the cable may be damaged by external factors, investigate what materials can be used to protect the cable, such as a cable tray, ducts, flexible pipes, etc.

Cutting the Cable

Measure the exact length of the cable you require by carefully checking the route and then cut the cable using a cutting tool.

Consider the followings when cutting the cable:

- Cut the cable to the length measured in the previous cable route step.
- Use a cable cutting tool.
- Cut the cable at a right angle.
- Be careful to keep the cable away from moisture, iron, lead, dust, or any other foreign substance when cutting it.
- If the cable is in contact with foreign substances, clean it using a solvent or brush.

Installing the Cable

Installing the cable involves arranging the cable along the cable route to the target connector of the system, or to an auxiliary device, after checking the previous cable route and cutting steps have been completed.

Consider the following when installing the cable:

- Be careful not to damage the cable.
- If the cable is damaged, cut out the damaged section before installation.
- When overlaying other cables with the installed ones, make sure the cables are not flipped over. Pay close attention to the parts where a horizontal line changes to a vertical line in order to prevent any cables flipping.
- Apply as great a bend radius as possible within the specified minimum bend radius.
- If the cable needs to be protected, use a PVC channel, spiral sleeve, flexible pipe, or cable rack when installing the cable.
- Keep DC power cables and data transmission cables away from AC power cables to prevent electromagnetic induction.

Table 16. Minimum Cable Bend Radius Allowed

No.	Type	Minimum Allowed Bend Radius	Description
1	F-GV/F-CV/FR-8	8 times the external diameter of the cable	0.6/1 KV Cable
2	UTP/FTP/S-FTP cable	4 times the external diameter of the cable	PVC/LSZH, 4 Pair

No.	Type	Minimum Allowed Bend Radius	Description
3	RG-306D	15 mm	-

* If an allowable cable bend radius is specified by the manufacturer, then comply with that specified bend radius.

Binding the Cable

Binding the cable means securing and arranging the installed cables using binding thread, cable ties, binding wire, ram clamps, etc.

Consider the following when binding the cable:

- Be careful not to damage the cable while binding it.
- Select the appropriate material to use for binding the cables according to the cable's environment (indoor/outdoor) and usage (power, optical, or feeder line).
- When the cut section of the binding material, such as a cable tie or binding wire, is exposed, it may damage the cable or cause injury. Make sure that these sections are not exposed.
- When using a binding thread, cut 50 mm away from the knot to ensure that it does not become untied if cut too short.
- When a bad connection may occur due to tension in the connector's interlinked area, bind the cable at the shortest point from the connector.

Connecting the Connector

Connecting to the connector involves assembling a connector to an installed cable and connecting the connector to a device.

Consider the following when connecting to a connector:

- Before assembling the connector, make sure you are fully aware of how to assemble a connector and proceed with the assembly by matching up the pin map.
- There is a hitch on each connector to hold the core position.
- Check the groove of the connector and connect it.
- The connecting part of the connector on the outdoor feeder line must be wrapped in a jelly-type heat shrink tube, butyl rubber tape, or insulation tape to prevent water leakage or rust in the exposed area.
- Keep the cables straight where the connectors are linked.
- Prevent a bad connection from occurring as a result of tension in the connection area.

Attaching Name Tags

Attaching a name tag is a marking method to distinguish the purpose and cable route of installed cables by using marker cable ties, name plates, or labels on both end points of the cables and connections.

NOTE

A marker cable tie is a type of cable tie label. The design and size may vary by type and manufacturer.

Consider the following when attaching name tags:

- Use engraved or coated labels for the outdoor cables to prevent fading.
- The type and method of attaching the tag may vary by business to business, so discuss the appropriate method with the business owner before labeling.

NOTE

Keep all of the cables from getting crossed or tangled and consider a possible extension when installing. Also, keep the DC power or data transmitting cable away from the AC power cable to avoid any electromagnetic induction.

Operators must have full knowledge of connecting cables, such as installing/ binding cables, before working on the cables.

3.2 Cable Configuration

Cables that are connected to the Outdoor AP are as follows:

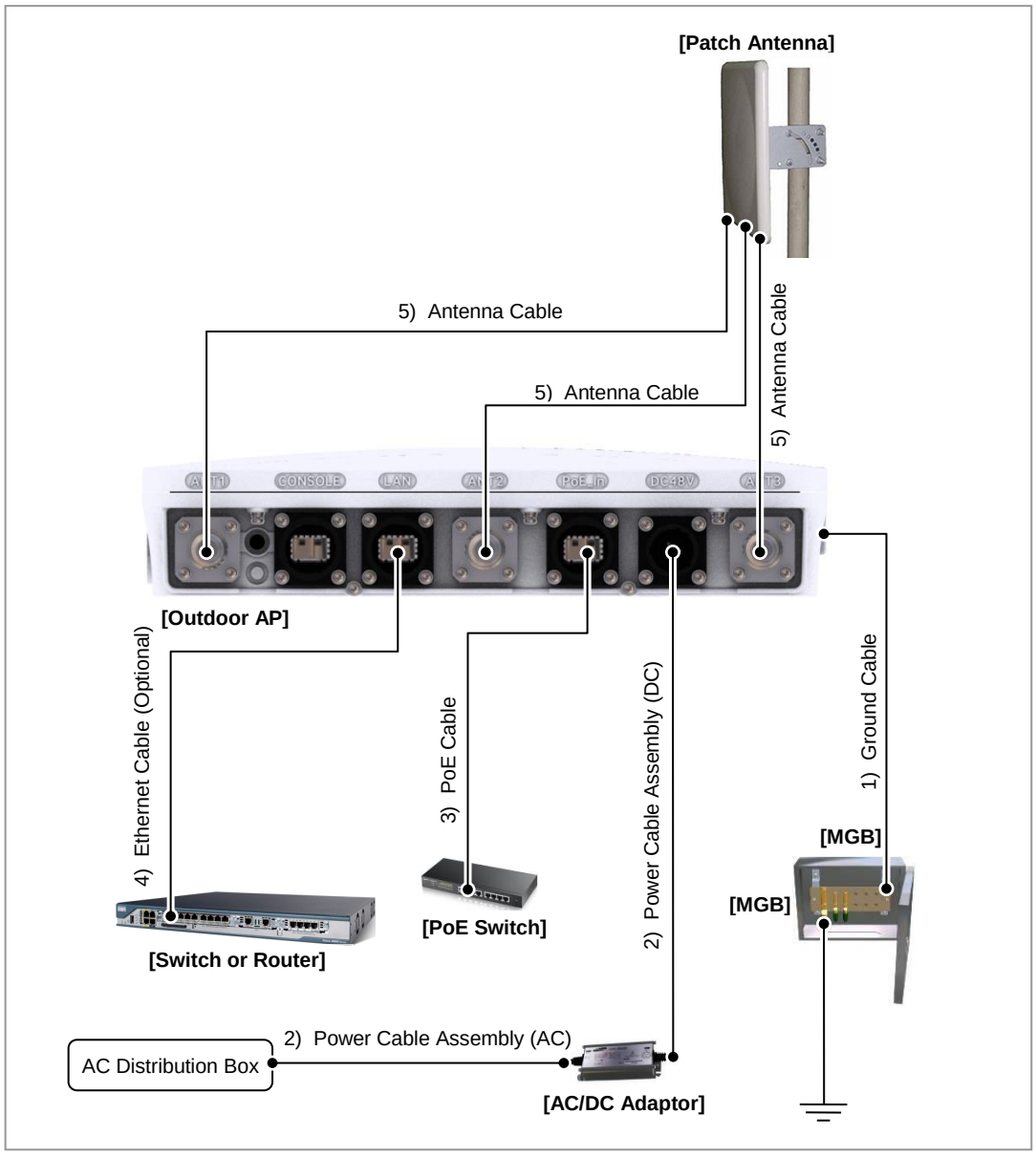


Figure 33. Outdoor AP Connection Cables

Table 17. Outdoor AP Connection Cables

From	To	Cable
MGB	Outdoor AP	1) Ground Cable : AWG10, F-GV 4 mm^2 × 1C
AC/DC Adaptor	AC Distribution Box	2) Power Cable Assembly (DC) : AC Power Cable Assembly
Outdoor AP	AC/DC Adaptor	2) Power Cable Assembly (AC) : DC Power Cable Assembly
	PoE Switch	3) PoE Cable : S-FTP Cat.6, 4 Pair, ø8.1~ ø8.5
	Switch or Router	4) Ethernet Cable : S-FTP Cat.6, 4 Pair, ø8.1~ ø8.5
	Patch Antenna	5) Antenna Cable : Antenna Cable Assembly

3.3 Connecting a Ground Cable

Grounding involves not only stabilizing the complicated electrical and electronic systems, such as power, transmission and control systems by protecting them from lightning, excessive electricity or voltage inflow, and electric noise, but also protecting from accidental electric shocks.
The grounding system prevents an electrical charge between the ground and the installation unit by connecting all equipment to the ground in order to keep the electric potential close to 0, which is the grounded electrical level.

When connecting the system, connecting the cable, or maintaining the system without the ground cable connected, the system can be damaged due to static electricity and short circuit, which may result in an electric shock to the operator.

The purpose of grounding is as follows:

- To protect human lives and electrical systems from lightning, excessive electricity surges, or high voltage.
- To provide a discharge path for a surge caused by lightning or electricity.
- To protect the system from static electricity.
- To remove or reduce the potential for a high-frequency electrical overload inside the system or the unit.
- To provide a conductor for the high-frequency electrical output to be equilibrated and stabilized.
- To stabilize the electric current from the grounding circuit.

Connecting a Ground Cable to the Outdoor AP

1) Prepare the following components:

Table 18. Components and Tools Required for Connecting the Ground Cable to the Outdoor AP

Item	Description	
Installation Section	MGB-Outdoor AP Ground Terminal	
Cable	AWG10, F-GV 4 mm^2 × 1C	
Heat Shrink Tube (Spec/Color/Length)	Φ 10 mm/Green/50 mm	
Pressure Terminal	MGB	Check the MGB standards for the field and have the pressure terminal ready.
	Outdoor AP	4 mm^2, 2 holes, hole diameter: 6.4 mm, hole distance: 16 mm

Item	Description	
Fastening Components	MGB	Check the MGB standards for the field and have the fasteners ready.
	Outdoor AP	M6 × 12L SEMS/2 EA (tightened to the system)
Regulated Torque Value	M6 SEMS	33.28~49.92 kgf·cm
Required Tools	Cable Cutter, Wire Stripper, Crimper, Heating Gun, Torque Driver (+), Torque Wrench, and Nipper	

2) Install a ground cable from the MGB to the ground terminal of the Outdoor AP.

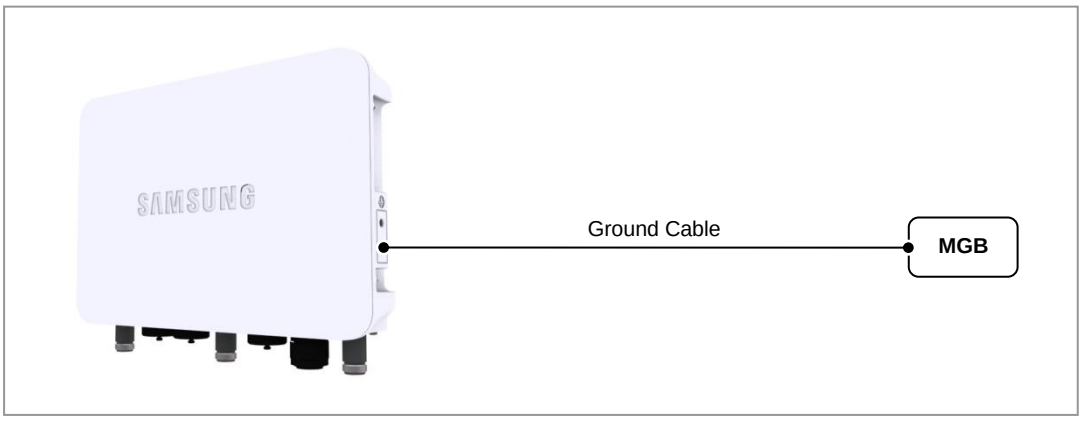


Figure 34. Connecting a Ground Cable to the Outdoor AP (1)

3) After assembling a pressure terminal with a heat shrink tube, secure it firmly into the ground terminal of the system using the M6 SEMS.

NOTE

Fastening components, such as the pressure terminal or cables, must meet the UL or equivalent standards requirements.

Ex) Manufacturer: Panduit
Outdoor AP: 4 mm^2 Pressure Terminal (LCD10-14A-L)

For information on how to assemble the pressure terminal and the heat shrink tube, see ANNEX C.

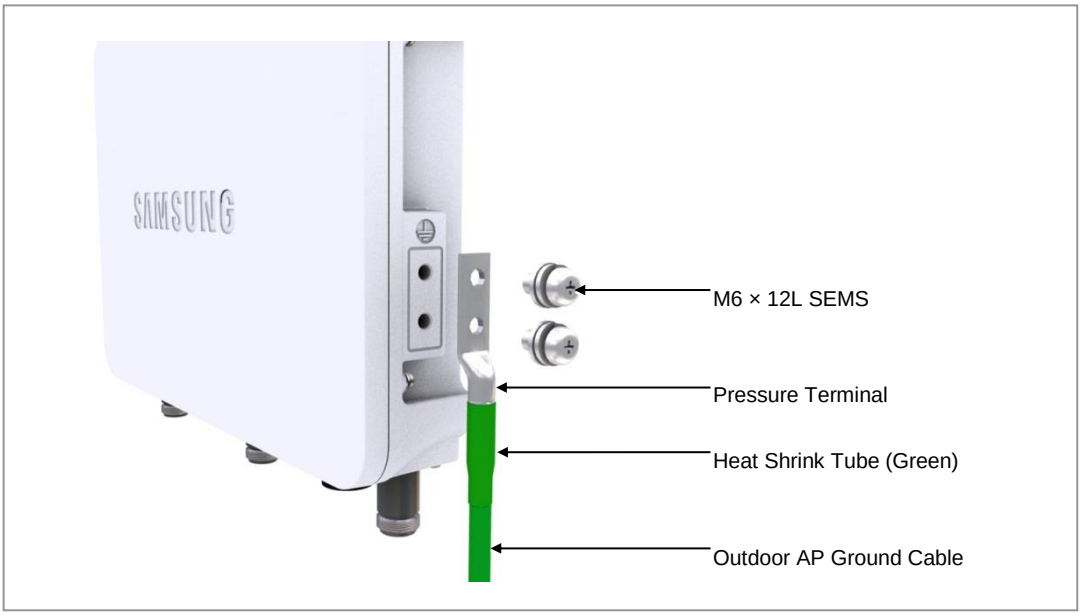


Figure 35. Connecting a Ground Cable to the Outdoor AP (2)

Connecting a Ground Cable to the Arrestor

1) Prepare the following components:

Table 19. Components and Tools for Connecting the Ground Cable to the Arrestor

Item	Description	
Installation Section	Arrestor Ground Terminal-MGB	
Cable	AWG10, F-GV 4 mm^2 × 1C	
Heat Shrink Tube (Spec/Color/Length)	Φ 10 mm/Green/50 mm	
Pressure Terminal	MGB	Check the MGB standards for the field and have the pressure terminal ready.
	Arrestor	4 mm^2, 1 hole, ring-type, hole diameter: 4.2 mm
Fastening Components	MGB	Check the MGB standards for the field and have the fasteners ready.
	Arrestor	M4 Screw/1 EA (Installed on the arrestor)
Regulated Torque Value	M4 Screw	9.52-14.28 kgf·cm
Required Tools	Cable Cutter, Wire Stripper, Crimper, Heating Gun, Torque Driver (+), Torque Wrench, and Nipper	

NOTE

It is a cascade type of connection in which three arrestors are connected to the MGB using the ground cable.

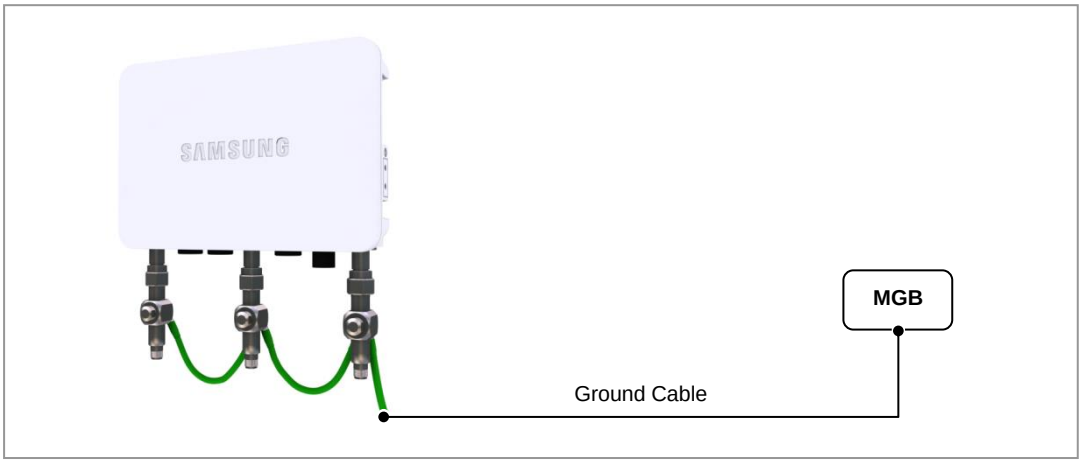


Figure 36. Connecting a Ground Cable to the Outdoor AP (3)

2) After assembling Arrestor-1 and Arrestor-2 using a pressure terminal and a heat shrink tube, secure only Arrestor-1 using the fastening components.

NOTE

Fastening components, such as the pressure terminal or cables, must meet the UL or equivalent standards requirements.

Ex) Manufacturer: Panduit
Arrestor: 4 mm^2 Pressure Terminal (S10-10R-Q)

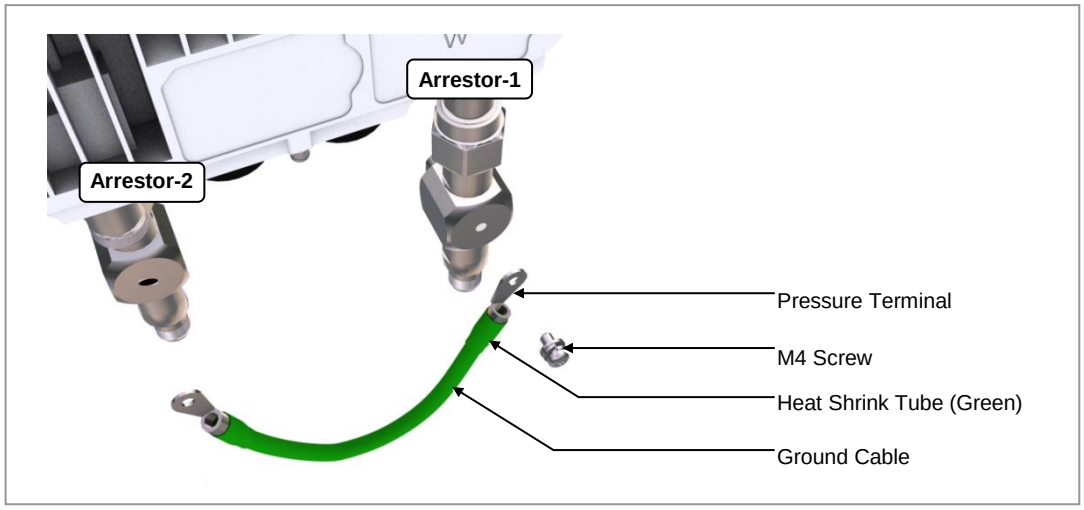


Figure 37. Connecting a Ground Cable to the Arrestor (1)

3) After assembling Arrestor-2 and Arrestor-3 using a pressure terminal and a heat shrink tube, secure only Arrestor-1 using the fastening components.

