



ZXMBW R9110

Remote Radio Unit(4×8)

Installation Manual

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Preface

Purpose ZXMBW R9110 is a type of WiMAX remote radio unit produced by ZTE. It is used for large-capacity coverage outdoors. In addition, it also provides coverage for some urban blind zones and hot-spot zones, such as basements and plazas.

This manual provides procedures and guidelines that support ZXMBW R9110 installation.

Intended Audience This document is intended for engineers and technicians who perform installation activities on ZXMBW R9110 Remote Radio Unit (4×8).

Prerequisite Skill and Knowledge To use this document effectively, users should have a general understanding of ZXMBW R9110 equipment and its components. Familiarity with the following is helpful:

- WiMAX fundamental
- ZXMBW R9110 hardware structure

What is in This Manual

This manual contains the following chapters:

Chapter	Summary
Chapter 1 Safety Description	This chapter introduces the safety symbols and safety specifications during ZXMBW R9110 installation.
Chapter 2 Installation Overview	This chapter introduces the product appearance, engineering indices, installation components, flow and precautions.
Chapter 3 Installation Preparation	This chapter introduces necessary ZXMBW R9110 installation preparations and unpacking acceptance process.
Chapter 4 Cabinet Installation	This chapter introduces three modes of ZXMBW R9110 installation.
Chapter 5 Cable Installation	This chapter introduces the installation of ZXMBW R9110 external cables.
Chapter 6 Main Antenna Feeder System Installation	This chapter introduces ZXMBW R9110 main antenna feeder system installation.
Chapter 7 Installation Check	This chapter introduces the procedures of ZXMBW R9110 hardware check after installation.

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Chapter 1

Safety Description

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Safety Specifications Guide

These safety instructions must be considered as supplementary for local safety regulations. The priority must be given to local safety regulations if there is any conflict between the two.

The maintenance personnel must have the knowledge of safety operations and maintenance with required qualification and technical background.



Warning:

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

All the operation and maintenance personnel must follow the safety precautions and instructions provided by ZTE Corporation to avoid any accident.












Note:

ZTE Corporation does not bear any liabilities incurred because of violation of the universal safety operation requirements, or violation of safety standards for designing, manufacturing and using the equipment.

Safety Symbols

[Table 1](#) lists safety symbols. They are to prompt the user of the safety precautions to be observed during ZXMBW R9110 operation and maintenance.

TABLE 1 SAFETY SYMBOLS DESCRIPTION

Safety Symbols	Meaning
	No smoking: Smoking is forbidden
	No flammables: No flammables can be stored.
	No touching: Do not touch.
	Universal alerting symbol: General safety attentions.
	Electric shock: Risk of electric shock.
	Electrostatic: The device may be sensitive to static electricity.
	Microwave: Beware of strong electromagnetic field.
	Laser: Beware of strong laser beam.
	Scald: Beware of scald.

Amongst these safety symbols, the universal alarm symbols are classified into three levels: danger, warning, and caution. The formats and meanings of the three levels are described as below:



Danger:

Indicates a potentially hazardous situation which, if not avoided, will result in death or serious injury of people, or equipment damages and breakdown.



Warning:

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

**Caution:**

Indicates a potentially hazardous situation which, if not avoided, could result in serious injuries, equipment damages or interruption of part services.

Safety Instructions

Electrical Safety Instructions**1. Tools**

Use special tools rather than common tools for high-voltage and AC operations.

2. High Voltage

- ▶ Strictly follow local safety rules to install AC power equipments.
- ▶ Installation staff must be qualified for performing high-voltage and AC operations.
- ▶ Do not wear any watch, hand chain, bracelet, ring or any other conductive object during such operations.
- ▶ Prevent moisture from accumulating on the equipment during operations in a damp environment.

**Danger:**

High voltage is hazardous. Direct or indirect contact with high voltage or main supply using a wet object could result in death.

3. Power Cable

- ▶ Make sure to switch off power supply before installing or disconnecting a power cable.
- ▶ Before connecting the power cable, make sure that the connecting cable and its label is appropriate for the actual installation requirements.

**Danger:**

- ▶ Never install or uninstall power cables while they are live.
- ▶ when contacting a conductor, power cables may result in sparks or electric arc causing a fire or even damage to eyes.

4. Drilling Holes

- ▶ Unqualified drilling could damage wiring and cables inside the cabinet. Additionally, metal pieces inside the cabinet created by the drilling could result in short circuit.

- ▶ Use insulation protection gloves and first move cables inside a cabinet away when it is necessary to drill holes on a cabinet. Protect eyes during drilling as dust or flying debris may damage eyes. Clean any debris in time after drilling.

**Warning:**

It is not allowed to drill cabinet holes without permission.

5. Lightning

Thunderstorms would give rise to a strong electromagnetic field in the atmosphere. Therefore, the equipment must be grounded and protected in time against lightning strikes.

**Danger:**

Do not perform high-voltage, AC, iron tower or mast operations in a thunderstorm.

Antistatic Safety Instructions

- Friction caused by human body activities is the root causing electrostatic charge accumulation. Static voltage carried by a human body in a dry environment can be up to 30 kV, and can remain in there for a long time. An operator with static electricity may discharge electricity through a component when he/she touches the conductor and causing damage.
- Wear an antistatic wrist strap (the other end of wrist strap must be well grounded) before touching the equipment or holding a plug-in board, circuit board, Integrated Circuit (IC) chip or other devices, to prevent human static electricity from damaging sensitive components.
- A resistor over 1 M Ω should be connected in series on the cable between the antistatic wrist strap and the grounding point, to protect the operator against accidental electric shock. Resistance over 1 M Ω is low enough to discharge static voltage.
- The antistatic wrist strap used must be subject to regular check. Do not replace the cable of an antistatic wrist strap with any other cable.
- Do not contact static-sensitive modules with any object that easily generates static electricity. For example, friction of package bag, transfer box and transfer belt made from insulation plastic may cause static electricity on components. Discharge of static electricity may damage components when they contact a human body or the ground.
- Modules should only contact materials such as antistatic bag. Keep modules in antistatic bags during storage and transportation.
- Discharge static electricity of the test device before use, that is, ground the test device first.
- Do not place the module near a strong DC magnetic field, such as the cathode-ray tube of a monitor. Keep the module at least 10 cm away.

**Electrostatic:**

Static electricity produced by human body can damage static-sensitive components on circuit board, such as large-scale integrated circuits.

Hoisting Heavy Objects

- Ensure the hoister can meet hoisting requirements when disassembling heavy equipment, or moving and replacing equipment.
- The installation personnel must be duly trained and qualified for hoisting operations. Hoisting tools must be inspected and complete before service. Make sure that hoisting tools are fixed firmly on a sufficiently secured object or wall before the hoisting operation. Give brief oral instructions during hoisting operations to prevent any mishap.

**Warning:**

When hoisting heavy objects, ensure that nobody is standing or walking under the hoisted object.

Other Safety Instructions

- Replacing any parts or making any changes to the equipment might result in an unexpected danger. Therefore, be sure not to replace any parts or perform any changes to the equipment unless authorized otherwise.
- Contact ZTE office if you have any question, to ensure your safety.
- Due to that RRU is in high temperature during running, the RRU should be installed in some regions out of operators' reach or strictly restricted.

**Caution:**

Do not perform maintenance or debugging independently, unless a qualified person is present.

FCC Radiation Exposure Statement

ZXMBW R9110 complies with FCC radiation exposure limits set forth for an uncontrolled environment. ZXMBW R9110 should be installed and operated with minimum distance 3m between the radiator & your body.

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Chapter 2

Installation Overview

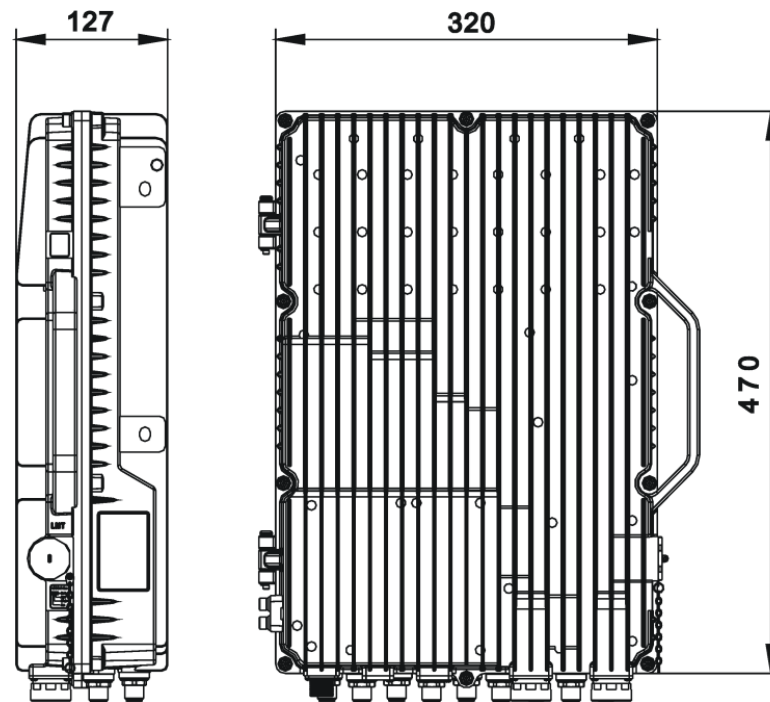
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Appearance

[Figure 1](#) shows the appearance of the ZXMBW R9110.

FIGURE 1 ZXMBW R9110 APPEARANCE



- Unit: mm

Engineering Indexes

[Table 2](#) lists the engineering indexes of the ZXMBW R9110.

TABLE 2 ENGINEERING INDEXES

Index	Description
Dimension	470 mm (H) × 320 mm (W) × 127 mm (D)
Volume	19.1 L
Weight	≤17 kg
Environmental temperature	-40°C ~ +55°C
Environmental humidity	5% ~ 95% RH
Shell protection level	IP65
Overall power consumption	Single carrier: ≤170 W Dual carrier: ≤185 W
Power supply	-48 V DC, -36V DC ~ -60V DC



Note:

The power supply index value is the measured value at the power input interface (PWR IN) of the ZXMBW R9110 chassis.

Components to be Installed

The following lists all components to be installed:

1. ZXMBW R9110



Note:

Inner cables and function modules in the ZXMBW R9110 have been installed completely before shipment. There is no need to check on site.

2. Cables
3. Main antenna feeder system (including antenna and feeder)
4. Protective shield

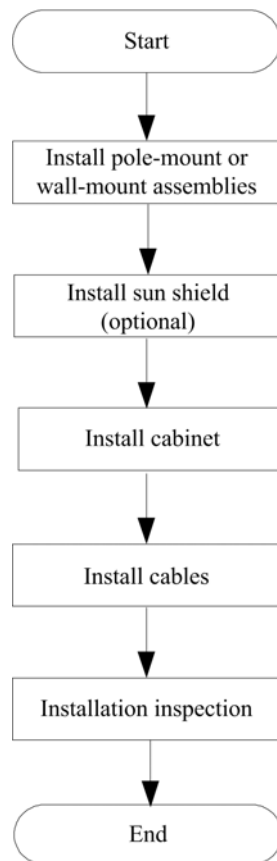
Note:

ZXMBW R9110 outdoor installation must be equipped with a protective shield.

R9110 Installation Flow

[Figure 2](#) illustrates ZXMBW R9110 installation flowchart.

FIGURE 2 ZXMBW R9110 INSTALLATION FLOWCHART

**Note:**

In an on-site installation, refer to [Figure 2](#) and some steps can be adjusted to be more convenient.

R9110 Installation Precautions

Before installation, the technical personnel must check the equipment running environment and prepare the information about data configuration, equipment position, interface configuration and cable length from the network operator.

In addition, the technical personnel must follow the following rules:

1. Do not operate the cabinet during installation process, unless the entire installation is completed.
2. Do not install the outdoor antenna feeder system during thunder and lightning.

Chapter 3

Installation Preparation

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Installation Environment Check

Equipment Installation Space Requirements

[Figure 3](#) illustrates the equipment room space requirements for installing ZXMBW R9110 (Unit: mm).

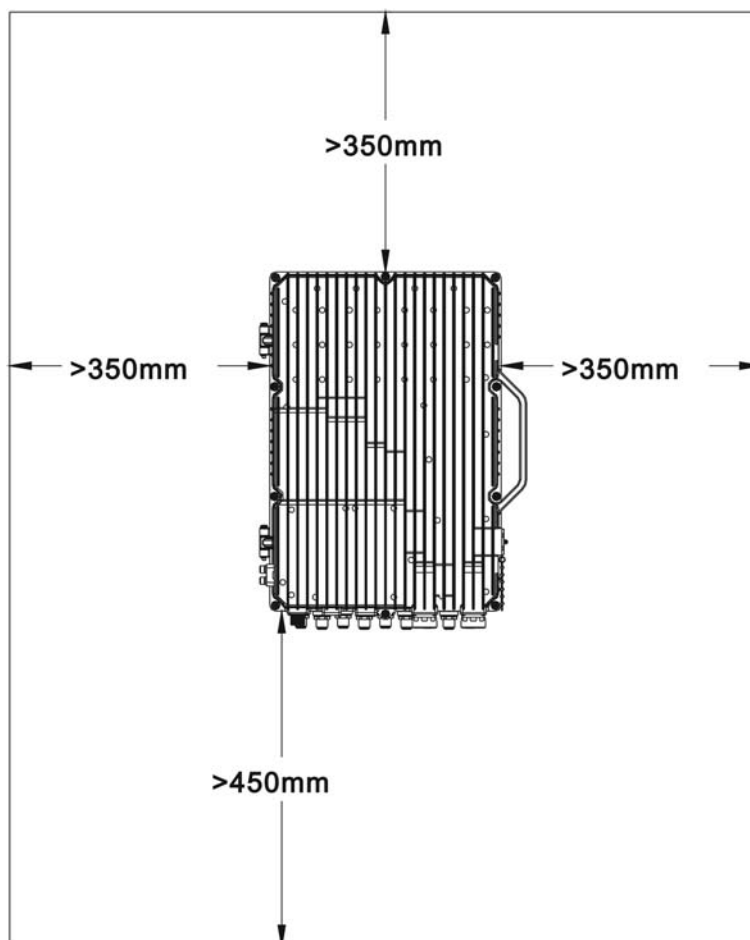
FIGURE 3 EQUIPMENT ROOM REQUIREMENTS FOR INSTALLING ZXMBW R9110**Note:**

Figure 3 gives space requirements for ZXMBW R9110 installed with a protective shield. For no protective shield, the cabinet top must remain $\geq 200\text{mm}$ space.

Cabinet Power Supply Requirements

The cabinet power supply should meet the following requirements:

- The DC power supply facility provides an adequate power and a stable voltage, of which the nominal value is -48 V ($-57\text{ V} \sim -40\text{ V}$).
- The storage battery has enough capacity.
- The Power socket to provide power supply is marked with an obvious label.

- Audible and visible alarms is required for power undercurrent, undervoltage and overvoltage.
- DC power installation requires polar consistency for fear of reverse connection and equipment damage.



Electric Shock:

Make sure all switches powered off to avoid electric shock before checking powers.

Lightning Grounding Requirements

- Install an antenna feeder lightning protection module and DC power lightning protection module in the ZXMBW R9110 cabinet. [Table 3](#) describes the lightning protection strengths and reference standards.

TABLE 3 LIGHTNING PROTECTION STRENGTHS AND REFERENCE STANDARDS

Module Name	Lightning Strength	Reference Standard
Antenna feeder lightning protection module	10KA	Signal port arrester international standard: IEC 61643-21
AC power lightning protection module	15KA	Power port arrester international standard: IEC 61643-1

- The common grounding mode must be used in ZXMBW R9110 cabinet grounding.



Note:

Common grounding mode: foundation grounding electrodes of all constructions mutually connected with other special grounding electrodes form a common grounding net; work grounding/protection grounding/logic grounding/shield enclosure grounding/antistatic grounding of devices share a group of grounding system with lightning protection grounding of constructions.

- The resistance of ZXMBW R9110 cabinet grounding must be not more than 10Ω.

Transmission Requirements

Table 4 describes external transmission interfaces of ZXMBW R9110 cabinet.

TABLE 4 ZXMBW R9110 EXTERNAL TRANSMISSION INTERFACE

Transmission Type	Interface Name	Connector	Description
Optical fiber	Baseband-RF optical fiber interface	LC	Connects to a corresponding optical fiber interface in the baseband unit.
Feeder	RF antenna interface	N-type	Connect the ZXMBW R9110 cabinet with feeder as well as feeder with antenna.
Ethernet cable	Ethernet interface	RJ45	Local operation and maintenance

Cabling Requirements

Cable Layout Requirements

- Wrap their connector with insulation adhesive tape before laying a power cable and PE cable.
- Separate a signal cable from the power cable and PE cable while laying them.
- Their distances each other are not less than 100 mm outside the cabinet while laying the power cable, PE cable and signal cable parallel.
- Make sure the cross angle of signal cable and power cable as 90 degree, if needed.
- Make sure that the cable bending radius is 20 times greater than the power cable diameter.
- Make straight routing and smooth bending of the power cable during connecting to the earthing terminals of power distribution box inside the cabinet.
- Make sure the cable installation position in terms of the engineering requirements and consistent with the data configuration.
- Lay cables in a distinct and reasonable way with proper bending according to the working design.
- Make sure organized and smoothing routing of signal cables without cross.
- Make sure cable layout convenient for maintenance and capacity expansion.
- Make sure the minimum bending radius is not less than 20 times that of the feeder.

- See [Table 5](#) below for detailed feeder bending radius requirements.

TABLE 5 BENDING RADIUS REQUIREMENTS ON FEEDERS OF DIFFERENT TYPES

Feeder Type	Recommended Minimum Bending Radius	
	Single Bending	Repeated Bending (≤ 15 times)
Super flexible 1/2" feeder	150 mm	300 mm
1/2" feeder	500 mm	1,250 mm
7/8" feeder	900 mm	2,500 mm
5/4" feeder	1,500 mm	3,800 mm

Binding Technical Requirements

- Keep an equal spacing between wire fasteners and an appropriate degree of binding tightness with the same orientation.
- All fasteners are bound in the same direction. Remain 5~10 mm cable ties and cut redundant part flatly.
- Separate the signal cable from power cable and grounding cable while laying them.
- Bind the cables closely and orderly before arraying on the cable tray.
- Make allowance of each plug for extra plugging.


Staff Requirements











The installation personnel for ZXMBW R9110 should take part in ZTE training first to obtain installation and debugging methods. They are not qualified until passing the exams and getting the work certificate.






Tools and Instruments Preparation



[Table 6](#) lists tools and instruments used in installation.













TABLE 6 TOOLS AND INSTRUMENTS



Category	Name	Instance
Special tools	Knife for cutting feeder ends	
	75Ω coaxial cable stripper	
	Multifunctional crimping pliers	
	Multimeter	
	Standing wave ratio tester	
	Earth resistance tester	
Drilling tools	Electrical percussion drill	
	Drill bit	


Category	Name	Instance
	Vacuum cleaner	
	Connector board (there must be three two-phase and three three-phase sockets at least; the current capacity must be more than 15 A)	
Common tools	Cross screwdriver (one 4", one 6" and one 8")	
	Flathead screwdriver (one 4", one 6" and one 8")	
	Adjustable wrench (one 6", one 8", one 10", one 12")	
	Dual-purpose wrench (one 17" and one 19")	
	Socket wrench	
	Paper knife	
	Claw hammer with 5 kg	
Electric iron (300 W and 40 W)		

Category	Name	Instance
	Hexagonal wrench	
	Solder wire	
Mea- sure- ment tools	50 m tape	
	5 m tape measure	
	Angle instrument	

Category	Name	Instance
	Compass	
	Horizontal ruler	
	Plumb	
Pro- tec- tive tools	Antistatic wrist strap	
	Slip-proof gloves	
	Safety helmet	

Category	Name	Instance
Bench work tools	Hacksaw	
	Sharp nose pliers (8")	
	Thin nose bent pliers (8")	
	Round-nose pliers (8")	
	Vice (8")	
	Needle file (medium-sized)	
	Nippers	
	Paint brush	
	Scissors	
	Hot air blower	
	Solder removal tool	
	Hydraulic crimper	

Category	Name	Instance
	Crowbar	
Auxiliary tools	Pulley block	
	Rope	
	Ladder	
Me- ters	Spectrum analyzer	
	BS tester	

Category	Name	Instance
	Field intensity tester	

Documentation Preparation

Prepare the following technical documents:

- *ZXMBW R9110 Remote Radio Unit (4×8) Project Survey Report*
- *ZXMBW R9110 Remote Radio Unit (4×8) Environment Acceptance Report*

Refer to a suite of ZXMBW R9110 documents as follows:

- *ZXMBW R9110 Remote Radio Unit (4×8) Technical Manual*
- *ZXMBW R9110 Remote Radio Unit (4×8) Installation Manual*
- *ZXMBW R9110 Remote Radio Unit (4×8) Operation and Maintenance Manual*
- *ZXMBW R9110 Remote Radio Unit (4×8) Commissioning and Configuration Manual*

Unpacking Acceptance and Handover

Counting Goods

Context The representative of customer and the project supervisor must be present on site when counting received goods. If either party is not present, transporter must be responsible for the intactness of the goods.

- Steps**
1. Check the Delivery Checklist of ZTE Corporation. Check the total number of the goods and the intactness of the packing boxes. Check the packing list to see if the place of arrival is the actual installation place. If the goods are intact, unpack and inspect them.

**Note:**

It is recommended to unpack the goods about 30 minutes after receipt, because there is a possibility of moisture content due to temperature variations.

2. The equipment inspection list and *unpacking acceptance report* are present in the first packing carton. Firstly, open first the packing carton and take out the *Unpacking Acceptance Report* to check whether the goods received are in accordance with the inspection list.
3. During the counting and unpacking inspection process, if any material is found short, or goods damaged, fill in the *Unpacking Acceptance Feedback Table* and contact ZTE promptly.

END OF STEPS

Crate Unpacking

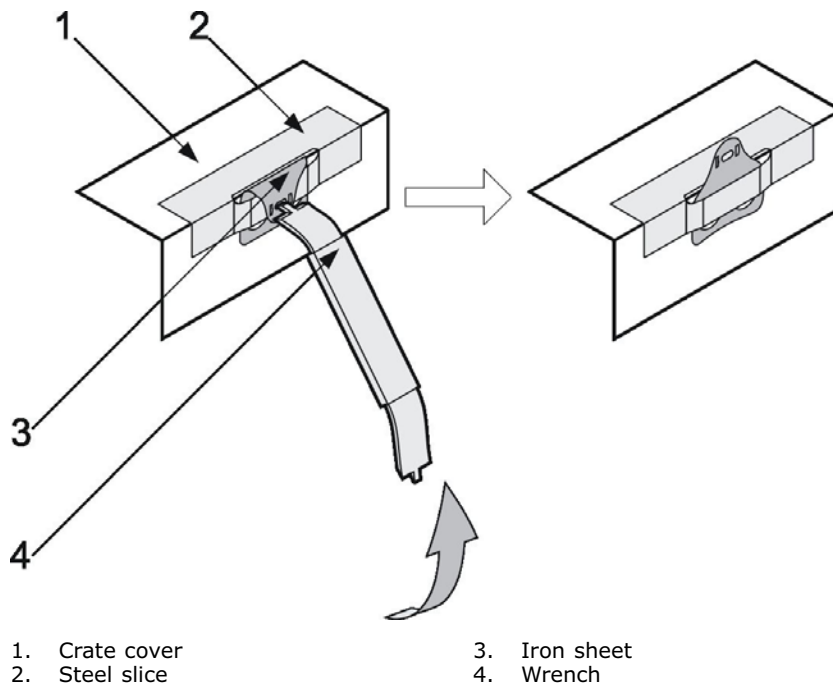
Context Prepare the appropriate tools such as claw hammer, straight screwdriver, pliers, and crowbar.

