ZXSDR BS8800 C200
CDMA Indoor Basestation-8800
Installation Manual

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Contents

Preface

Purpose

The ZXSDR BS8800 C200 is a radio transceiver device to provide service for a certain cell. The ZXSDR BS8800 C200 can fulfill most functions concerning CDMA patent technologies. The primary functions of ZXSDR BS8800 C200 are: baseband modulation and demodulation, RF signal transmission and demodulation, radio resources distribution, call processing, power control and soft handoff.

This manual provides fundamental installation operation guide for ZXSDR BS8800 C200 hardware installation engineers and at the same time acts as a reference material for operation maintenance personnel.

Intended Audience

This document is intended for engineers and technicians who perform installation activities on ZXSDR BS8800 C200.

Prerequisite Skill and Knowledge

To use this document effectively, users should have a general understanding of ZXSDR BS8800 C200 equipment and its components. Familiarity with the following is helpful:

- cdma2000 fundamental
- ZXSDR BS8800 C200 hardware structure

What is in this Manual

This manual contains the following chapters:

Chapter	Summary
Chapter 1 Safety Instruction	Describes safety precautions during ZXSDR BS8800 C200 installation or operation maintenance as well as meanings of various safety symbols.
Chapter 2 Installation Overview	Describes the ZXSDR BS8800 C200 installation flows and installation precautions.
Chapter 3 Installation Preparation	Describes installation environment inspection, requirements of installation personnel, tools and documents, as well as unpacking and acceptance before installation.
Chapter 4 Installing Cabinet	Describes installation modes of ZXSDR BS8800 C200 cabinet and the installation process.
Chapter 5 Installing Components	Describes installation methods of ZXSDR BS8800 C200 modules and subrack.
Chapter 6 Installing Cable	Describes the installation process of cables.

Chapter	Summary
Chapter 7 Installing GPS Antenna Feeder System	Describes the installation methods of GPS antenna feeder system.
Chapter 8 Installing Main Antenna Feeder System	Describes the installation methods of main antenna feeder system.
Chapter 9 Installation Check	Describes the inspection process after installation completion.

Chapter 1

Safety Instruction

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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 ZXSDR BS8800 C200 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

This section describes the safety instructions related to electrical safety, antistatic, heavy objects and modules.

Electrical Safety Instructions

The following are the electrical safety instructions about tools, high voltage, power cables, holes and lightning:

- **Tools**

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

- **High Voltage**

  Danger:

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

  - 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.

- **Power Cable**

Warning:

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

- Make sure to shut 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.

- **Drilling Holes**

Warning:

It is not allowed to drill cabinet holes without permission.

- Unqualified drilling could damage wiring and cables inside the cabinet. Additionally, metal pieces inside the cabinet created by the drilling could result in a short circuit. Use insulation protection gloves and first move cables inside a cabinet away when drilling is necessary on a cabinet.
- Protect eyes during drilling as dust or flying debris may damage eyes.
- Clean any debris in time after drilling.

- **Lightning**

Danger:

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

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.

Antistatic Safety Instructions

Electrostatic:

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

- Friction caused by human body activities is the root cause of 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 MΩ 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 MΩ 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.

Hoisting Heavy Objects

Warning:

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

- 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.

Unplugging/Plugging a Module

- Never plug a module with excessive force, to ensure that the pins on the backplane do not get deformed.
- Plug the module right into the slot and make sure module circuit faces do not contact each other lest any short circuit may occur.
- Keep hands off the module circuit, components, connectors and cable trough when holding a module.

Other Safety Instructions

Note:

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

- 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.
- 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.
- 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.
- Contact ZTE office if you have any question, to ensure your safety.

Chapter 2

Installation Overview

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Appearance

Figure 1 shows the appearance of ZXSDR BS8800 C100.

FIGURE 1 ZXSDR BS8800 C200 APPEARANCE

Engineering Indices

Table 2 lists the engineering indices of ZXSDR BS8800 C200.

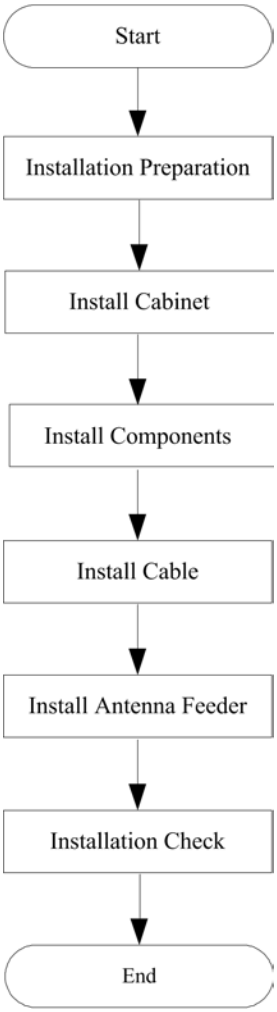
TABLE 2 ZXSDR BS8800 C200 ENGINEERING INDICES

Item	Index
Dimension	950 mm × 600 mm × 450 mm (height × width × depth)
Weight	< 200 kg
Power Supply	-48 V DC: -40 V ~ -57 V
Working Temperature	-40 ℃ to 55 ℃ (-40 ℉ to 131 ℉)
Overall Power Consumption	< 3000 W (full configuration)
Working Humidity	5% RH ~ 95% RH
Grounding	< 5 Ω

Installation Flow

The ZXSDR BS8800 C200 installation flow is listed in Figure 2 .

FIGURE 2 INSTALLATION FLOW



Installation Precautions

Warning:

Nonprofessional personnel prohibits installing and debugging devices alone, except with guide of professional personnel.

- Read this manual as well as corresponding manuals carefully before installation and perform installation according to the installation flow and specifications in this manual.
- ZXSDR BS8800 C200 hardware installation personnel must participate in some training related to communication equipment installation and own skilled installation technique.
- During installation, ensure personal safety and avoid accidents such as electric shock or bruise.

- During installation in the equipment room, installation personnel should wear insulation shoes and take off necklaces, bracelets and watches.
- During inserting and extracting boards, installation personnel should wear antistatic wrist straps and make sure the other end of it grounding.
- During installation and maintenance of optical fiber, prohibit directly staring at a section of optical fiber or a socket of optical terminal in case that laser beams damage eyes.
- Insert boards along slots, avoid contact between paralleled boards causing short circuit. Make proper force in case of pins distorted.
- Take hold of the edge of boards and not touch the circuit, components and wires.
- Replacing components or modifying devices may bring extra risks. Without authorization, prohibit replacing or modifying devices.

Chapter 3

Installation Preparation

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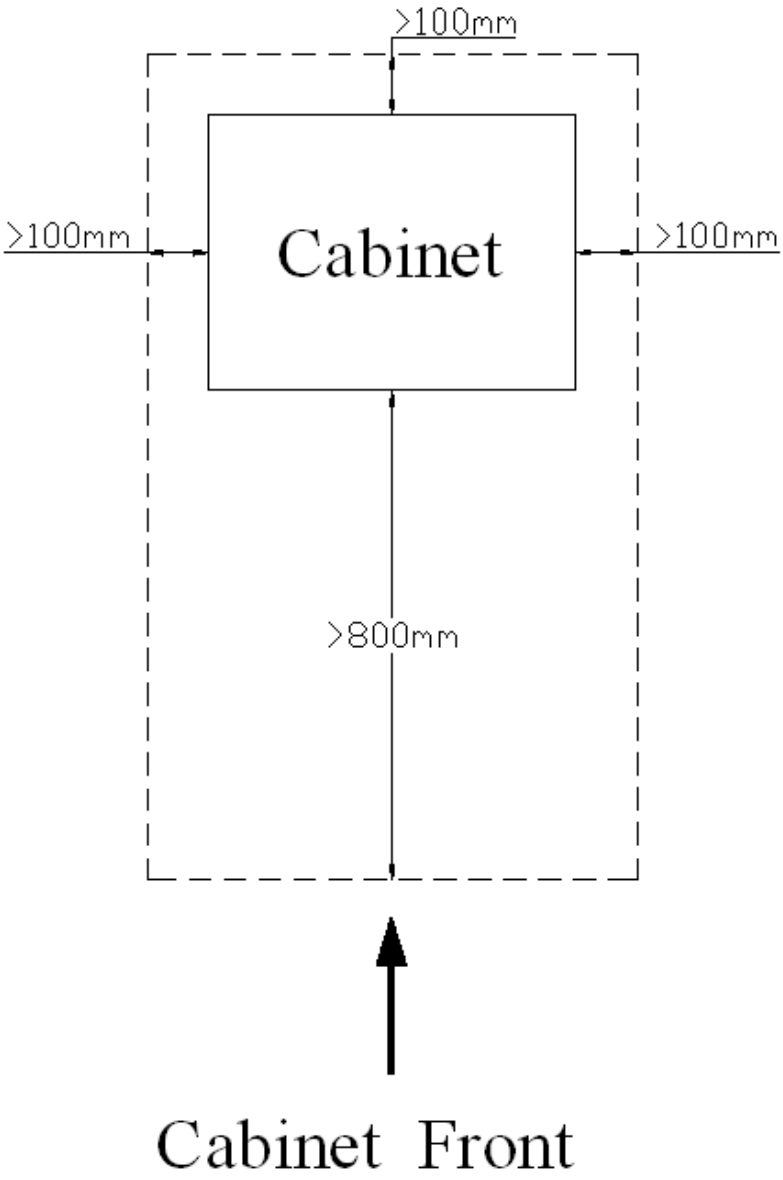
Cabinet Installation Environment Check

Equipment Room Space Requirements

The minimum installation space of cabinet is required as shown in Figure 3.