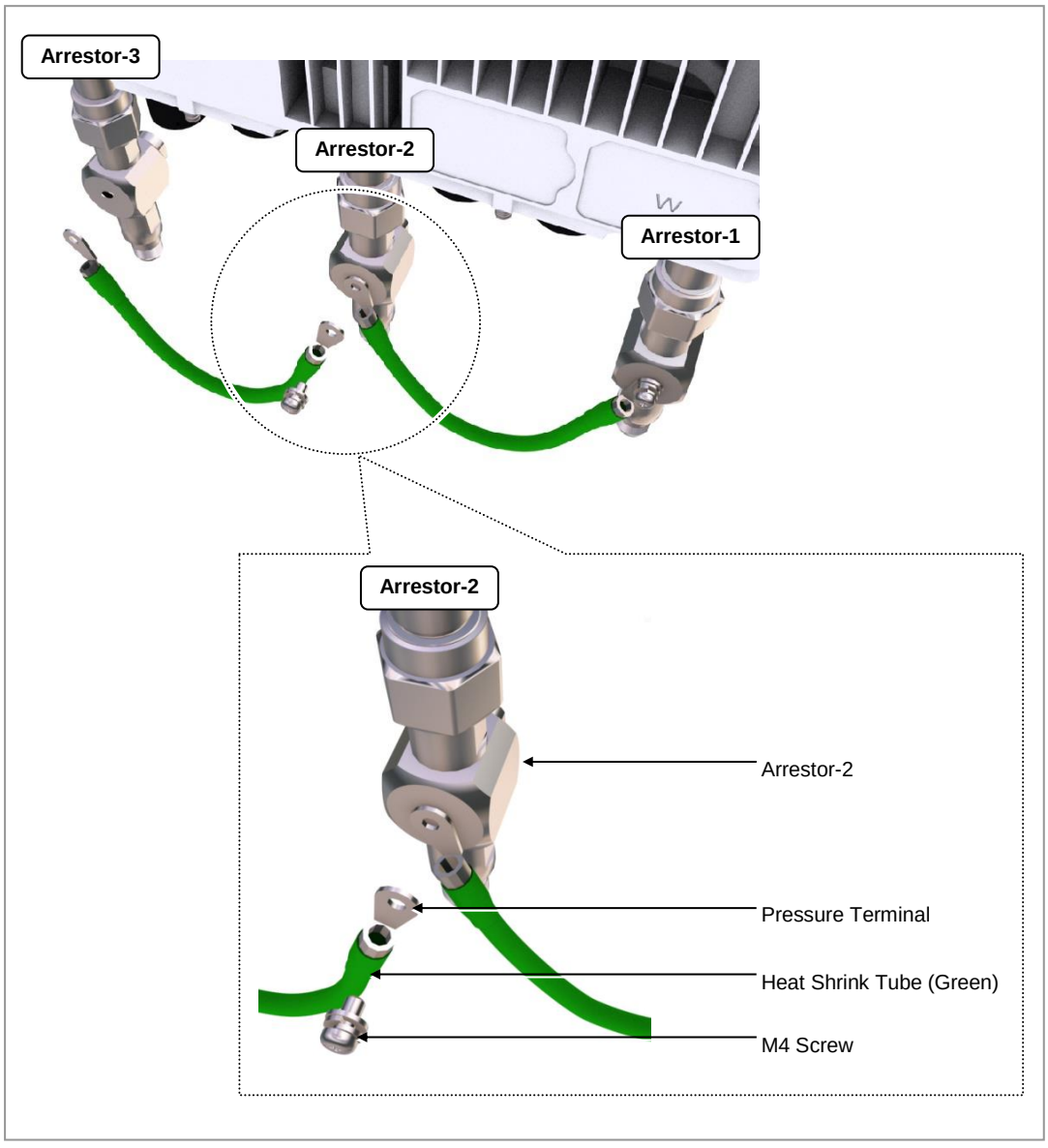


Figure 38. Connecting a Ground Cable to the Arrestor (2)

4) Assemble Arrestor-3 with a pressure terminal and a heat shrink tube, then connect it to the MGB.

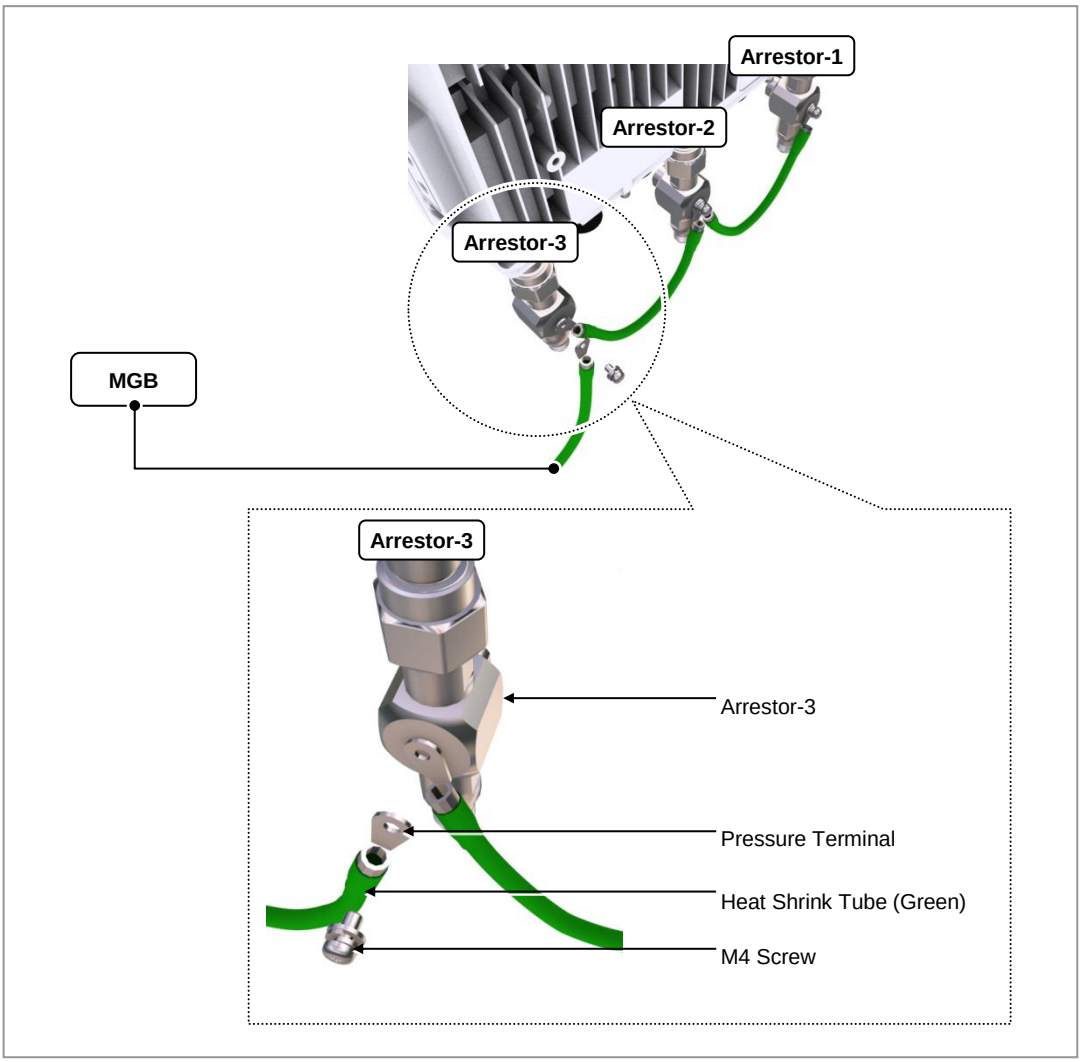


Figure 39. Connecting a Ground Cable to the Arrestor (3)

Connecting a Ground Cable to the Patch Antenna

When the patch antenna bracket is secured to the metal bracket in a way that makes the ground terminal unreachable, 1 in 4 screw holes for the bracket connection on the back of patch antenna must be connected with a ground cable.

- Screw Standard: M4 × L8 (washer included)/Regulated Torque Value: 6.0 kgf·cm

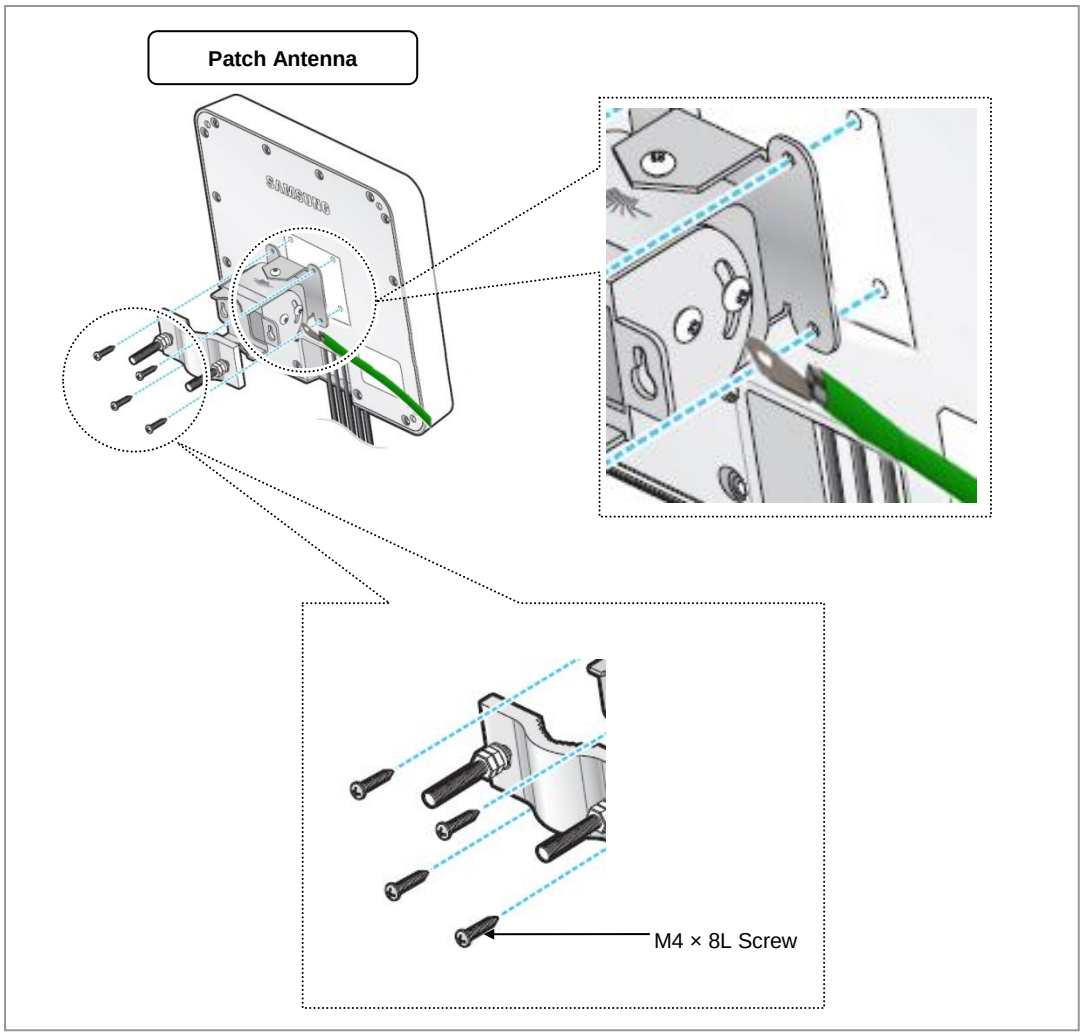


Figure 40. Connecting a Ground Cable to the Patch Antenna

3.4 Connecting a Power Cable

The power system consists of the following configuration:

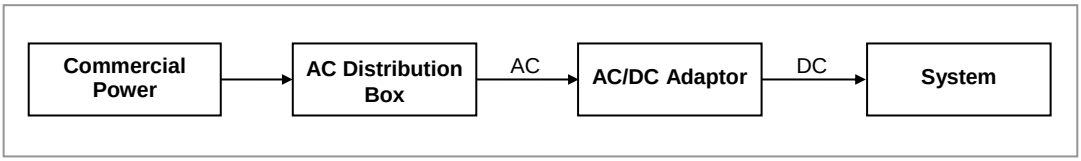


Figure 41. Power Supply Configuration

CAUTION

When handling power cables, ensure the power switch of the rectifier, and/or the system, is turned off to prevent short circuits and electrical accidents.
An electrical accident can occur if fasteners become loose. Make sure the fasteners that secure the power cable are firmly attached. Use a power cable that has a temperature limit of 90°C or higher.

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

Connecting a Power Cable

1) Prepare the following components:

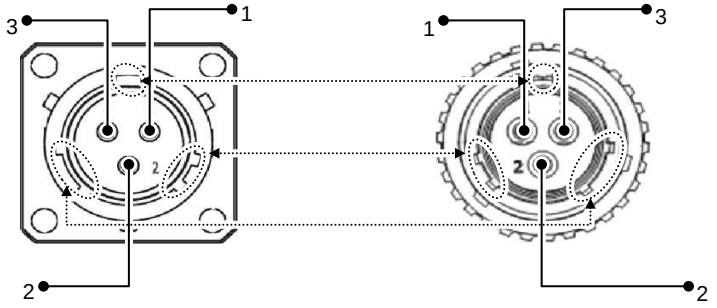
Table 20. Components and Tools for Connecting a Power Cable

Item	Description	
Installation Section	Rectifier-Outdoor AP Power Input Terminal	
Cables	AC Distribution Box-AC/DC Adaptor	Power Cable Assembly-1 (100-240VAC)
	AC/DC Adaptor-Outdoor AP Power Input Terminal	Power Cable Assembly-2 (48 VDC)
Connectors	AC Distribution Box	Check the output port standards for the field and prepare the connector.
	Outdoor AP	- System Side: DY5F1203PNFL[JONHON] - Cable Side: DY5T1203SNF[JONHON]
Required Tools	Cable Cutter, Wire Stripper, Crimper, Heating Gun, Torque Driver (+), Torque Wrench, and Nipper	

Item	Description
	

Table 21. Power Cable/Connector Pin Map

Power Connector Pin No.	Description	Color
1	GND	White
2	NC (No Connection)	Green
3	48 VDC	Black



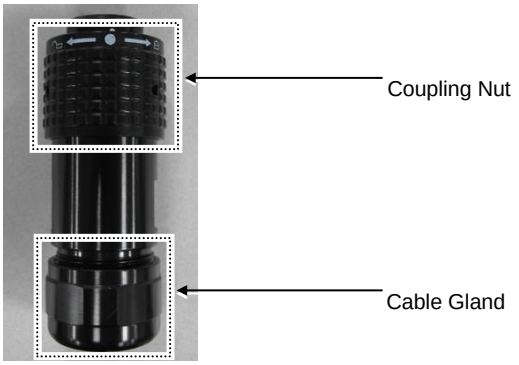
[System-Side Connector: DY5F1203PNFL-04] **[Cable-Side Connector: DY5T1203SNF]**

CAUTION

Complete the following finishing touch to keep ports for the system input/output (power or external interface) and cable connection free of any foreign substances, air, or moisture.

- Unused port or connection:
  Use a waterproof cap, rubber packing, or other finishing materials.
- Port or connection with a cable installed:
  After installing the cable, use a pressed sponge, rubber packing, or silicon to remove any gaps in the port or the connection.

When connecting power cables, turn the coupling nut on the upside of the cable connector to make the connection. Try not to grab the cable gland on the bottom of the cable connector when turning or tightening.



2) Install the DC cable from the Outdoor AP to the AC distribution box.

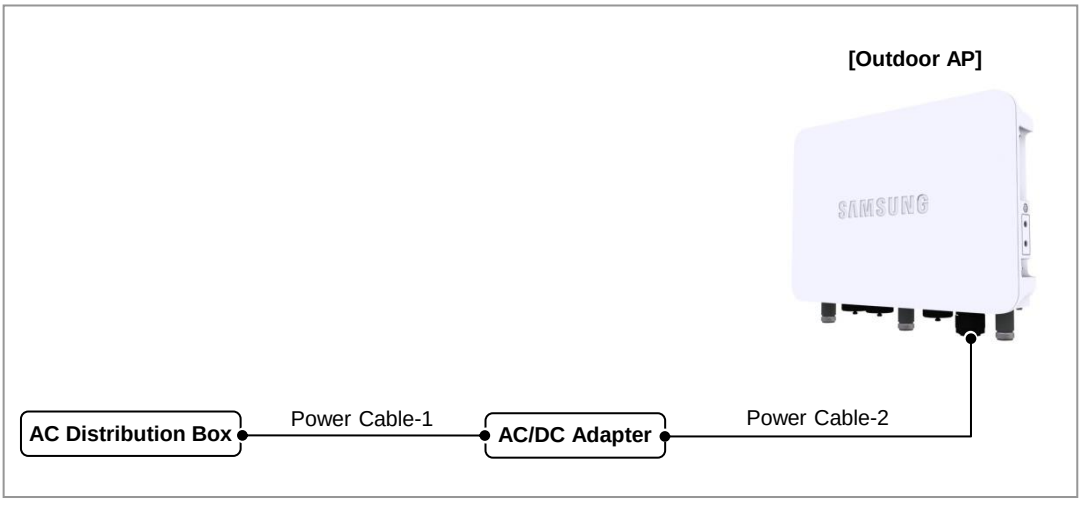


Figure 42. Connecting a Power Cable (1)

3) Look for the ⊓ mark on the connector linked to the system.

4) Align the ⊔ mark on the connector linked to the cable with the ○ mark on the coupling nut.

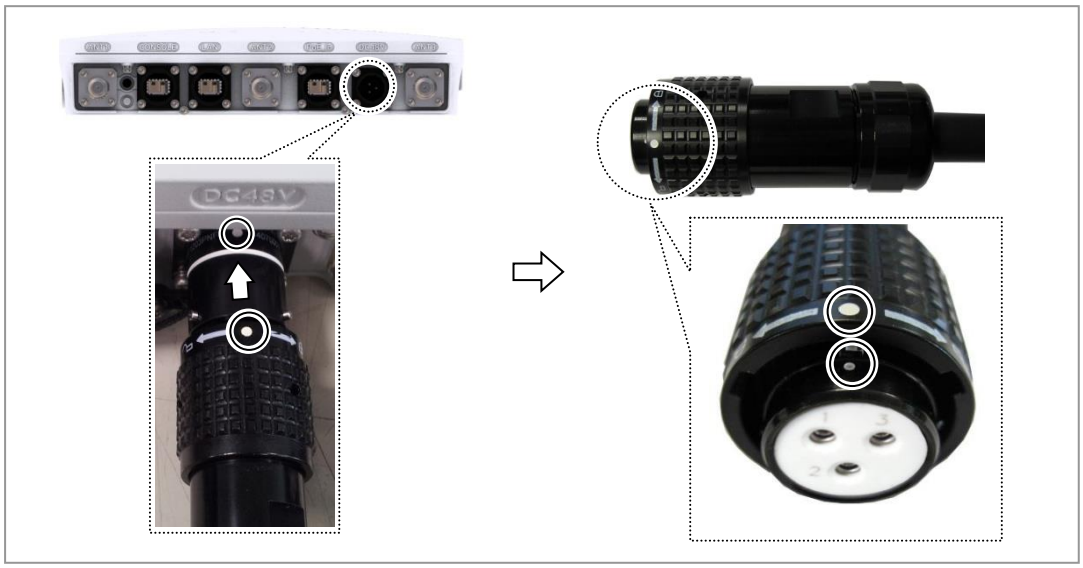


Figure 43. Connecting a Power Cable (2)

5) Align the ○ mark on the connector linked to the system with the O mark on the connector linked to the cable.

6) Keep the cable straight between the connector linked to the system and the connector linked to the cable to avoid any damage caused by twisting the connectors.

7) Take the connector body in your left hand and turn the coupling nut with your right hand in a clockwise direction until the lock clicks.

NOTE

If excessive force is applied to the coupling nut while turning it, the connector can become damaged.

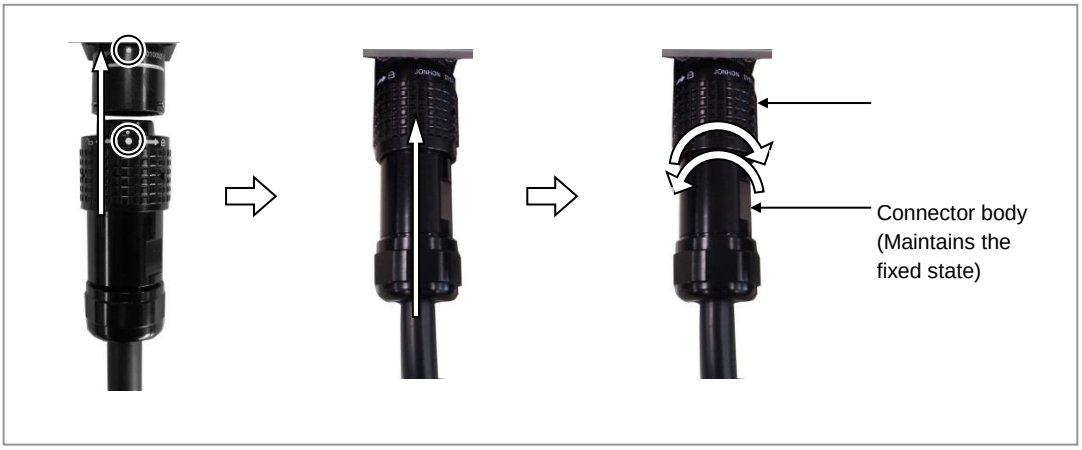
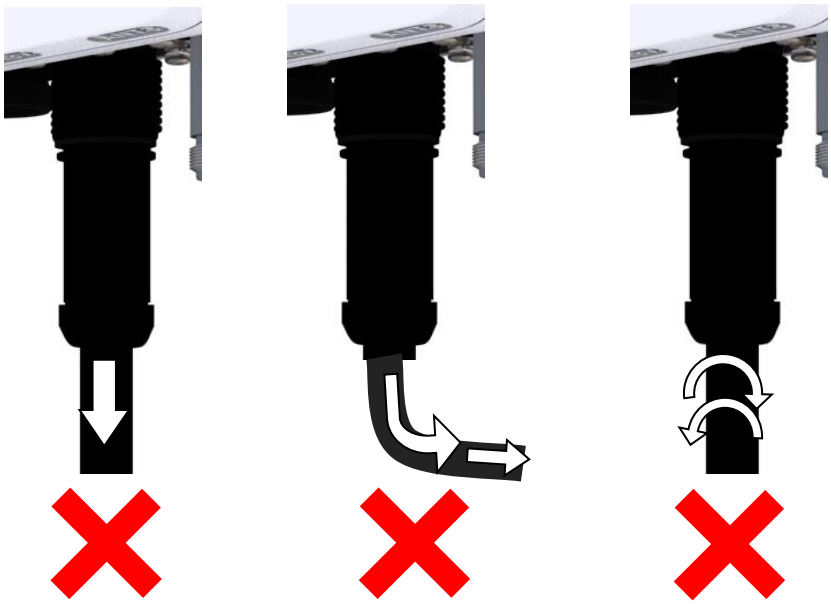


Figure 44. Connecting a Power Cable (3)

CAUTION

Do not apply excessive force to pull on the cable.
Do not bend the cable to exceed the allowed bend radius.
Do not twist the cable.