Pay attention to the following while unpacking.

- Make sure the antistatic bag intact during unpacking to store spare parts or pack faulty components for repair in future.
- Keep carefully the desiccant in the crate or antistatic bag out of children's reach.

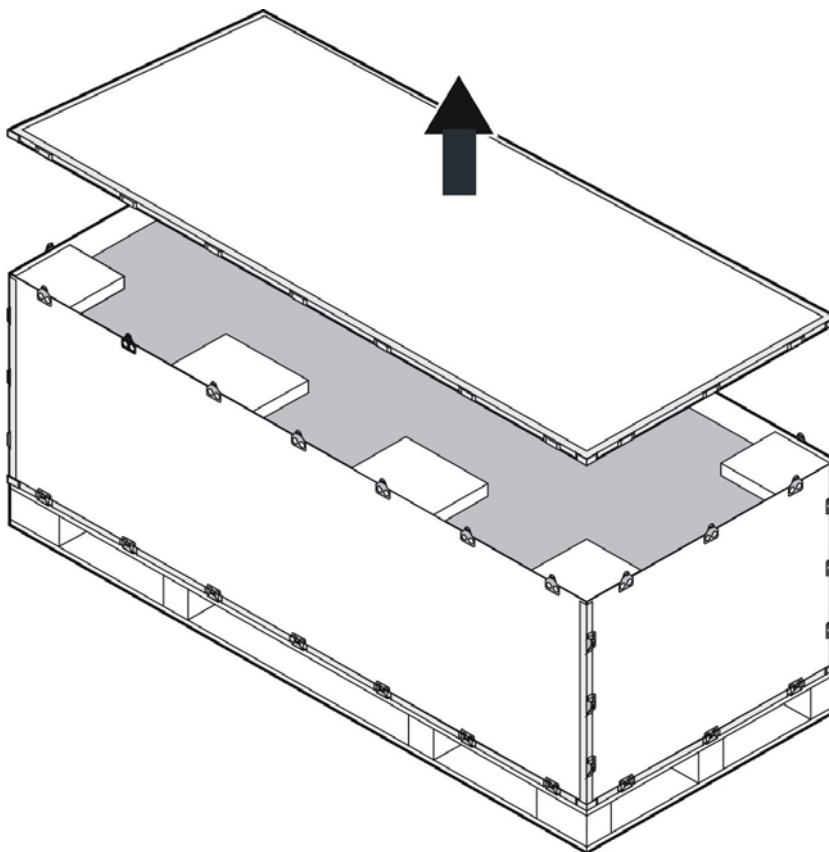
- Steps**
1. Insert a straight screwdriver or claw hammer into a metal locker on the crate cover and then turn it to make a iron sheet loose. Then use a wrench, crowbar or pliers to unclench the iron sheet. The process is as shown in [Figure 4](#).

FIGURE 4 CRATE UNPACKING (1)



- 2. Unclench other metal lockers on the top of crate. Remove the top cover of crate, as shown in [Figure 5](#).

FIGURE 5 CRATE UNPACKING (2)

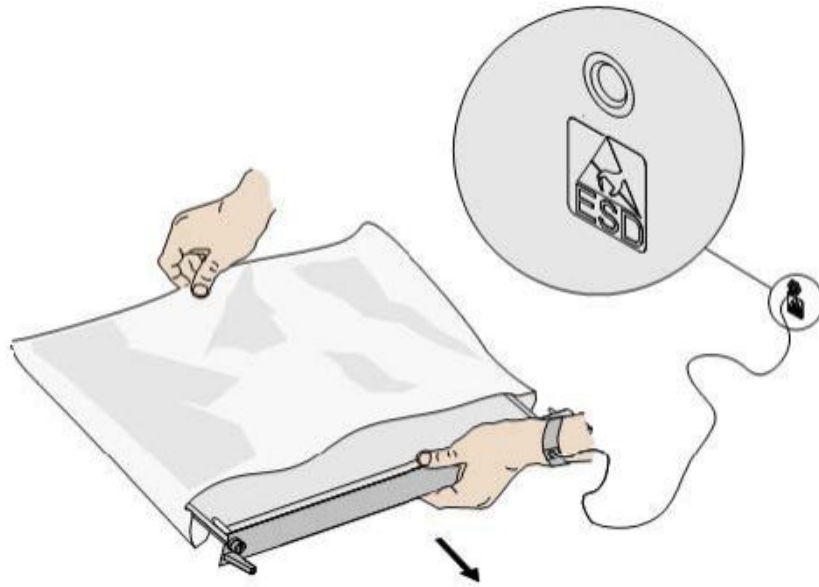


3. Take out the ZXMBW R9110 cabinet.

END OF STEPS

Postrequisite Before carefully opening the antistatic packing bag in the crate with a scissors, first wear an antistatic wrist strap, as shown in [Figure 6](#). Then take out components in the bag.

FIGURE 6 WEARING ANTISTATIC WRIST STRIP



Carton Unpacking

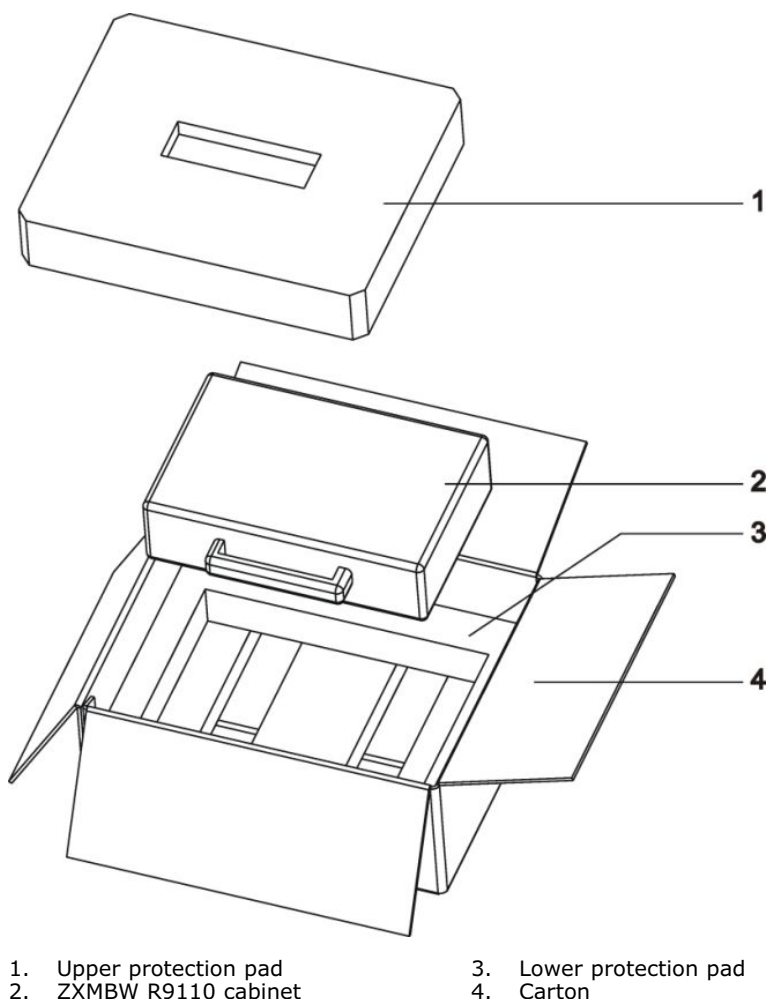
Context Prepare the appropriate tools such as diagonal pliers, and paper knife.

Pay attention to the following while unpacking.

- Make sure the antistatic bag intact during unpacking to store spare parts or pack faulty components for repair in future.
- Keep carefully the desiccant in the crate or antistatic bag out of children's reach.

- Steps**
1. Use a diagonal pliers to cut packing straps.
 2. Carefully cut adhesive tape along the slits on the carton cover with a paper knife to avoid damaging goods inside.
 3. Open the carton, and remove the foam board.
 4. Check the goods within the carton according to an attached checklist. Carton unpacking is as shown in [Figure 7](#).

FIGURE 7 CARTON UNPACKING

**END OF STEPS**

Goods Acceptance and Handover

Context Perform this procedure for accepting goods, and handing them over to operators.

Steps 1. **Acceptance**

Based on the name, category and number mentioned on the shipping list, carefully check the goods piece by piece. Make sure that all goods meet the following conditions:

- i. There is no bubbly, peeling, nick and filth mark on the surface of the chassis.
- ii. The oil paint on the chassis surface is intact.
- iii. All clamping screws are tight and intact.
- iv. All components are properly installed in position.

v. The inspected goods are placed by category.

2. **Handover**

After completing the unpacking procedure, representative of customer and project supervisor should approve and sign the *Unpacking for Inspection Report*. Both parties should have a copy of Unpacking for Inspection Report.

END OF STEPS

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Chapter 4

Cabinet Installation

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R9110 Installation Mode Introduction

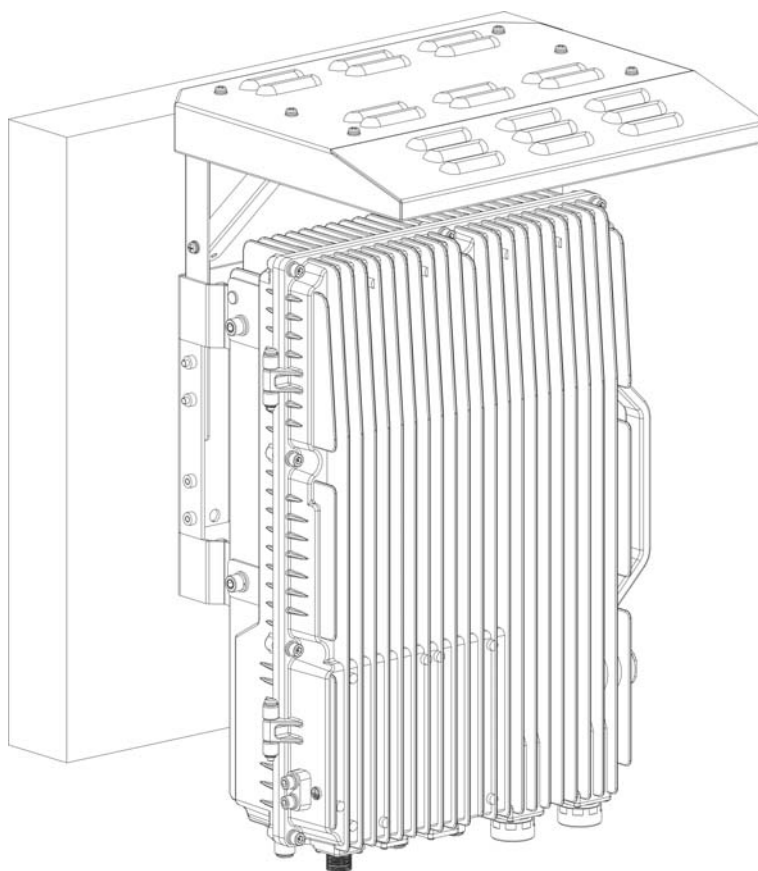
The ZXMBW R9110 cabinet adapts two types of installation modes:

- Wall-mount installation
- Pole-mount installation

**Wall-mount
Installation**

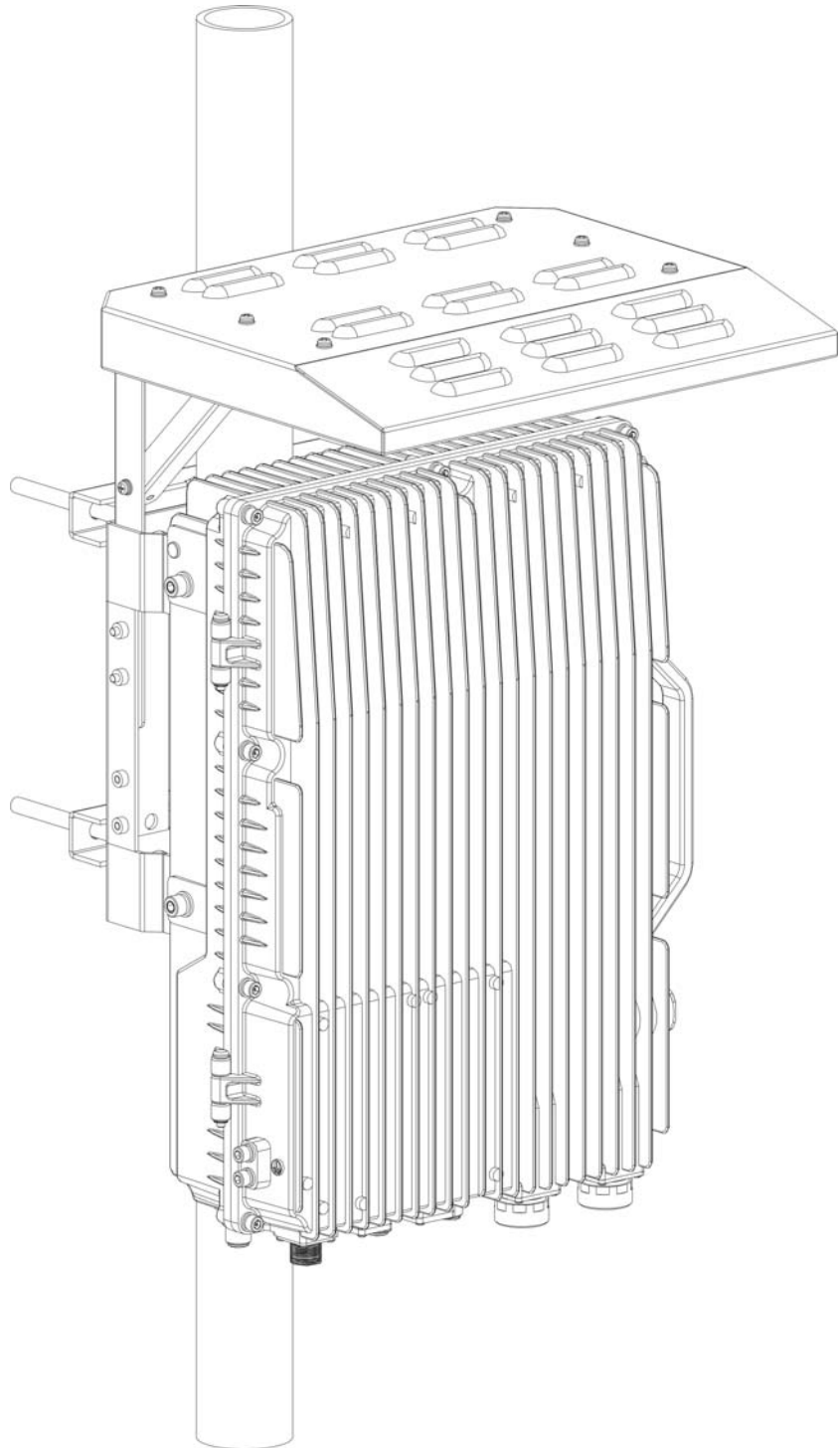
The wall-mount installation mode is illustrated in [Figure 8](#).

FIGURE 8 ZXMBW R9110 WALL-MOUNT INSTALLATION



**Pole-mount
Installation**

The pole-mount installation mode is illustrated in [Figure 9](#).

FIGURE 9 ZXMBW R9110 WALL-MOUNT INSTALLATION

Typical Application Scenarios

The ZXMBW R9110 cabinet shares a pole with an antenna in the outdoor pole-mount mode, as shown in [Figure 10](#), [Figure 11](#) and [Figure 12](#).

FIGURE 10 ZXMBW R9110 AND ANTENNA SHARING POLE (1)

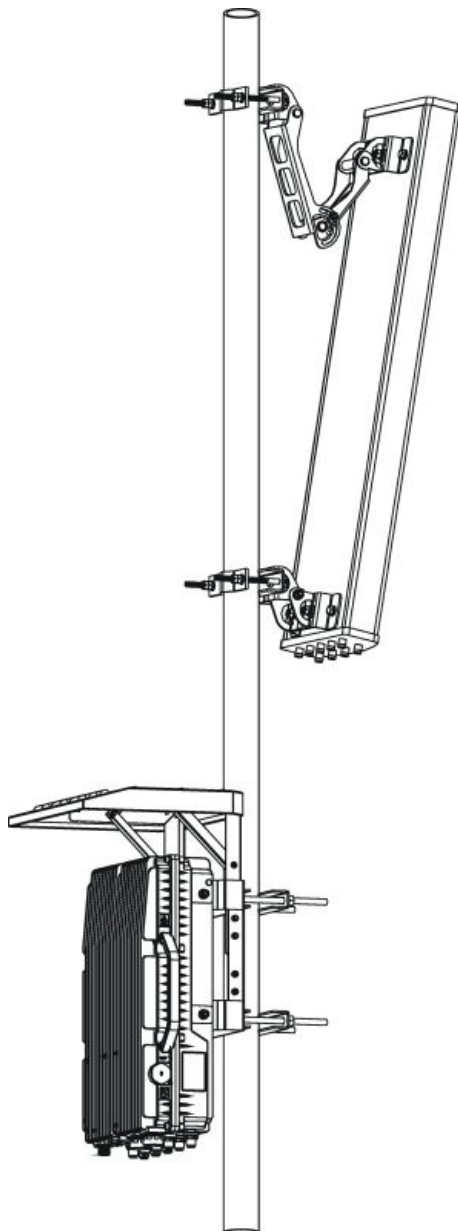


FIGURE 11 ZXMBW R9110 AND ANTENNA SHARING POLE (2)

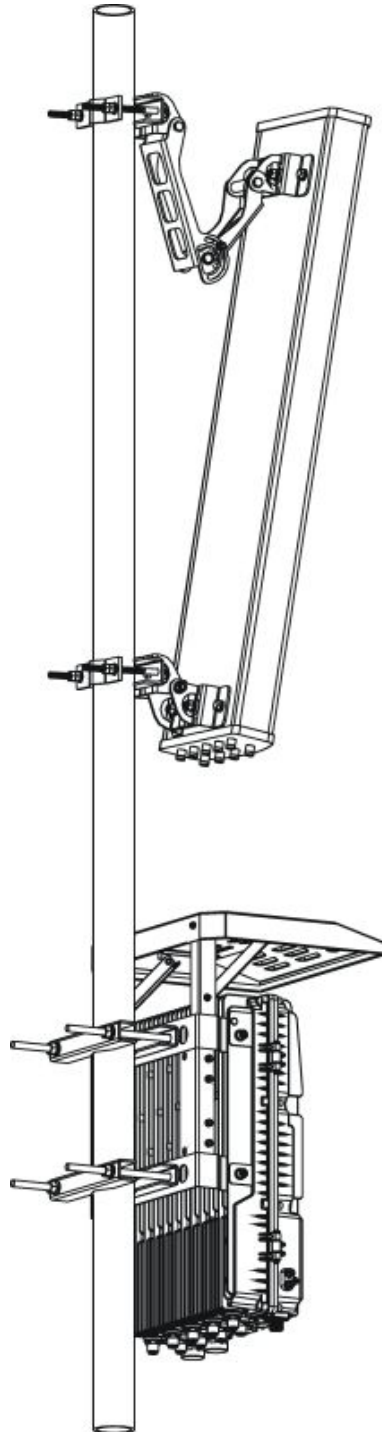
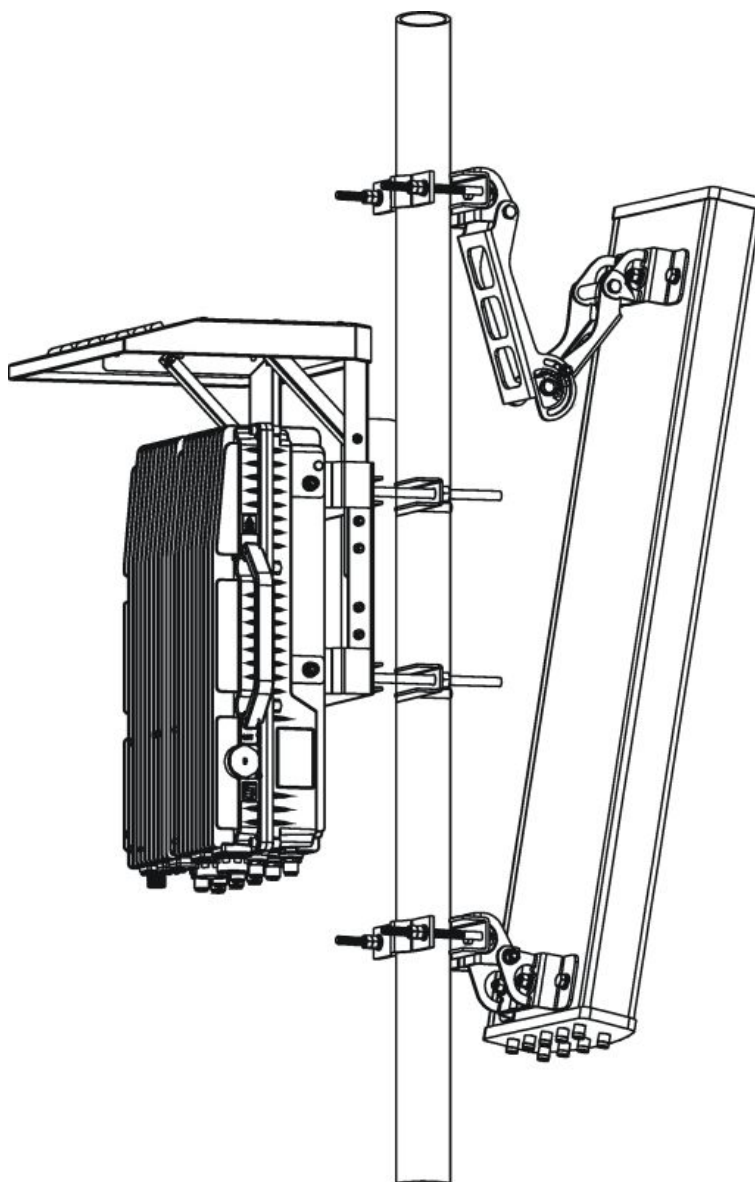
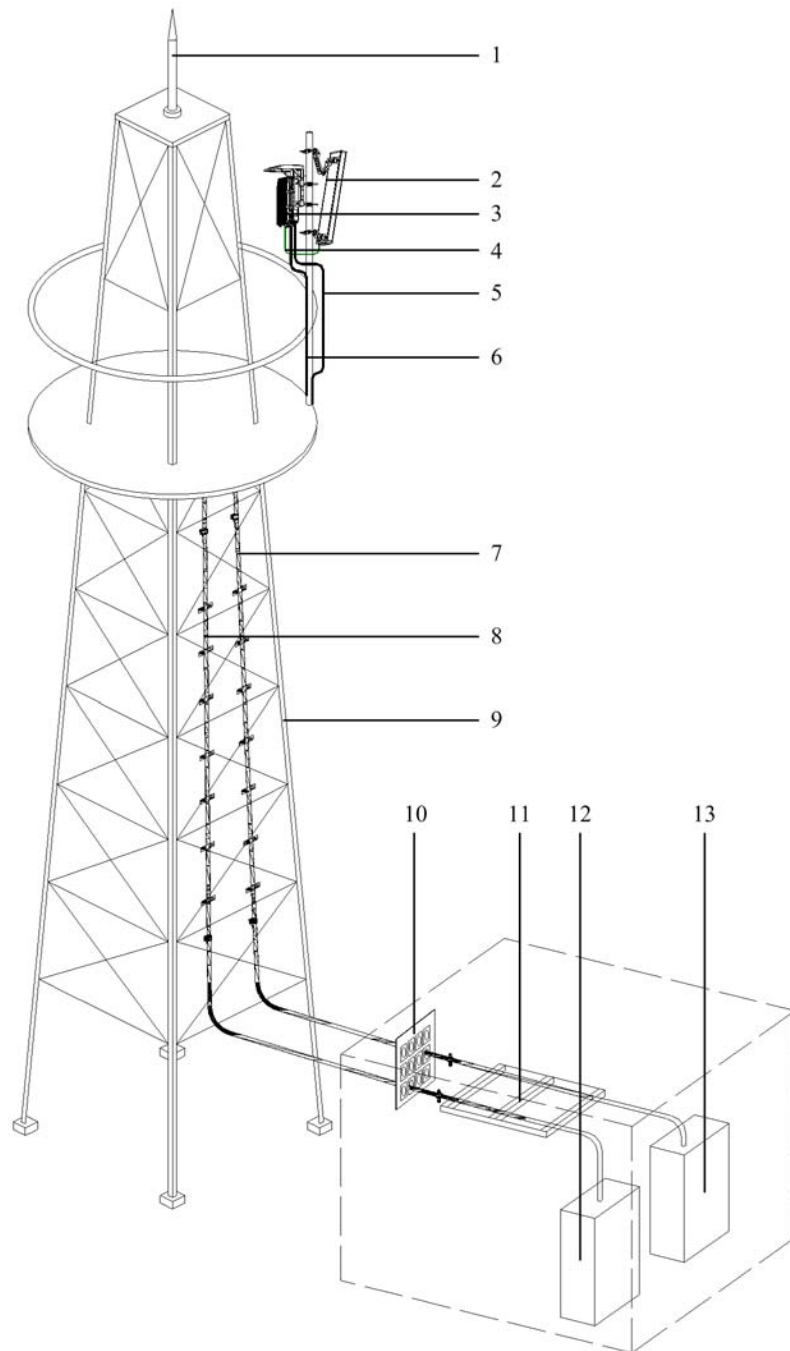