FIGURE 3 INSTALLATION SPACE REQUIREMENT



The detailed requirements is as follows:

- This equipment can be installed alongside a wall and perform maintenance for all boards under the condition that the back door is closed; keep the cabinet a distance of more than 100 mm from the wall.
- When there are other equipment at both sides of the equipment, make it abutting against other equipment; when there are walls at both sides of the equipment, keep a distance of more than 100 mm from the both walls.
- Keep a more than 800 mm space from the face of equipment.

Equipment Room Environment Requirements

Equipment Room Layout Requirements

The layout of equipment room includes cable tray layout and cabinet layout. According to the engineering design drawing, installation personnel should mark and locate based on equipment room space and cabinet dimension.

The direction from feeder to cabinet should be considered enough during cabinet layout. The feeder should be short as possible as it can, and the bending radius of feeder should be not too small. If two cabinets or more are required, the main cabinet should be put in the middle of all cabinets.

Cabinet layout adopting a row or multi-rows (put in the same equipment room with BSC or MSC) is determined by the size of equipment room and cabinet quantity.

In order to be convenient for operation, suggest that cabinet layout should meet the following requirements:

- The distance from cabinet to wall should be more than 10 cm.
- A row of cabinets keeps 1m distance at least from another neighboring row of cabinets.
- When multiple cabinets are put side by side, these cabinets should keep in line.
- The face of cabinet keeps 1m distance at least from an obstruction.

Equipment Room Building

The engineering for equipment room must meet the following requirements:

- The level floor difference per square meter is not more than 2 mm.
- The floor, wall, ceiling, reserved installation holes and grooves of equipment room should accord with the design requirements.
- Prevent water on the outdoor floor into the indoor floor while installation holes passes an outdoor wall. Take measures against dampness for the grooves.
- Select some material which is difficult to deform and crack for hidden pipes, holes and slots between cover plates.
- Prepare a temporary room to store installation materials and devices.

Note:

High-voltage power wire, strong magnetic filed, strong electrical spark as well as other factors bringing danger for equipment room must be away from the equipment room.

Temperature and Humidity

The air-condition devices should meet the following conditions:

- Environment Temperature: -5 ℃~+45 ℃ (Suggest maintaining the environment temperature between 15 ℃ and 30 ℃).
- Relative Humidity: 15%~90% (Suggest maintaining the relative humidity between 15% and 90%).

Noise

Considering maintenance personnel's physical and mental health, noise in the equipment room should be lower than 70dB.

Fire Protection

The fire protection conditions of equipment room must meet:

- The indoor wall should maintain dryness, and the wall surface and ceiling are coated with white noncombustible lusterless paint or other flame-retardant materials.
- Prohibit storing flammable and explosive substances and equip necessary fire protection devices.

Dustproof

The dustproof requirements of equipment room should meet the following:

- All doors and windows should be closed.
- Ventilation pipelines in the equipment room should be cleaned, and air condition devices should be installed with dust screens.
- Holes Communicating between equipment rooms and passage for cable layout should be closed to decrease dust flow between rooms.

Lighting

The lighting conditions of equipment room should reach the requirements of equipment maintenance. Daily lighting, standby lighting and emergency lighting systems should be prepared.

Water Supply and Draining

Pipelines of ware supply, draining and fire protection should not be equipped inside the equipment room.

Equipment Room Power Supply Requirements

The power supply of equipment room must meet the following requirements:

- Equip a diesel engine to provide standby power. The AC power is responsible for power supply alone. The voltage range: 380 V±10% ; 220 V±10%.
- The supply power voltage of DC distribution device should be stable and the nominal value is -48 V (-57 V~-40 V).
- The battery capacity should be adequate.

- Different power sockets in the equipment room should have obvious marks. The power electricity should be distinguished from the lighting electricity obviously.
- When the phenomena of power undercurrent, under-voltage and over-voltage occur, there should be sound-and-light alarms.
- While using 220V or 380V AC voltage, pay great attention in case of electric shock.
- While installing DC power, make sure power polarities consistent.

Electric Shock:

While checking powers, examine the current status of all switches and watch out electric shock.

Lightning and Grounding Requirements

The lightning and grounding in the equipment room should meet the following requirements:

- The grounding resistance is not more than 5 Ω.
- The indoor grounding system connects directly with a grounding bar. All device grounding connects to this grounding bar. And then the grounding bar connects with the primary grounding bar of the building.

Transmission Requirements

The external interfaces of ZXSDR BS8800 C200 locate on the RSU modules and BBU subsystem, referring to Table 3.

TABLE 3 ZXSDR BS8800 C200 EXTERNAL INTERFACE INDEX DESCRIPTION

Transmission Category	Module	Interface Name	Connector	Description
E1/T1	SA-data cable	B2 interface	DB44	Connects the ZXSDR BS8800 C200 with the BSC; E1 provides 75Ω and 120Ω load interfaces; T1 provides 100Ωload interface.

Transmission Category	Module	Interface Name	Connector	Description
Ethernet cable	CC	ETH0	RJ45	Connects the ZXSDR BS8800 C200 with the BSC.
		ETH1	RJ45	Connects the ZXSDR BS8800 C200 and PC for LMT maintenance.
RS232/RS485 monitoring cable	SA-data cable	B4	DB9	Provides internal and external environment monitoring for ZXSDR BS8800 C200.
Dry contact cable	SA-data cable	B3	DB25	Import dry contact signal from external devices; Export dry contact signal from this device.
AISG control cable	RSU	AISG	DB9	Controls electrical adjustment antenna.
GPS jumper	CC	ANT	SMA	Import satellite signal into the cabinet.

Wiring Requirements

Wiring Requirements

- Before layout of power cable and protective ground cable, wrap cable connectors well with insulation adhesive tape.
- The power cable and protective ground cable should be separate from the signal cable.
- When the power cable and protective ground cable are parallel with the signal cable, the distance from the signal cable keeps 10 mm at least inside the cabinet and 100 mm at least outside the cabinet.
- If the signal cable is crossed with the power cable, the crossed angle must be 90°.
- At the turning of cable, the bending radius should be more than five times of the cable diameter.
- When the power cable connects to a connecting terminal of distribution power box inside the cabinet, the wiring should be straight and the radian of turning should be smooth.
- The actual installation position of cables should be consistent with requirements of engineering survey and data configuration.
- The rout of cable layout should be clear and reasonable, according to the engineering design drawing.
- The layout of signal cable should be orderly, smooth and non-crossed.
- The layout of cables should be convenient for maintenance and capacity expansion.

- 。Before feeder layout, learn of the wiring route and draw a practical wiring route on the paper in case feeder crossed
- The minimum bending radium of feeder is not less than 20 times of the feeder radium.
- The requirements of feeder bending radium are as shown in Table 4.

TABLE 4 BENDING RADIUM REQUIREMENTS

Feeder Bending	The Minimum Bending Radius (recommended)	
	Bending for Once	Consecutive Bending (<=15 times)
Super–soft 1/2" Feeder	15 cm	30 cm
1/2" Feeder	50 cm	125 cm
7/8" Feeder	90 cm	250 cm
5/4" Feeder	150 cm	380 cm

Binding Requirements

- The binding tape is bound neatly and properly, and the spaces between wire fasteners and directions of fasteners keep consistent.
- Cut redundant binding tape and make it flat and tidy.
- The power cable and protective ground cable are bound separately from the signal cable.
- The cables inside the cabinet is bound onto a wire bushing.
- While laying out cables along the cable tray, the cable should be bound together close.
- Remain proper length in cable for inserting and extracting connectors.

Technical Material Preparation

It is necessary to prepare the following technical material for ZXSDR BS8800 C200 installation:

- ZXSDR BS8800 C200 CDMA Indoor Basestation-8800 Engineering Survey Report
- ZXSDR BS8800 C200 CDMA Indoor Basestation-8800 Environment Acceptance Report

ZXSDR BS8800 C200 kit materials include:

- ZXSDR BS8800 C200 CDMA Indoor Basestation-8800 Technical Manual
- ZXSDR BS8800 C200 CDMA Indoor Basestation-8800 Hardware Manual

- ZXSDR BS8800 C200 CDMA Indoor Basestation-8800 Installation Manual
- ZXSDR BS8800 C200 CDMA Indoor Basestation-8800 Operation and Maintenance Manual
- ZXSDR BS8800 C200 CDMA Indoor Basestation-8800 Commissioning and Configuration Manual

Personnel Requirements

Installation personnel should participate in ZTE's training and examination, and handle knowledge of installation and debugging. After obtaining job certificate, installation personnel are qualified for installation and debugging.

Tools and Instruments Preparation

Table 5 shows tools and meters list required during installation.