3.5 Connecting an Interface Cable

3.5.1 Connecting a PoE Cable

1) Prepare the following components:

Table 22. Components and Tools for Connecting a PoE Cable

Item	Description	
Installation Section	PoE Switch-Outdoor AP PoE Port	
Cable	Ethernet Cable Assembly (S-FTP Cat.6, 4 Pair, ø8.1~ ø8.5)	
Connectors	PoE Switch	Check the specifications of the connector for the PoE switch and have the connector ready.
	Outdoor AP	RJ45
Required Tools	LAN Tool, LAN Tester, Nipper, Scissors, Wire Stripper, and Cable Cutter	

Table 23. PoE Cable Pin Map

System Side	Color Map	Description
1	White/Orange	Gigabit Ethernet Tx/Rx0+
2	Orange	Gigabit Ethernet Tx/Rx0-+
3	White/Green	Gigabit Ethernet Tx/Rx1+
4	Blue	Gigabit Ethernet Tx/Rx2+
5	White/Blue	Gigabit Ethernet Tx/Rx2-+
6	Green	Gigabit Ethernet Tx/Rx1-+
7	White/Brown	Gigabit Ethernet Tx/Rx3+
8	Brown	Gigabit Ethernet Tx/Rx3-+
Shell	Shield	Shield

The connector pin map provided above is for one linked to the system. Confirm the pin link point for the connector that is linked to the cable before assembly.

Complete the following finishing touch to keep the ports for the system input/output (power or external interface) and cable connection free of any foreign substances, air, or moisture.

- Unused port or connection:
  Use a waterproof cap, rubber packing, or other finishing materials.
- Port or connection with a cable installed:
  After installing the cable, use a pressed sponge, rubber packing, or silicon to remove any gaps in the port or the connection.

2) Install the PoE cable from the PoE switch to the Outdoor AP PoE port.

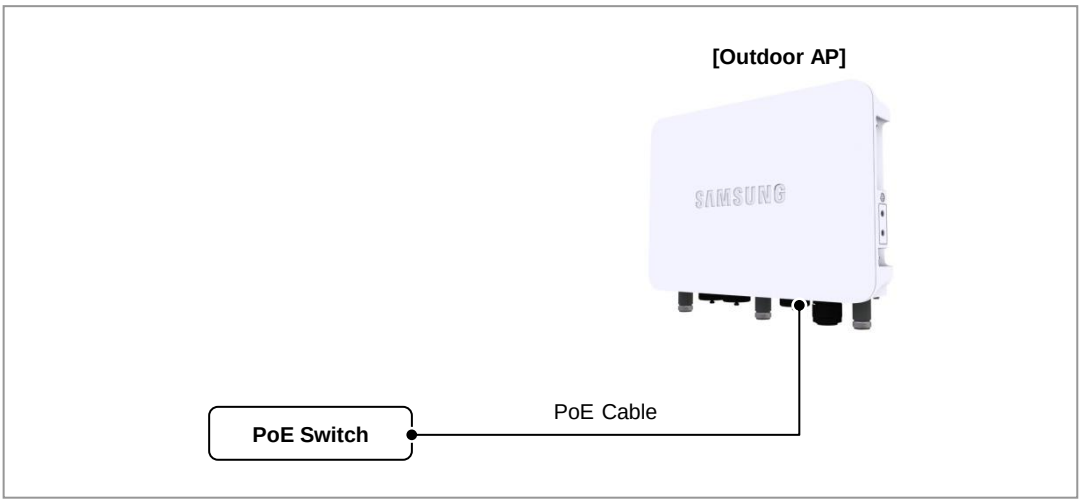


Figure 45. Connecting the PoE Cable (1)

3) Connect the RJ-45 plug linked to the PoE cable to the Outdoor AP PoE port. When connecting, make sure the latch of the RJ-45 plug faces down and listen for a clicking sound.

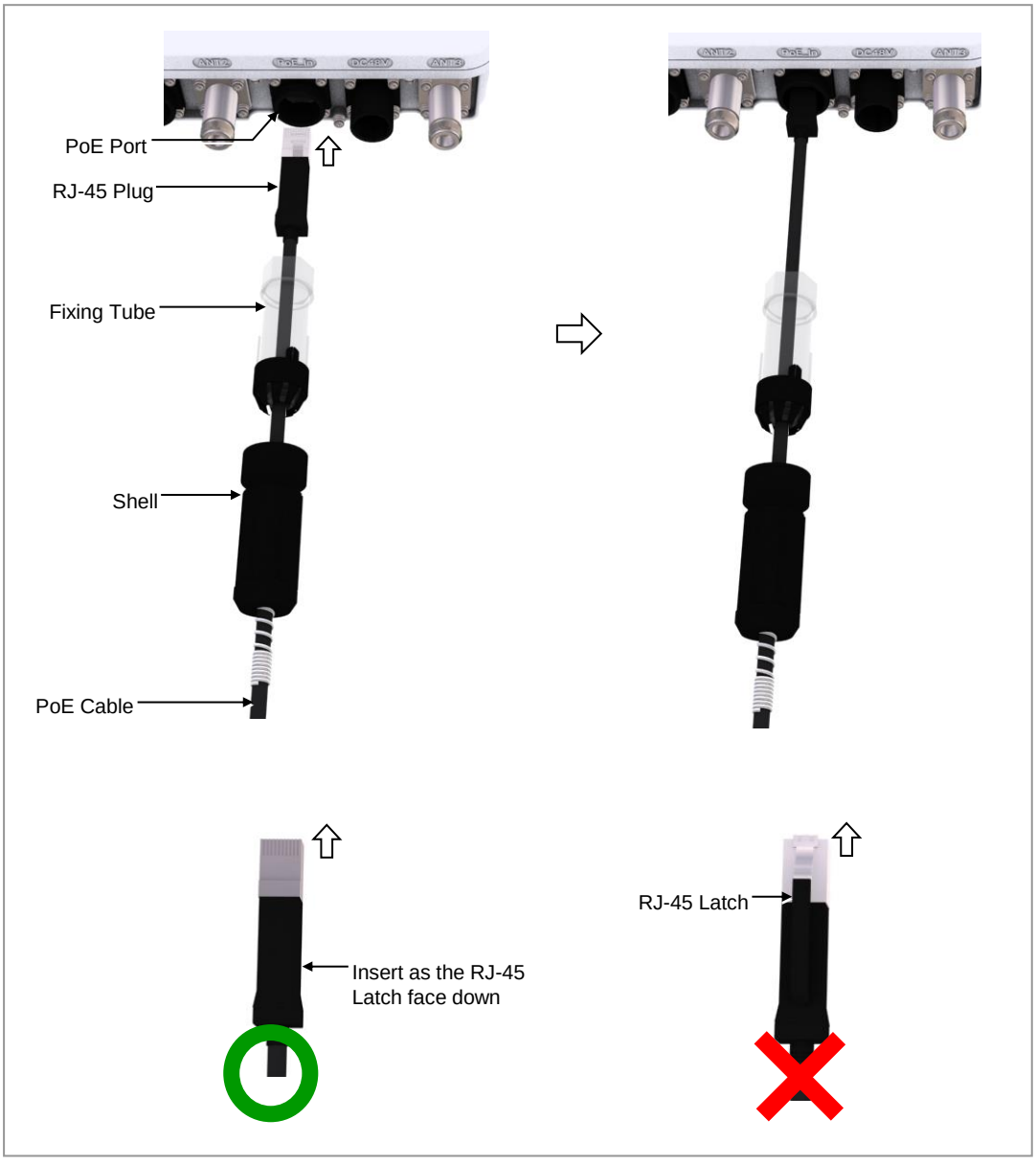


Figure 46. Connecting the PoE Cable (2)

4) Insert the fixing tube into the Outdoor AP LAN and match each groove.

5) Push the shell against the Outdoor AP PoE connector.

6) Straighten the cable and fasten the shell by turning it clockwise.

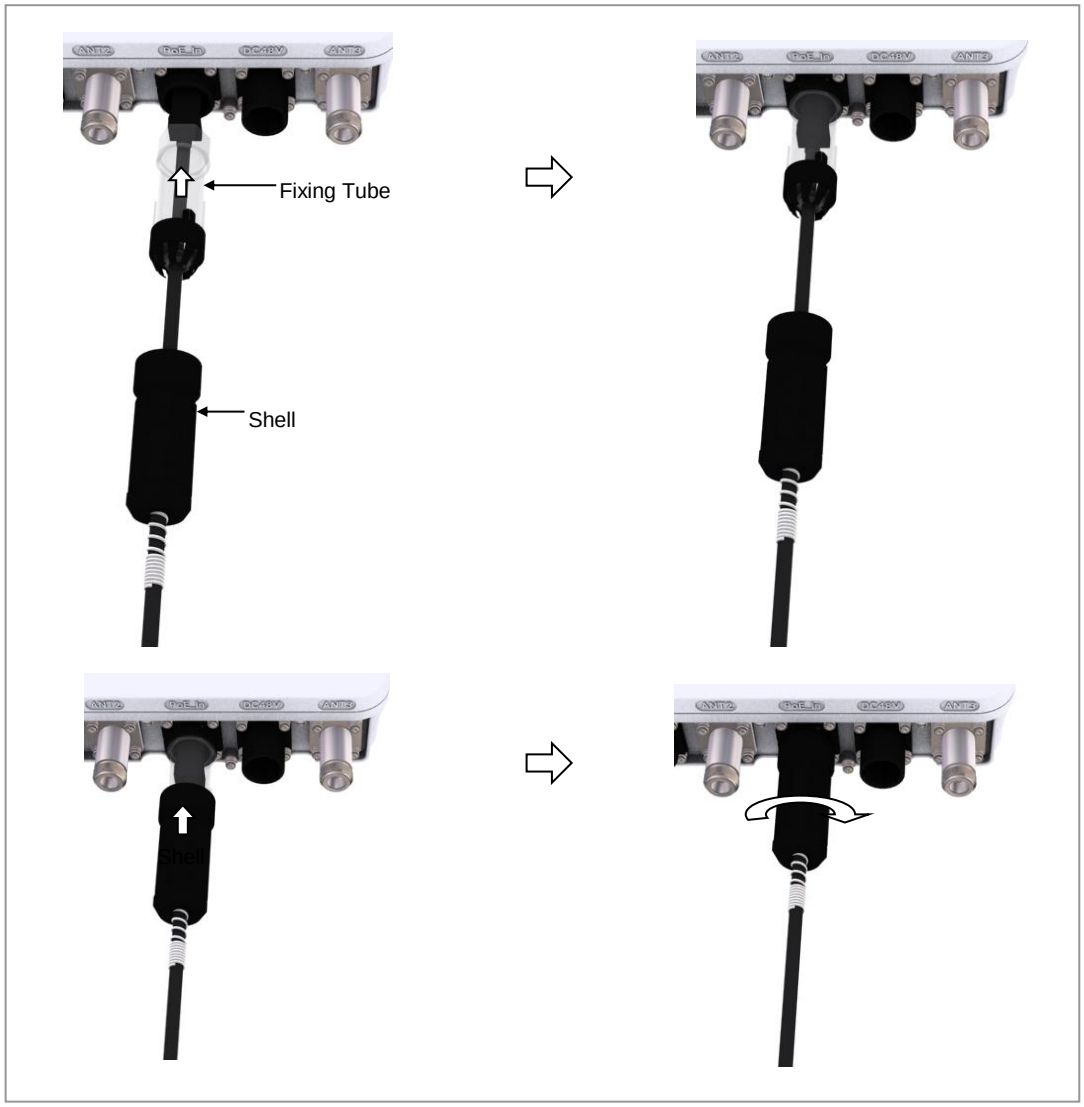


Figure 47. Connecting the PoE Cable (3)

7) Fasten it completely until the white belt on the connector can no longer be seen.

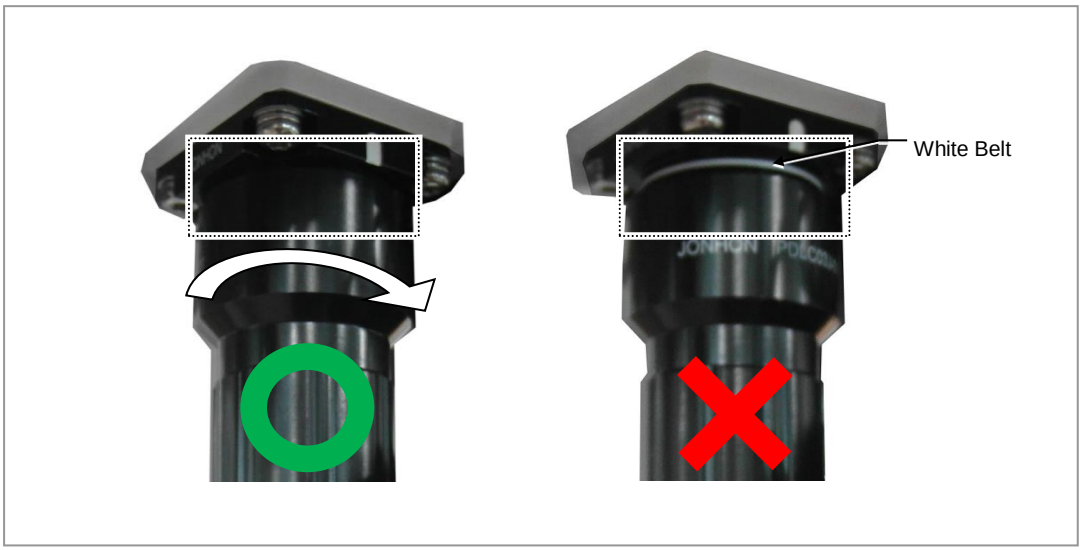


Figure 48. Connecting the PoE Cable (4)

3.5.2 Connecting a LAN Cable

1) Prepare the following components:

Table 24. Components and Tools for Connecting a LAN Cable

Item	Description	
Installation Section	Switch or Router-Outdoor AP LAN Port	
Cable	Ethernet Cable Assembly (S-FTP Cat.6, 4 Pair, ø8.1~ ø8.5)	
Connectors	Switch or Router	Check the specifications of the connector for the switch or router port and have the connector ready.
	Outdoor AP	RJ45
Required Tools	LAN Tool, LAN Tester, Nipper, Scissors, Wire Stripper, and Cable Cutter	

Table 25. LAN Cable Pin Map

System Side	Color Map	Description
1	White/Orange	Gigabit Ethernet Tx/Rx0+
2	Orange	Gigabit Ethernet Tx/Rx0-+
3	White/Green	Gigabit Ethernet Tx/Rx1+
4	Blue	Gigabit Ethernet Tx/Rx2+
5	White/Blue	Gigabit Ethernet Tx/Rx2-+
6	Green	Gigabit Ethernet Tx/Rx1-+
7	White/Brown	Gigabit Ethernet Tx/Rx3+
8	Brown	Gigabit Ethernet Tx/Rx3-+
Shell	Shield	Shield

Shell **Fixing Tube** **RJ-45 Plug**

CAUTION

The connector pin map provided above is based on the system-side connector. Confirm that the pin link point for the connector is linked to the cable before assembly.

Complete the following finishing touch to keep the ports for the system input/ output (power or external interface) and cable connection free of any foreign substances, air, or moisture.

- Unused port or connection:
  Use a waterproof cap, rubber packing, or other finishing materials.
- Port or connection with a cable installed:
  After installing the cable, use a pressed sponge, rubber packing, or silicon to remove any gaps in the port or the connection.

2) Install the LAN cable from the switch (or router) to the Outdoor AP LAN port.

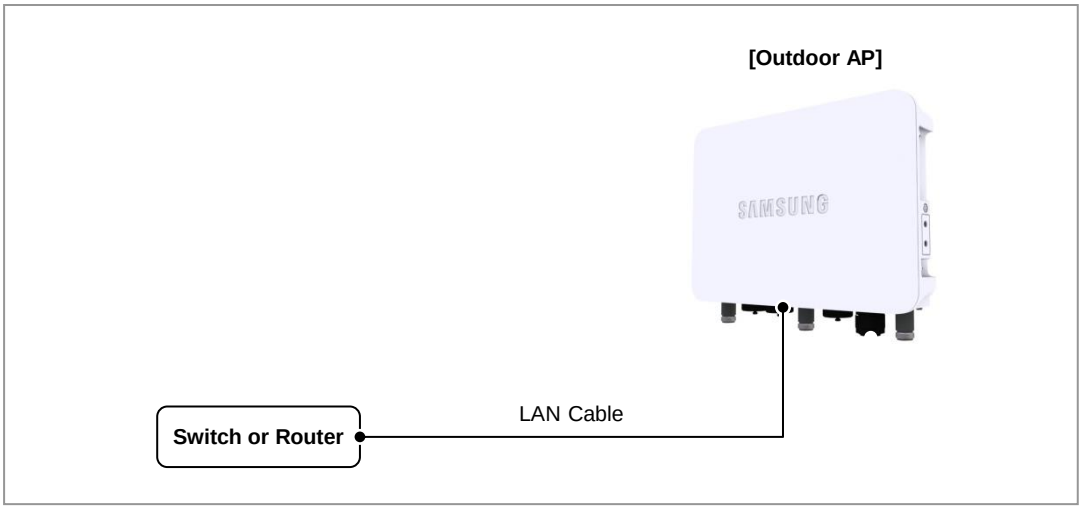


Figure 49. Connecting a LAN Cable (1)

3) Connect the RJ-45 plug linked to the LAN cable to the Outdoor AP LAN port. When connecting, make sure the RJ-45 plug faces down and listen for a clicking sound.

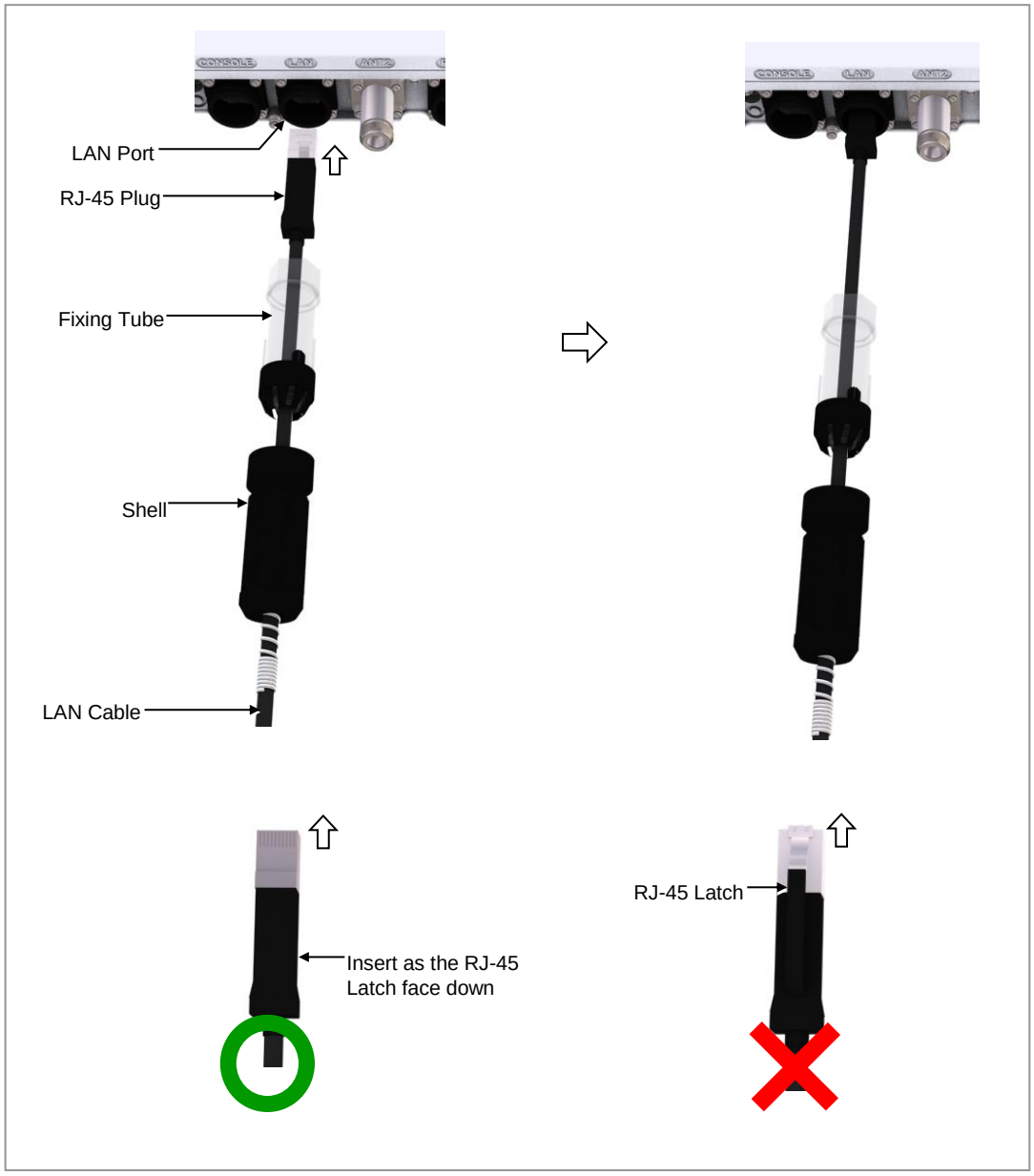


Figure 50. Connecting a LAN Cable (2)

4) Insert the fixing tube into the Outdoor AP LAN and match each groove.

5) Push the shell against the Outdoor AP PoE connector.

6) Straighten the cable and fasten the shell by turning it clockwise.