FIGURE 12 ZXMBW R9110 AND ANTENNA SHARING POLE (3)

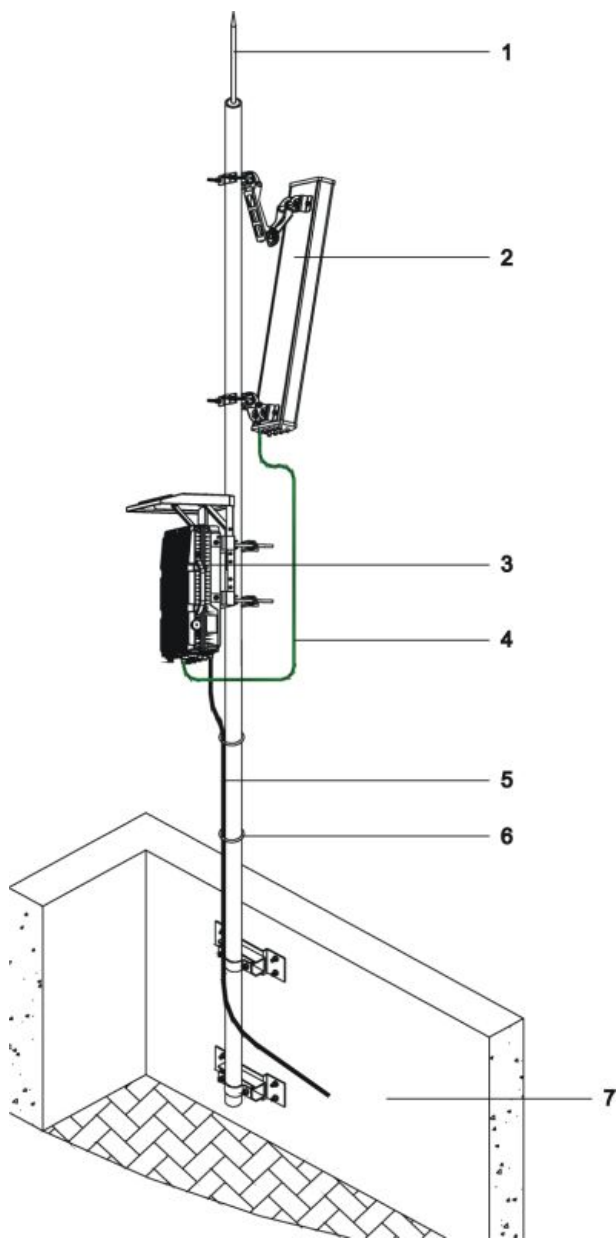
[Figure 13](#), [Figure 14](#) and [Figure 15](#) illustrate the typical application scenarios for ZXMBW R9110 outdoor installation.

FIGURE 13 ZXMBW R9110 APPLICATION SCENARIO (1)



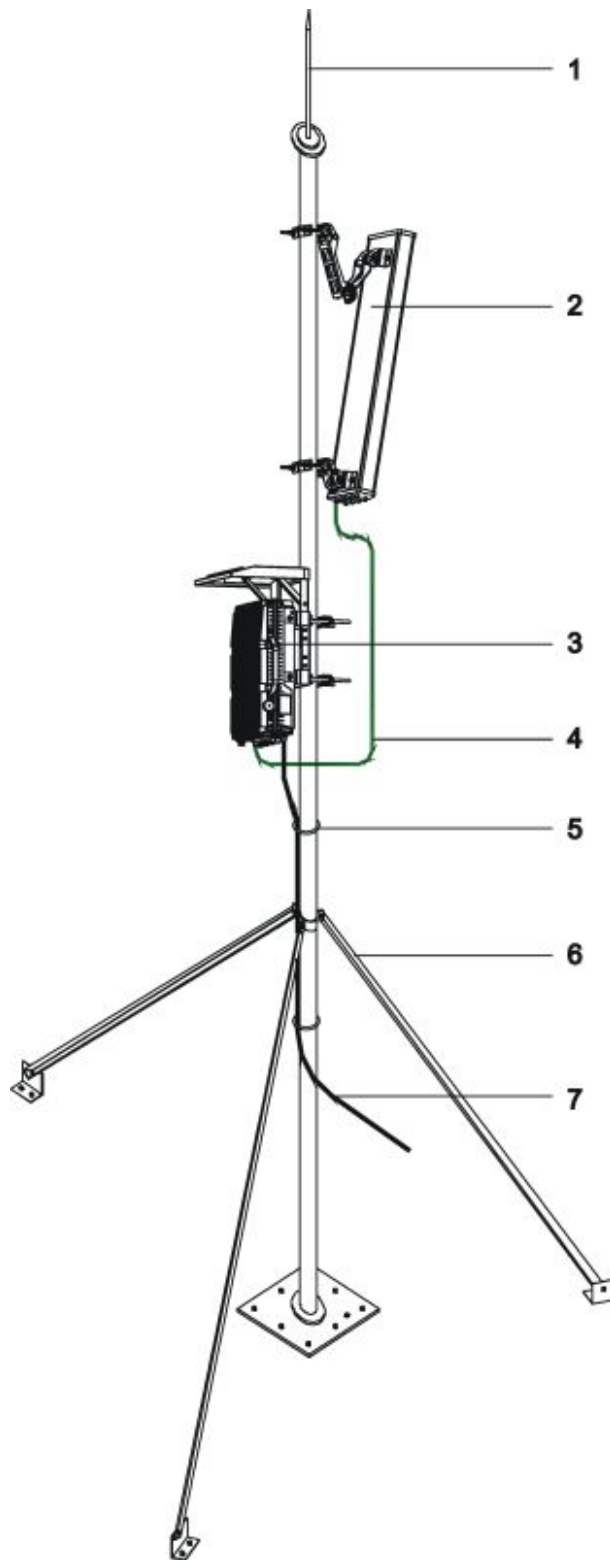
1. Lightning rod
2. Antenna
3. ZXMBW R9110 Cabinet
4. Feeder
5. AC power cable
6. Field optical fiber
7. DC power cable
8. Field optical fiber
9. Iron tower
10. Feeder window
11. Cable rack
12. BBU
13. Power distribution box

FIGURE 14 ZXMBW R9110 APPLICATION SCENARIO (2)



- 1. Lightning rod
- 2. Antenna
- 3. ZXMBW R9110 cabinet
- 4. Feeder
- 5. DC power cable and field optical fiber
- 6. Fastener
- 7. Enclosure atop building

FIGURE 15 ZXMBW R9110 APPLICATION SCENARIO (3)



- | | |
|------------------------|---|
| 1. Lightning rod | 6. Support pole |
| 2. Antenna | 7. DC power cable and field optical fiber |
| 3. ZXMBW R9110 cabinet | |
| 4. Feeder | |
| 5. Fastener | |

**Caution:**

1. The pole dose not replace the lightning rod.
2. The face of ZXMBW R9110 cabinet must be toward the direction where it is convenient to maintain during pole-mount installation.
3. Make sure all interfaces of ZXMBW R9110 cabinet downward while installing it.

Pole-mounted Installation Mode

Components Used in Pole-mount Installation

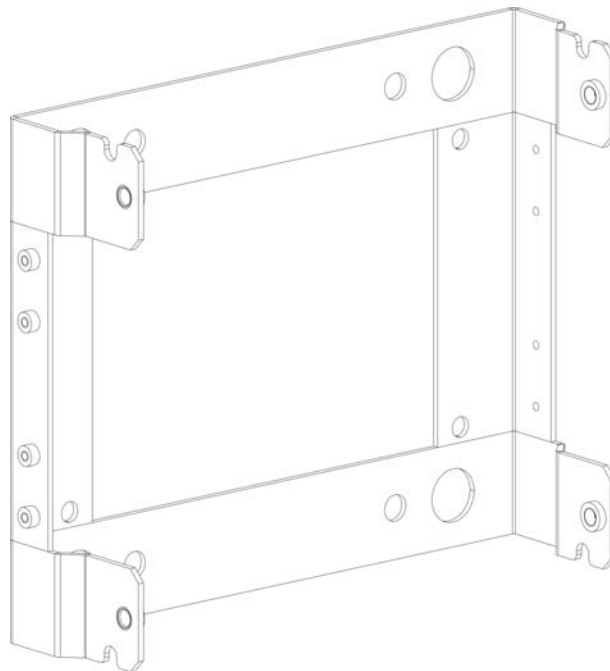
The main components used in pole-mount installation for a single ZXMBW R9110 cabinet are listed in [Table 7](#).

TABLE 7 MAIN COMPONENT LIST

Name	Quantity
Pole (Diameter: 60 mm ~ 114 mm)	1
ZXMBW R9110 cabinet	1
Pole fixing clip	4
M10×180 hexagon head bolt (full thread)	4
M10 hexagon head bolt	4
Flat washer 10	8
Spring washer 10	4
M8×20 hexagon head screw	4
Supporting panel	1
Protective shield	1
M5×16 cross recessed small pan head combined screw	4

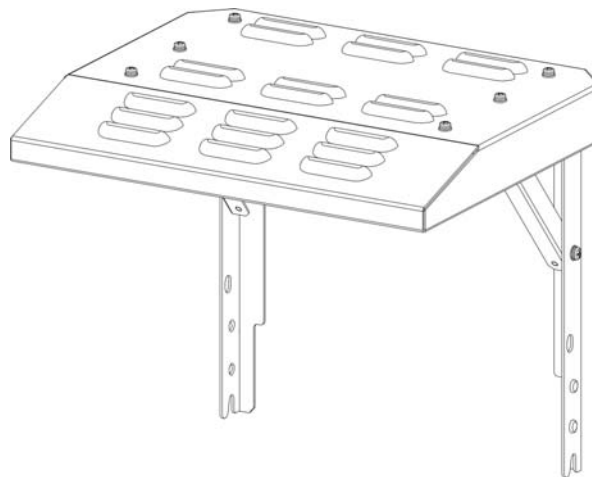
The supporting panel is illustrated in [Figure 16](#).

FIGURE 16 SUPPORTING PANEL



The protective shield is illustrated in [Figure 17](#).

FIGURE 17 PROTECTIVE SHIELD



Note:

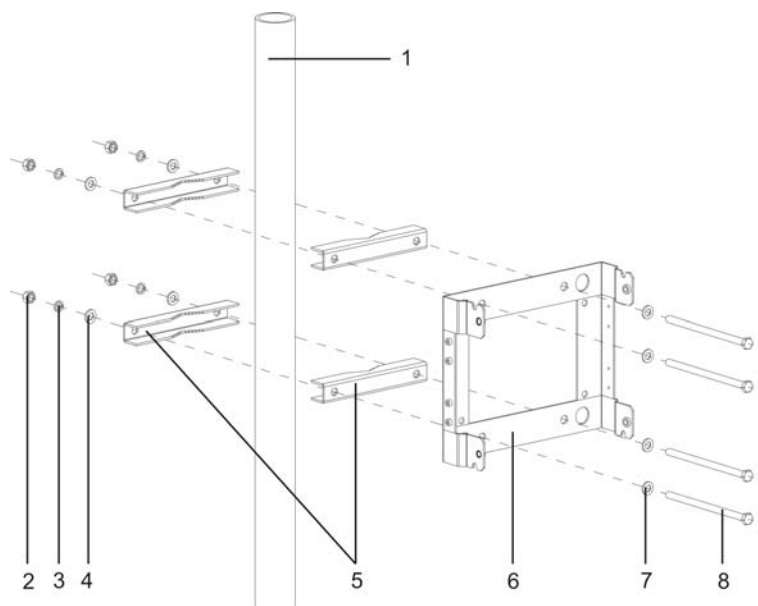
1. As common installation components, the supporting panel and protective shield are used in the ZXMBW R9110 pole-mount installation and wall-mount installation.
-

Installing Pole-mount Mode

Steps 1. Install fixing clip assemblies.

Lead M10×180 hexagon bolts through a supporting panel and clips and then cover a spring washer 10 and flat washer 10. Screw down M10×180 hexagon bolts to fix the supporting panel to the pole, as shown in [Figure 18](#).

FIGURE 18 INSTALLING POLE CLIP ASSEMBLIES

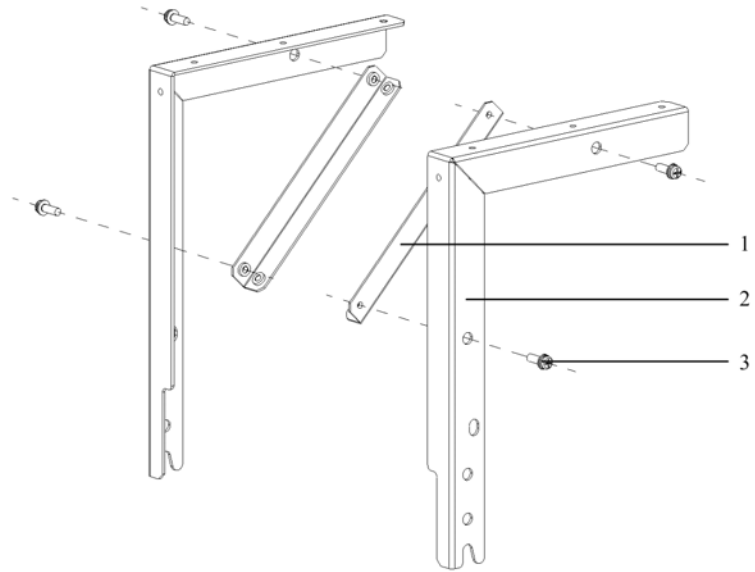


- | | |
|---------------------|-------------------------|
| 1. Pole | 5. Clip |
| 2. M10 hexagon nut | 6. Supporting panel |
| 3. Spring washer 10 | 7. Flat washer 10 |
| 4. Flat washer 10 | 8. M10×180 hexagon bolt |

2. Install a protective shield.

- i. Assemble the protective shield with M5×16 screws, as shown in [Figure 19](#) and [Figure 20](#).

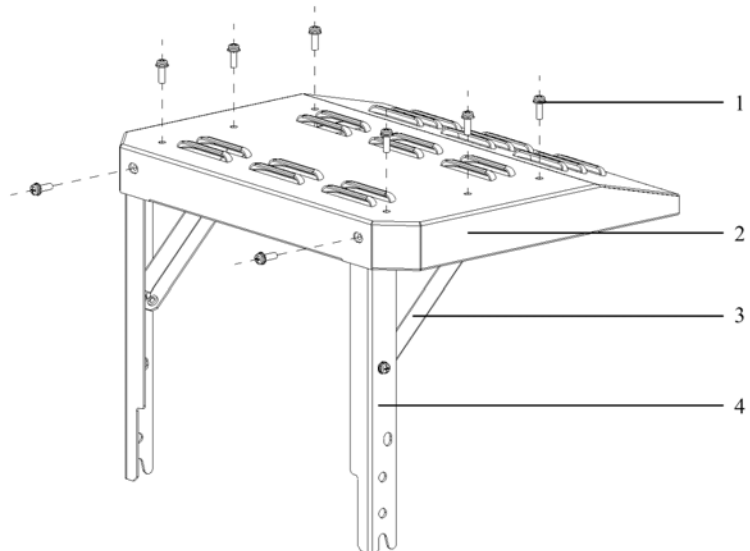
FIGURE 19 ASSEMBLING PROTECTIVE SHIELD (1)



1. Support pole
2. Rack

3. M5×16 cross recessed small pan head combined screw

FIGURE 20 ASSEMBLING PROTECTIVE SHIELD (2)

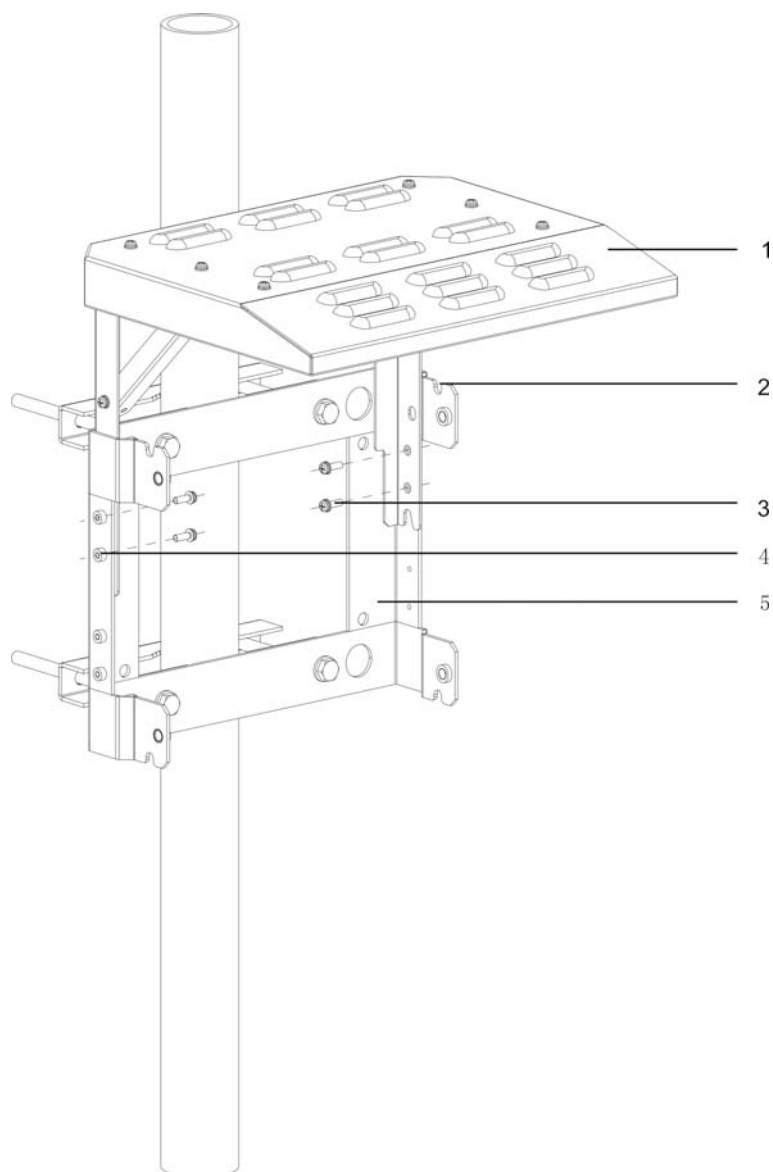


1. M5×16 cross recessed small pan head combined screw

2. Protective shield
3. Support pole
4. Rack

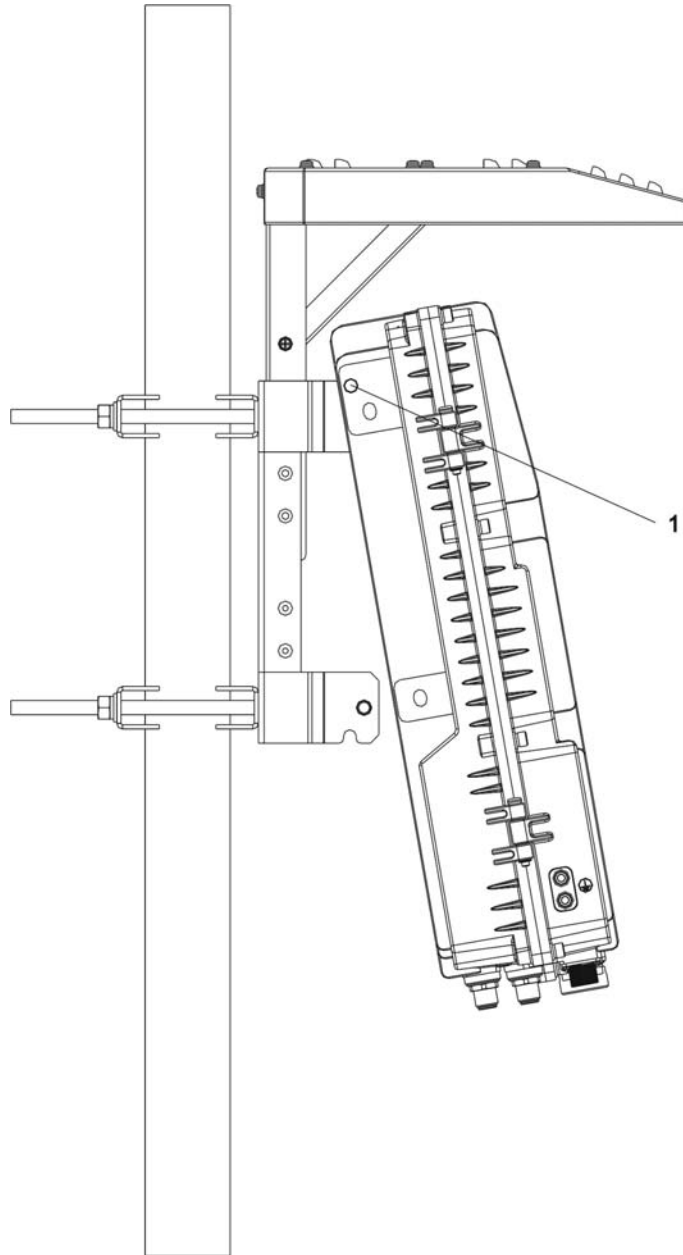
- ii. Insert the protective shield inside the supporting panel and align it with installation holes. Mount four M5×16 crossed recessed small pan head combined screws (respectively two at left and right) from the inside of protective shield to fix the protective shield and supporting panel, as shown in [Figure 21](#).