TABLE 5 TOOL AND METER LIST

Category	Name
Special-purpose tools	One feeder connector knife
	One wire stripper One crimping pliers
	One multi-functional crimping pliers Earth resistance tester
Concrete drilling tools	One electric percussion drill
	Auxiliary and sample bits
	One vacuum cleaner
	Power socket (two-phase and three-phase socket, with current capacity greater than 15 A)

Category	Name
General-purpose tools	Cross screwdrivers (4”, 6” and 8” each)
	Flathead screwdrivers (4, 6” and 8” each)
	Adjustable wrenches (6”, 8”, 10” and 12)
	Dual-purpose spanners (17” and 19” each)
	One set of socket wrench
	5 kg (11 lb) nail hammer
	One 300 W iron
	One 40 W iron
	Solder wires
	Hot blower
	Oil paint brush
	Pliers
	Scissor
	Paper knife
Measurement tools	One 50 m (164 feet) tape measure
	One 5 m (16 feet) steel tape
	One 400 mm (16 inches) level bar
	One angle meter
	One compass
	Plumb
Protection tools	Antistatic wrist strap
	Safety helmet
	Pair of gloves
Clamp tools	One hacksaw (with several saw blades)
	One pair of sharp-nose pliers (8”)
	One pair of diagonal pliers (8”)
	One pair of slip joint pliers (8”)
	One pair of vices (8”)
	Crowbar
Auxiliary tools	Chain wheel
	Rope
	Ladder
	Forklift

Unpacking Acceptance

Counting Goods

Prerequisite The transported cargo should have reached the installation site.

Context The representative of customer and the project supervisor must be present on site during counting of goods received. If any party is not present at that time, transporter must hold the responsibility for any difference in goods.

The steps involved in counting goods are as follows:

Steps

1. Check Delivery Checklist of ZTE Corporation. Check total number of goods, intactness of packing boxes, and check whether arrival place is the actual installation place against packing list number attached to packing boxes. If goods are intact, start to unpack and inspect them.

   Note:

   It is recommended to unpack the goods after about 30 minutes of receiving the cargo, since there is a possibility of moisture content due to temperature variations if any.

2. Equipment inspection list and *unpacking acceptance report* are present in the first packing carton. Firstly, open first 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, then fill-in *Unpacking Acceptance Feedback Table* and contact ZTE promptly.

END OF STEPS.

Crate Unpacking

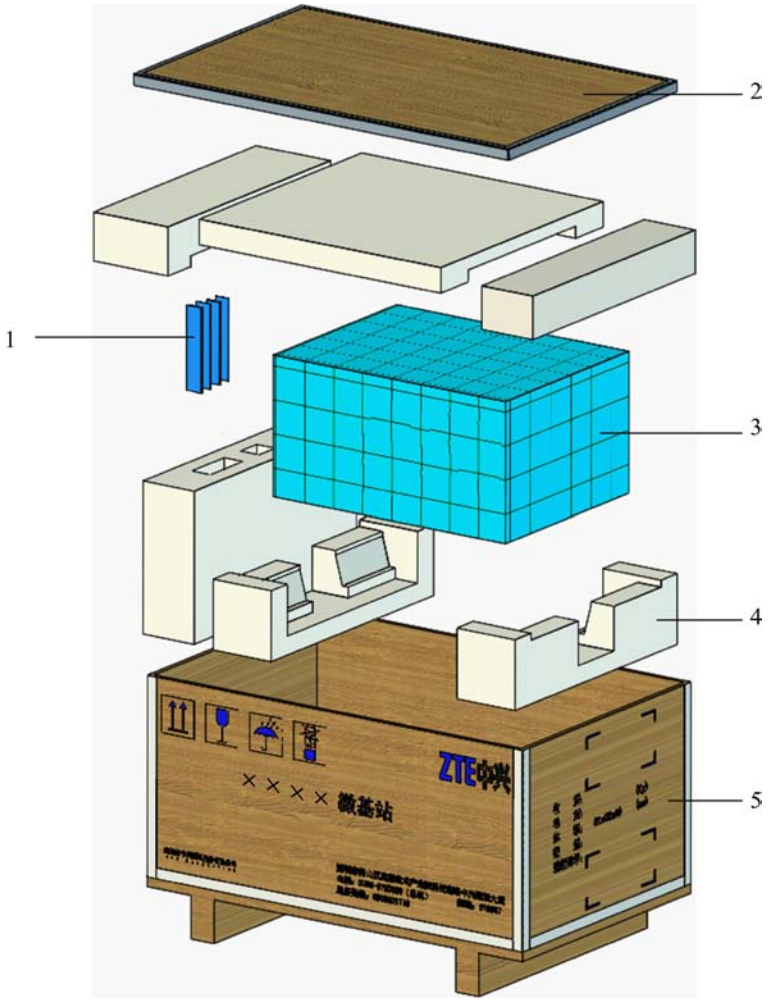
Prerequisite Prepare the appropriate tools such as straight screwdriver, pliers, and crowbar.

Context Perform the following steps to open the crate:

Steps

1. Insert a straight screwdriver into the slit between crate and front cover board to make it loose; then insert crowbar to unclench cover board.
2. Pull the cover board out from the crate.
3. Remove the other boards of the crate, as shown in Figure 4.

FIGURE 4 CRATE UNPACKING



1. Accessories
2. Cover plate
3. Equipment
4. Foam piece
5. Crate

END OF STEPS.

Carton Unpacking

Prerequisite Prepare the appropriate tools such as straight screwdriver, diagonal pliers, and paper knife.

Context Perform the following steps to unpack the carton:

Steps

1. Use diagonal pliers to cut packing straps.
2. Use a paper knife to cut adhesive tape along the slits on carton cover, avoid damaging goods inside.
3. Open the carton, and remove the foam board.

4. Check the goods within the carton.

Note:

- Avoid damaging the antistatic bag (It can be used in the future for storage of spare parts) during unpacking.
- While the equipment is moved to a hotter and damper place, wait for 30 minutes before unpacking the equipment. Otherwise, moisture may condense on the surface of the equipment and cause damage.
- Properly dispose of recycle desiccants.

END OF STEPS.

Acceptance and Goods Handover

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

Steps

1. **Acceptance**

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

   i. Make sure that there are no bubbly, peeling, nick and filth mark on the surface of the chassis.

   ii. Ensure that oil paint on the chassis surface is intact.

   iii. Ensure clamping screws are tight and intact.

   iv. All the components are properly installed at their respective positions.

   v. Lay down the inspected goods according to categories.

2. **Handover**

   After completing the unpacking procedure, representative of customer and project supervisor should approve and sign *Unpacking for Inspection Report*. Each party should have a copy of Unpacking for Inspection Report. If the goods are still under the supervision of the operator even after acceptance, then goods will not be handed over to the operator until both parties sign on the report.

END OF STEPS.

Chapter 4

Installing Cabinet

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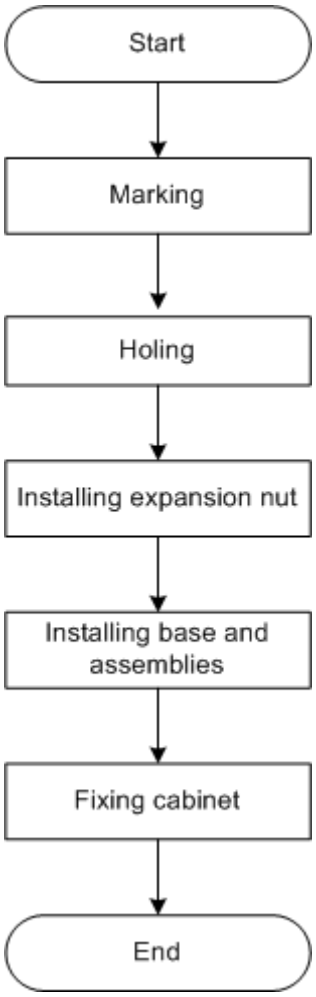
Cabinet Installation Flow

ZXSDR BS8800 C200 cabinet installation flow is listed in Figure 5.

FIGURE 5 CABINET INSTALLATION FLOW

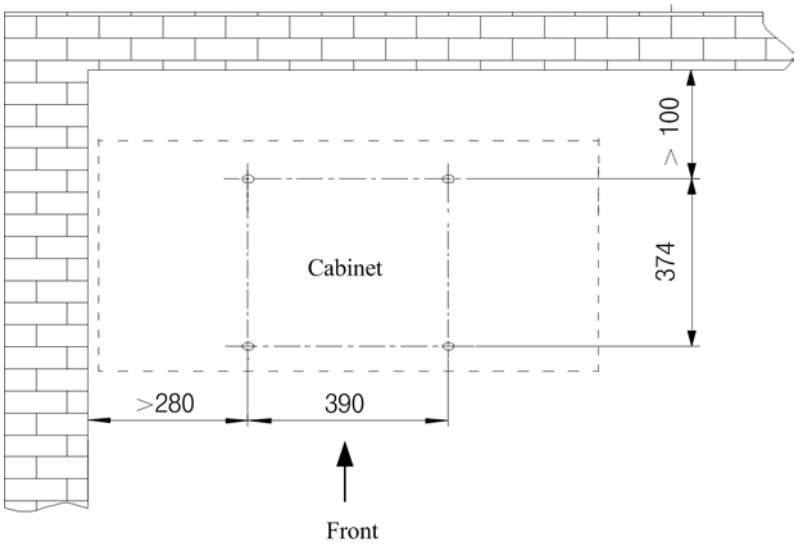


Installing Single-cabinet

Steps

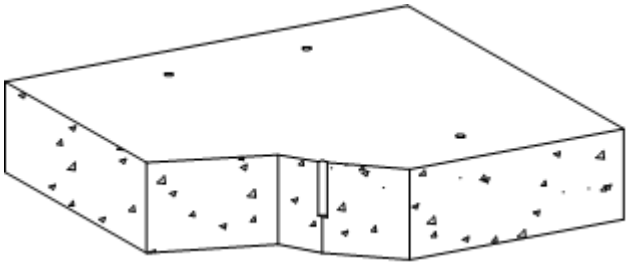
1. Confirm the installation position of cabinet based on the reference dimension and cabinet dimension given by the engineering design drawing. Measure some marking points with a measuring tape and draw two straight lines paralleled with the reference line with an inking pot. Make sure the hole positions for cabinet installation on the straight lines according to the design drawing. The position of single-cabinet is as shown in Figure 6.