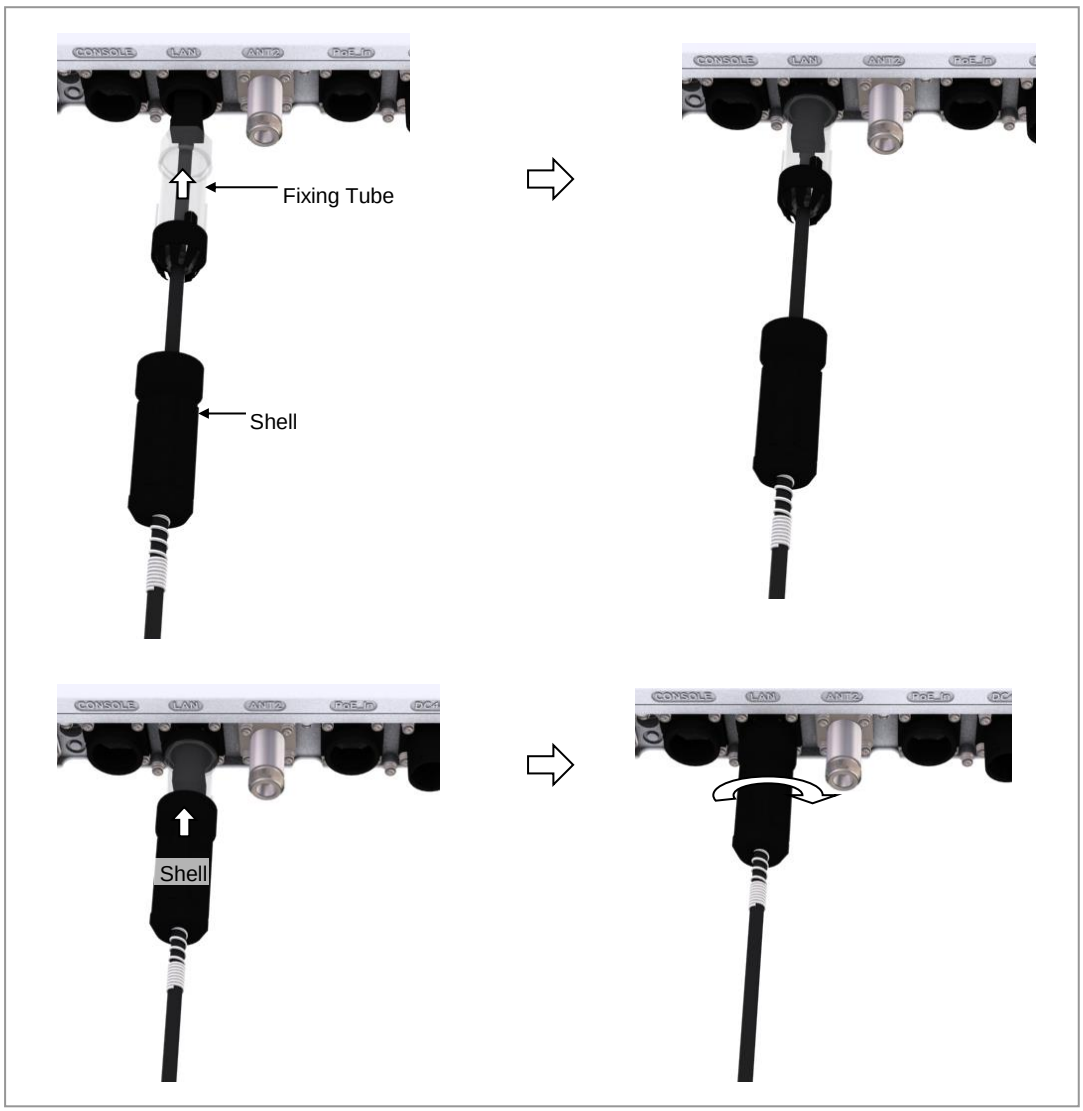


Figure 51. Connecting a LAN Cable (3)

7) Fasten it completely until the white belt on the connector can no longer be seen.

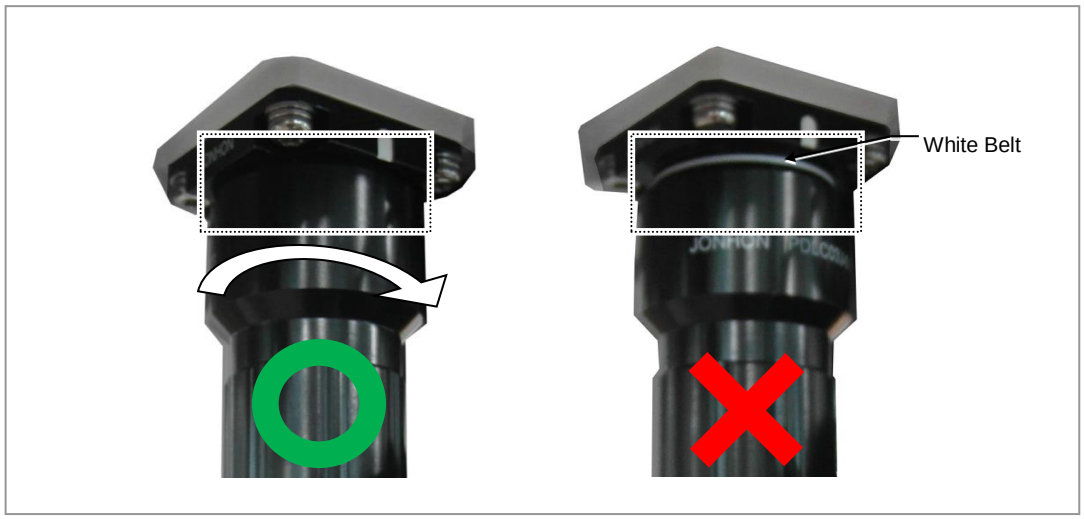


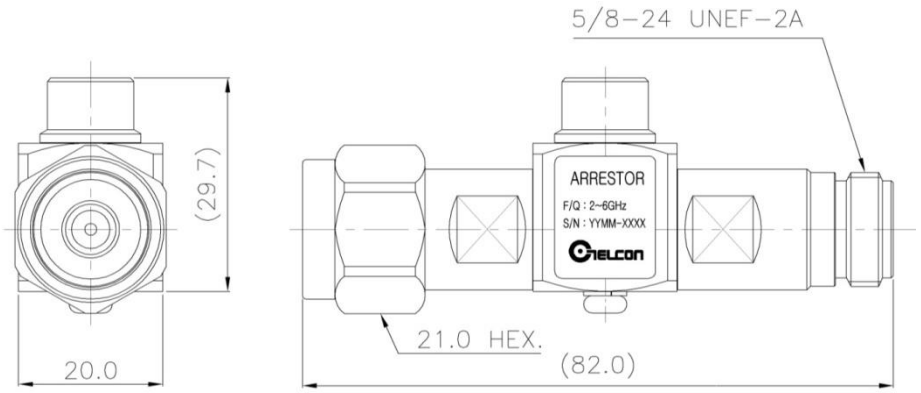
Figure 52. Connecting a LAN Cable (4)

3.5.3 Connecting the Arrestors

1) Prepare the following components:

Table 26. Components and Tools for Connecting the Arrestors

Item	Description	
Component	Arrestors	3 EA
Connectors	Linked to the Outdoor AP	N Type-Male
	Linked to the Patch Antenna	N Type-Female
Regulated Torque Value	N Type	16.5-18.1 kgf·cm
Required Tool	Torque Wrench	



[Outdoor AP Side] **[Patch Antenna Side]**

2) Connect the 3 arrestors to the Outdoor AP connectors (ANT1, ANT2, and ANT3).

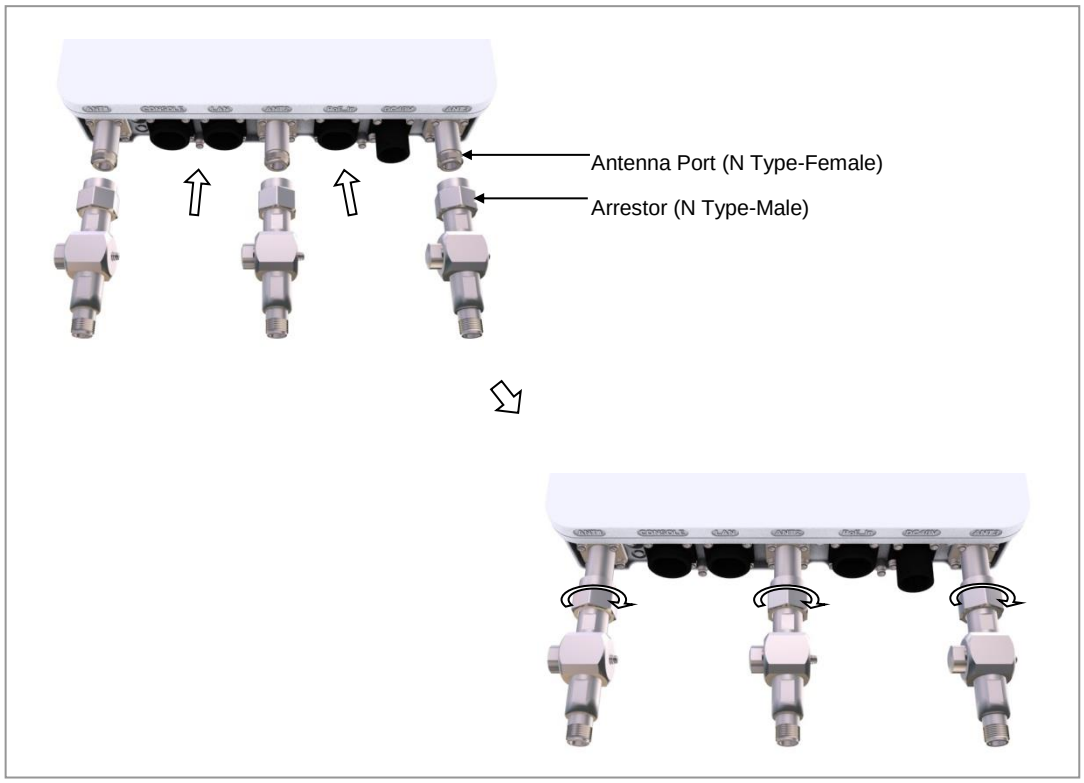


Figure 53. Connecting the Arrestors (1)

3) Wrap the interlinked parts in two or more layers of insulating tape to cover the metal sections after connecting the connector.

4) Wrap the insulating tape in two or more layers of butyl tape, covering all of the insulating tape and up to 10-20 mm below the insulated area.

5) Wrap over the butyl tape area with two or more layers of insulating tape in the same manner.

6) Tie both ends of the insulating tape using cable ties to make sure they do not become unwrapped.

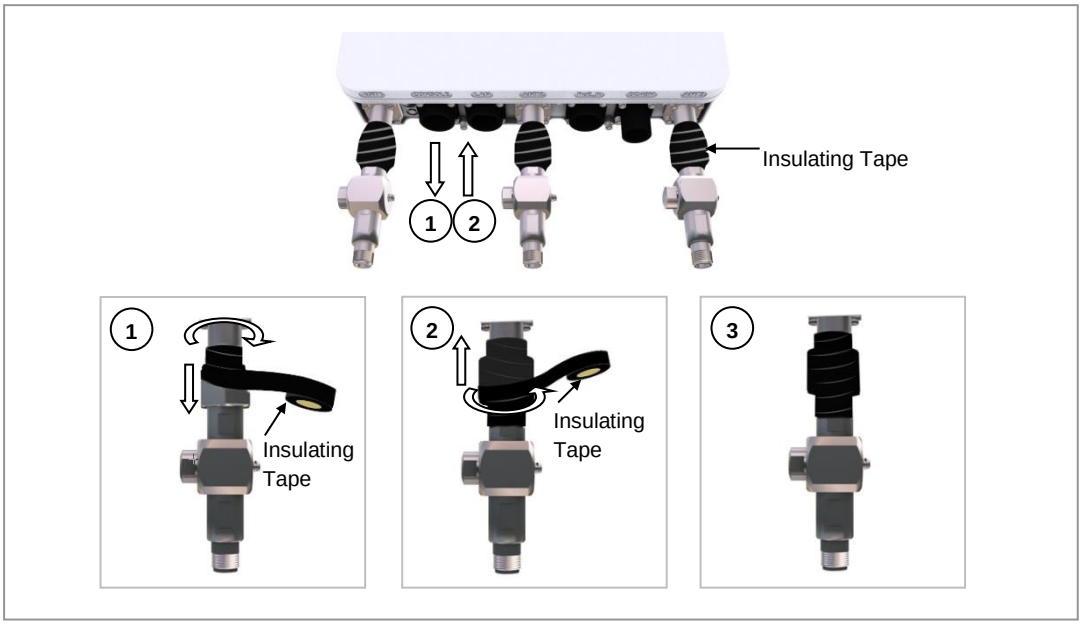


Figure 54. Connecting the Arrestors (2)

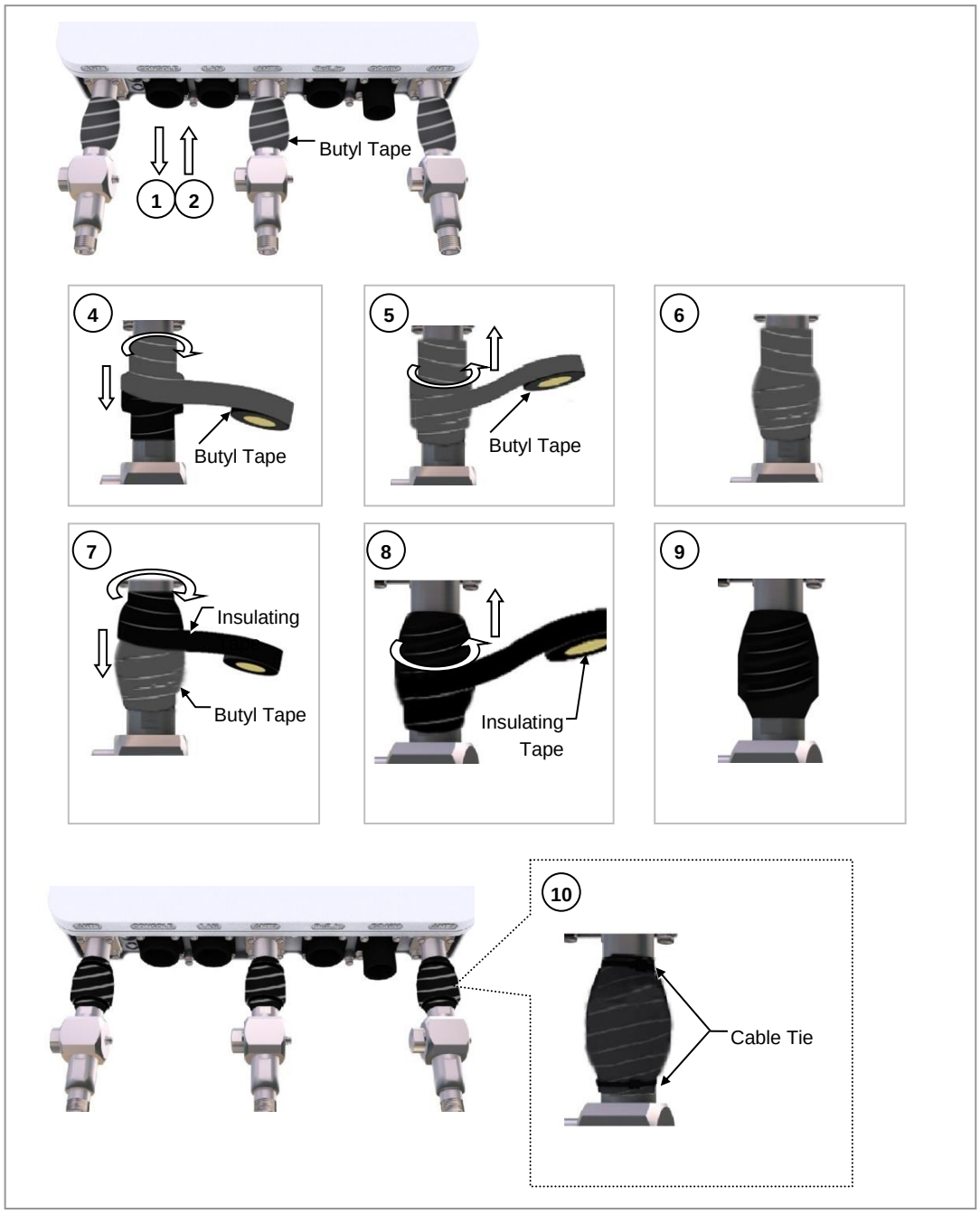


Figure 55. Connecting the Arrestors (3)

3.5.4 Connecting the Patch Antenna Cables

1) Prepare the following components:

Table 27. Materials and Tools for Connecting the Patch Antenna Cables

Item	Description	
Installation Section	Patch Antenna-Outdoor AP Antenna Port	
Cable	Antenna Cable Assembly	
Connectors	Arrestor	N Type-Female
	Patch Antenna Port	N Type-Male (check the specifications of the RF antenna and have the connector ready)
Required Tools	Cable Cutter, Wire Stripper, Nipper, Torque Wrench, Spanner, Utility Knife, Soldering Iron, and Lead	

2) Connect the cables from the Outdoor AP arrestor to the patch antenna.

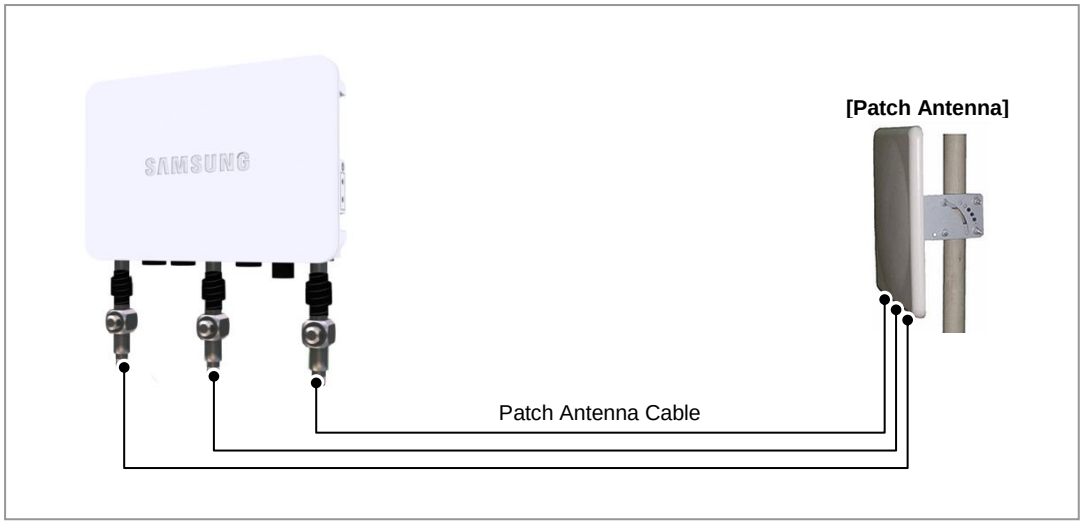


Figure 56. Connecting the Patch Antenna Cables (1)

3) Connect the patch antenna cables to the patch antenna ports on the arrestors.

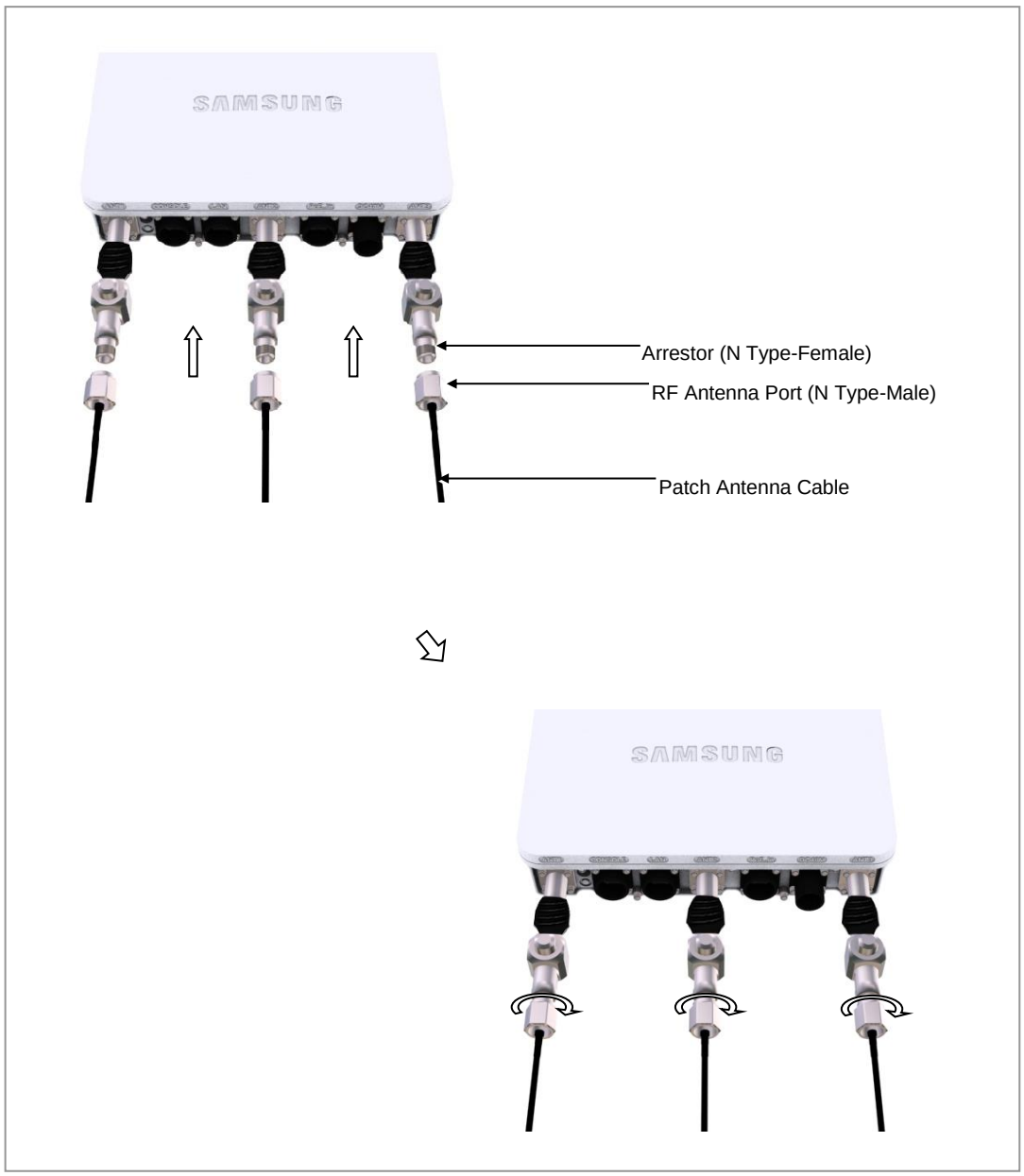


Figure 57. Connecting the Patch Antenna Cables (2)

3) Wrap the interlinked parts in two or more layers of insulating tape to cover the metal sections after connecting the connector.