FIGURE 21 INSTALLING PROTECTIVE SHIELD



- | | |
|---|-----------------------|
| 1. Protective shield | 4. Self-clinching nut |
| 2. Semicircle slot | 5. Supporting panel |
| 3. M5×16 cross recessed
small pan head combined
screw | |

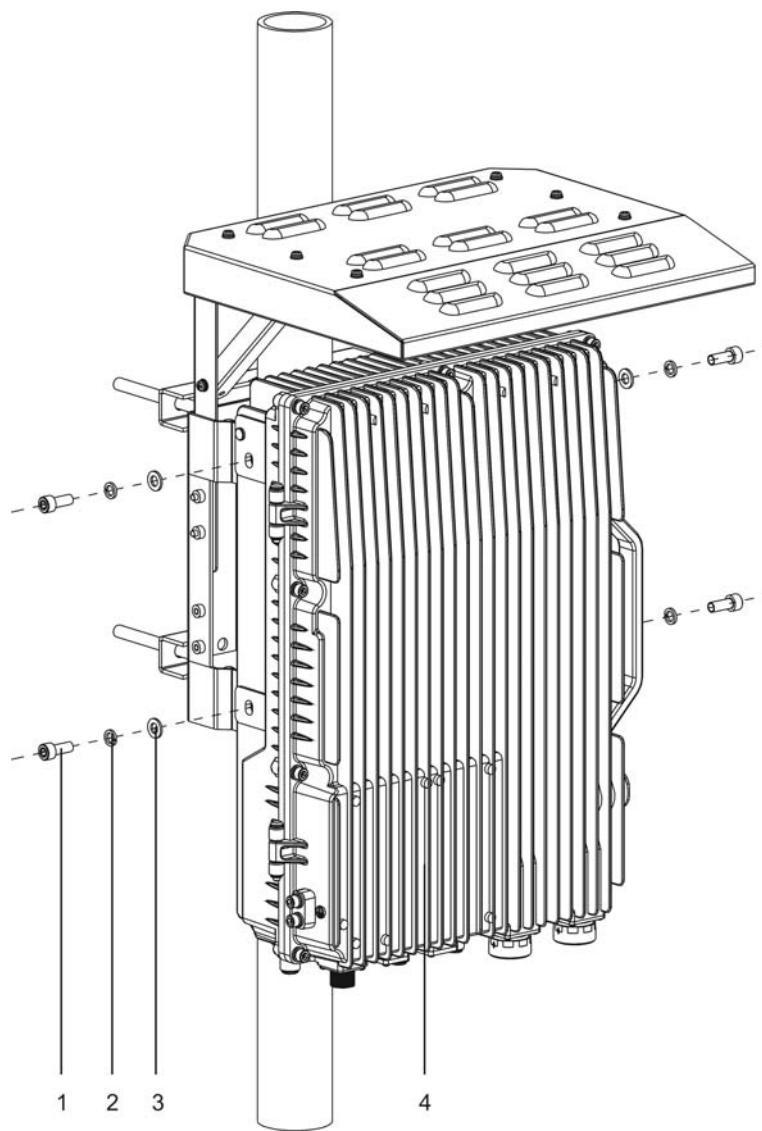
3. Install the ZXMBW R9110 cabinet.
 - i. Hold the ZXMBW R9110 cabinet and mount pins located at top left and right corners of cabinet into the semicircle slots of supporting panel, as shown in [Figure 22](#).

FIGURE 22 INSTALLING ZXMBW R9110 CABINET (1)

1. Pin

- ii. Mount four M8×20 hexagon head screws (respectively two at left and right) to fasten the ZXMBW R9110 and supporting panel, as shown in [Figure 23](#).

FIGURE 23 INSTALLING ZXMBW R9110 CABINET (2)

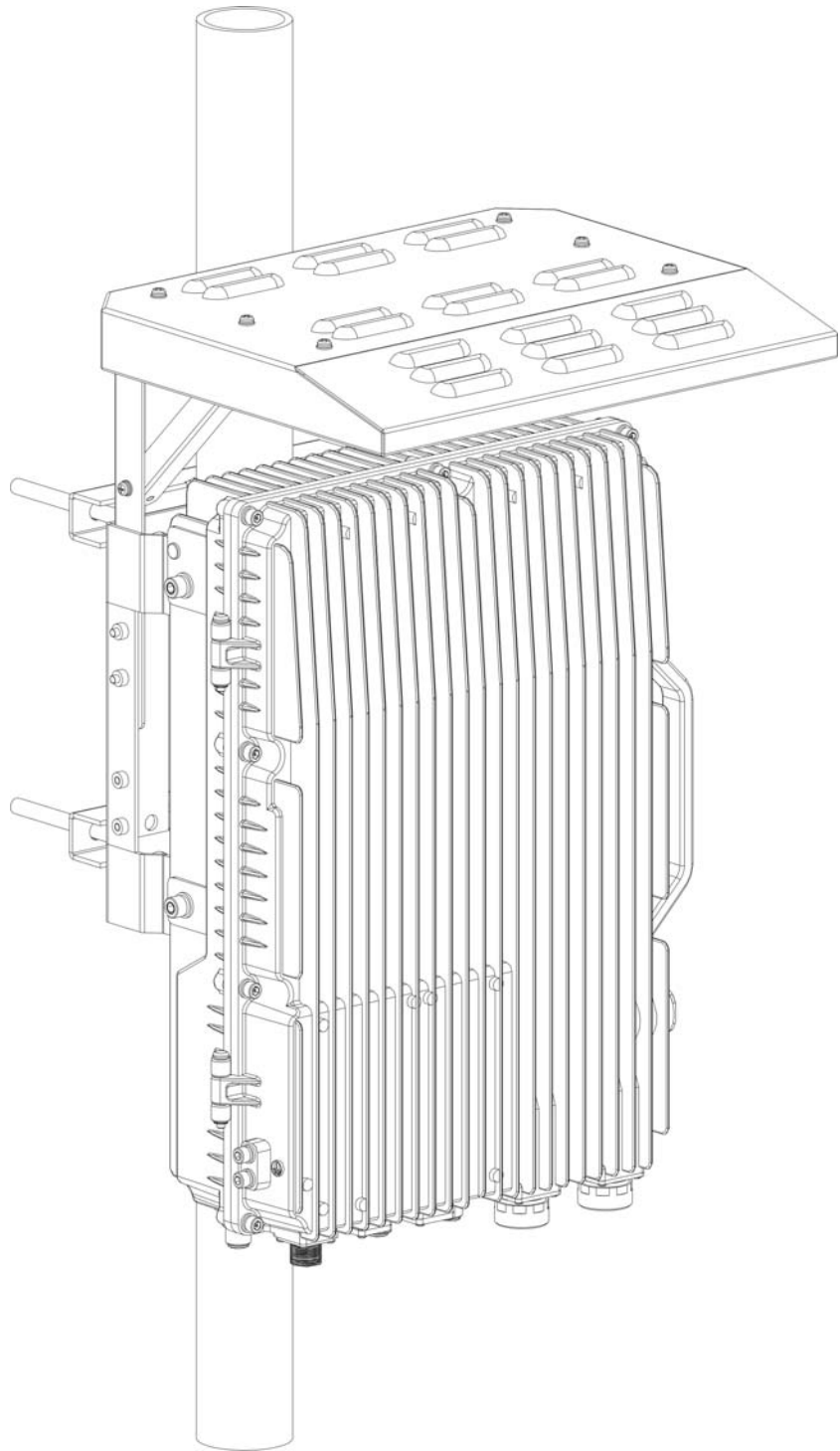


- | | |
|-----------------------------|------------------------|
| 1. M8×20 hexagon head screw | 3. Flat washer 8 |
| 2. Spring washer 8 | 4. ZXMBW R9110 cabinet |

END OF STEPS

Result The ZXMBW R9110 cabinet is completely installed to the pole, as shown in [Figure 24](#).

FIGURE 24 COMPLETING ZXMBW R9110 POLE-MOUNT INSTALLATION



Hoisting ZXMBW R9110 on Tower

Prerequisites

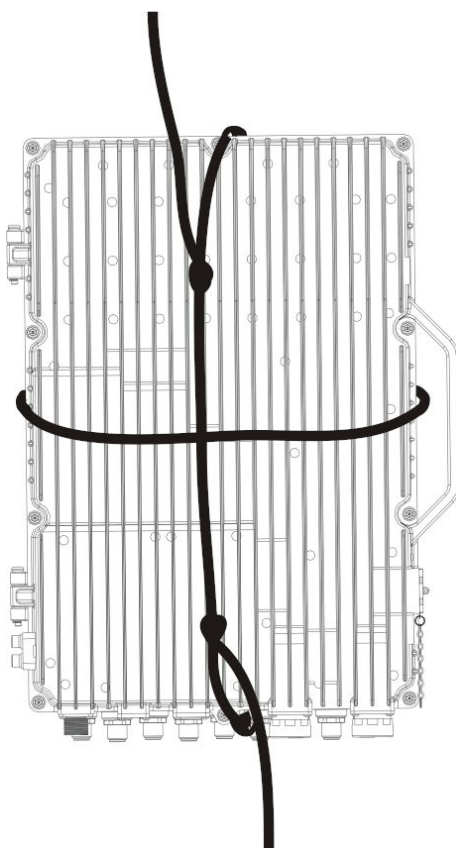
Note:

If it is required to install the ZXMBW R9110 cabinet on tower, refer to the following content.

1. The natural environments must meet the requirements of hoisting on the tower, such as no fog and high visibility. Prohibit hoisting in the windy, rainy or snowy day.
2. Prepare tools to be used in hoisting, such as a rope and fixed pulley. The fixed pulley has been installed in position on the tower.

- Steps**
1. Use the rope to tightly bind the ZXMBW R9110 cabinet, as shown in [Figure 25](#).

FIGURE 25 FASTENING ROPE TO ZXMBW R9110 CABINET



Danger:

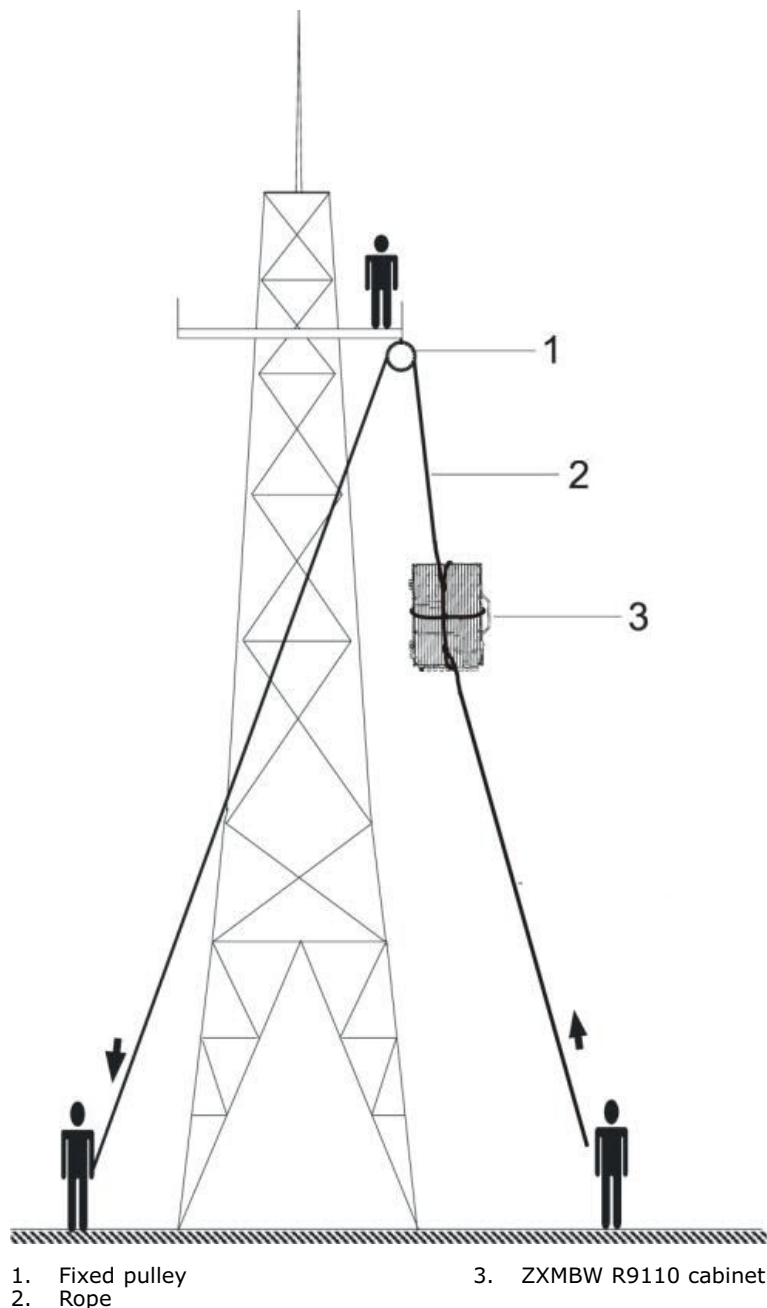
The bearing capacity of rope must be not less than 100 kg.

**Note:**

According to actual conditions on site, suggest pre-install pole assemblies, supporting panel and protective shield and then perform hoisting installation.

2. Before hoisting installation, check whether the rope and bolts are fastened properly again.
3. During hoisting installation, two installation personnel stand under the tower. One pulls the rope slowly on the side of tower and the other looses the rope and leads the ZXMBW R9110 cabinet to avoid touching the tower on the other side. One installation personnel stands on the tower to catch the ZXMBW R9110 cabinet, as shown in [Figure 26](#).

FIGURE 26 HOISTING ZXMBW R9110 CABINET ON TOWER



Caution:

During hoisting installation, make sure no people standing around the hoisting position to avoid personnel injury.

END OF STEPS

Postrequisite The process of disassembling the ZXMBW R9110 cabinet to the floor is similar to that of hoisting.

Wall-mounted Installation Mode

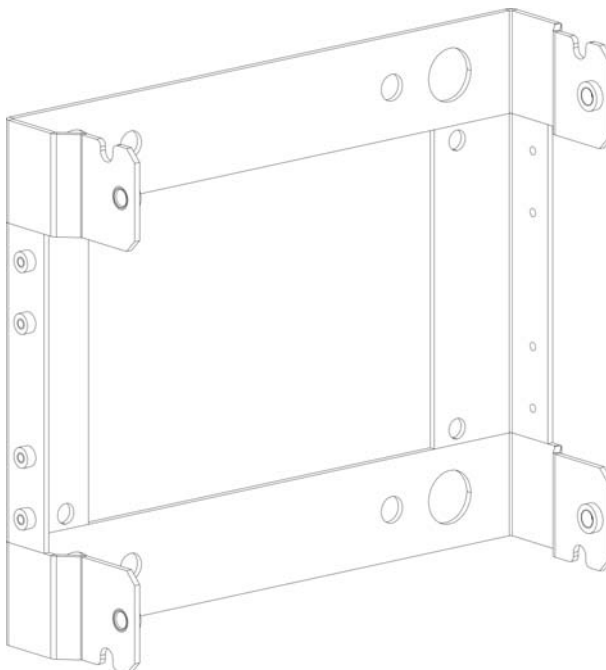
Components Used in Wall-mounted Installation

The main components used in wall-mount installation for a single ZXMBW R9110 cabinet are listed in [Table 8](#).

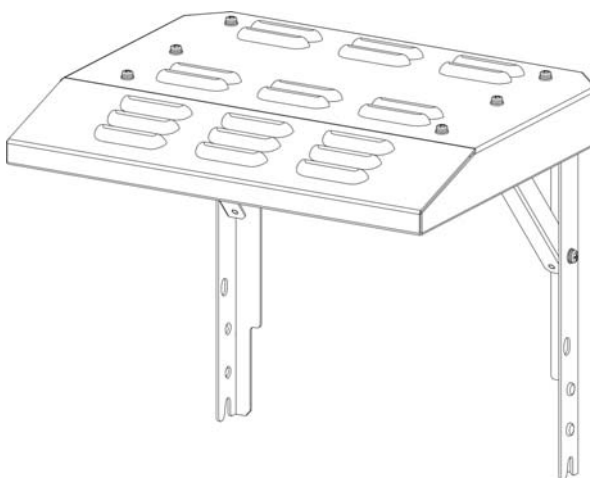
TABLE 8 MAIN COMPONENT LIST

Name	Quantity
ZXMBW R9110 cabinet	1
M10×100 expansion bolt	4
Flat washer 10	4
Spring washer 10	4
M8×20 hexagon head screw	4
Supporting panel	1
Protective shield	1
M5×16 cross recessed small pan head combined screw	4

The supporting panel is illustrated in [Figure 27](#).

FIGURE 27 SUPPORTING PANEL

The protective shield is illustrated in [Figure 28](#).

FIGURE 28 PROTECTIVE SHIELD

Note:

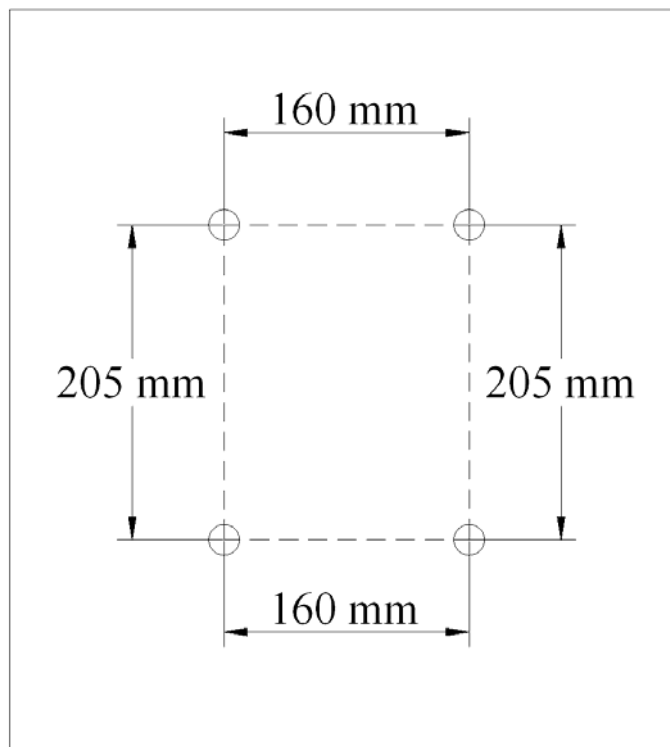
1. As common installation components, the supporting panel and protective shield are used in the ZXMBW R9110 pole-mount installation and wall-mount installation.
-

Installing Wall-mount Mode

Steps 1. Mark holing positions.

Determine the positions on the wall for installing a ZXMBW R9110 cabinet according to the engineering design drawing. Then mark the hole positions on the wall with a hole design template. The hole dimension is as shown in [Figure 29](#).

FIGURE 29 HOLE POSITION



2. Install expansion bolts.

- i. Use an electrical percussion drill ($\Phi 12$) to drill holes about 85 mm ~ 90 mm depth at these positions. Use a vacuum cleaner to clear dust while drilling.
- ii. Lead an expansion tube through the expansion bolt and then put the spring washer and flat washer on it. Slightly tighten the nut. Insert them vertically into the hole and use a claw hammer to strike the expansion bolt into the hole. Screw down the nut to make the expansion tube expanded enough and then remove the nut. The process is as shown in [Figure 30](#) and [Figure 31](#).