FIGURE 6 SINGLE-CABINET INSTALLATION POSITION



2. Drill some φ12 holes with 60 mm depth based on the expansion bolt marks, as shown in Figure 7.

FIGURE 7 HOLING



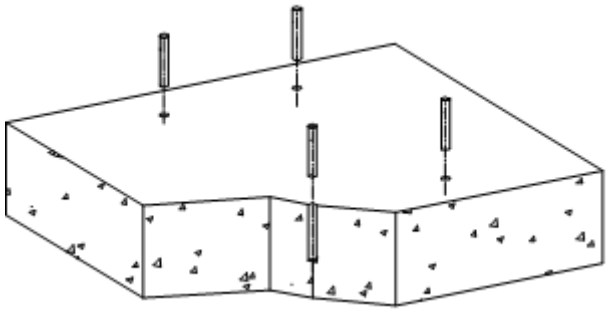
Note:

- While using a hammer drill or an electric hammer, make sure the drill bit vertical with the horizontal ground, clasp the drill stock with hands and press it vertically downwards.
- While holing, use a cleaner to clean dust and make sure clean out all garbage after construction.
- If the drill bit is unable to fix due to too smooth floor, in order to help positioning drill bit, first cut a hole on the marked positions with a punch.

3. Install expansion nuts.
   i. Before installation, use the cleaner to get rid of all dust inside and outside holes.

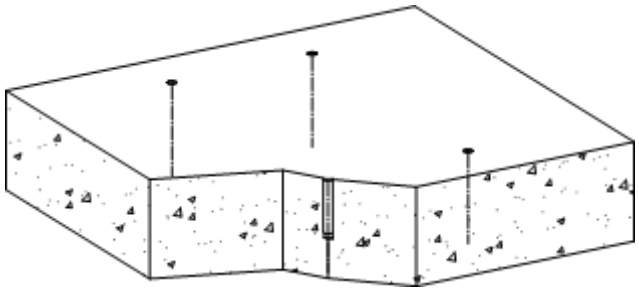
ii. Install four insulation sleeves on the installation holes to make sure the expansion nuts insulated with the ground, as shown in Figure 8.

FIGURE 8 INSULATION SLEEVE INSTALLATION



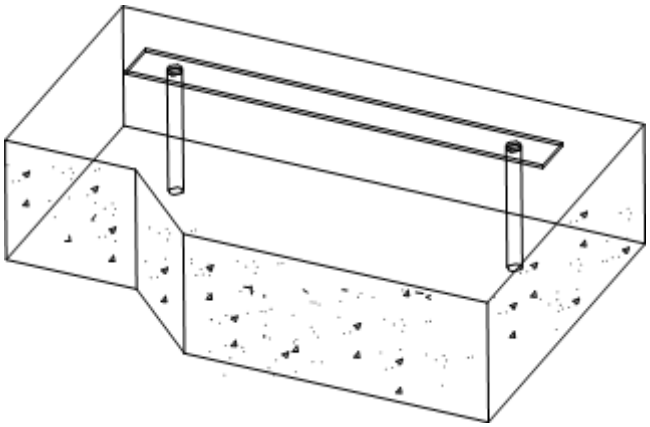
iii. Insert the expansion nuts vertically into the insulation sleeves, and knock the nuts with a rubber hammer to make them completely into the ground, as shown in Figure 9.

FIGURE 9 EXPANSION NUT INSTALLATION



4. Adjust an insulation sheet and align two holes on the insulation sheet with those on the ground, as shown in Figure 10.

FIGURE 10 INSULATION SHEET INSTALLATION



5. Align installation holes on the base installation assembly with holes of expansion nuts. Insert the M10 bolt through a big washer, insulation washer, installation hole of base installation assembly and insulation washer in turn. Screw down the bolts and fix the installation assembly on the cement floor, as shown in Figure 11 and Figure 12.

FIGURE 11 BASE INSTALLATION ASSEMBLY (1)

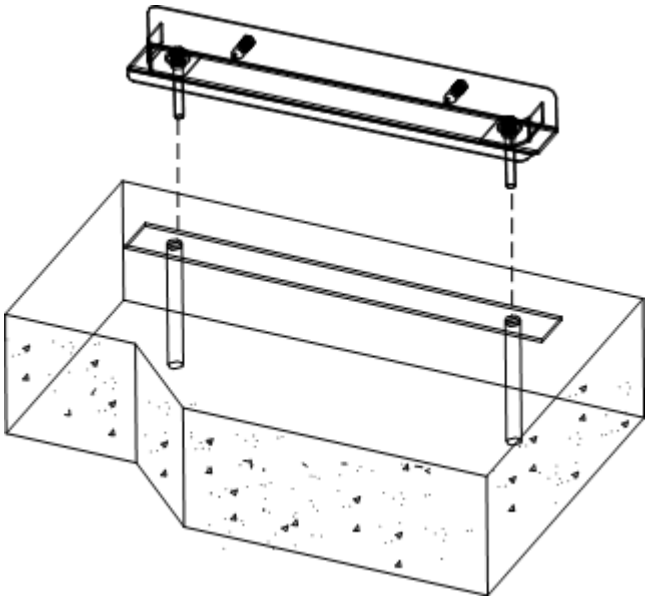
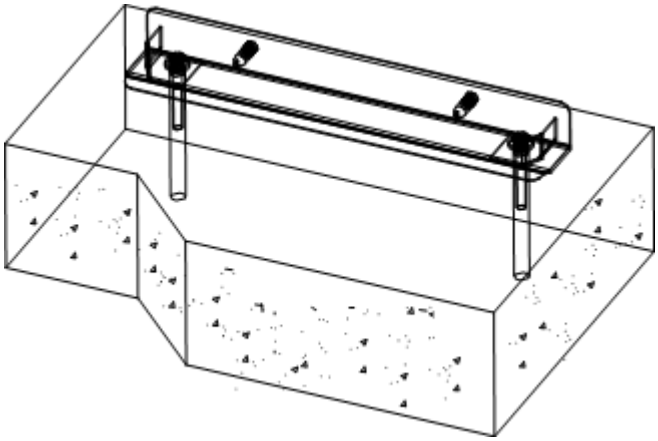


FIGURE 12 BASE INSTALLATION ASSEMBLY (2)



6. Implement an insulation test.
   i. Adjust the multimeter to the resistance grade.
   ii. For resistance measurement, one measuring probe of the multimeter contacts with the metal part of base assembly and the other with the expansion nuts. If the circuit dis-

plays an open status, the insulation test completes. If not, continue the next.

iii. Check whether the insulation sleeves are damaged or forgotten to install. Such as this situation, repeat the above flow (install the base assembly) and perform an insulation test again.

7. Fix the cabinet.

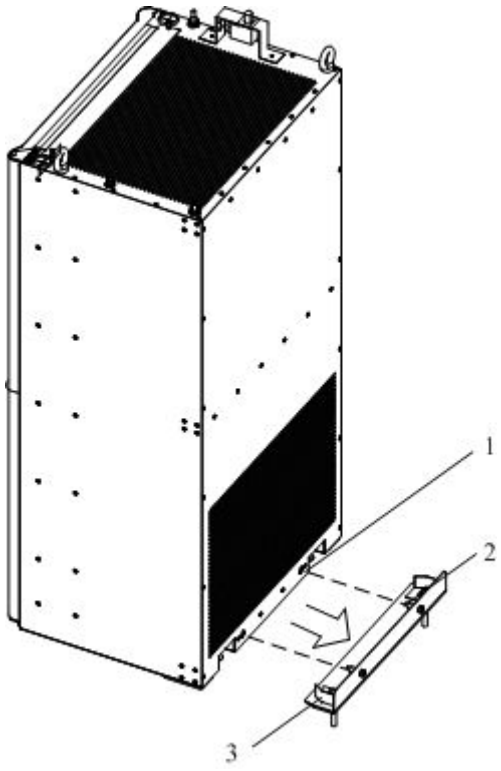
i. Move the cabinet to the front of base assembly and the back of cabinet faces to the base assembly.

Note:

Considering the weight of cabinet, the top of cabinet provides lifting eyes and suggest a hoisting installation mode.

ii. Align the location holes at the bottom of cabinet with the orientation pin bolts on the base assembly, and move the cabinet slowly and carefully to make two angle supports inserting the slots at the bottom of cabinet, as shown in Figure 13.