4) Wrap the insulating tape in two or more layers of butyl tape, covering all of the insulating tape and up to 10-20 mm below the insulated area.

5) Wrap over the butyl tape area with two or more layers of insulating tape in the same manner.

7) Tie both ends of the insulating tape using cable ties to make sure they do not become unwrapped.

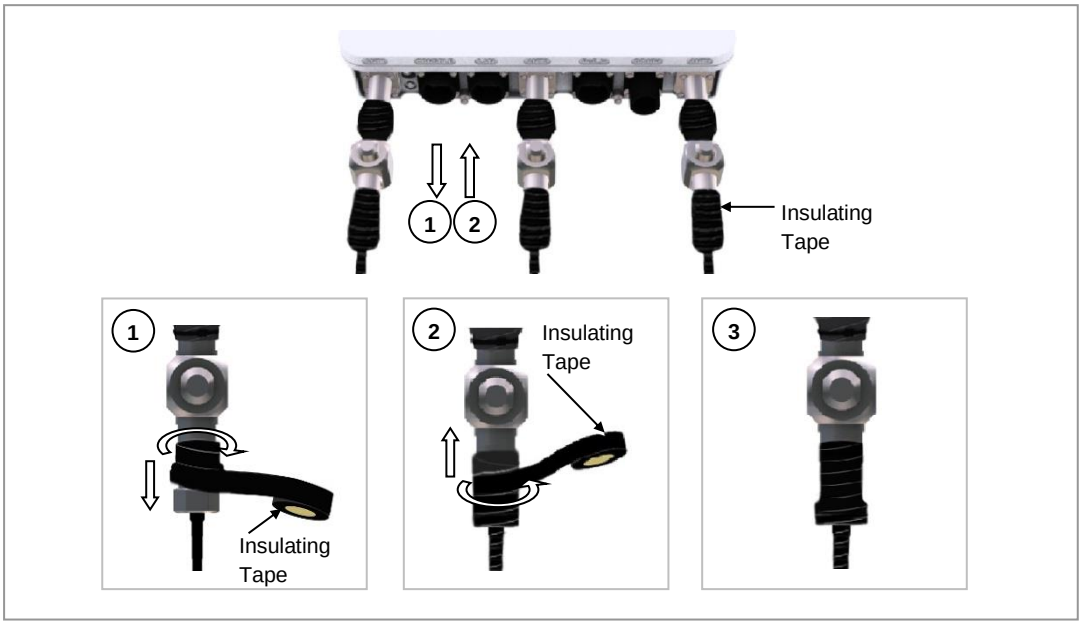


Figure 58. Connecting the Patch Antenna Cables (3)

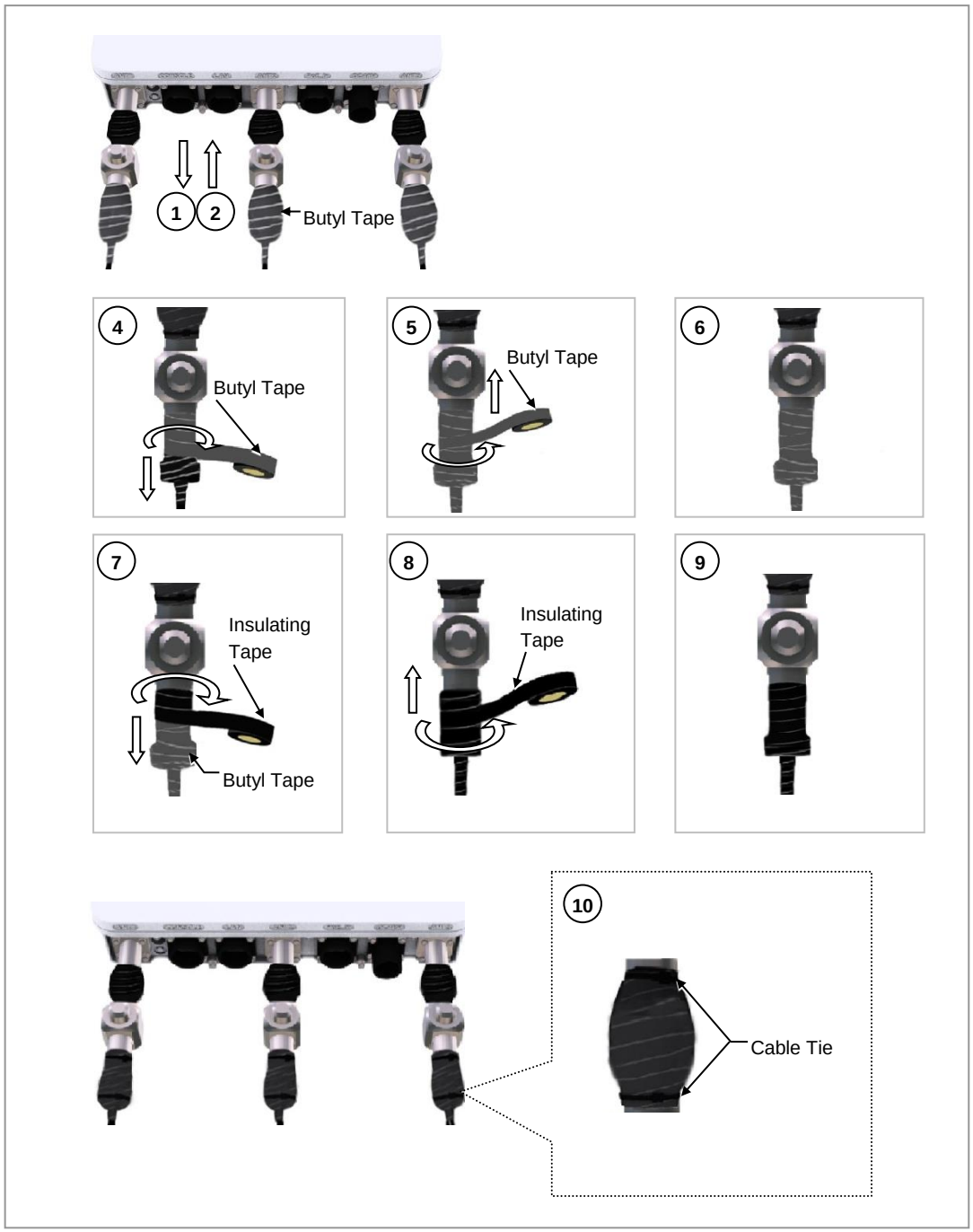


Figure 59. Connecting the Patch Antenna Cables (4)

3.5.5 Connecting the Patch Antenna Cables (Outdoor AP)

3.5.5.1 Patch Antenna Package Components

Unpack the patch antenna package and confirm all of the following components are included.

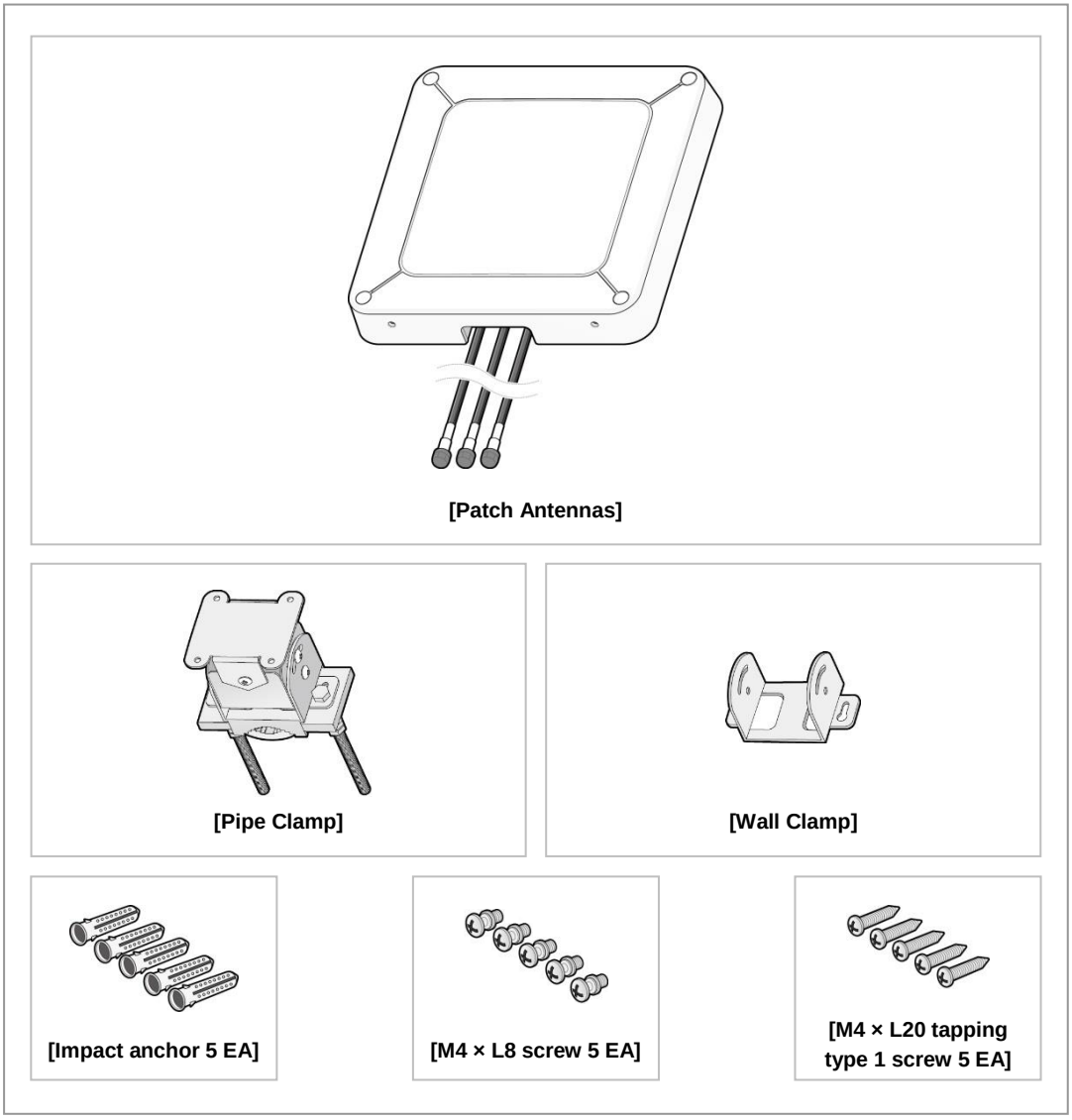


Figure 60. Patch Antenna Package Components

3.5.5.2 Installation Safety Precautions

Pay close attention to the following when installing the patch antenna:

- Install the patch antenna in a place where it is easily accessible for product installation, cable connections, and maintenance.
- If the antenna cable is too short, you can extend it by using an additional cable.
- When it should be extended, use an N-type cable connector. One end is female, the other is male.
- For best performance, use a cable with less signal loss.

3.5.5.3 Installing the Patch Antenna

Install the patch antenna on a wall, pipe, or ceiling.
Make sure that all of the necessary components are included and prepared before installing.

Always make sure the patch antenna cable is facing down when installing it outside or on a pipe.

Only trained service personnel can install or remove the patch antenna.

Installing on a Wall

1) Take the screw caps off of the patch. Keep the caps.
2) Use a drill to make 4 holes that look the same as those of the patch antenna on the wall you want to install it on, then insert and secure the impact anchors into the holes.
3) Screw the M4 × L20 screws into the holes of the patch antenna to secure the patch antenna to the impact anchors.
4) Return the screw caps to the mounted patch antenna.

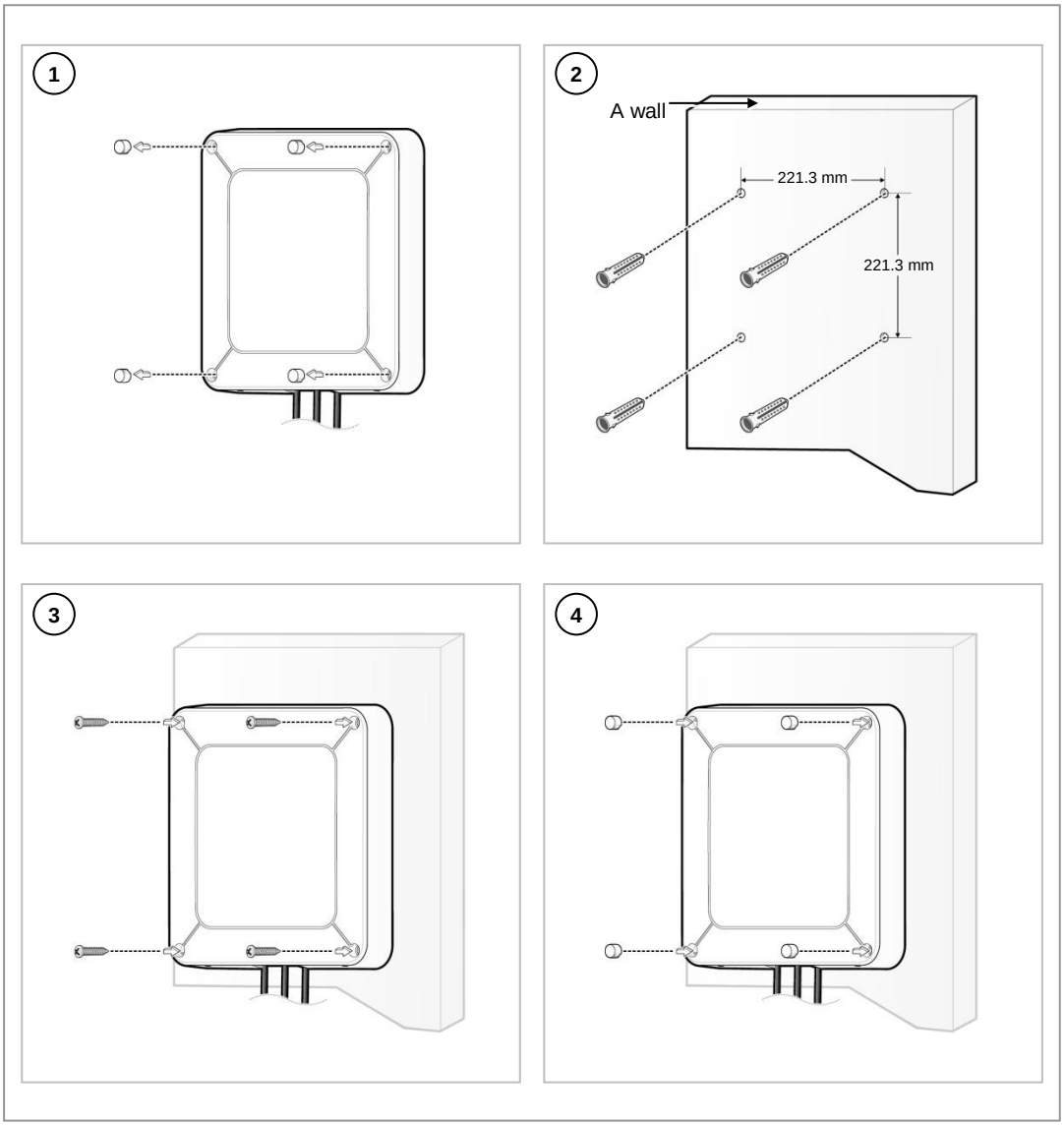


Figure 61. Installing on a Wall

Installing on a Pipe

1) Connect the clamp to the patch antenna using the M4 × L8 screws (Torque 6.0 Kgf.cm).
2) Attach the clamp to the pipe and secure it by tightening the nuts. Keep the cables of patch antenna facing down (Torque 80.0 kgf.cm).
3) Unscrew the M4 bolts, adjust the angle of the patch antenna (to up/down, left/right), and then tighten the M4 bolts again.

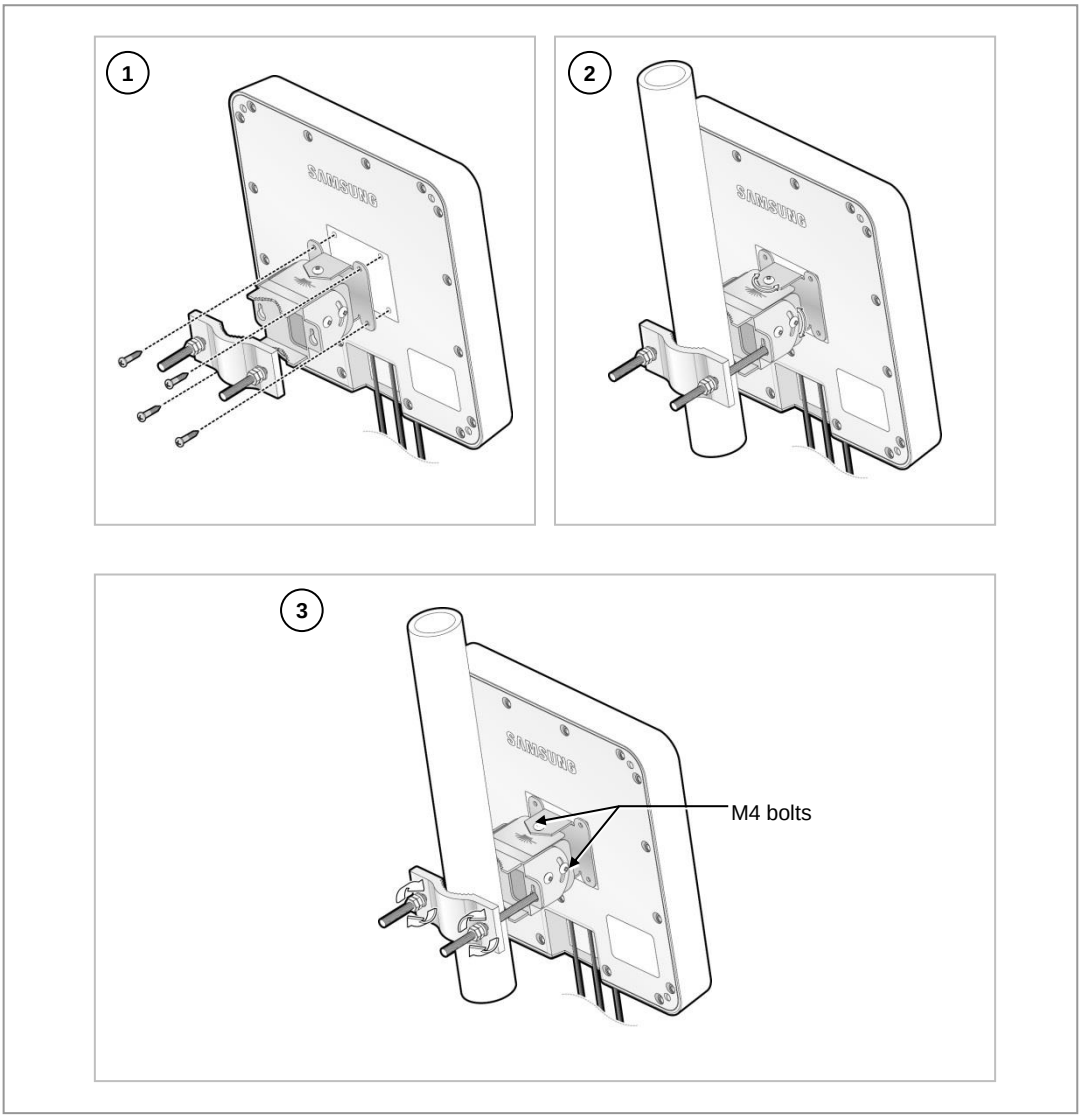


Figure 62. Installing on a Pipe

Installing on a Wall Using Brackets

1) Unscrew the 4 M4 × L10 screws from the clamp of the product package and remove the brackets for installing on a pipe.
2) Assemble the brackets for mounting on a wall using 4 M4 × L10 screws.
3) Attach the clamp to the patch antenna using the M4 × L8 screws. Assemble the clamp with the wide area of the key hole facing down.
4) Drill the same 2 holes as those of the patch antenna on the wall you want to install it on, then insert and secure the impact anchors into the holes.
5) Leave 2.3-3 mm of the screws out from the wall when screwing the 2 M4 × L20 screws into the impact anchors.
6) Hook the keyholes of the bracket on the two screw heads, and then secure the patch antenna by pulling it down towards the cables.