FIGURE 30 INSTALLING M10×100 EXPANSION BOLT (1)

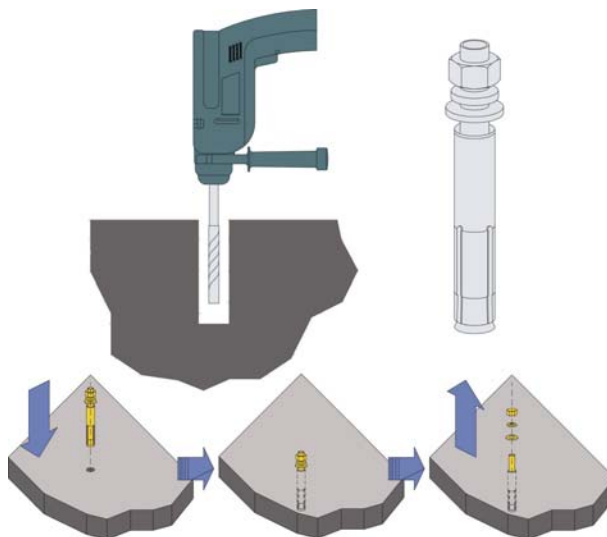
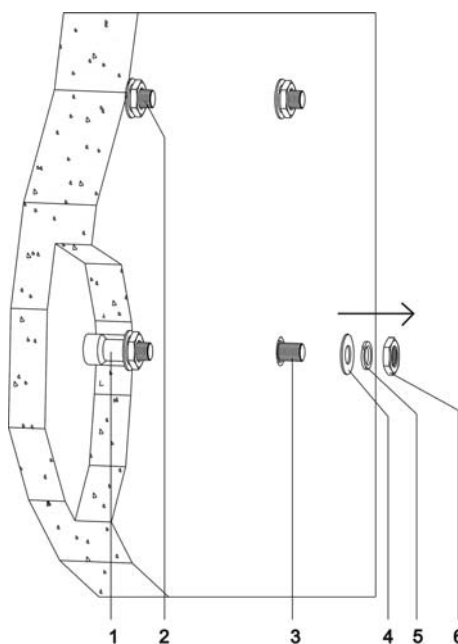


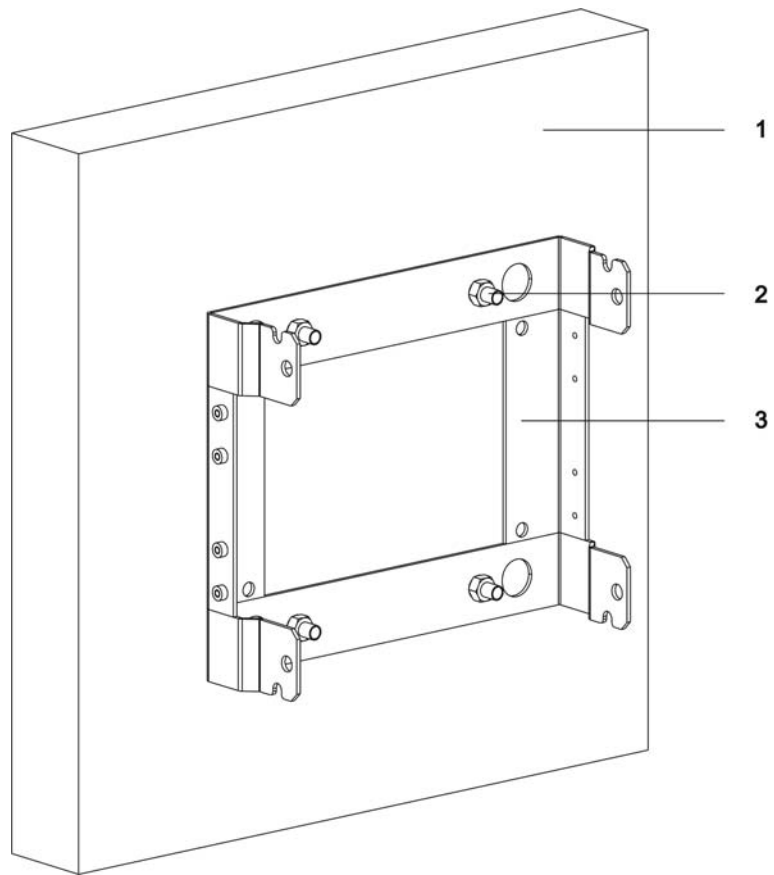
FIGURE 31 INSTALLING M10×100 EXPANSION BOLT (2)



- | | |
|--|--|
| <ol style="list-style-type: none"> 1. Expansion bolt embedded in the wall 2. Screw down nut to make the expansion tube expanded enough | <ol style="list-style-type: none"> 3. After-installation status 4. Spring washer 10 5. Flat washer 10 6. M10 nut |
|--|--|

3. Install the supporting panel.

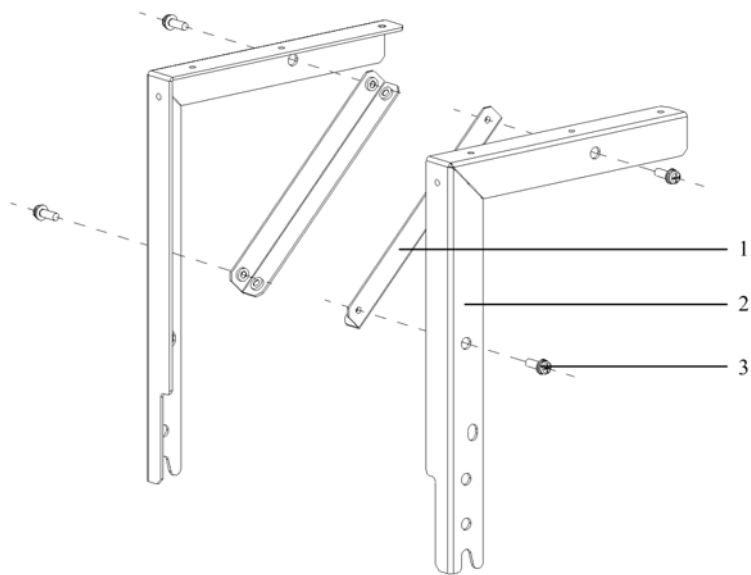
Align the supporting panel with expansion bolts on the wall and fix it through these expansion bolts. Cover the spring washer 10 and flat washer 10. Screw down the M10 nut, as shown in [Figure 32](#).

FIGURE 32 INSTALLING THE SUPPORTING PANEL.

1. Wall
2. M10×100 expansion bolt
3. Supporting panel

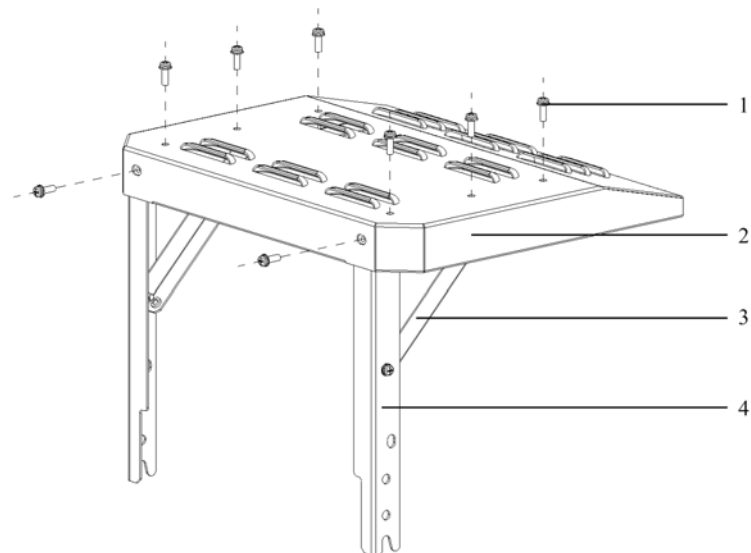
4. Install the protective shield.
 - i. Assemble the protective shield with M5×16 screws, as shown in [Figure 33](#) and [Figure 34](#).

FIGURE 33 ASSEMBLING PROTECTIVE SHIELD (1)



- 1. Support pole
- 2. Rack
- 3. M5×16 cross recessed small pan head combined screw

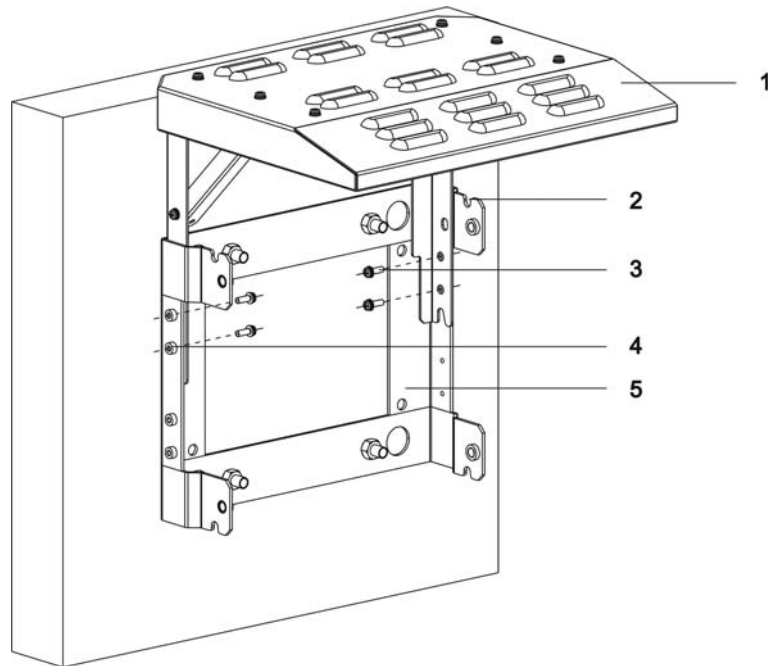
FIGURE 34 ASSEMBLING PROTECTIVE SHIELD (2)



- 1. M5×16 cross recessed small pan head combined screw
- 2. Protective shield
- 3. Support pole
- 4. Rack

- ii. Insert the protective shield inside the supporting panel and align it with installation holes. Mount four M5×16 crossed recessed small pan head combined screws (respectively two at left and right) from the inside of protective shield to fix the protective shield and supporting panel, as shown in [Figure 35](#).

FIGURE 35 INSTALLING PROTECTIVE SHIELD

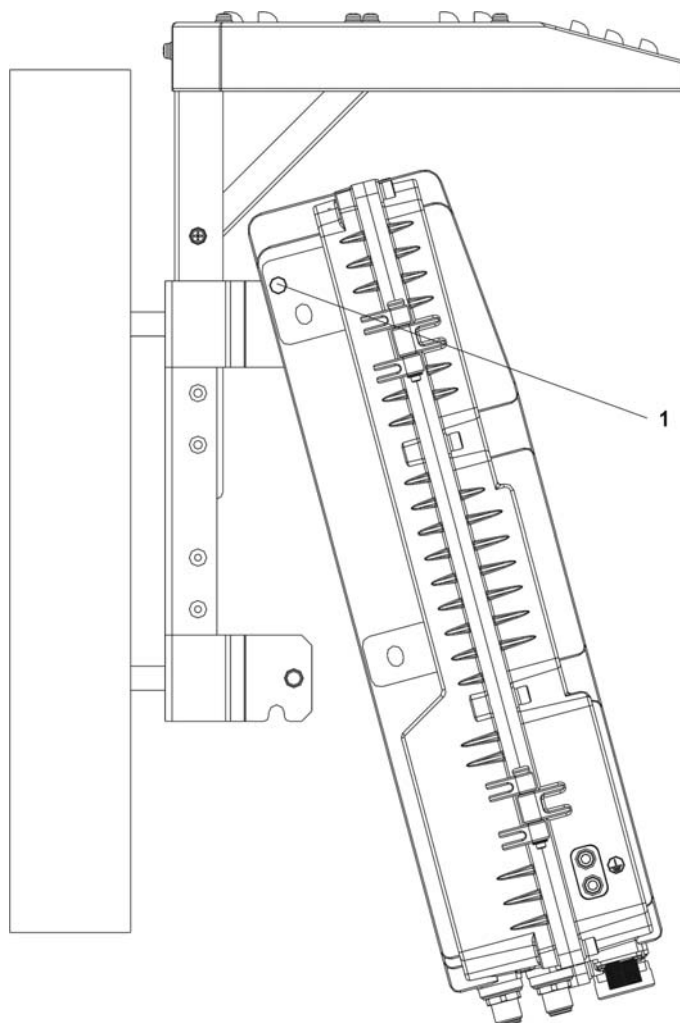


- | | |
|---|-----------------------|
| 1. Protective shield | 4. Self-clinching nut |
| 2. Semicircle slot | 5. Supporting panel |
| 3. M5×16 cross recessed
small pan head combined
screw | |

 **Note:**

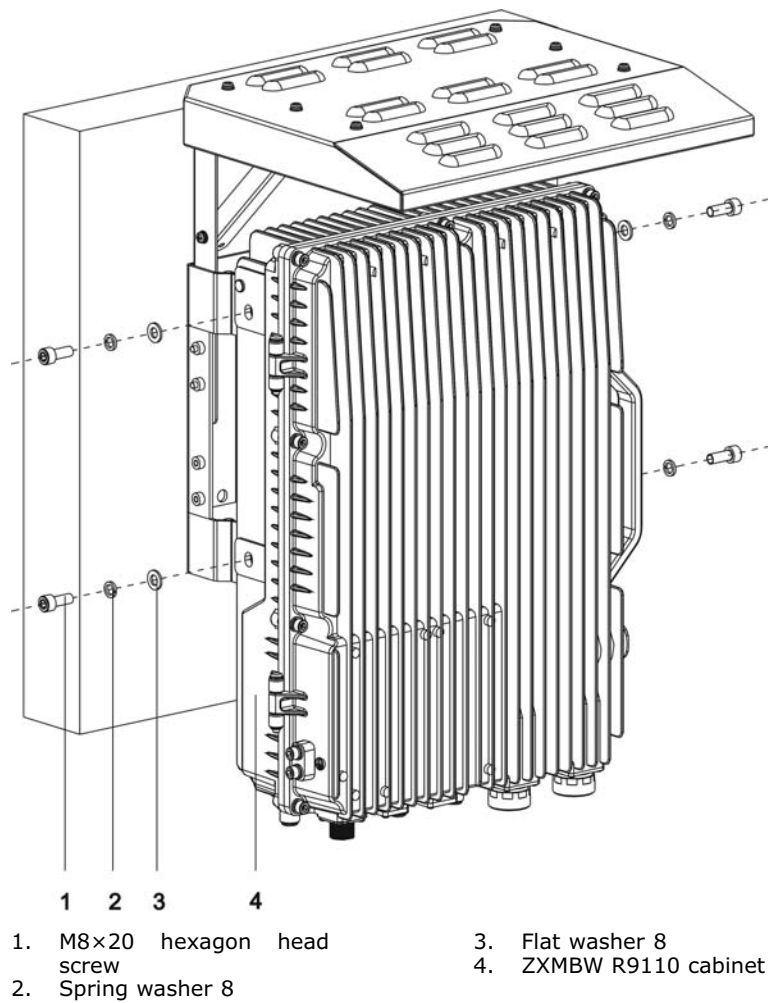
For outdoor wall-mount installation, the ZXMBW R9110 cabinet must be equipped with the protective shield. For indoor wall-mount installation, the protective shield is optional.

5. Install the ZXMBW R9110 cabinet.
 - i. Hold the ZXMBW R9110 cabinet and mount pins located at top left and right corners of cabinet into the semicircle slots of supporting panel, as shown in [Figure 36](#).

FIGURE 36 INSTALLING ZXMBW R9110 CABINET (1)

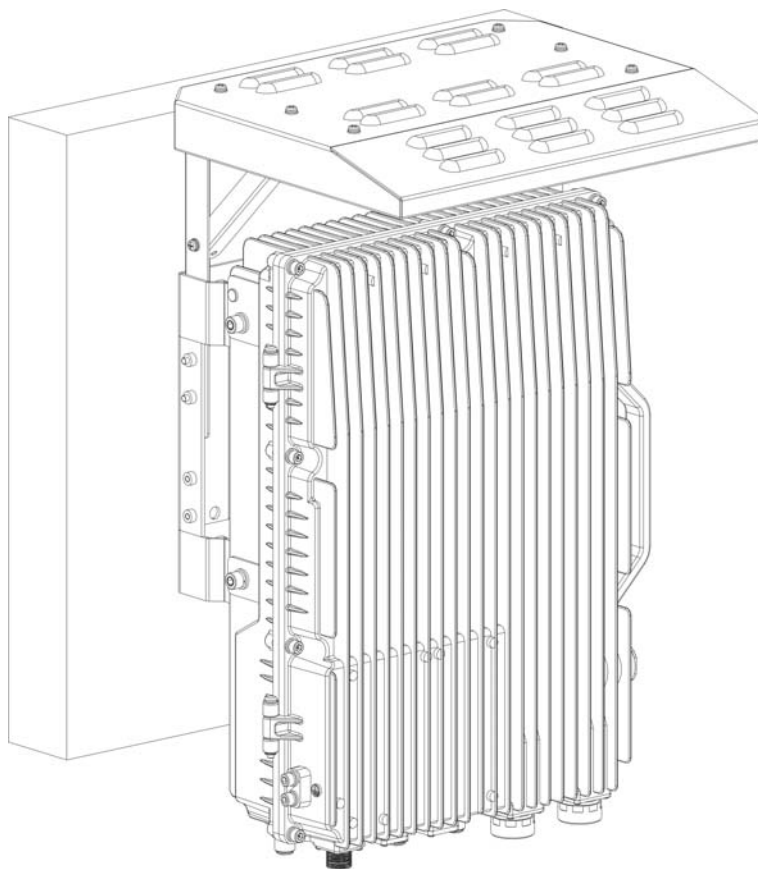
1. Pin

- ii. Mount four M8×20 hexagon head screws (respectively two at left and right) to fasten the ZXMBW R9110 and supporting panel, as shown in [Figure 37](#).

FIGURE 37 INSTALLING ZXMBW R9110 CABINET (2)**END OF STEPS**

Result The ZXMBW R9110 cabinet is completely installed to the wall, as shown in [Figure 38](#).

FIGURE 38 COMPLETING ZXMBW R9110 WALL-MOUNT INSTALLATION



Chapter 5

Cable Installation

Table of Contents

Installation Cable List.....	59
Cable Connection Relation	59
Installing the DC Power Cable	60
Installing the Grounding Cable	61
Installing the Field Operation Fiber.....	64
Installing Feeder	70
Performing Outdoor-Connector Waterproof Processing	73

Installation Cable List

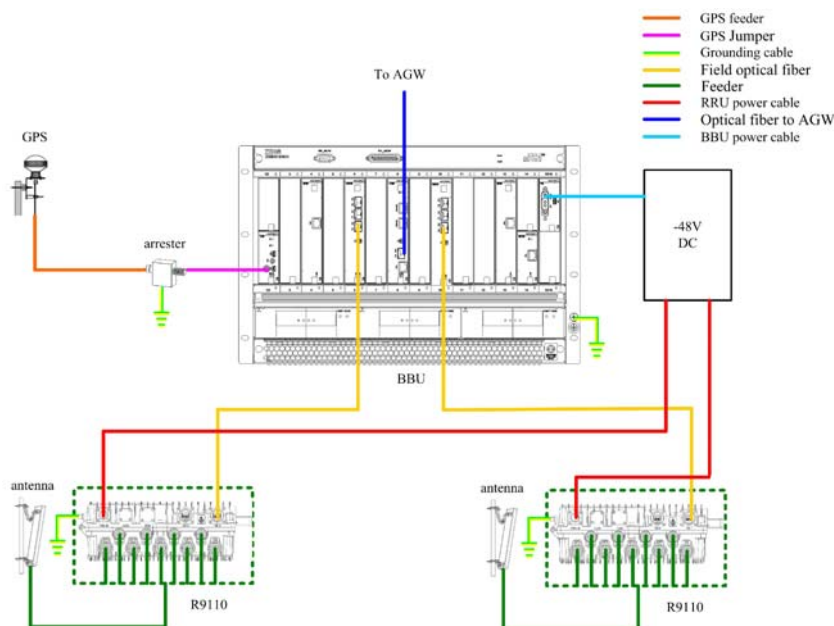
ZXMBW R9110 external cables include:

- DC power cable
- Grounding cable
- Field optical fiber
- Feeder

Cable Connection Relation

[Figure 39](#) illustrates the cable connection relation of ZXMBW R9110 three-sector networking.

FIGURE 39 CABLE CONNECTION RELATION

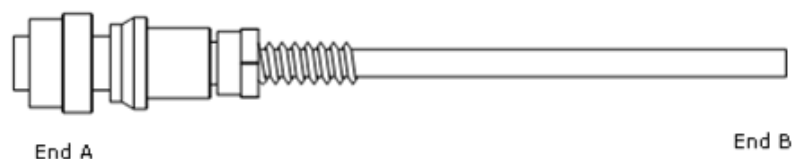


Installing the DC Power Cable

Context ZXMBW R9110 uses -48 V DC for power supply. The DC power cable is equipped with ZXMBW R9110. One end is an aviation connector and the other end is made on site. Its length is determined by engineering survey.

[Figure 40](#) illustrates the appearance of ZXMBW R9110 DC power cable.

FIGURE 40 DC POWER CABLE



[Table 9](#) describes inner core colors and relevant meanings.

TABLE 9 DC POWER CABLE INNER CORE COLOR AND MEANING

Color	Meaning
Blue	-48V
Black	-48V GND

Note:

1. For a two-core cable, the blue core stands for -48V and black core stands for -48VGND.
 2. For a four-core cable, two blue core connected in parallel stand for -48V and two black core connected in parallel stand for -48VGND.
-

- Steps**
1. Connect the aviation connector of power cable to a power interface (PWR IN) on the ZXMBW R9110 cabinet.
 2. Strip off an insulating sheath of End B and connect to -48V output end of DC power supply according to core colors.
 3. Bind and fasten the power cable at 0.5 m off the lower connector.
 4. Perform waterproof processing for the aviation connector, referring to [Performing Outdoor-Connector Waterproof Processing](#).
 5. Bind labels respectively at both ends of power cable with fasteners.

END OF STEPS

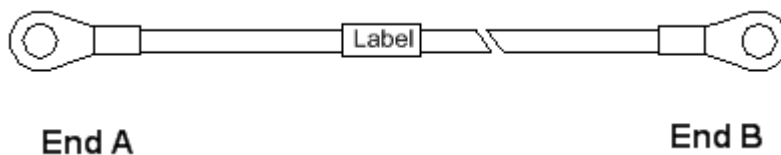
Installing the Grounding Cable

Context First install a grounding cable and then install other external cables.

The grounding cable is made of fireproof multi-strand conductors. It is in yellow and green and its cross sectional area is 16 mm², as shown in [Figure 41](#).

FIGURE 41 GROUNDING CABLE

- Steps**
1. Copper lugs are crimped at both ends of the grounding cable, as shown in [Figure 42](#).

FIGURE 42 CRIMPING COPPER LUGS

Note:

The length of grounding cable that connects the ZXMBW R9110 cabinet with the grounding copper bar should be less than 2 m.

2. Put the copper lug at one end of grounding cable onto a grounding bolt of ZXMBW R9110. The grounding bolt is located at side of cabinet, as shown in [Figure 43](#). Screw down the grounding bolts, as shown in [Figure 44](#).

FIGURE 43 GROUNDING BOLT ON ZXMBW R9110 CABINET

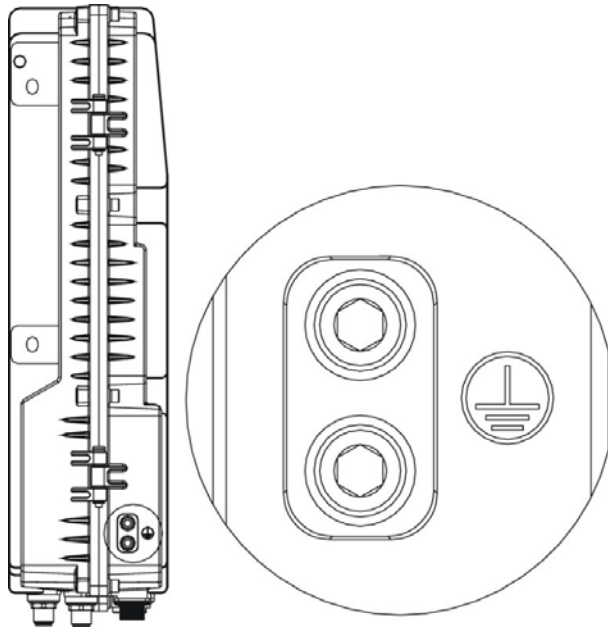
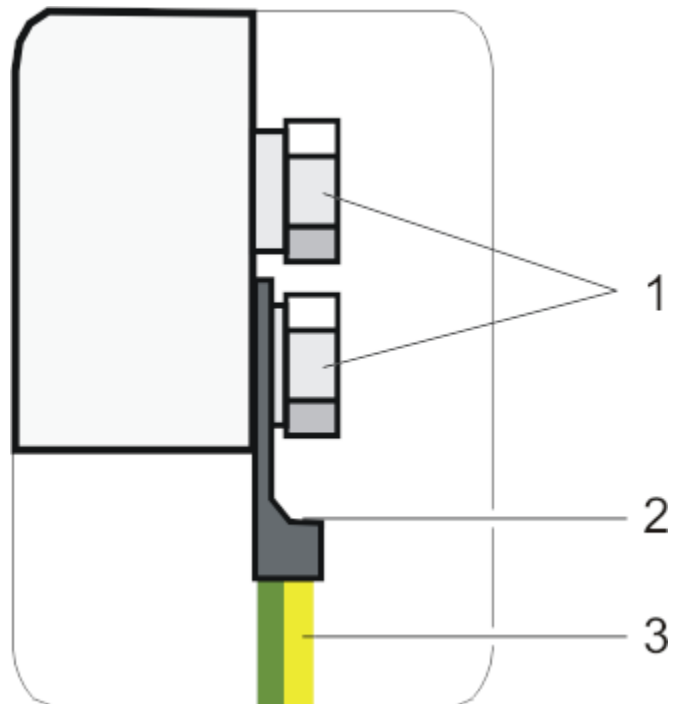


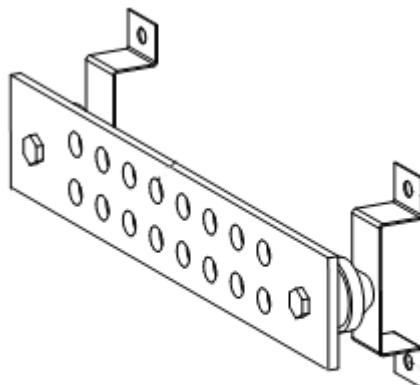
FIGURE 44 INSTALLING GROUNDING CABLE



- 1. Grounding bolts
- 2. Copper lug
- 3. Grounding cable

3. The copper bar of ground grid is as shown in [Figure 45](#). Clear off rust on the copper bar and then connect the other end of grounding cable to the copper bar. Finally, fix them with bolts.