FIGURE 13 FIXING CABINET (1)



1. Location Hole
2. Orientation Pin Bolt
3. Angle Support

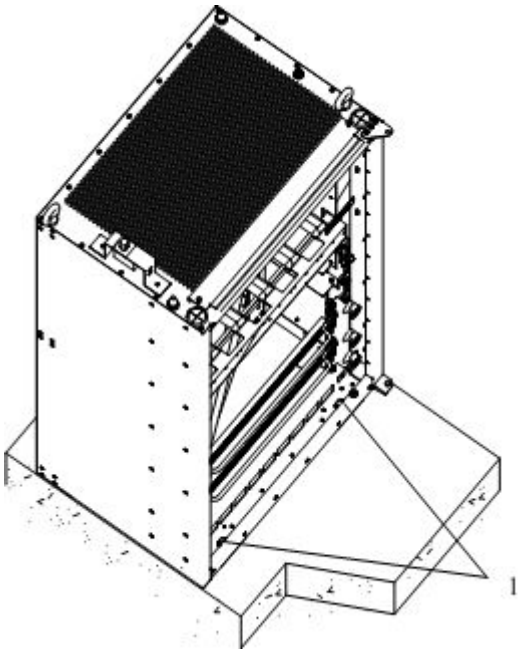
Caution:

Prohibit drilling hole on the cabinet by self. Drilling hole that does not meet requirements will damage the cables and cable connection inside the cabinet. The metal dust caused by drilling will result in short circuit.

iii. Measure whether the cabinet is level with a level bar. If not, add a levelling sheet under the cabinet to adjust to level.

iv. Open the front door of cabinet and display two circular holes at the bottom, as shown in Figure 14. Insert the M10 bolt through a washer, insulation washer and oval hole, and screw down the bolt.

FIGURE 14 FIXING CABINET (2)



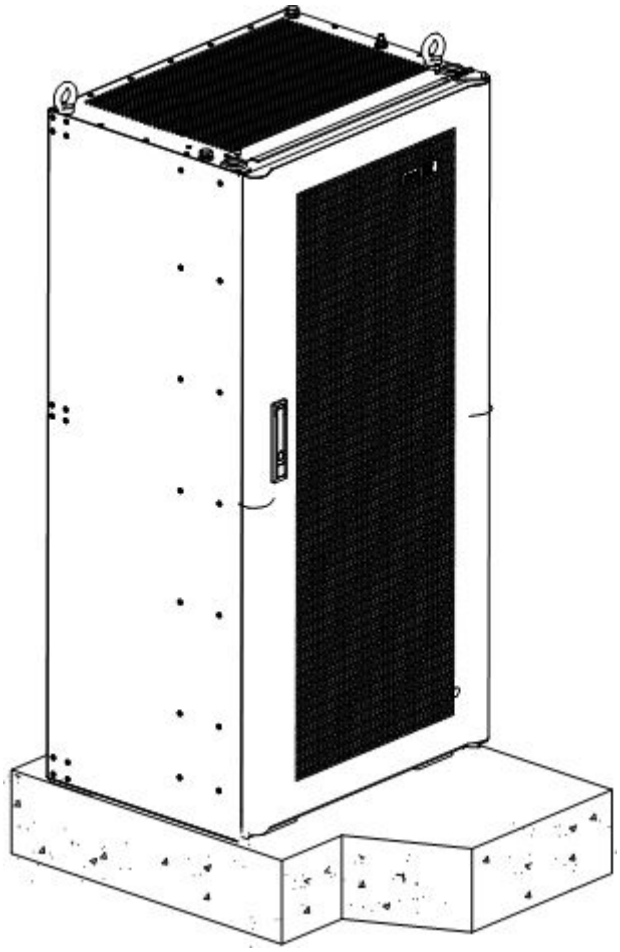
1. Circular Hole

Note:

The insulation washer has been riveted at the bottom of cabinet.

8. According to Step 6, perform a solution test for metal components at the front of cabinet.
9. Close the front door and fix the cabinet, as shown in Figure 15.

FIGURE 15 CABINET INSTALLATION COMPLETION



END OF STEPS.

Chapter 5

Installing Components

Table of Contents:

Module Position Schematic Diagram

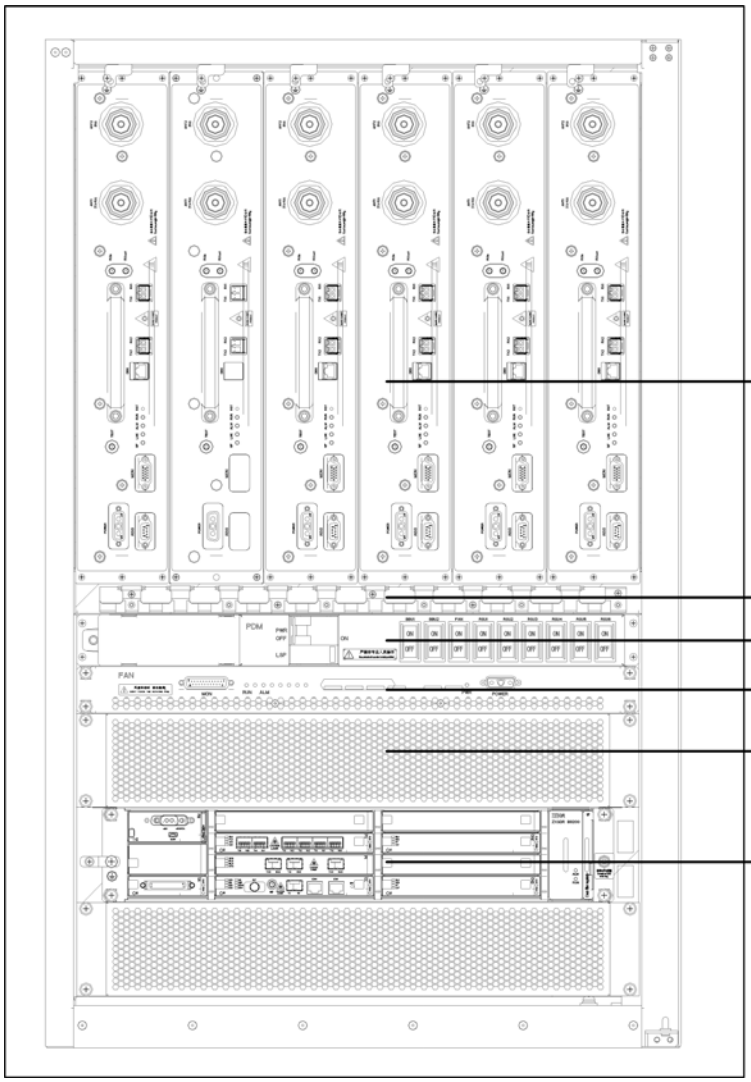
ZXSDR BS8800 C200 Baseband

The main modules of ZXSDR BS8800 C200 are installed in the RF layer and baseband layer. The internal structure is as shown in

and RF Cabinet Internal Structure

Figure 16.

FIGURE 16 BASEBAND-RF CABINET INTERNAL STRUCTURE

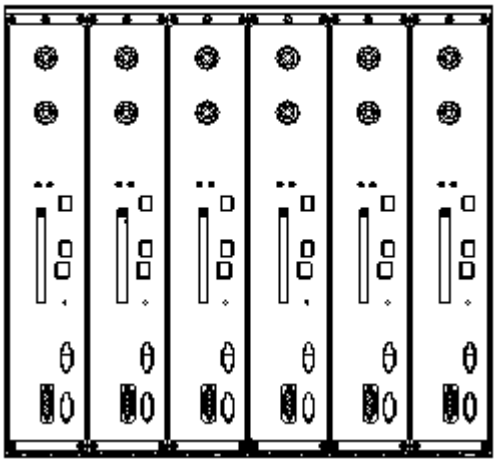


1. RF Subrack
2. Cable Tray
3. Power Distribution Subrack
4. Fan Subrack
5. Wind-guide Place
6. Baseband Subrack

RF Module Layout

The RF modules are configured in the first subrack, as shown in Figure 17.

FIGURE 17 RF SUBRACK APPEARANCE



1. RF Unit

Six RSU multi-carrier RF units can be configured in Slot1~Slot6.

Baseband Moudle Layout

ZXSDR BS8800 C200 baseband subrack is as shown in Figure 18.

FIGURE 18 BASEBAND SUBRACK APPEARANCE

1. PM
2. FS
3. CC
4. SA
5. CHV
6. FA
7. CHD

Installing RSU Module

Prerequisite

- Install the ZXSDR BS8800 C200 cabinet completely.
- Wear an antistatic wrist strap to avoid damaging the RSU.

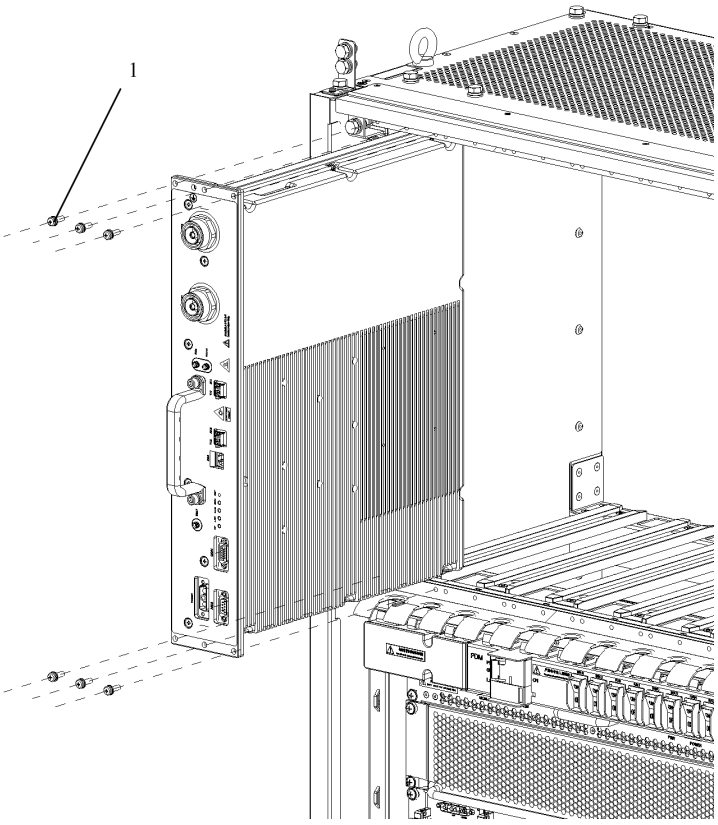
Steps

1. Confirm slots of module to be installed.
2. Hold part of a metal panel with the right hand and support the lower part of RSU with the left hand. In this way, keep the metal panel erect.
3. Push the module gently into a slot along a guideway , keep it erect and locate upper and lower ends into the slots.
4. Hold the module at middle and push it slowly once 2/3rd of board is inserted. When the module touches to a backplane socket, push it little forcibly and make it into the socket of backplane.