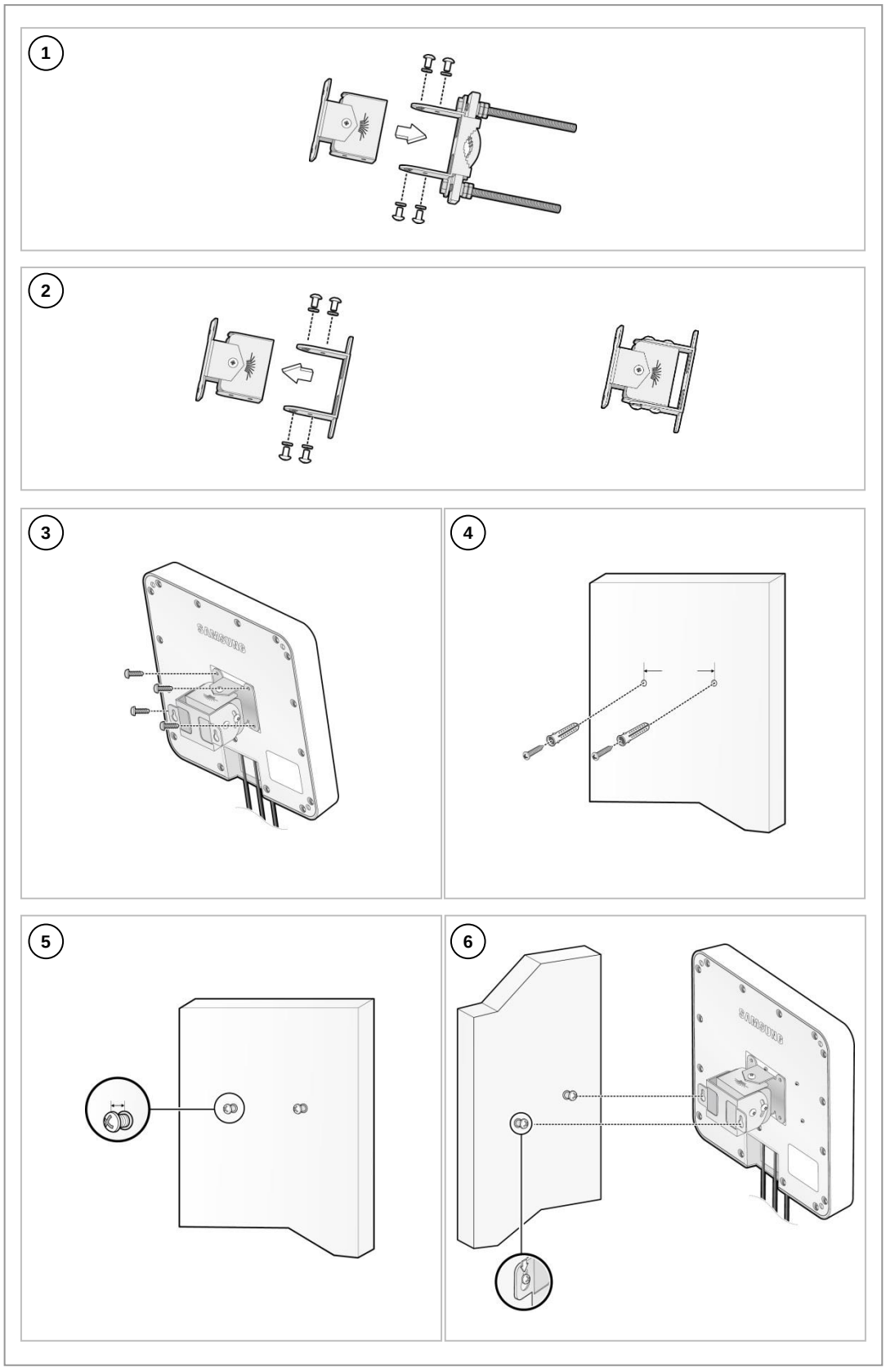


Figure 63. Installing on a Wall Using Brackets

Installing on a Ceiling

Be cautious when installing since it may drop and cause personal injury or product damage if the patch antenna is incorrectly installed on a ceiling.

1) Prepare four round-head, taping-type 1-M4 screws and a steel plate on which the holes for the screws are punched out. Prepare the length of screws for more than L20 when considering the ceiling's depth.
2) Use a drill or other device to drill 4 holes into the ceiling to match the plate size.
3) Take the caps off of the patch. Keep the caps.
4) Use the M4 × L20 screws to screw the patch antenna and the plate onto the ceiling securely.
5) Return the screw caps to the mounted patch antenna.

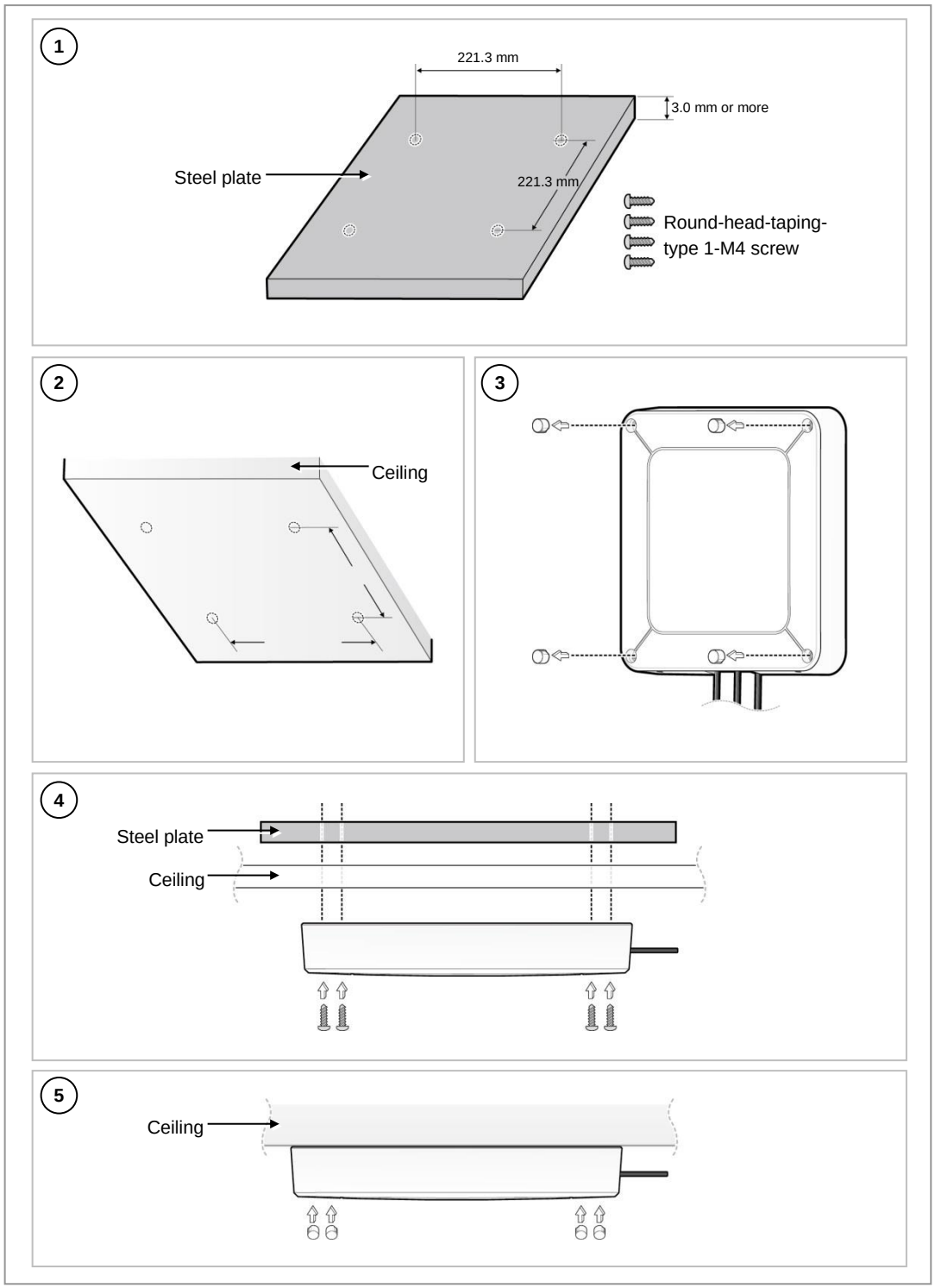


Figure 64. Installing on a Ceiling

NOTE

Refer to the Outdoor AP installation manual for instructions on how to connect the patch antenna cable to the Outdoor AP.

CHAPTER 4. Inspecting the Installation Status

The inspection procedure of the installation status is as follows:

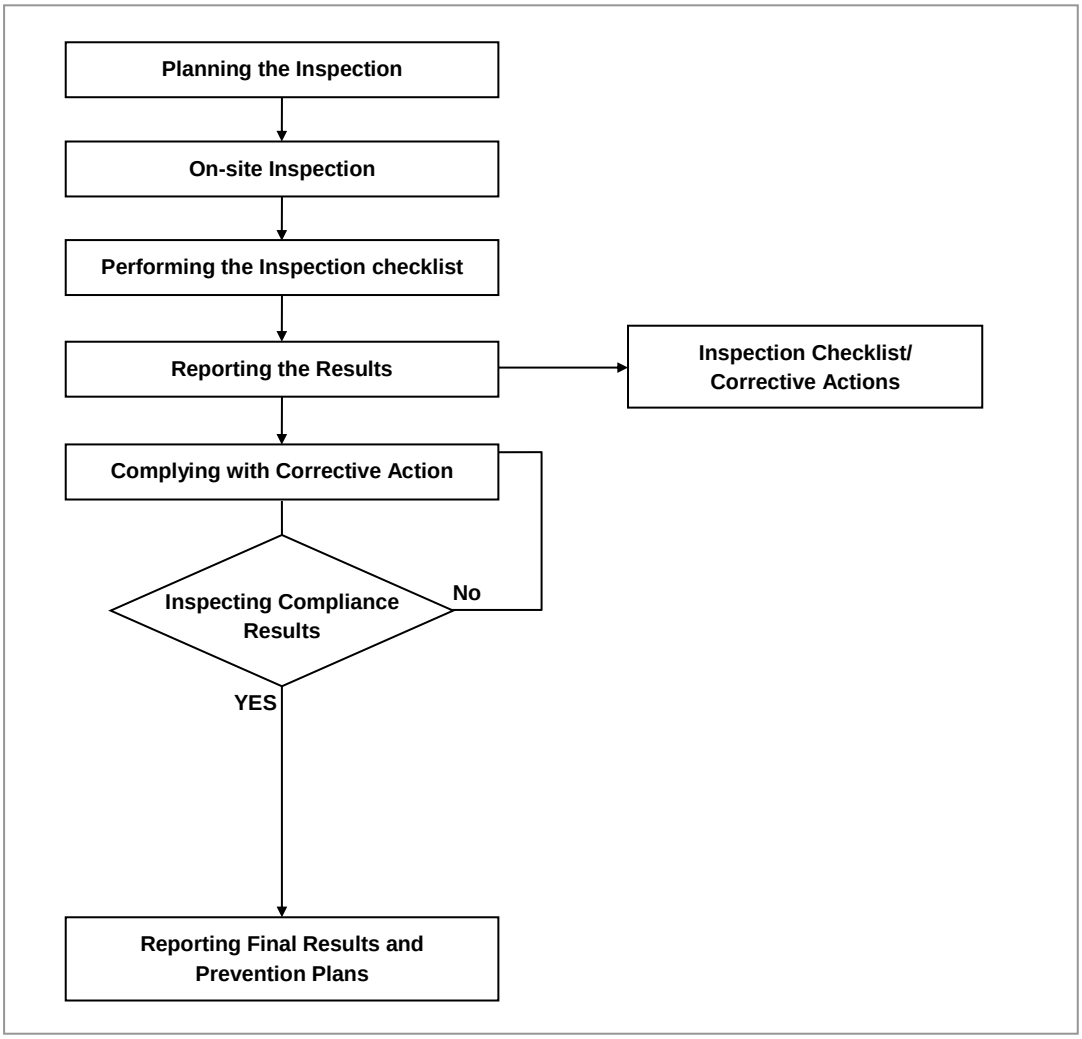


Figure 65. Procedure for Inspecting the Installation Status

4.1.1.1 Planning the Inspection

Compose a checklist for each system, appoint an inspector, and establish the inspection schedule for each site.

4.1.1.2 Inspecting On-Site and Composing an Inspection Checklist

Inspecting on-site involves visiting the site where the systems are installed and checking each item's specifications, standards, and installation status using the naked eye or by using measuring devices and going over all of the items on the checklist.
During, or after, the inspection, all of the inspected items must be recorded on the checklist.

4.1.1.3 Reporting and Reviewing the Results, Complying with Corrective Action

The inspector must report the inspection results (checklist/corrective actions) to the installation manager, and the installation manager must go over the corrective actions and fix them as necessary.

4.1.1.4 Inspecting Compliance Results

The inspector must check if all of the corrective actions have been carried out, and then request any further corrective action to the installation manager when the results of the corrective action or compliance inspection are unsatisfactory.

4.1.1.5 Reporting the Final Results and Prevention Plans

After all of the corrective actions have been completed, the inspector must report the final results to the installation manager and the relevant department heads, as well as a plan to prevent the recurrence of similar problems in the future.

Table 28. Inspection Checklist

Item	Main Inspection Checklist	Evaluation Criteria	Inspection Results	
			Pass	Fail
Equipment Installation	External status of equipment and mechanical parts	Equipment damage such as dents, scratches, or cracks.		
	Arrangement state of equipment and mechanical parts	Maintenance and the horizontal/vertical arrangement status.		
	Leveling state of equipment and mechanical parts	Inspection of the horizontal/vertical status (using a spirit level).		
	Tightened status and	Check with the naked eye and use		

Item	Main Inspection Checklist	Evaluation Criteria	Inspection Results	
			Pass	Fail
	the state of the bolts/nuts/washers	magnets if the tightening torque value has been followed.		
	Insulation status	Check if there is any contact between the insulators by performing an insulation resistance test.		
	Other installation components, such as the cable duct installation status	Locate and check each installation status.		
Grounding	Grounding bar installation status	Check the separation status of the Outdoor AP/power/arrestor grounding.		
	Cable standards	Check if the standards have been followed, such as thickness and so on.		
	Cable installation and binding status	Check the damage/installed route/ bending radius of cables and the materials used.		
	Cable connection status	Check for the tightened and assembled status of the pressure terminal and if the tightening torque value has been met.		
	Cable tag installation status	Check the location, labeling, and tag installation method used.		
Power Supply	Power supply equipment and circuit breaker installation status	Check the power supplying the equipment's capacity/input voltage (using a tester), and the circuit breaker's type and capacity.		
	Cable standards	Check the thickness and limited distance of the cables.		
	Cable installation and binding status	Check the damage/installed route/bending radius of cables and the materials used.		
	Cable connection status	Check the power connection status for each cable according to the pin map configuration. Check the pressure terminal/connector's assembly and tightened status to determine if the tightening torque value has been met.		
	Cable tag installation status	Check the location, labeling, and tag installation method used.		
Other Data Cables	Cable standards	Check the cable standards are correct for each purpose.		
	Cable installation and binding status	Check the damage/installed route/ bending radius of cables and the		

Item	Main Inspection Checklist	Evaluation Criteria	Inspection Results	
			Pass	Fail
		materials used.		
	Cable connection status	Check the power connection status for each cable according to the pin map configuration. Check the pressure terminal/connector's assembly and tightened status to determine if the tightening torque value has been met.		
	Cable tag installation status	Check the location, labeling, and tag installation method used.		
RF	Antenna installation status	Check the specifications, installation position, mounting status, and gap between each antenna.		
	Arrestor installation status	Check the specifications, installation position, and mounting status.		
	Cable installation and binding status	Check the damage/installed route/ bending radius of cables and the materials used.		
	Cable connection status	Check the cable connection status, the connector assembly, and the tightened state. Check if the tightening torque value has been met. Check the finishing status.		
	Cable tag installation status	Check the location, labeling, and tag installation method used.		
Miscellaneous	Reserved ports and cable connection status	Check the finishing status (waterproof caps, etc.).		
	Equipment connection I/O port (conduit/cable gland)	Check the tightened status.		
	Cable installation route status	Check the status of the cable tray, duct, and other installation items.		
	Clean-up state for inside/outside and the surrounding area of the system.	Check for any disposed materials/items/ packing materials and the overall clean-up status.		
Opinions				

ANNEX A. Connector Assembly

A.1 RJ-45 (Shield Type)

Procedure that assembles the RJ-45 (shield type) connector is as follows:

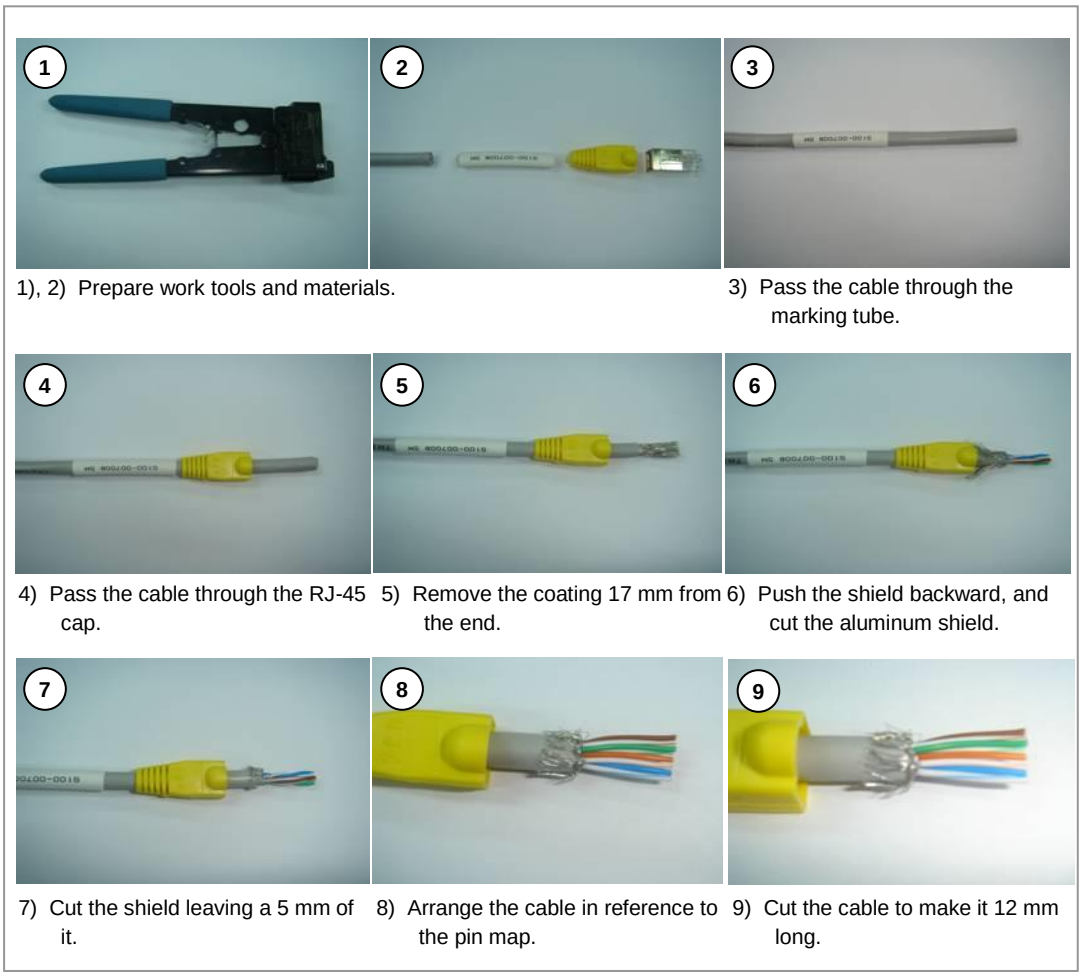


Figure 66. Assembling the RJ-45 Connector (Shield Type) (1)

10) Insert the RJ-45 modular jack.

11) Make sure that the shield does not get in the RJ-45 modular iack.

12) Insert the cable completely into the RJ-45 modular jack.

13) Compress the jack using the tool.

14) Move the RJ-45 cap to the connector side and compress the marking tube to finish the assembly.

Figure 67. Assembling the RJ-45 Connector (Shield Type) (2)

A.2 Finishing the Connector Connection Part by Tape

Check Items for Finishing the Connector Connection Part

Check following items before finishing the connector connection part by tape.