FIGURE 45 COPPER BAR OF GROUND GRID



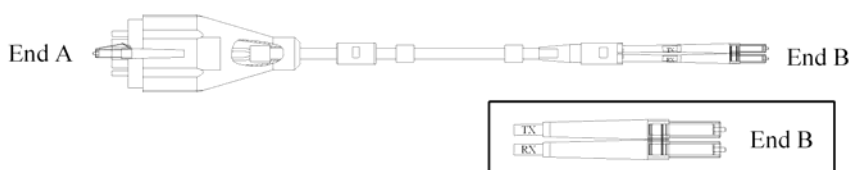
4. Spray antirust lacquer around the bolt.
5. Affix a label on the grounding cable.

END OF STEPS

Installing the Field Operation Fiber

Context [Figure 46](#) shows the baseband-RF field operation fiber, which is used to connect the ZXMBW R9110 chassis and the ZXMBW Type-B Baseband Pool Unit (BBU).

FIGURE 46 BASEBAND-RF FIELD OPERATION FIBER



- Steps**
1. Remove the protective cover from the waterproof sealing connector, and remove the dust cap, as shown in [Figure 47](#).

FIGURE 47 PROTECTIVE COVER AND DUST CAP OF FIELD OPERATION FIBER



Caution:

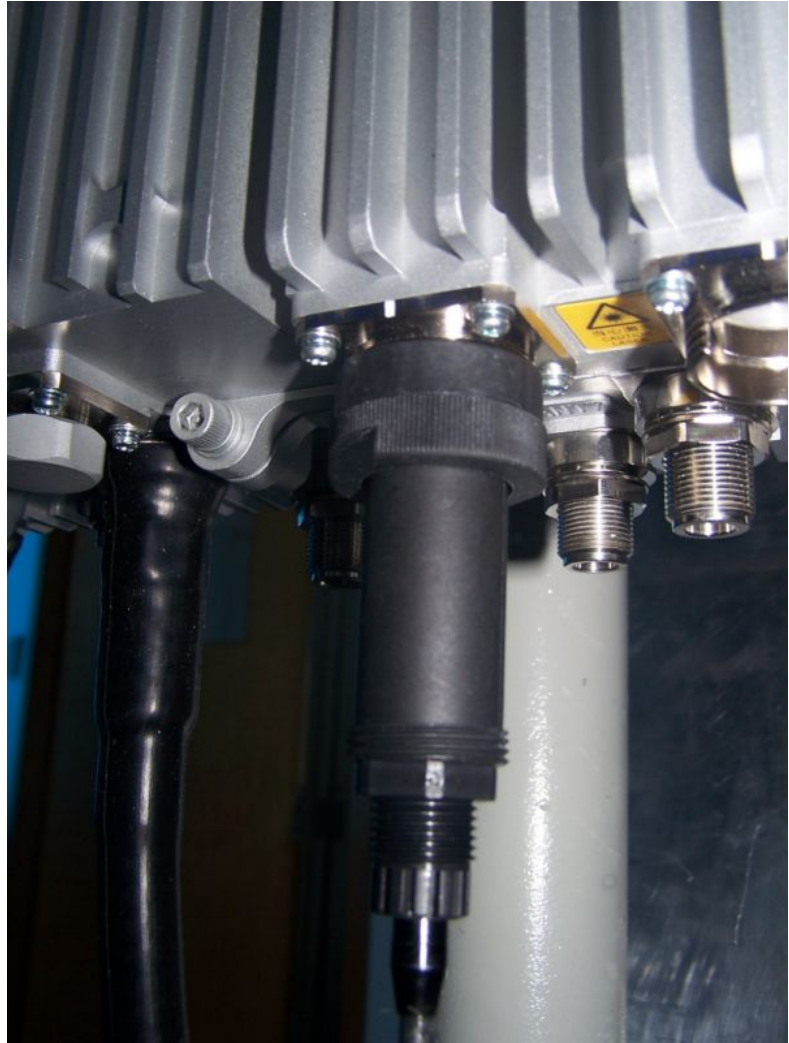
Remove the protective cover and dust cap only before you install the field operation fiber. In other processes such as moving and storing it, do not remove its protective cover or dust cap.

2. Connect the fiber to the optical interface of the ZXMBW R9110 chassis.
 - i. Align the white color code on the threaded sleeve of the waterproof sealing interface with the white color code on the optical interface, as shown in [Figure 48](#). Then, screw the threaded sleeve, as shown in [Figure 49](#).

FIGURE 48 ALIGNING COLOR CODES



1. White color codes

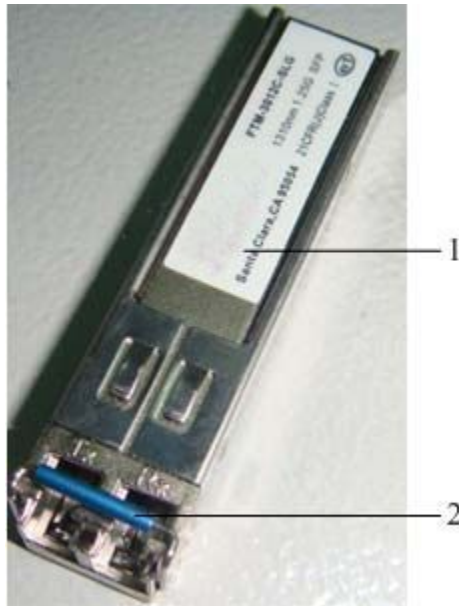
FIGURE 49 FASTENING THE THREADED SLEEVE

- ii. Fasten the external sealing gland, as shown in [Figure 50](#).

FIGURE 50 FASTENING THE SEALING GLAND**Caution:**

While fastening the sealing gland, do not move the fiber to prevent damage.

3. Connect the fiber to the optical interface of the ZXMBW Type-B Baseband Pool Unit (BBU).
 - i. Install the optical module on the optical interface of the ZXMBW Type-B Baseband Pool Unit (BBU). [Figure 51](#) shows the optical module.

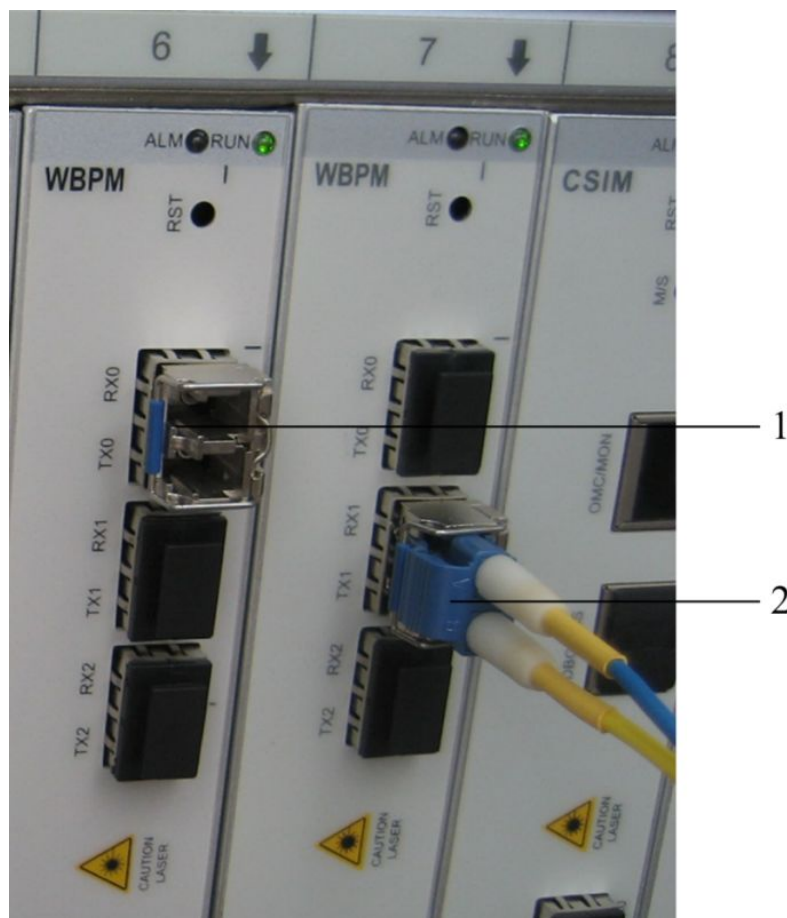
FIGURE 51 OPTICAL MODULE

1. Optical module

2. Blue handle

- ii. Remove the white dust cap from the LC connector. Connect the TX/RX tail fibers to the TX/RX ends of the optical interface of the ZXMBW Type-B Baseband Pool Unit (BBU), as shown in [Figure 52](#).

FIGURE 52 CONNECTING THE FIBER TO THE OPTICAL INTERFACE OF THE BBU



1. Optical interface of the optical module

2. LC connector

4. On the ZXMBW R9110 chassis side, bind and fix the fiber about 0.5m under the connector. On the BBU side, bind and fix the tail fibers on the cable trough.
5. In the case of installation of the ZXMBW R9110 chassis outdoor, perform waterproof processing on the connectors, as shown in [Performing Outdoor-Connector Waterproof Processing](#).
6. Paste labels on the two sides of the fiber.

END OF STEPS

Installing Feeder

Prerequisites Install the antenna and ZXMBW R9110 cabinet.

Context The feeder with a fixed length is used in the ZXMBW R9110 cabinet. Both ends of feeder are N-type connectors, as shown in [Figure 53](#).

FIGURE 53 LENGTH-FIXED FEEDER



- Steps**
1. Connect one end of feeder to the ANT0 interface on the ZXMBW R9110 cabinet, and connect the other end to the ANT0 interface of antenna.

**Note:**

The fastening torque of N-type connector is 0.7–1.1Nm.

2. [Table 10](#) describes the connection relations of feeders,

TABLE 10 FEEDER CONNECTION RELATION

Feeder Serial No.	Label No.	Connector at ZXMBW R9110 Cabinet Side	Connector at Antenna Side
1	S1-ANT0	ANT0	ANT0
2	S1-ANT1	ANT1	ANT1
3	S1-ANT2	ANT2	ANT2
4	S1-ANT3	ANT3	ANT3
5	S1-ANT4	ANT4	ANT4
6	S1-ANT5	ANT5	ANT5
7	S1-ANT6	ANT6	ANT6
8	S1-ANT7	ANT7	ANT7
9	CAL	CAL	CAL

– S1-ANT0 means the ANT0 feeder of the first sector. For ZXMBW R9110 three-sector networking, the corresponding feeders should be S1-ANT0, S2-ANT0 and S3-ANT0. The rest may be deduced by analogy.

3. Bind and fasten the feeder at 0.5 m off the lower feeder connector.
4. Measure the standing wave ratio (SWR). The SWR should be not over 1.3. Refer to [VSWR Test](#).
5. Perform waterproof processing for the feeder connectors that accord with the measure requirements of SWR, referring to [Performing Outdoor-Connector Waterproof Processing](#).
6. Referring to [Table 10](#), bind relevant labels at both ends of feeder with fasteners, as shown in [Figure 54](#).

FIGURE 54 BINDING FEEDER LABEL**END OF STEPS**

Postrequisite The feeder connectors are distributed densely at the ZXMBW R9110 cabinet side. Use a special wrench equipped with the device to disassemble them. The wrench is as shown in [Figure 55](#). Remove a shrinkable sleeve at the feeder connector before disassembling the feeder, as shown in [Figure 56](#).

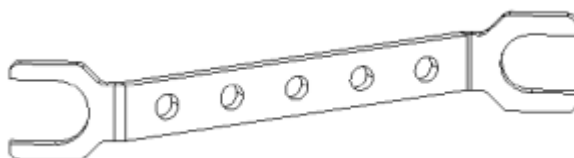
FIGURE 55 SPECIAL WRENCH

FIGURE 56 DISASSEMBLING FEEDER



Performing Outdoor-Connector Waterproof Processing

Context The waterproof processing for outdoor connectors adopts the “1+3+3” mode to wrap “one layer PVC insulating tape + three layer waterproof insulating tape + three layer PVC insulating tape”.

The waterproof insulating tape is as shown in [Figure 57](#).

FIGURE 57 WATERPROOF INSULATING TAPE



The PVC adhesive tape is as shown in [Figure 58](#), used to protect connectors from damage as well as waterproof tape from aging.

FIGURE 58 PVC ADHESIVE TAPE

- Steps**
1. Wrap a layer of PVC insulating tape.
 - i. Clean out dust and stain on the feeder connector or feeder grounding kit.
 - ii. As shown in [Figure 59](#), wrap the feeder with the PVC insulating tape in an overlapping way from lower to upper, and the upper adhesive tape should cover a half of the lower adhesive tape. The extended width of adhesive tape is not over 1/2 longer than the former width, or else it destroys molecular structure of adhesive tape due to extension too much.

FIGURE 59 WRAPPING A LAYER OF PVC INSULATING TAPE

2. Wrap three layers of waterproof insulating tape.
 - i. Expand the waterproof insulating tape and strip off release paper. The adhesive tape sticks to the connector or the feeder which is 20~50 mm away from the lower end of grounding kit.
 - ii. Extend the adhesive tape to up to 1/2 – 3/4 of the former width, in order to keep a certain extension strength. Bind the feeder in an overlapping way from lower to upper, and the upper adhesive tape should cover a half of the lower adhesive tape, as shown in [Figure 60](#).

FIGURE 60 WRAPPING THREE LAYERS OF WATER INSULATING TAPE (THE FIRST LAYER)



Note:

The wrapping direction should be towards the direction of connector screwed down. Prohibit wrapping in a reverse direction.

- iii. While wrapping to the 20~50 mm position off the connector , repeat it for twice and the sequence respectively is: from upper to lower as shown in [Figure 61](#) and from lower to upper as shown in [Figure 62](#).

FIGURE 61 WRAPPING THREE LAYERS OF WATER INSULATING TAPE (THE SECOND LAYER)



FIGURE 62 WRAPPING THREE LAYERS OF WATER INSULATING TAPE (THE THIRD LAYER)



- iv. After wrapping the waterproof insulating tape, press the adhesive tape at the binding with hands and make it affixed tightly.
3. Wrap three layer of PVC insulating tape.

Two ends of PVC insulating tape must be 20mm longer than the upper layer of waterproof insulating tape. Bind the feeder in an overlapping way from lower to upper, and the upper adhesive tape should cover a half of the lower adhesive tape, as shown in [Figure 63](#). Repeat it for twice and the sequence respectively is: from upper to lower as shown in [Figure 64](#) and from lower to upper as shown in [Figure 65](#). Make sure proper stretch strength during wrapping.

FIGURE 63 WRAPPING THREE LAYERS OF PVC INSULATING TAPE (THE FIRST LAYER)



FIGURE 64 WRAPPING THREE LAYERS OF PVC INSULATING TAPE (THE SECOND LAYER)



FIGURE 65 WRAPPING THREE LAYERS OF PVC INSULATING TAPE (THE THIRD LAYER)



4. After finishing wrapping, fasten two wrapped ends with black fasteners, as shown in [Figure 66](#).

FIGURE 66 FASTENING



END OF STEPS

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Chapter 6

Main Antenna Feeder System Installation

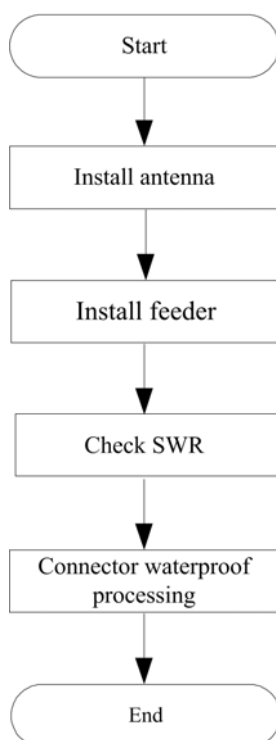
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Main Antenna Feeder System Installation Flow

[Figure 67](#) illustrates the installation flow of main antenna feeder system.

FIGURE 67 MAIN ANTENNA FEEDER SYSTEM INSTALLATION FLOWCHART



Main Antenna Feeder System Installation Preparation

Before installation, make sure that installation staff is qualified and the following requirements are satisfied.

Personnel Requirement


Normally, supervisors are in charge of direction and supervision and installation personnel carry out the installation.

Installation Supervisor

- Familiar with all materials, tools and operation methods used in the installation.
- In charge of assigning different work to the proper employee who is good at the operation, especially while working on the iron tower.

Installation Personnel

- Installation employees are required to install antenna system skillfully under the direction of supervisor.
- Employees on tower must be qualified and in good physical state.
- All installation personnel must purchase security insurances and use safe tools in terms of regulations.

Environment Requirement Check	<ul style="list-style-type: none"> ■ Installation after drinking is forbidden. <p>Pay attention to the following items and check whether these items accord with requirements in engineering design.</p> <ul style="list-style-type: none"> ■ Lightning protection and grounding ZXMBW R9110 is usually located outdoors. Prepare all necessary tools and assistant materials. The vendor must negotiate a distinct and detailed feeder layout with the operator. Check whether a protective earthing cable, lightning rod, lightning protective grounding site, antenna pole meet the design requirements. The lightning rod, grounding net, protective earthing cable, antenna pole as well as antenna and feeder cable tray should be completely installed by the operator. The grounding stake and outdoor protective earthing cable should be installed by the operator. Engineering supervisors must check installation of outdoor protective earthing cable. ■ Pole and antenna supporting rack Accomplish installation of antenna supporting rack and pole according to project design requirements. The stability of the supporting rack and pole should be in accordance with the design requirements. ■ Feeder layout Lay out feeders according to the project design requirements. ■ Electric power environment ZXMBW R9110 antenna and feeder system can not be installed too near to public electric power cables.
Safety Precaution Check	<p>Installation personnel must perform the following:</p> <ul style="list-style-type: none"> ■ Wear safety belts. ■ Wear safety helmets. ■ Do not wear loose clothes and slippery shoes on site. ■ Obviously locate a caution sign on site to warn unrelated people away from the installation site. <hr/> <p> Warning:</p> <ul style="list-style-type: none"> ■ Installation personnel is obligate to supervise unrelated people away from the installation site, especially children. ■ Put unused tools and metal installation components into a tool bag and seal it.
Tools Requirement	<p>The following tools are used for main antenna feeder system installation:</p> <ol style="list-style-type: none"> 1. Measure tools Compass, multimeter, angle meter, and tape measure 2. Special tools Special tools and instruments for main feeder connector making and test

3. Regular tools

Adjustable wrench, sharp-nose pliers, diagonal pliers, electrician knife, file, hacksaw (with several saw blades) and torque wrench

4. Protective tools

Safety helmet, safety belt, safety rope, gloves, thick work clothes, radiation-shielding clothes, multiple power socket and sealed canvas tool bag

5. Other tools

Tools for lifting, for example, Ladder

Main Antenna Feeder System Installation Position

The main antenna feeder system may be installed in the following positions:

- On iron tower
- On top of building (without fencing)
- On top of building (with fencing)



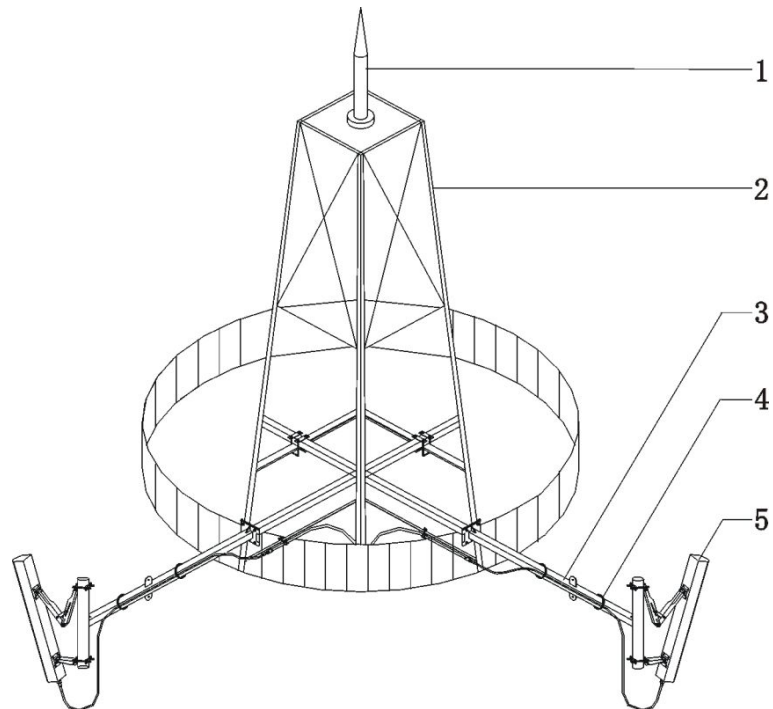
Note:

Pay attention to the following while selecting an installation position of main antenna feeder.

1. The installation position must have no impact on adjustment of antenna direction and angle.
2. The installation position must be convenient for engineering installation and maintenance.
3. The main antenna feeder installed atop the building or against the external wall of building must be far away from obstructions.

Installing on iron tower

[Figure 68](#) illustrates the main antenna feeder installed on iron tower.