5. Screw down six M5X20 pan head assembly screws on the RF module.

   The positions of six screws are as shown in Figure 19.

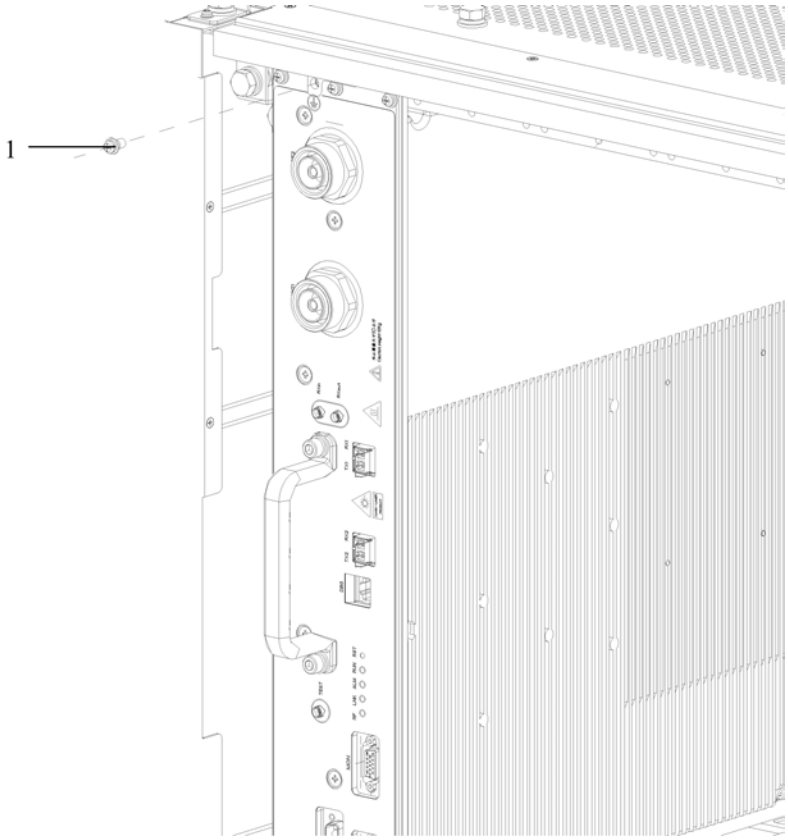
FIGURE 19 SCREW POSITIONS ON RF MODULE



1. M5X20 pan head assembly screw

6. Screw down all screws as shown in Figure 20 and connect the RSU grounding sheet.

FIGURE 20 SCREW POSITION



1. M5*10 pan head screw with cross recessed

END OF STEPS.

Installing BBU

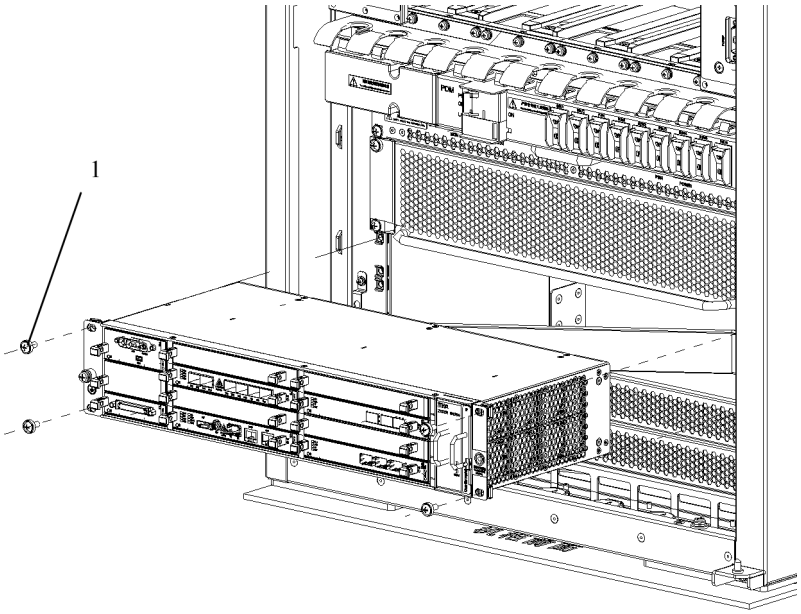
Prerequisite

- Install the ZXSDR BS8800 C200 cabinet.
- Wear an antistatic wrist strap to avoid damaging the BBU.

Steps

1. Insert the module into the ZXSDR BS8800 C200 cabinet along the guideway and fix it with four M5×16 combined screws (two respectively at left and right), as shown in Figure 21.

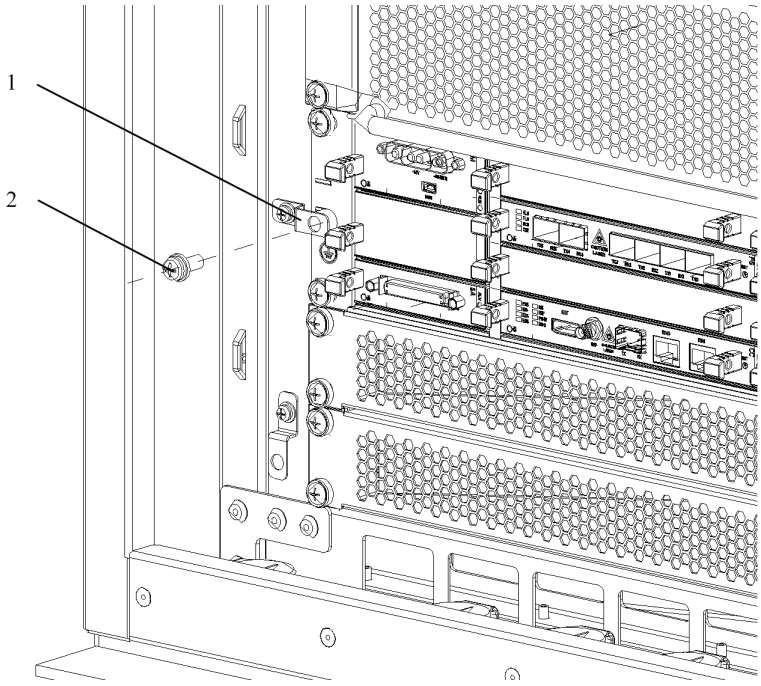
FIGURE 21 BBU INSTALLATION



1. M5×16 screw

2. Connect the grounding lug of BBU to the cabinet with a M6×16 screw. The position of M6×16 screw is as shown in Figure 22.

FIGURE 22 M6×16 SCREW POSITION



1. Grounding lug
2. M6×16 screw

END OF STEPS.

Installing BBU Horizontal Module

Prerequisite Before installation, make sure wearing an antistatic wrist strap to avoid damaging the PCB board.

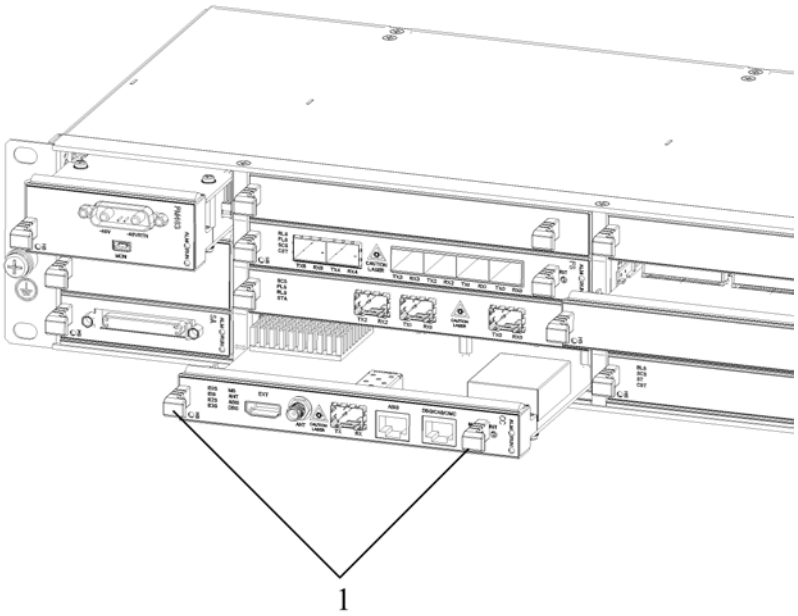
Context The horizontal modules of ZXSDR BS8800 C200 include as follows:

- Control and clock module (CC)
- Channel module (CH)
- Fabric switch module(FS)
- Site alarm module (SA)
- Power module (PM)

Steps

1. Insert the modules into the ZXSDR BS8800 C200 subrack along the left and right guideways, as shown in Figure 23.

FIGURE 23 HORIZONTAL MODULE INSTALLATION



1. Horizontal Insertion and Extraction Handle

2. Hold handles at both sides of subrack to push into the module and make sure the handle locked with the ZXSDR BS8800 C200 subrack.