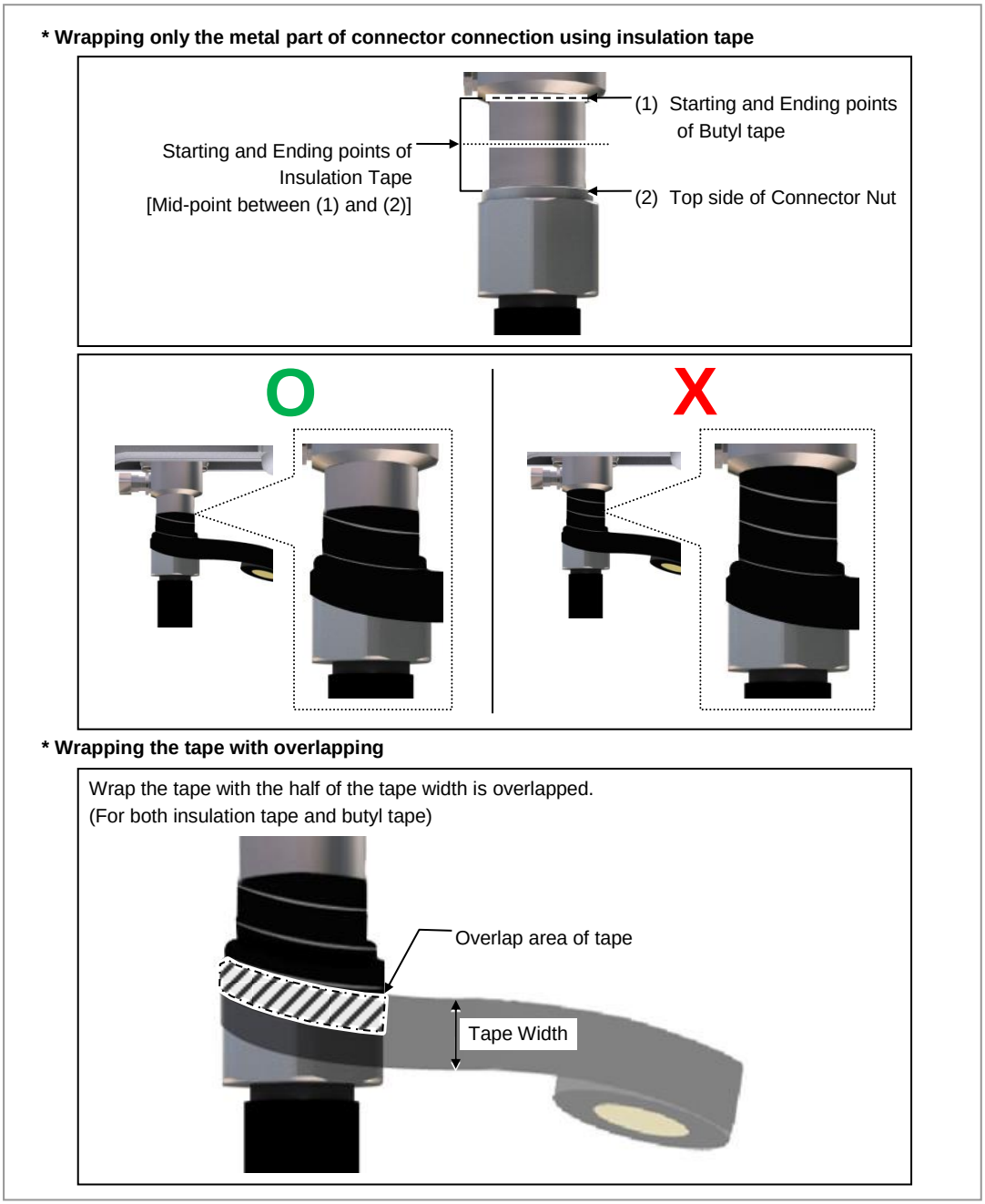


Figure 68. Check Items for Finishing the Connector Connection Part

ANNEX B. Pressure Terminal Assembly

B.1 Preparations

The following must be available to connect a pressure terminal to a cable.

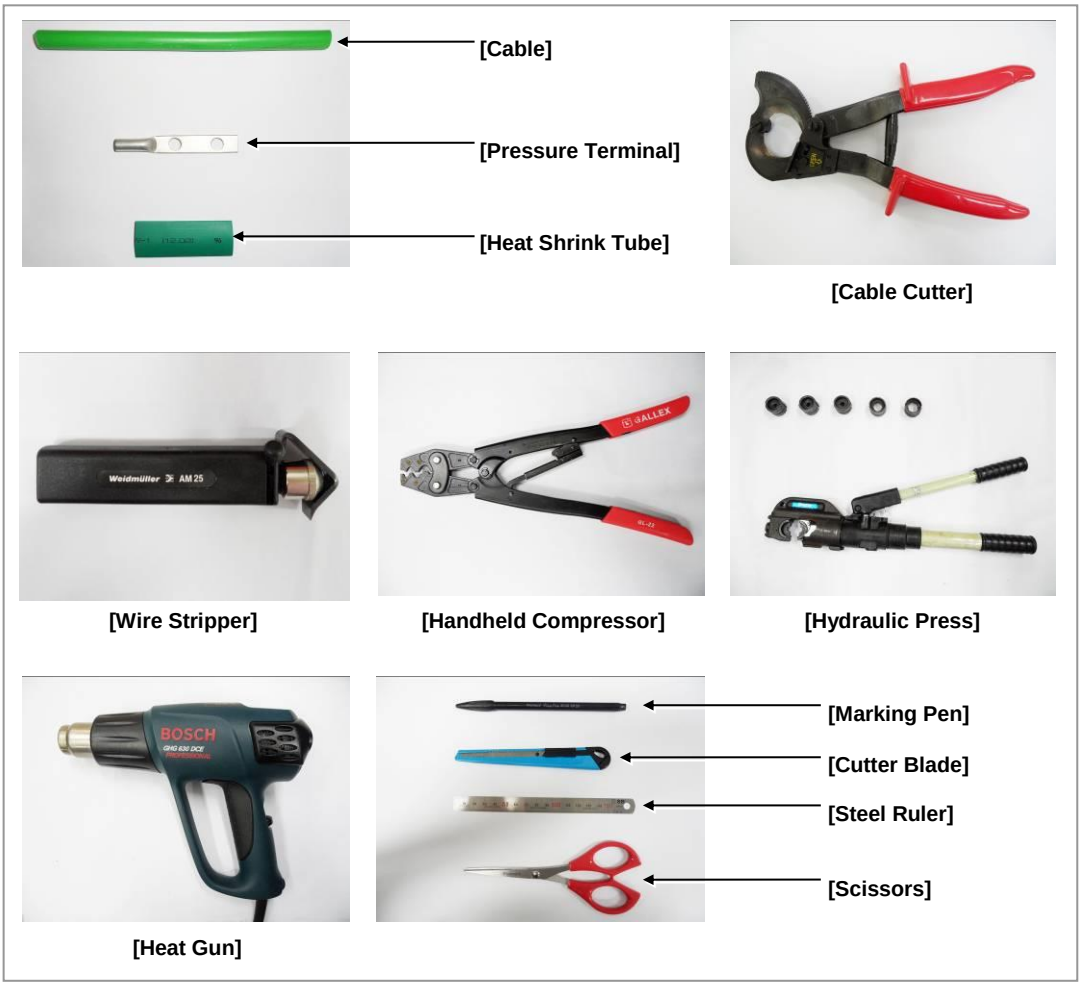


Figure 69. Preparations

B.2 Pressure Reference Table

The pressure reference table used to assemble a pressure terminal to a cable is shown below.

Table 29. Pressure Reference Table for Pressure Terminal

Category	Copper tube length of a pressure terminal (mm)	Number of pressure points
Hand	11 mm or less	1
Hand	12~15 mm	2
Hand	16~23 mm	3
Hand	24~32 mm	4
Hand	33 mm or more	5
Hydraulic	30 mm or less	2
Hydraulic	31~47 mm	3
Hydraulic	48~63 mm	4
Hydraulic	64 mm or more	5

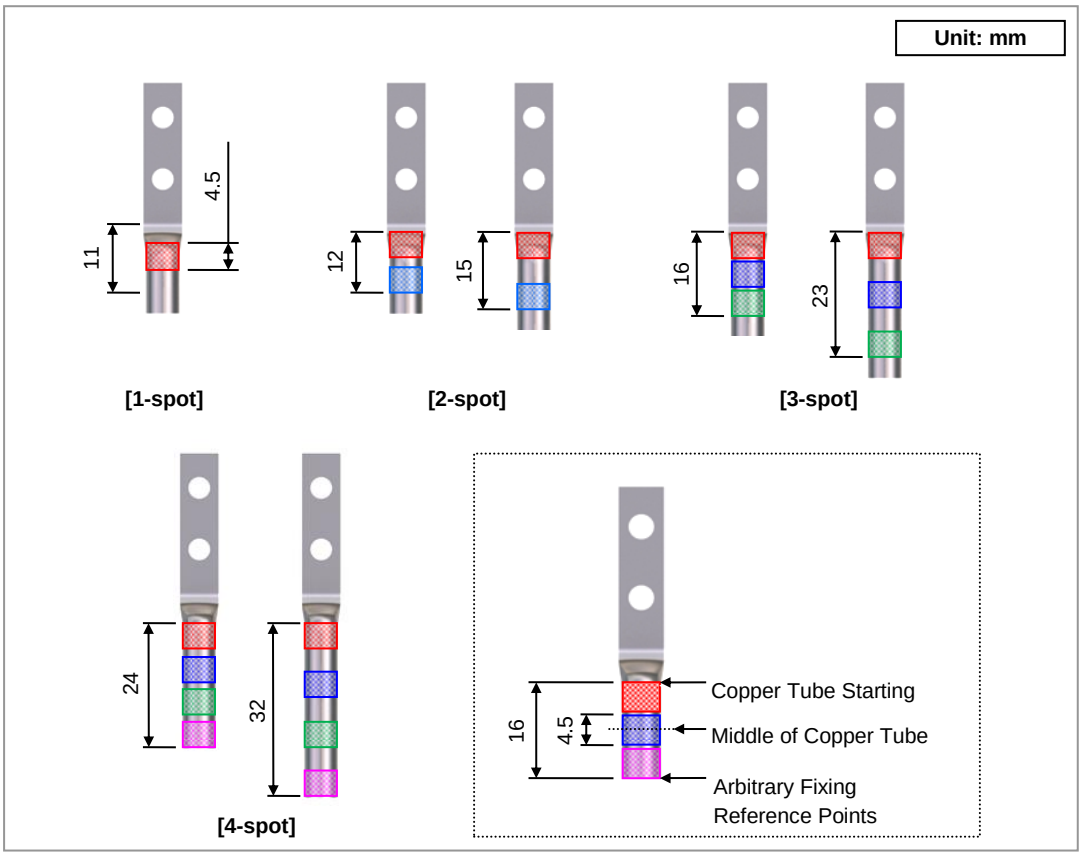


Figure 70. Pressure Reference Drawing (Handheld Compressor)

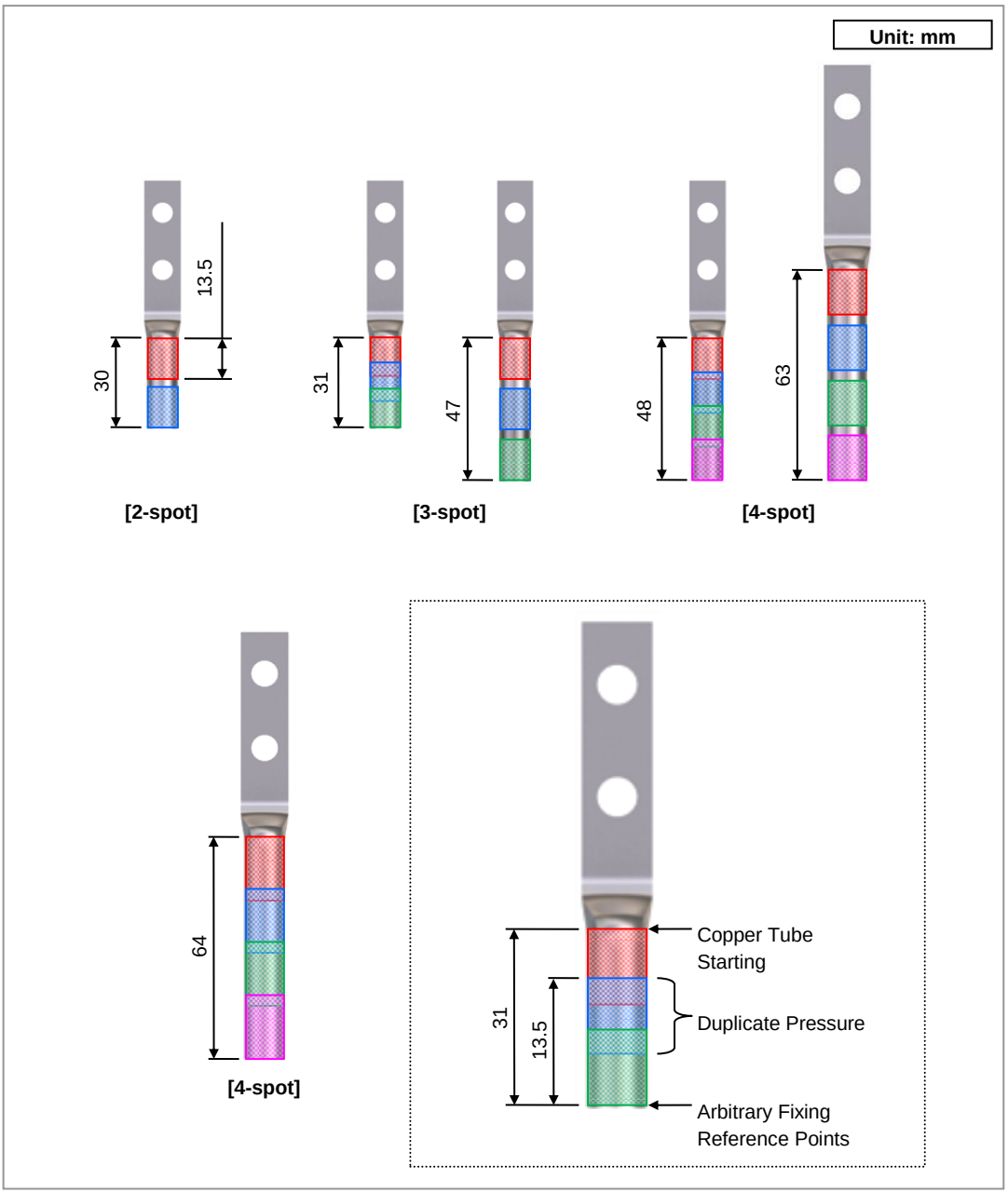


Figure 71. Pressure Reference Drawing (Hydraulic Compressor)

Table 30. Compressor Specifications per Cable Thickness

Cable Size (mm^2)	Press Size		
	Small Handheld Press	Large Handheld Press (AK-38, 100)	Hydraulic Press (IZUMI Hexagonal Dies)
2.5	2	X	X
4	2	X	X
6	5.5	X	X
10	8	8	X

Cable Size (mm^2)	Press Size		
	Small Handheld Press	Large Handheld Press (AK-38, 100)	Hydraulic Press (IZUMI Hexagonal Dies)
16	14	14	16
25	22	22	25
35	38	38	35
50	X	60	50
70	X	80	70
95	X	100	95~300

B.3 Assembling Pressure Terminal

The procedures for assembling a pressure terminal to a cable are as follows:

Strip the Cable Sheath

1) After checking the inside length of a pressure terminal, mark the cable.

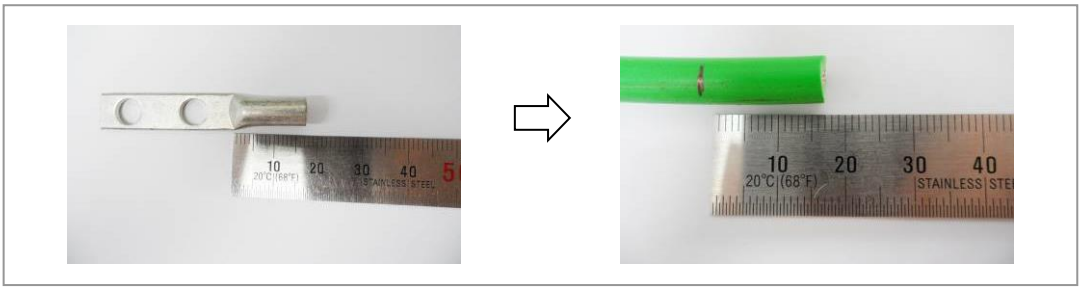


Figure 72. Stripping Cable Sheath (1)

2) Adjust the length of a cutter blade according to the sheath thickness of the cable.

3) Push the clamp with a thumb according to the cable size to secure a space for the cable.

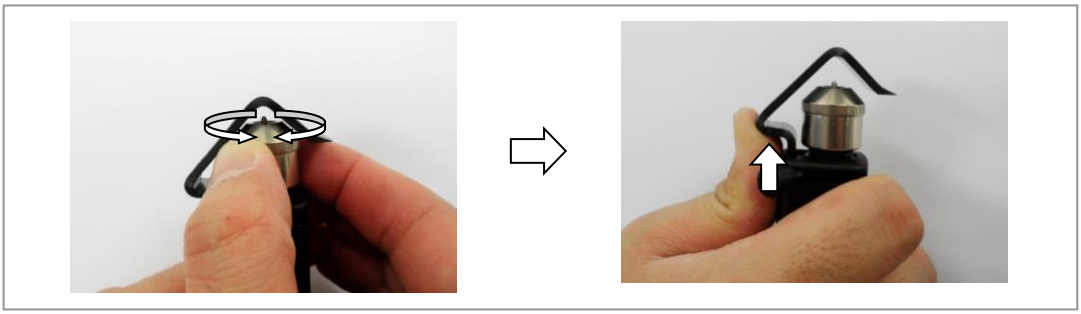


Figure 73. Stripping Cable Sheath (2)

4) Put a cable into a clamp, locate a blade on a marking position, and push it into the sheath.

5) Align the stripper to be perpendicular to the cable and rotate it more than two laps.

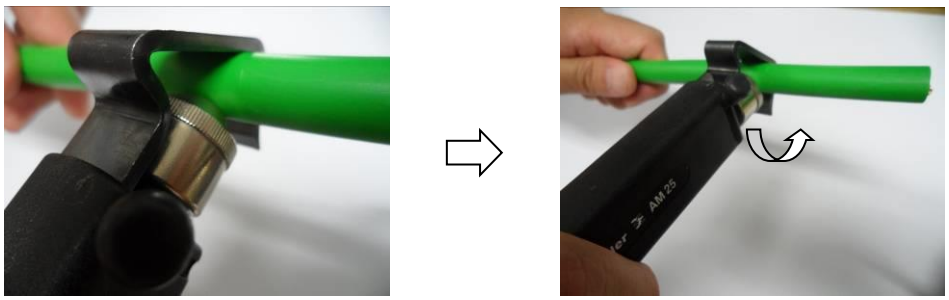


Figure 74. Stripping Cable Sheath (3)

6) Push the lever of the stripper to the right to turn its blade at 90°.

Figure 75. Stripping Cable Sheath (4)

7) Move the stripper up to the end of cable while maintaining the stripper to be perpendicular to the cable.

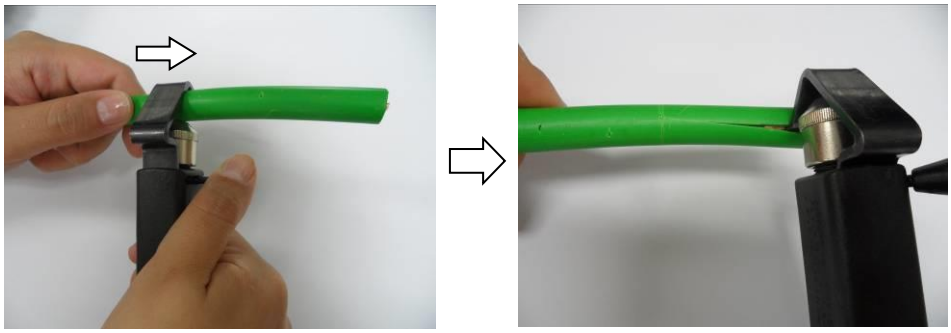


Figure 76. Stripping Cable Sheath (5)

8) Remove the sheath.

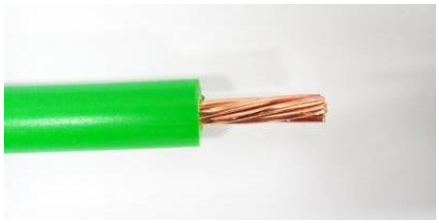


Figure 77. Stripping Cable Sheath (6)

NOTE

Checking When Using A Wire Stripper

A wire stripper is used differently depending on its manufacturer or type. Therefore, refer to the user manual enclosed with the product.

The specifications and cautions of a wire stripper described in this manual are as follows:

- Vender: Weidmuller
- Model: Weidmuller-AM25 (Order No-9001080000)
- Specifications: For outer diameter 6-24 mm PVC sheath Up to 4.5 mm sheath cutting depth

- To prevent the cutter blade of a wire stripper from touching the cable conductor, adjust the length of cutter blade by checking the cable sheath thickness.
- Make sure that the cutter blade goes into the cable sheath completely.
- Rotate the wire stripper perpendicularly to the cable.

[X] **[O]**

Fixing Pressure Terminal (Handheld Compressor)

1) Insert the conductor of the cable with the sheath stripped to the internal end of pressure terminal.
   For a ring type pressure terminal, push it in until the conduct comes out 1 mm from the end of the terminal.

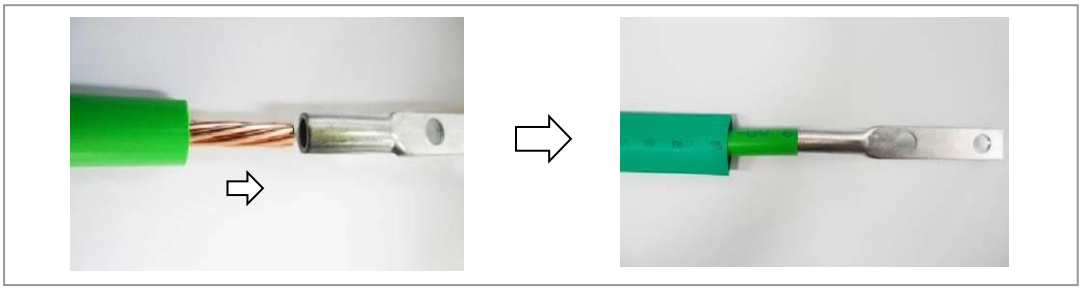


Figure 78. Fixing Pressure Terminal_Handheld Compressor (1)

2) From the holes of handheld compressor, select one that fits to the pressure terminal.