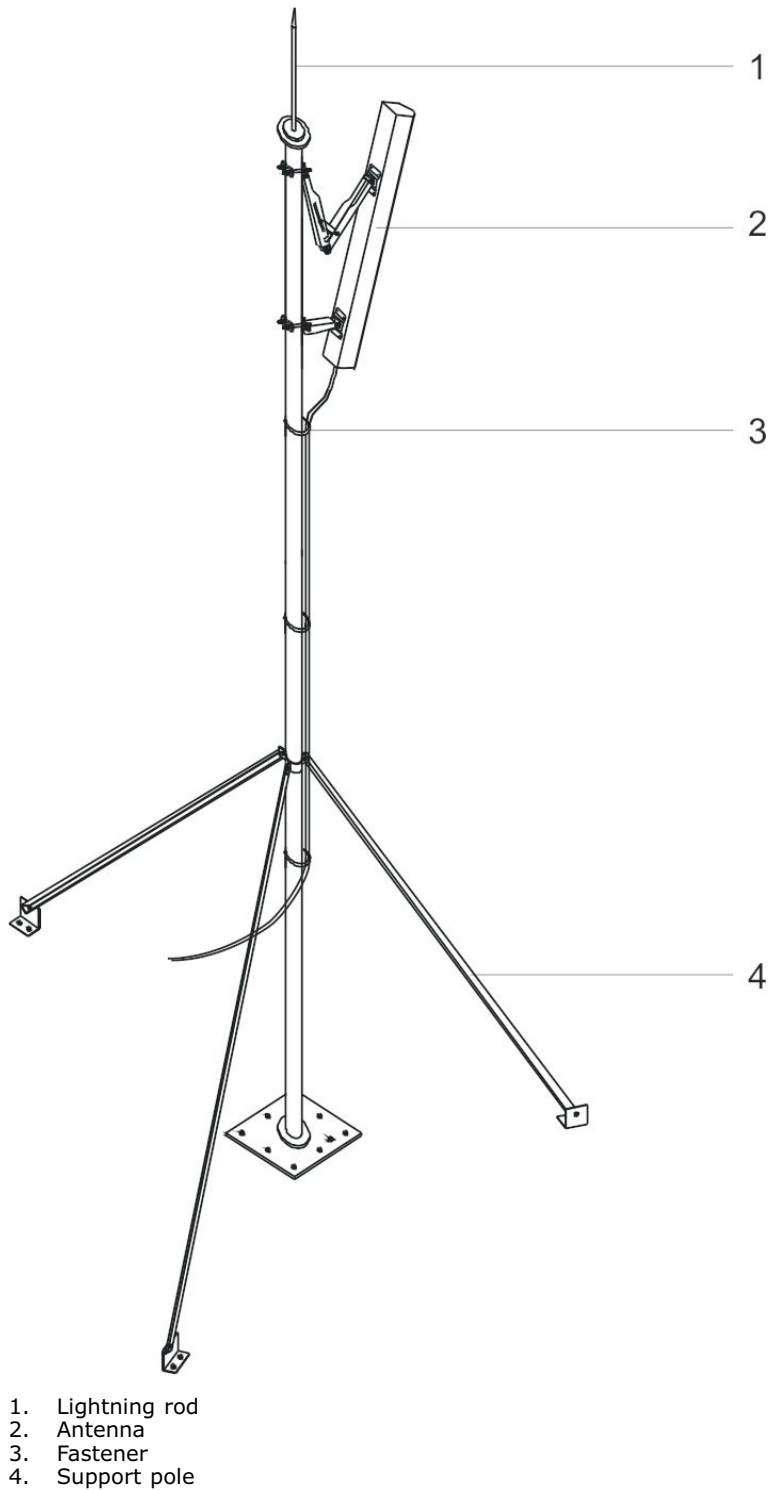
FIGURE 68 INSTALLING MAIN ANTENNA FEEDER ON IRON TOWER

1. Lightning rod
2. Iron tower
3. Antenna supporting rack
4. Fastener
5. Antenna

Installing atop Building (without fencing)

Figure 69 illustrates the main antenna feeder installed on top of building (without fencing).

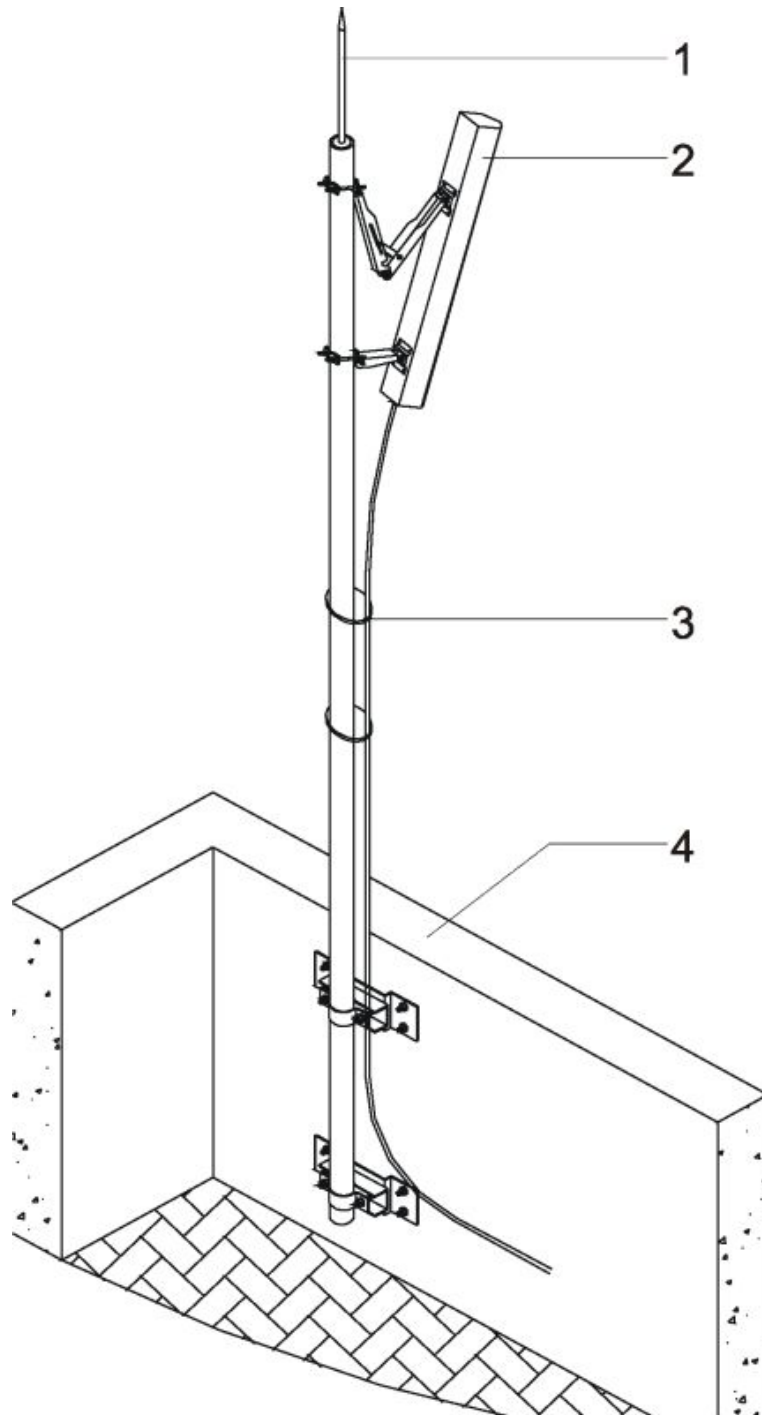
FIGURE 69 INSTALLING MAIN ANTENNA FEEDER ATOP BUILDING (WITHOUT FENCING)



Installing atop Building (with fencing)

Figure 70 illustrates the main antenna feeder installed on top of building (with fencing).

FIGURE 70 INSTALLING MAIN ANTENNA FEEDER ATOP BUILDING (WITH FENCING)



1. Lightning rod
2. Antenna
3. Fastener
4. Wall

Antenna Installation

Antenna Installation Technical Specifications

1. Antenna height

The installation height of antenna is determined by network planning design.

2. Antenna azimuth

The azimuth of the antenna is determined by network planning design.

3. Antenna pitching angle

The pitching angle of the antenna is determined by network planning design. Usually the pitching angle is $0^{\circ}\sim 10^{\circ}$.

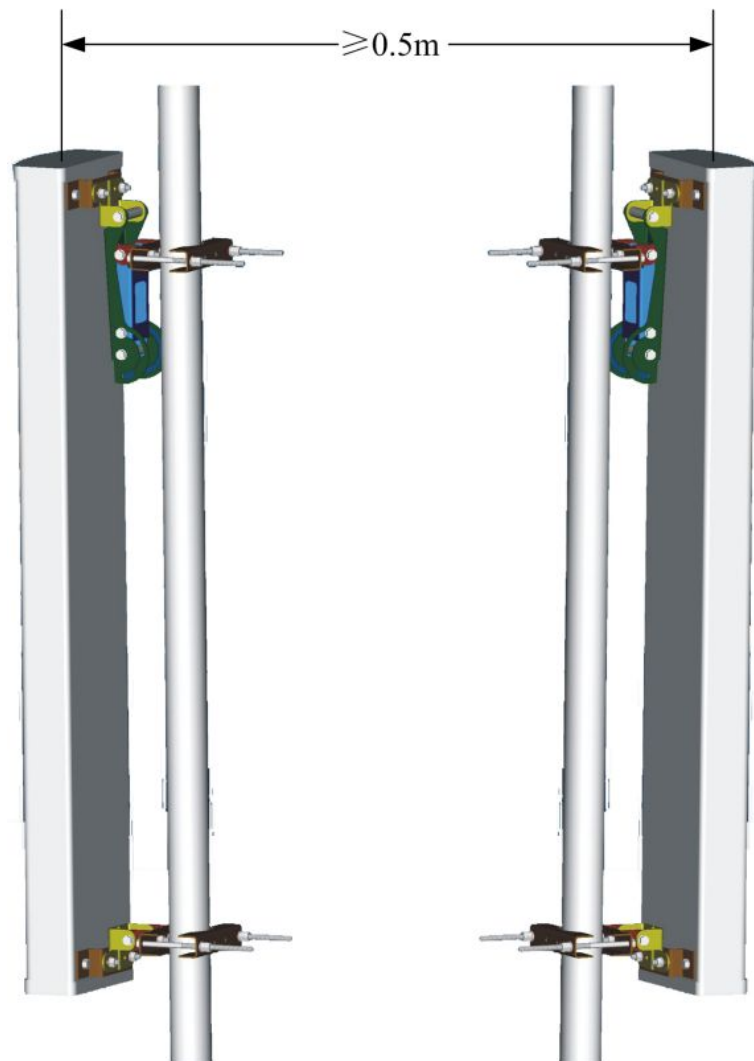
4. Antenna direction

Antenna direction depends on the antenna azimuth. Two antennas in one sector must share the same azimuth.

5. Antenna distance

The distance between antennas must be not less than 0.5 m, as shown in [Figure 71](#).

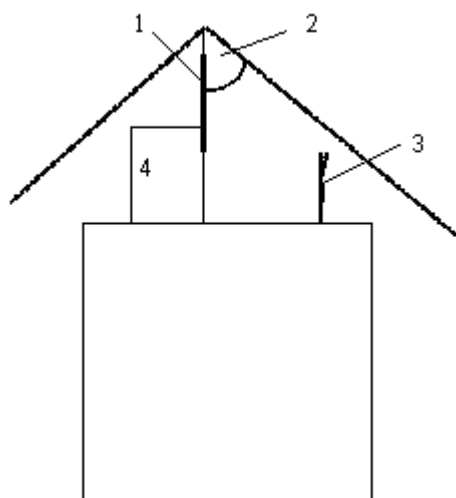
FIGURE 71 ANTENNA DISTANCE



Antenna Installation Position

The antenna must be installed within 45° coverage area of lightning rod, as shown in [Figure 72](#).

FIGURE 72 LIGHTNING ROD EFFECTIVE PROTECTION AREA



- | | |
|----------------------------------|--------------------|
| 1. Lightning rod | 3. Antenna |
| 2. 45° Lightning protection area | 4. Grounding cable |

Components Used in Antenna Pole-mount Installation

[Table 11](#) lists components used in antenna pole-mount installation.

TABLE 11 COMPONENTS USED IN ONE ANTENNA POLE-MOUNT INSTALLATION

Name		Quantity
Antenna		1
Upper supporting arm		1
Lower supporting arm		1
Support		4
Supporting tube		4
Clip		2
U-shape clip		2
Standard Components	M8×25 hexagon bolt	1
	M10×30 hexagon bolt	5
	M10×110 hexagon bolt	4
	M10×170 hexagon bolt	4
	M8 hexagon nut	2
	M10 hexagon nut	17

Name		Quantity
	Flat washer 8	3
	Flat washer 10	13
	Spring washer 8	3
	Spring washer 10	13

Installing Antenna

Context

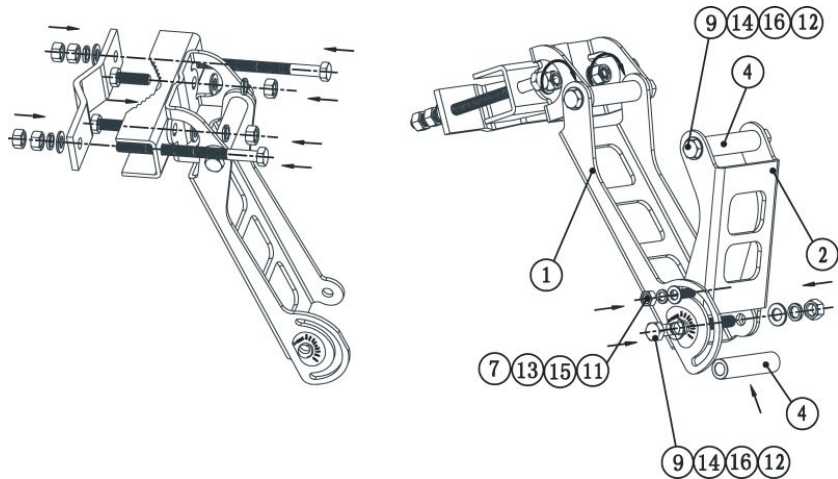
Note:

1. This topic describes installation steps of antenna in brief. For the detail installation procedure, refer to the instruction equipped in the antenna.
2. The installation or usage instruction is prior to instruct installation.

Steps

1. Mount an upper supporting arm of clip assembly, as shown in [Figure 73](#).

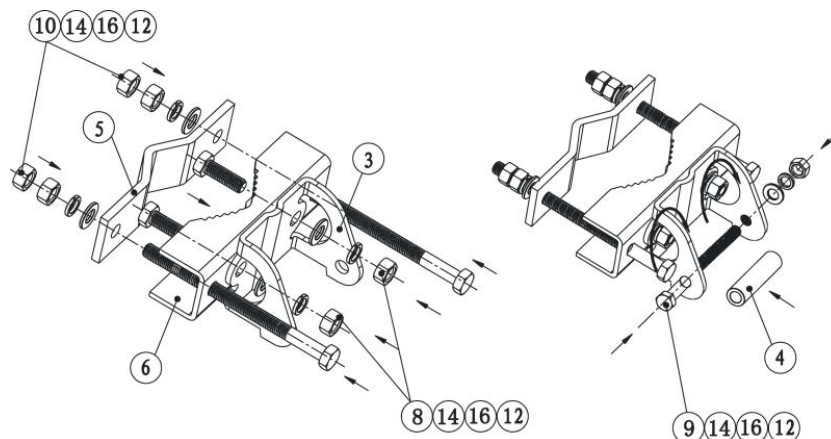
FIGURE 73 MOUNTING UPPER SUPPORTING ARM



- 1: Upper supporting arm
- 2: Lower supporting arm
- 4: Supporting tube
- 9,14,16,12: M10×110 hexagon bolt, flat washer
- 10, spring washer 10, M10 hexagon nut
- 7,13,15,11: M8×25 hexagon bolt, flat washer 8, spring washer 8, M8 hexagon nut

2. Mount a lower supporting arm, as shown in [Figure 74](#).

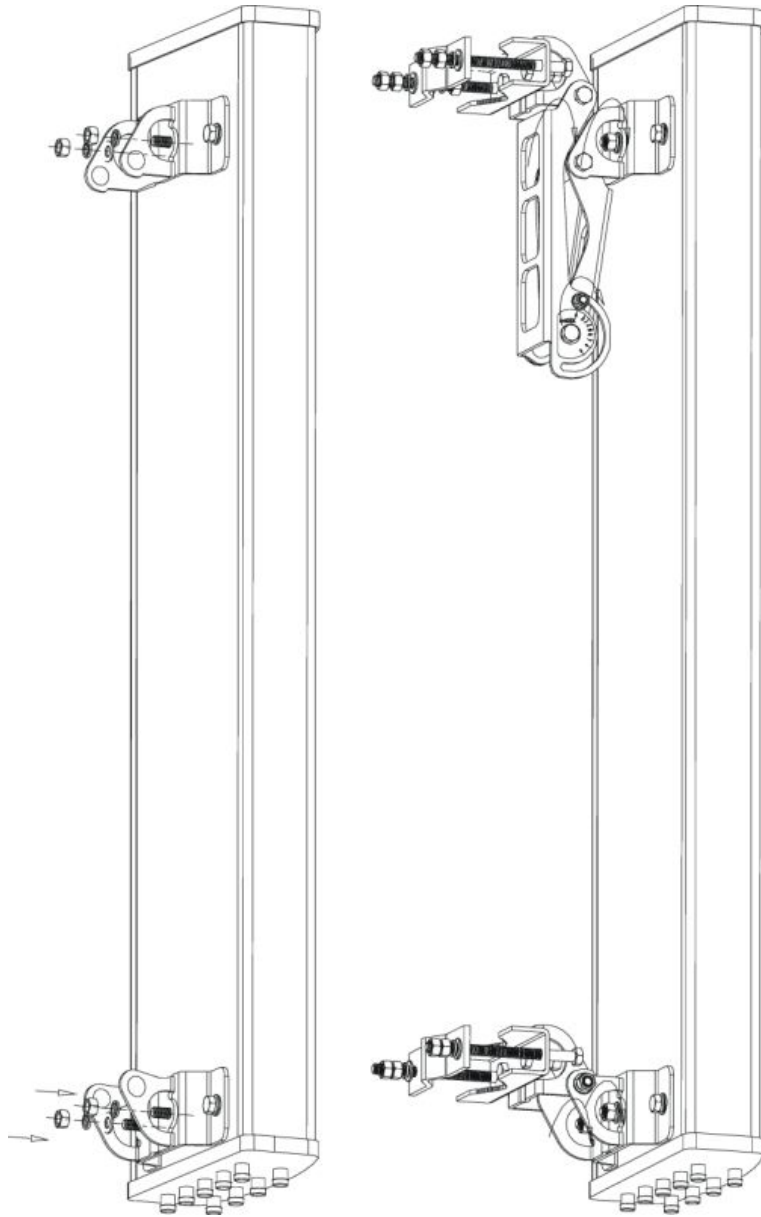
FIGURE 74 MOUNTING LOWER SUPPORTING ARM



- 3 Support
- 4 Supporting tube
- 5 Clip
- 6 U-shape clip
- 8,14,16,12: M10×30 hexagon bolt, flat washer 10, spring washer 10, M10 hexagon nut
- 9,14,16,12: M10×110 hexagon bolt, flat washer 10, spring washer 10, M10 hexagon nut
- 10,14,16,12: M10×170 hexagon bolt, flat washer 10, spring washer 10, M10 hexagon nu

3. Mount the upper and lower supporting arms to an antenna, as shown in [Figure 75](#).

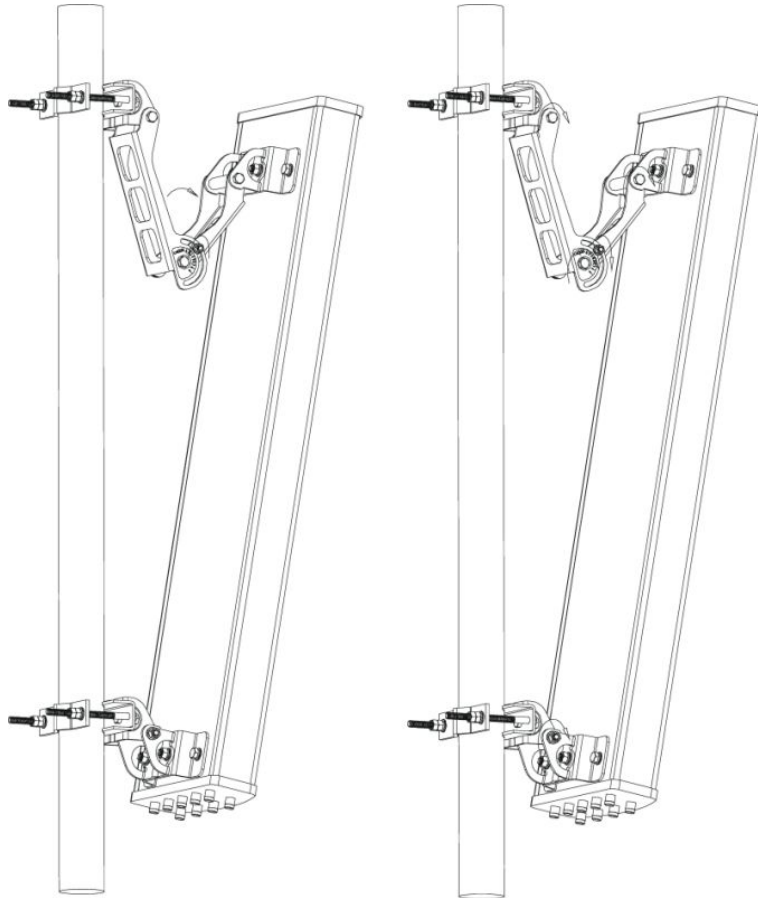
FIGURE 75 MOUNTING UPPER AND LOWER SUPPORTING ARM TO ANTENNA



4. Mount the antenna to a pole, as shown in [Figure 76](#).

FIGURE 76 MOUNTING ANTENNA TO POLE

5. Adjust the inclination of antenna, as shown in [Figure 77](#), and then screw down all adjustment bolts.

FIGURE 77 ADJUSTING ANTENNA INCLINATION**END OF STEPS**

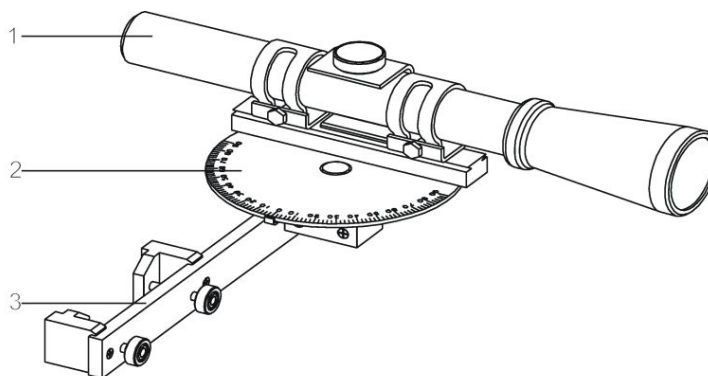
Adjusting Antenna's Azimuth

Context The azimuth of antenna is determined by the network planning. The actual azimuth should keep less than $\pm 1^\circ$ difference from the azimuth in the engineering design.

Generally, the antenna is installed on top of the iron tower. Due to that the iron tower affects magnetic field, a common compass is difficult to accurately locate the azimuth of antenna. It is suggested to use some special azimuth positioning tools to adjust the azimuth to a more proper angle. The following gives an example of using a Kathrein azimuth adjustment tool.

[Figure 78](#) illustrates the Kathrein azimuth adjustment tool.