END OF STEPS.

Installing BBU Vertical Module

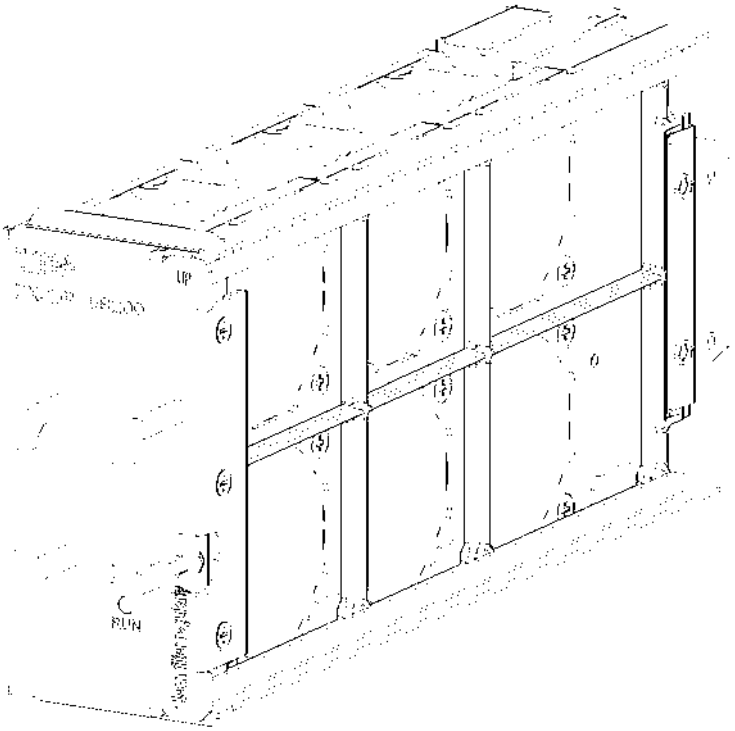
Prerequisite Make sure wearing an antistatic wrist wrap in case of damaging the PCB board.

Context The ZXSDR BS8800 C200 vertical modules include the fan array (FA) and dustproof assembly.

Steps

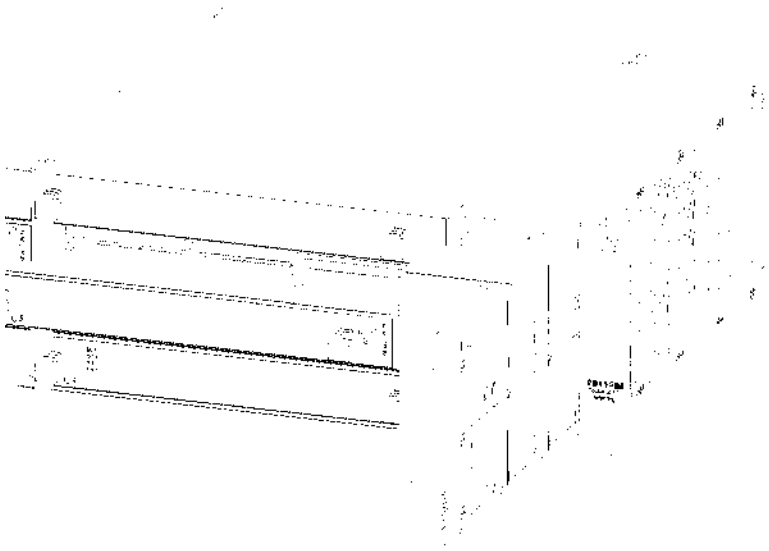
1. Fasten the FA module with the four self-clinching bolts locating at the bottom plate of the fan subrack with M3×8 combination screws.
2. Insert the dustproof assembly along the right guideway of FA subrack and make sure that the spring plate on the FA subrack is fastened with the dustproof assembly, as shown in Figure 24.

FIGURE 24 DUSTPROOF ASSEMBLY INSTALLATION



3. Push the equipped FA subrack and dustproof assembly into the ZXSDR BS8800 C200 until hearing locking sound, as shown in Figure 25.

FIGURE 25 VERTICAL MODULE INSTALLATION



END OF STEPS.

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Chapter 6

Installing Cable

Table of Contents:

On-site Cable Installation List

Internal cables installed on site are listed as follows:

- Internal optical fiber
- Receiving diversity cable
- Cascading Ethernet cable
- SA panel cable

External cables installed on site are listed as follows:

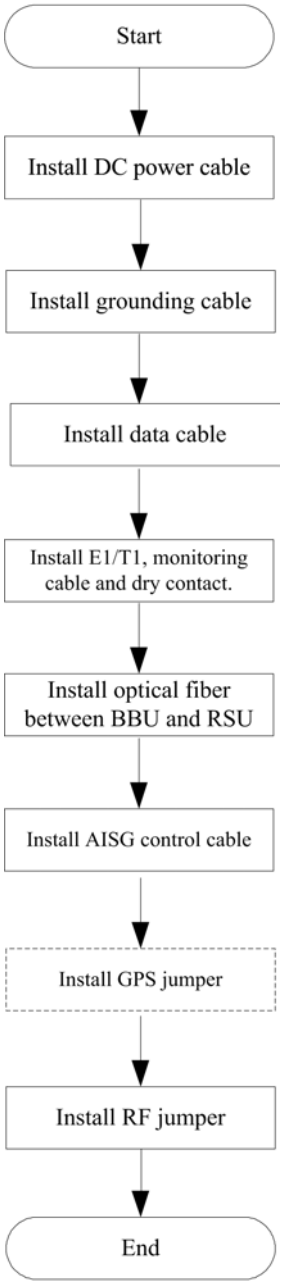
- External power cable
- Protective ground cable
- E1/T1 external cable
- Abis/Iub interface optical fiber
- Abis/Iub interface Ethernet cable
- Dry contact cable
- RS232/RS485 cable
- Antenna feeder and jumper

- GPS jumper

Cable Installation Flow

The cable installation flow is listed in Figure 26.

FIGURE 26 CABLE INSTALLATION FLOW



Note:

- The trunk should be selected according to the on-site situation.
- Generally, the GPS jumper is installed before delivery.

Installing DC Power Cable

Prerequisite

1. Lay out the route and length of cables along a cable tray between the power cabinet and the ZXSDR BS8800 C200. The power cable and the protective ground cable should be separately arranged and banded from other cables. The banding distance per segment is 200 mm. The 0.2 m~0.5 length at both ends is reserved.

   Note:

   The power cable and the protective ground cable should be intact and avoid joints appearing in the middle of cables.

2. Make sure the power supply output cut off.

   Danger:

   Make sure checking the status of circuit breaker inside the power cabinet. Prohibit installing power cables in a live status.

Context

There are two DC power cables, made up of strands of flame-retardant wire. The cross sectional area of DC power cable is 16 mm^2 . One is a -48V blue power input cable and the other is a black ground cable.

The appearance of DC power cable is as shown in Figure 27.

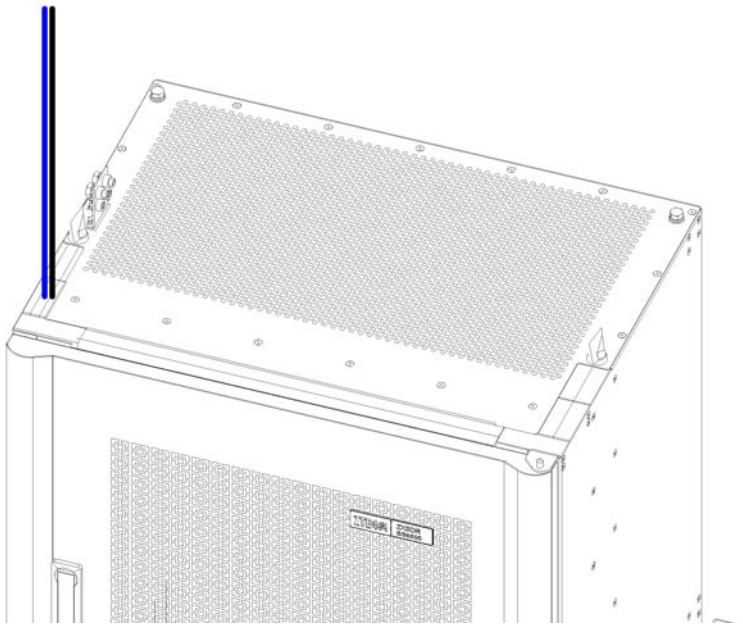
FIGURE 27 DC POWER CABLE APPEARANCE

Steps

1. Make blue and black cables with 16 mm^2 cross sectional area and connect their one ends to the power cabinet. The other ends of blue and black cables are reserved for standby.

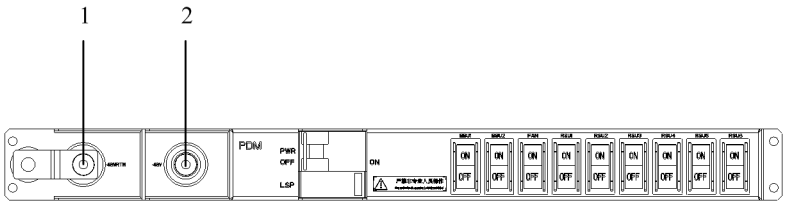
2. Lead the -48V DC (blue) and -48V RTN (black) cables through the cable inlet on the equipment top, as shown in Figure 28.