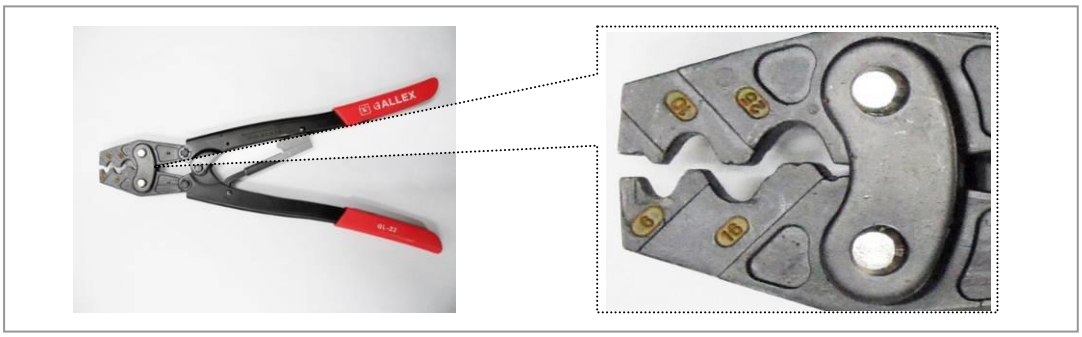


Figure 79. Fixing Pressure Terminal_Handheld Compressor (2)

3) Insert the pressure terminal to the selected hole.

4) Fix the pressure terminal and cable temporarily so the position can be changed later by pressing the compressor.

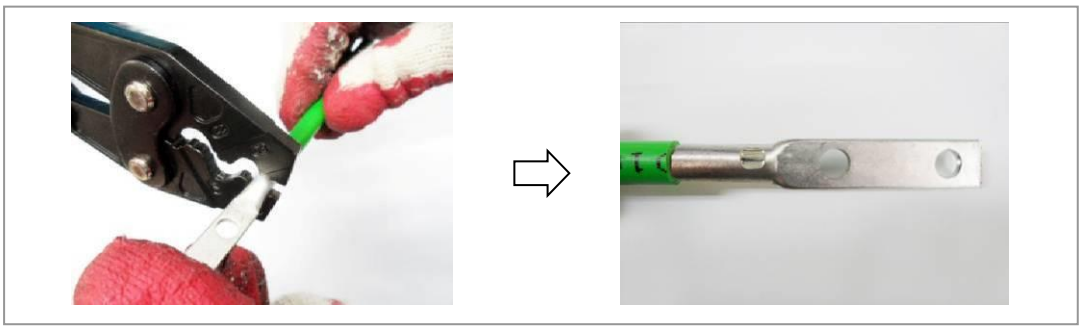


Figure 80. Fixing Pressure Terminal_Handheld Compressor (3)

5) After complementary of the cable which is temporary fixed, align it to the hole and firmly compress the pressure terminal to secure fix it.

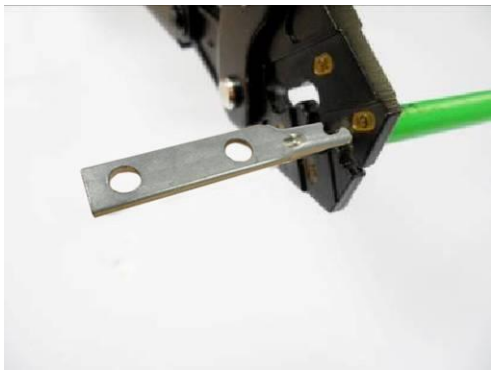


Figure 81. Fixing Pressure Terminal_Handheld Compressor (4)

6) Separate the pressure terminal from the handheld compressor. Press down the handle of compressor until a clicking sound is heard to be unlocked.

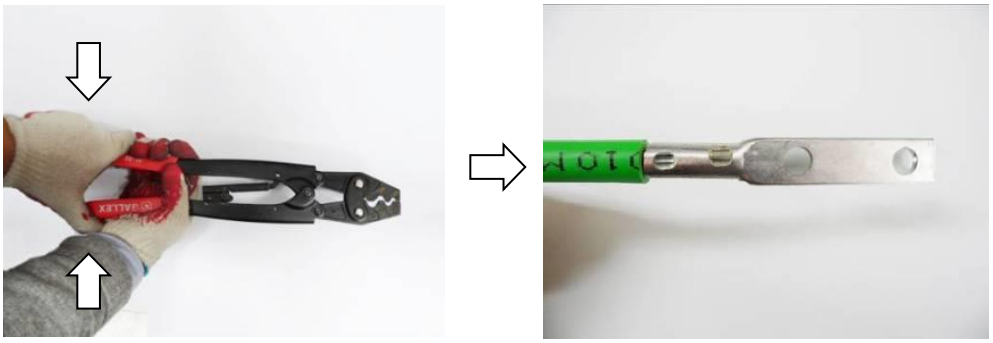


Figure 82. Fixing Pressure Terminal_Handheld Compressor (5)

NOTE

Checking When Using A Handheld Compressor

A handheld compressor is used differently depending on its manufacturer or type. Therefore, refer to the user manual enclosed with the product.

The specifications and cautions of a handheld compressor described in this manual are as follows:

- Vender: GALLEX
- Model: GL-2045A-22
- Specification: 5.5 mm^2, 8 mm^2, 14 mm^2, 22 mm^2 (JIS), 6 mm^2, 10 mm^2, 16 mm^2, 25 mm^2 (DIN)

Fixing Pressure Terminal (Hydraulic Press)

1) Among the dies of the hydraulic press, select one that fits to the pressure terminal.

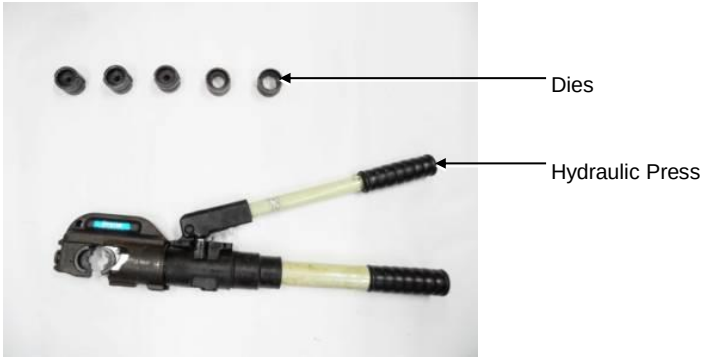


Figure 83. Fixing Pressure Terminal_Hydraulic Press (1)

2) Assemble the dies to the pressing area of the compressor.

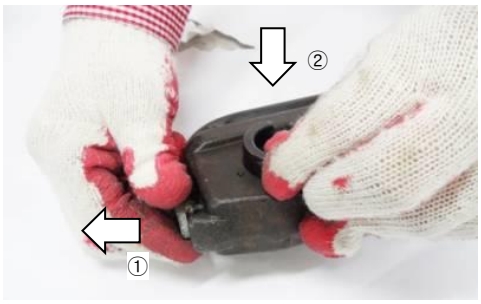


Figure 84. Fixing Pressure Terminal_Hydraulic Press (2)

3) Insert the pressure terminal into the pressing area and fix it slightly by aligning it to the end of cable sheath.

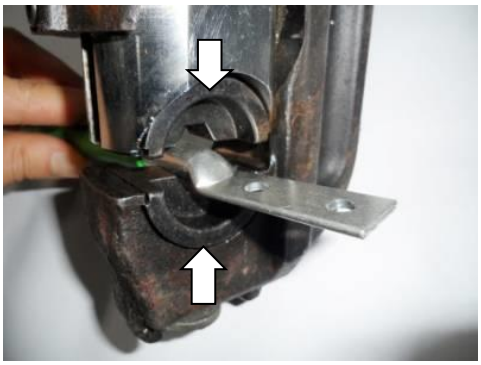


Figure 85. Fixing Pressure Terminal_Hydraulic Press (3)

4) Move the compressor lever up and down to press the pressure terminal firmly.

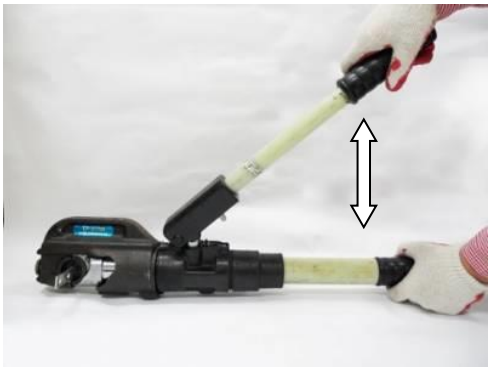


Figure 86. Fixing Pressure Terminal_Hydraulic Press (4)

5) Turn the top compressing lever clockwise and then push it down. When the pressing area of compressor is loosened, remove the pressure terminal.

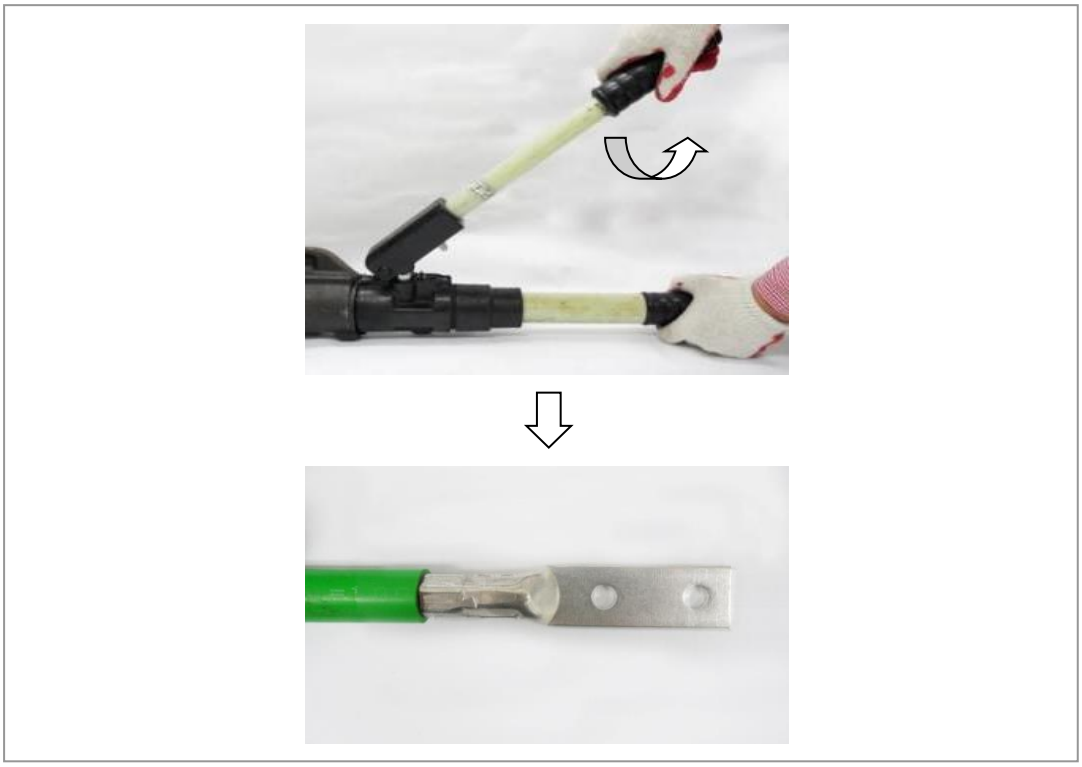


Figure 87. Fixing Pressure Terminal_Hydraulic Press (5)

NOTE

Checking When Using a Hydraulic Press

A hydraulic press is used differently depending on its manufacturer or type. Therefore, refer to the user manual enclosed with the product.

The specifications and cautions of a hydraulic press described in this manual are as follows:

- Vender: IZUMI
- Model: IZUMI-EP-510B
- Specification: Circular 32~160 (SQ) Hex 14~325 (SQ)

Assembling Heat Shrink Tube

1) After assembling a pressure terminal, move the heat shrink tube, inserted to the cable, to the end of pressure terminal copper tube.

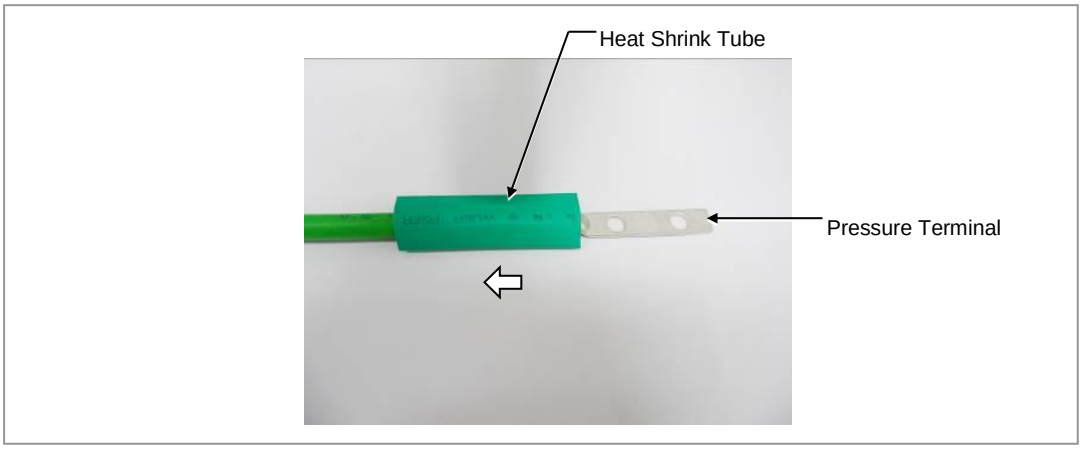


Figure 88. Assembling Heat Shrink Tube (1)

2) Set the temperature of the heat gun to 180-200°C.

3) Locate a heat shrink tube to cover the entire copper tube of the pressure terminal.

4) Rotate a heat gun 360° to apply heat evenly to shrink the tube.
(Because the pressure terminal and the cable is hot due to the heat of a heating gun, be careful not to have a burn.)

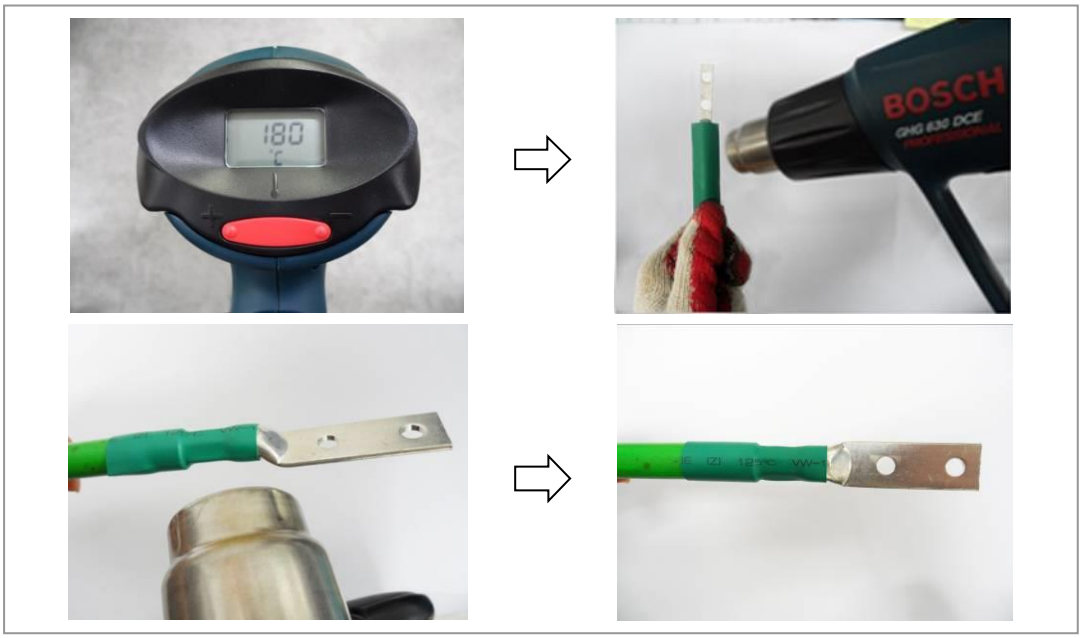


Figure 89. Assembling Heat Shrink Tube (2)

ANNEX C. Standard Torque

When you tighten the bolt, refer to the standard torque value below to prevent the equipment and bolt from damage and secure by tightening. When the torque value for each connection part is defined already, refer to the defined value.

Table 31. Standard Torque Value for Tightening Bolts

Bolt Spec.	Torque Value (kgf·cm)	Torque Value (N·m)	Torque Value (lbf·ft)
M3	4.08~6.12	0.40~0.60	0.29~0.44
M4	9.52~14.28	0.93~1.40	0.69~1.03
M5	20.0~30.0	1.96~2.94	1.45~2.17
M6	33.28~49.92	3.26~4.90	2.41~3.61
M8	82.4~123.6	8.08~12.12	5.96~8.94
M10	166.4~249.6	16.32~24.48	12.03~18.05
M12	292.0~438.0	28.64~42.65	21.11~31.67

Table 32. Brass Bolts Torque Value

Bolt Spec.	Torque Value (kgf·cm)	Torque Value (N·m)	Torque Value (lbf·ft)
M6	29.98 ± 10 %	2.94 ± 10 %	2.17 ± 10 %
M8	64.26 ± 10 %	6.3 ± 10 %	4.16 ± 10 %

Checking Standard Torque Value

Torque value can be different, defending on the material, characteristic and specification of the equipment and fastener. Make sure to check the proper torque value for each specification of the equipment and fastener.

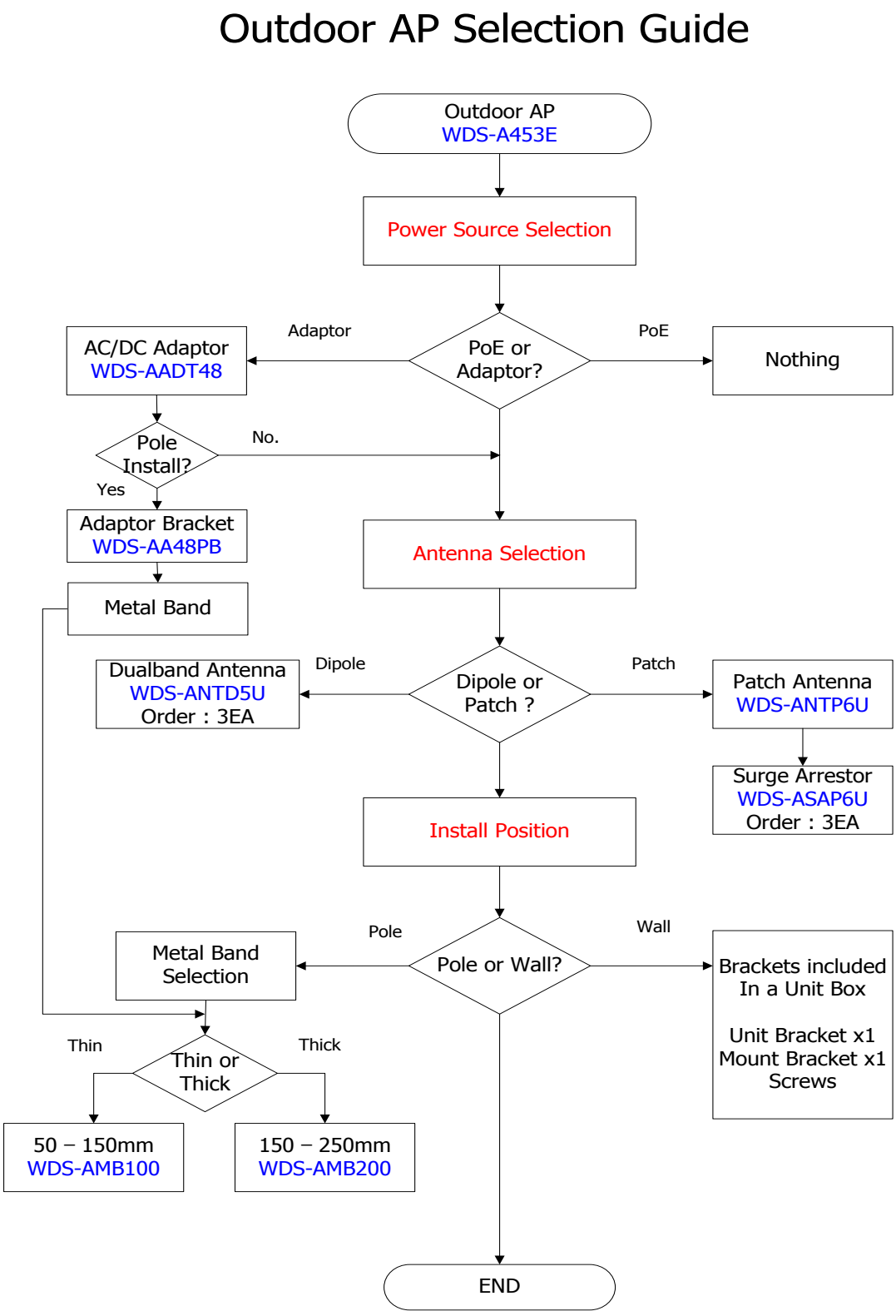


Figure 90. Outdoor AP Selection Guide

ABBREVIATION

A

AP	Access Point
AWG	American Wire Gauge

E

EMC	Electromagnetic Compatibility

L

LAN	Local Area Network

M

MGB	Main Ground Bar

P

PoE	Power over Ethernet

R

RF	Radio Frequency

S

S-FTP	Screened Foiled Twisted Pair

WEA453e AP

Installation Manual