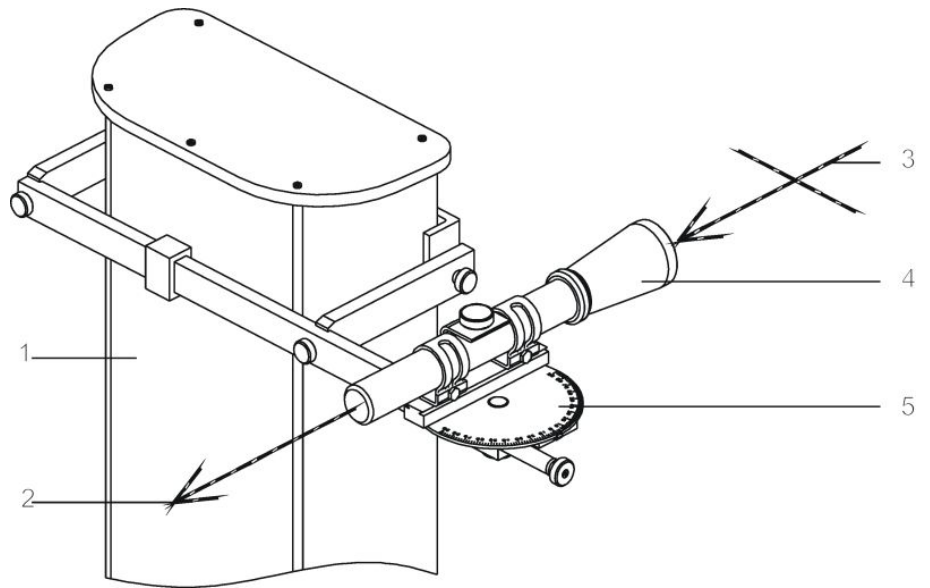
FIGURE 78 KATHREIN AZIMUTH ADJUSTMENT TOOL



1. Telescope
2. Dial
3. Fastener

- Steps**
1. Roughly adjust the azimuth.
Unscrew fastening bolts on the upper and lower supporting arms. Slowly turn the antenna around the pole to adjust azimuths of antennas in adjacent sectors to a certain angle. Normally, the angles of antennas in different sectors should keep 120° and two antennas in the same sector should keep consistent direction.
 2. Measure the angle difference.
Find a nearby target (for example, a high building, mountain and tower) and measure the angle difference between the target and azimuth.
 3. Set the angle difference on the Kathrein azimuth adjustment tool.
Set the angle on the Kathrein azimuth adjustment tool to the angle difference measured in **Step 2**.
 4. Accurately adjust the azimuth.
Locate the Kathrein azimuth adjustment tool to the antenna. Aim at the target by telescope and slowly turn the antenna to adjust it to the designed angle, as shown in [Figure 79](#).

FIGURE 79 TOOL USAGE METHOD



- | | |
|--------------------------|--------------|
| 1. Antenna | 4. Telescope |
| 2. Target direction | 5. Dial |
| 3. Observation direction | |

5. Screw down bolts.

After adjusting the azimuth, screw down fastening bolts of upper and lower supporting arms.

END OF STEPS

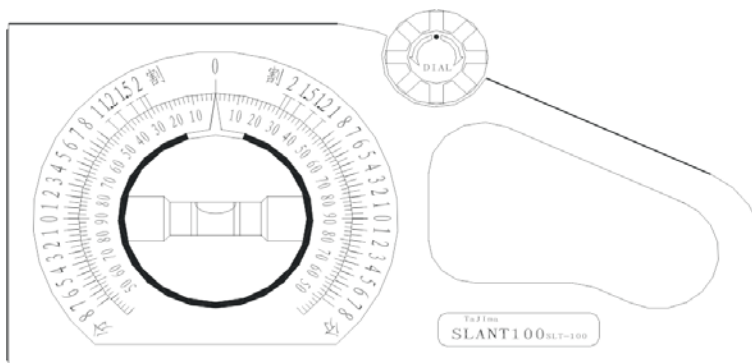
Adjusting Antenna's Downtilt

Context The downtilt of antenna is determined by the network planning. The actual downtilt should keep less than $\pm 1^\circ$ difference from the downtilt in the engineering design.

Adjust the downtilt by rectifying upper and lower supporting arms and then measure adjustment precision with an angle measurement tool.

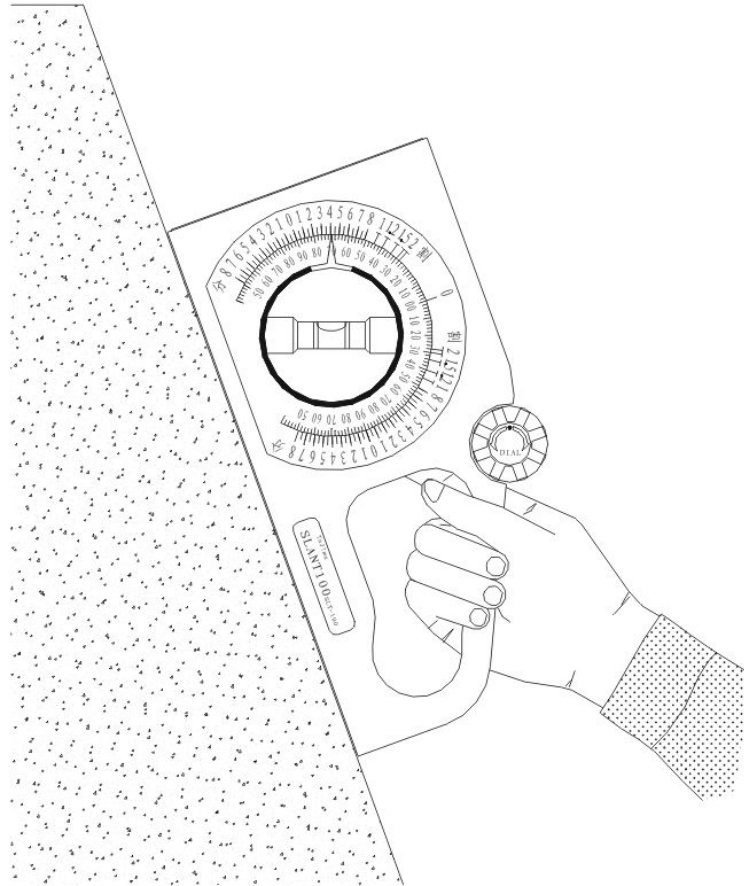
[Figure 80](#) illustrates the angle measurement tool.

FIGURE 80 ANGLE MEASUREMENT TOOL



- Steps**
1. Roughly adjust the downtilt.
Unscrew fastening bolts on the upper and lower supporting arms. Slowly turn the antenna around the pole to adjust the downtilt of antenna to a certain angle.
 2. Set the angle on the angle measurement tool.
Rotate the dial on the angle measurement tool to the degree of downtilt in the engineering design.
 3. Adjust the downtilt.
Locate the bottom of angle measurement tool close to the inclined plane and slowly adjust the antenna till an air bubbles in the pipe of angle measurement tool locates in the middle of two rings and keeps still, as shown in [Figure 81](#).

FIGURE 81 COMPLETING ADJUSTMENT



4. Screw down bolts.

After adjusting the downtilt, screw down fastening bolts of upper and lower supporting arms.

END OF STEPS

Hoisting Antenna on Tower

Prerequisites

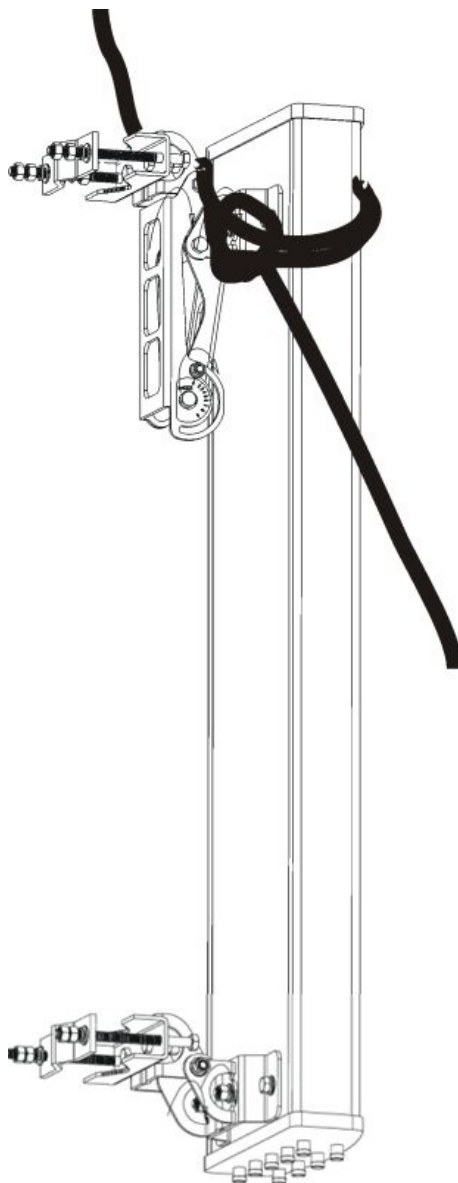
 **Note:**

If it is required to install the antenna on tower, refer to the following content.

1. The natural environments must meet the requirements of hoisting on the tower, such as no fog and high visibility. Prohibit hoisting in the windy, rainy or snowy day.
2. Prepare tools to be used in hoisting, such as a rope and fixed pulley. The fixed pulley has been installed in position on the tower.

- Steps**
1. Install the pole clips of antenna before hoisting. For the detailed installation method, refer to [Installing Antenna](#).
 2. Use the rope to tightly bind the upper supporting arm of pole clips, as shown in [Figure 82](#).

FIGURE 82 BINDING ANTENNA



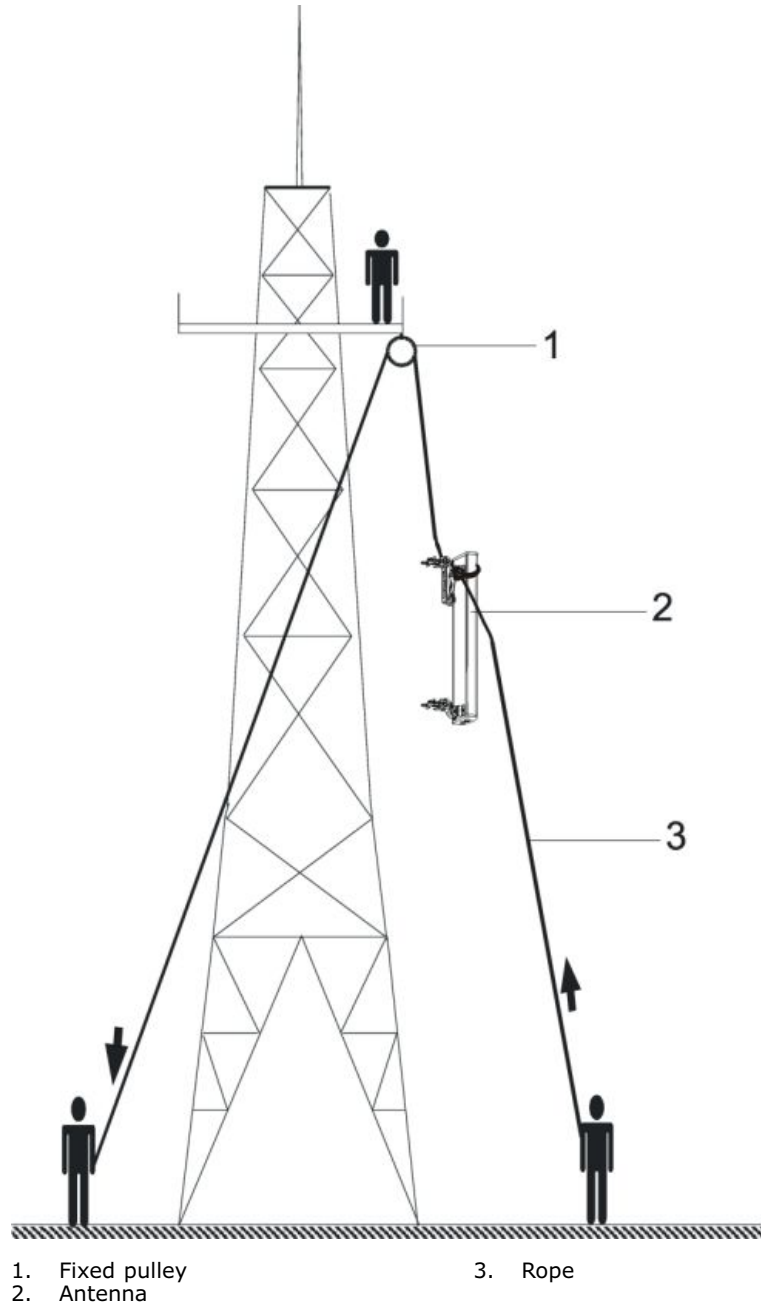
Danger:

The bearing capacity of rope must be not less than 100 kg.

3. Carefully recheck whether the rope and bolts are fastened properly.
4. During hoisting installation, two installation personnel stand under the tower. One pulls the rope slowly on the side of tower

and the other looses the rope and leads the antenna to avoid touching the tower on the other side. One installation personnel stands on the tower to catch the antenna, as shown in [Figure 83](#).

FIGURE 83 HOISTING ANTENNA ON TOWER



Caution:

During hoisting installation, make sure no people standing around the hoisting position to avoid personnel injury.

**Note:**

The hoisting procedures of feeder and other goods as well as disassembling procedure of the antenna to the floor are similar to the above.

END OF STEPS

Feeder Installation

Feeder Layout Principle

The feeder should be laid in accordance with the following principles.

- The feeder must be laid in good order and without crossings.
- The feeder route must be determined before layout. Mark the actual feeder route on a drawing to avoid reworks due to crossings.
- The minimum bending radius of the feeder should be greater than 20 times of the feeder radius.
- Lay out the feeder from up to down. Fasten the feeder with fixing clips.
- [Table 12](#) describes requirements of bending radius.

TABLE 12 BENDING RADIUS REQUIREMENTS FOR VARIOUS FEEDERS

Feeder Type	Recommended minimum bending radius	
	Single bending	Continuous bending (≤ 15)
Super-soft 1/2" feeder	150 mm	300 mm
1/2" feeder	500 mm	1250 mm
7/8" feeder	900 mm	2500 mm
5/4" feeder	1500 mm	3800 mm

Fixing Feeder

Prerequisites Lay out the feeder completely.

Context Use feeder clips to fix the feeder. According to the on-site engineering condition, there are two types of feeder clips available: two-combined or three-combined feeder clip.

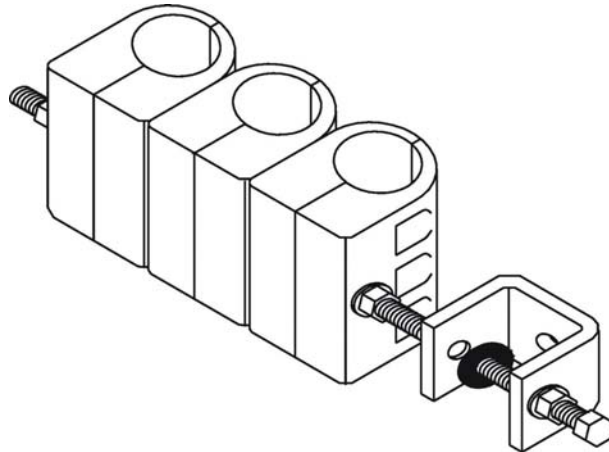
[Figure 84](#) illustrates the appearance of two-combined feeder clip.

FIGURE 84 TWO-COMBINED FEEDER CLIP APPEARANCE



[Figure 85](#) illustrates the appearance of three-combined feeder clip.

FIGURE 85 THREE-COMBINED FEEDER CLIP APPEARANCE



- Steps**
1. Tidy up the feeder.
 2. Bind and fasten the feeder at 0.5 m off the lower feeder interface on the ZXMBW R9110 cabinet.
 3. Install a feeder clip respectively per 1.5 m along a iron tower or cable rack. For on-site installation, the interval between feeder clips are determined by actual condition, however, not over 1.65 m at most. While installing feeder clips, keep equal distance between clips and identical direction. In the same cable tray (ladder), if two rows of feeder clips must be installed, keep them paralleled and in good order.
 4. Fix the feeder into feeder clips from up to down while tidying up the feeder. Then screw down the feeder clips. [Figure 86](#) and [Figure 87](#) illustrate the feeder installed on the iron tower.

FIGURE 86 FEEDER FIXATION ON TOWER (TWO-COMBINED FEEDER CLIP)



FIGURE 87 FEEDER FIXATION ON TOWER (THREE-COMBINATION FEEDER CLIP)



Note:

- ▶ Do not fix both ends of feeder simultaneously.
- ▶ Keep feeders straight and in a good order without any bulges between the feeder clips.

END OF STEPS

Performing Waterproof Processing for Feeder

Context Perform waterproof processing for the main feeder with a shrinkable sleeve.

 **Note:**

As soon as the whole antenna feeder system is completely installed and passes the test, perform waterproof processing for outdoor connectors.

The shrinkable sleeve is made of elastic material after vulcanization, such as silicon rubber and propylene rubber, as shown in [Figure 88](#).

FIGURE 88 SHRINKABLE SLEEVE



- | | |
|---------------------------|---------------------|
| 1. Plastic pipe | 3. Elastic material |
| 2. Separate plastic strip | |

- Steps**
1. Remove the connector of feeder at the ZXMBW R9110 cabinet side.
 2. Clean up dust and stains around the connector before performing waterproof processing.
 3. Lead the feeder through the shrinkable sleeve, as shown in [Figure 89](#).

FIGURE 89 FEEDER THROUGH SHRINKABLE SLEEVE**Caution:**

Draw the shrinkable sleeve downwards according to the tensile direction on the shrinkable sleeve.

4. Screw down the connector, as shown in [Figure 90](#).

FIGURE 90 SCREWING DOWN FEEDER CONNECTOR

5. Take hold of the shrinkable sleeve with one hand and keep its top close to the connector, as shown in [Figure 91](#).

FIGURE 91 SHRINKABLE SLEEVE CLOSE TO CONNECTOR

6. Slowly draw the upper separable plastic strips downwards with the other hand. The shrinkable sleeve is immediately affixed to the connector and feeder, as shown in [Figure 92](#) and [Figure 93](#).

FIGURE 92 DAWNING PLASTIC STRIPS (1)

FIGURE 93 DAWNING PLASTIC STRIPS (2)

7. While the whole plastic strips are completely drawn, the waterproof processing is finished, as shown in [Figure 94](#).

FIGURE 94 COMPLETING WATERPROOF PROCESSING

8. Referring to the above steps, continue to conduct waterproof processing of other feeder connectors.

END OF STEPS

VSWR Test

Before performing waterproof processing for feeders, conduct a VSWR test. The VSWR must be less than 1.3. Otherwise, check the following items:

- Whether the installation of feeder connectors is proper.
- Whether the feeder and antenna installation is proper.
- Whether the feeder is intact.

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Chapter 7

Installation Check

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Cabinet Installation Check

Cabinet Check

Implement the following items after installation:

- Make sure that the cabinet installation location complies with the engineering design.
- Keep the cabinet horizontal and vertical errors both less than 3 mm during installation and make it stand still and pleasant to eyes.
- Screw down all the fasteners. Properly place plain washers and spring washers.
- Make sure the cabinet is clean, tidy and in good painting condition. Make sure all the cabinet parts undamaged and all the wires well connected. Labels on the cabinet are proper, distinct and intact.

Cable Check

Power Cable and Grounding Cable Check

- Make sure all power cables (DC power cable of ZXMBW R9110 cabinet as well as AC/DC power cable of primary power) are firmly and correctly connected and the polarities are proper.
- Make sure all grounding cables (grounding cable of ZXMBW R9110 cabinet as well as grounding cable of primary power) as well as the PE connector posts are firmly and correctly connected.

External Cable Check

- Keep a proper spacing for the cable arraying and binding. Make the wire fasteners laid flat without repetition.
- Array the bellows of optical fiber in order.

- Keep the cable surface clean and tidy and the insulation layer of sheath undamaged.

Socket and Plug and Slice Check

Make sure the following items when checking sockets, plugs and slices:

- All the sockets, plugs and slices are correctly connected.
- The plugs are connected firmly to the socket.
- The core wire is undamaged during making connector on site.
- The cable plugs and slices are firmly fastened and these phenomena, such as pin loss or pin bending, do not occur.

Label Check

Check the following items:

- Make sure the labels are of ZTE special-purpose paster.
- Make sure the labels are pasted with the side indicating cable direction upward or toward the maintenance operation area.
- Make sure the label contents of rack rows or columns comply with the engineering design and ZTE equipment in the equipment room are all ready and in order without repetition.
- Make sure the ZTE equipment power cable breakers in the power supply cabinet and power distribution cabinet are well pasted and labelled with connection directions.
- Make sure both ends of all cables (power cable, grounding cable, transmission cable and jumper cable) are labelled with distinct writing and in correct positions. Keep the labels 20 mm apart from the cable ends.

Environment Check

Perform the following for environment check:

- Make sure that the surface of cabinet is clean and tidy after installation.
- Clean out the articles not in use and place these in use in order. Make sure that the operation console and raised floor are kept clean.
- Clear sundries such as cable strap, thread and desiccant away from beneath the cable tray, cabinet and the raised floor. Keep the cabling in good order.

Main Antenna Feeder System Installation Check

Checking Feeder Cable

Prerequisites The main antenna feeder system is completely installed.

- Steps**
1. The actual height of an antenna is consistent with the network planning and its installation position accords with the design.
 2. The antenna mount is firmly connected with the tower.
 3. The antenna is within the protection area of the lightning rod.
 4. All the antenna fixation bolts are screwed down and the spring washers are pressed flat.
 5. The SWR of the antenna feeder is not more than 1.3.
 6. All the outdoor jumper connectors are treated with waterproof protection.
 7. The feeder cable is bound equally, the maximum binding space not over 1.5 m.

END OF STEPS

Checking Waterproof Processing

Context Check the following items:

- Steps**
1. Make sure all feeder connectors treated with waterproof processing.
 2. Make sure feeders entering the door through the feeder hermetic window.

END OF STEPS

Checking Power-on Operation

- Prerequisites**
- The power cable and grounding cable of the chassis and power supply equipment are installed.
 - The chassis internal power cable and grounding cable are installed.
 - The sub-racks and boards are installed in the chassis.

- Necessary instrument (multimeter) is ready for use.

Context Perform the following steps for power-on check:

- Steps**
1. Correctly wear an antistatic wrist strap and ground it through the antistatic jack in the chassis.
 2. Switch off all the power supplies of the power distribution sub-rack.
 3. Set the multimeter to ohm band and then measure the power input terminal of the chassis power distribution sub-rack to confirm the -48 V power without short circuit.
 4. Set the multimeter to volt band and then measure the output terminal of -48 V DC power to confirm the output voltage as -48 V.
 5. Connect the power cable of ZXMBW R9110 with the power supply equipment.
 6. Switch on the external power to finish power-on process.
 7. Turn off the switch and check the causes if any abnormality occurs.

END OF STEPS

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Glossary

IC
- Integrated Circuit

PE
- Protective Earth