FIGURE 28 DC POWER CABLE INLET



3. Lay out the power cable to the power distribution subrack along the vertical cable tray on the left side of cabinet.
4. Screw off the screws on the protective cover at the left side of power distribution subrack with a screwdriver, and take off the protective cover.
5. Install respectively the –48V DC (blue) and –48V RTN (black) cables to the connection terminals of the power distribution subrack, the connection relationship as shown in Figure 29.

FIGURE 29 POWER DISTRIBUTION SUBRACK CONNECTION



1. —48V RTN
2. —48V DC

Caution:

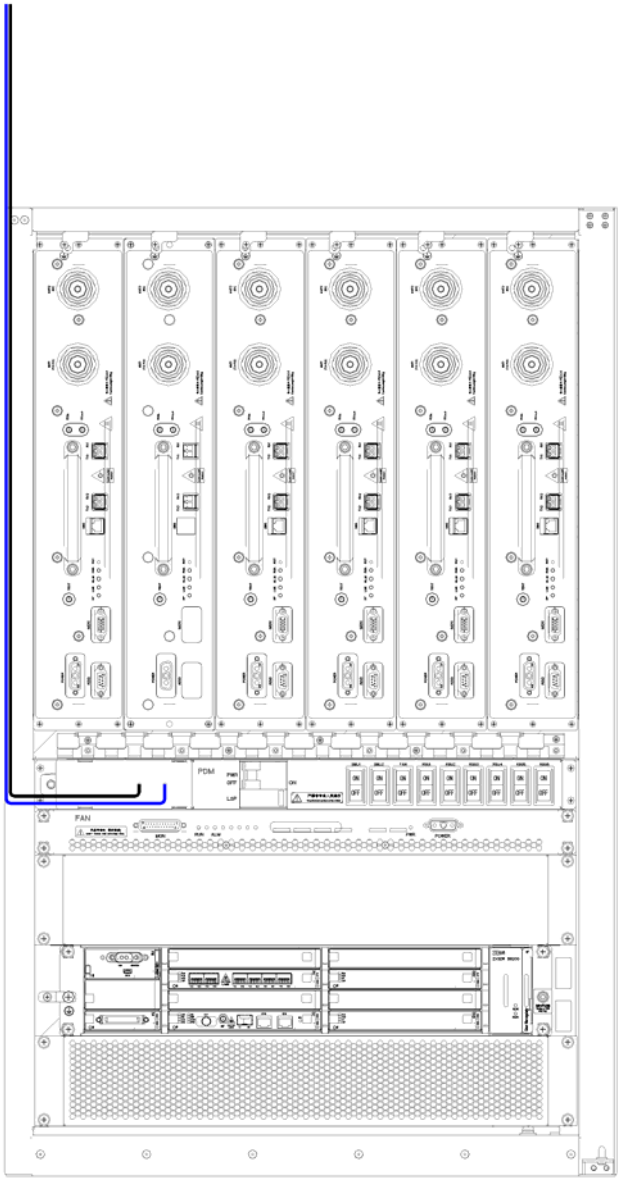
Refer to Figure 29 to connect the positive and negative electrodes of power cable and make sure not connection in reverse.

6. Refix the protective cover to the power distribution subrack.

END OF STEPS.

Result The installation of power cable is completed, as shown in Figure 30.

FIGURE 30 POWER CABLE INSTALLATION COMPLETION



Installing Grounding Cable

Steps

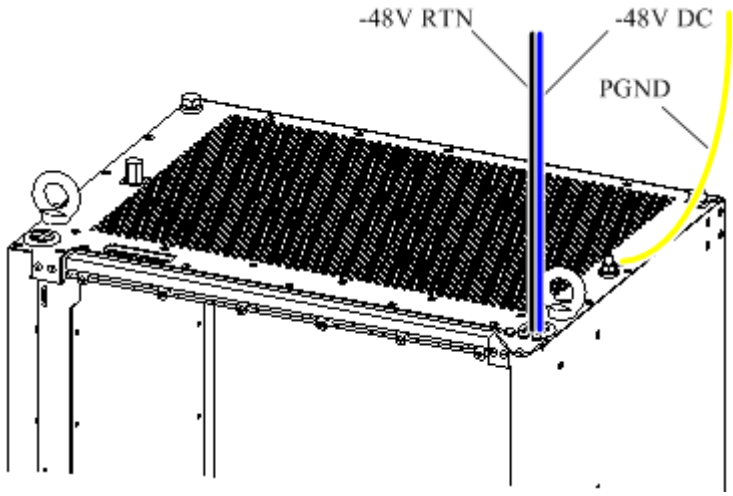
1. Based on the distance from the cabinet to the protective ground, cut a proper length of protective ground cable.

Note:

Make sure some cables left while cutting.

2. Install the protective ground cable to the PE binding post on the equipment top, as shown in Figure 31.

FIGURE 31 GROUND CABLE INSTALLATION



END OF STEPS.

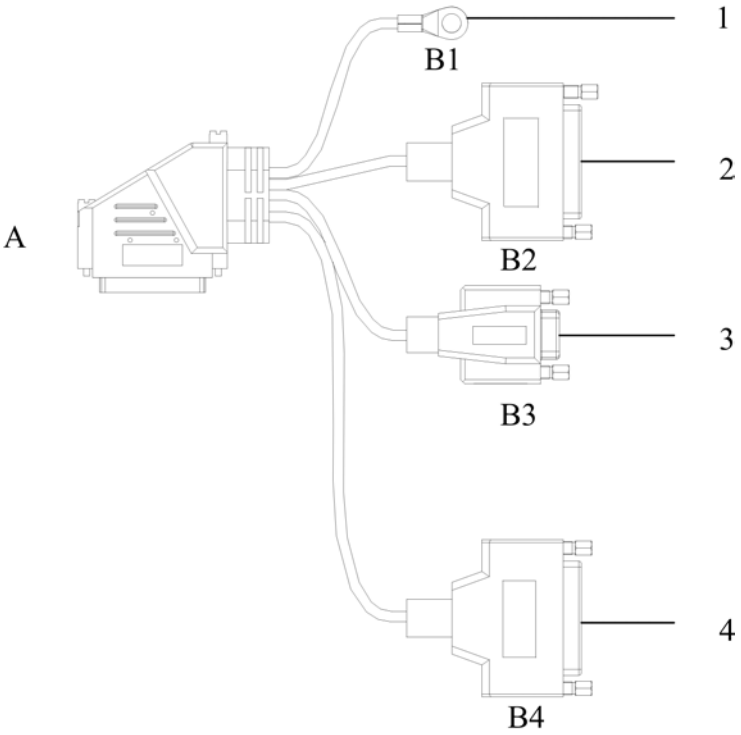
Installing Data Cable

Prerequisite Install the BBU and the FS board completely.

Context Due to a high—integration design for the BBU, interfaces on the panel are limited. Adopt a data cable for transfer, for it is convenient for access of the internal/external environment monitoring, dry contact monitoring and E1/T1 (Abis interface). There is one interface to connect the SA module at End A of data cable. There are multiple tri-interface at End B, connecting the internal/external environment monitoring, dry contact monitoring and E1/T1.

The exploded view of data cable is as shown in Figure 32.

FIGURE 32 DATA CABLE APPEARANCE



1. Ground terminal
2. E1/T1 cable
3. RS232/RS485
4. Dry contact input/output

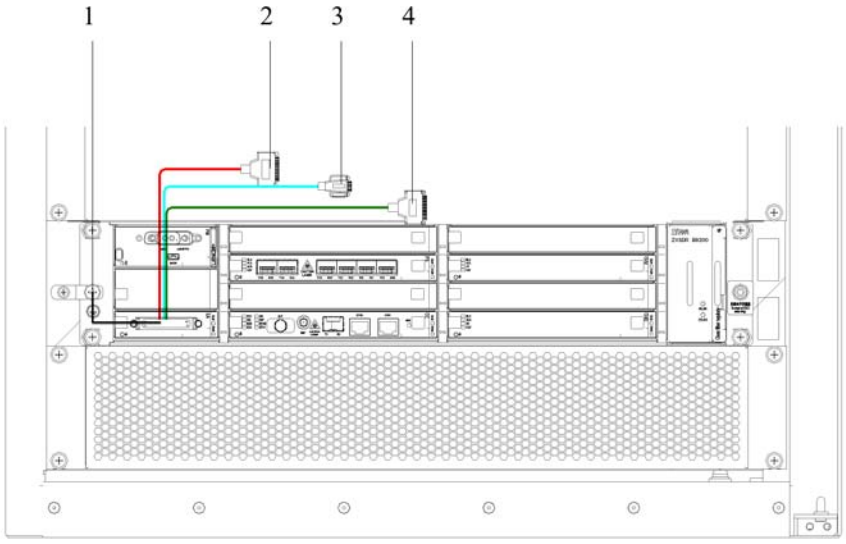
Steps

1. Connect the data cable to the "Monitoring/Abis" interface of FS module and screw down two bolts at the junction.
2. Connect End B1 to the ground terminal of cabinet.
3. Connect End B2 to the DB44 connector of E1/T1 cable and screw down two bolts at the junction.
4. Connect End B3 to the DB9 connector of RS485/RS232 environment monitoring cable and screw down two bolts at the junction.
5. Connect End B4 to the DB25 connector of the external dry contact cable and screw down two bolts at the junction.

END OF STEPS.

Result The data cable is installed completely, as shown in Figure 33.

FIGURE 33 DATA CABLE INSTALLATION COMPLETION



1. Ground terminal
2. E1/T1 cable
3. RS232/RS485
4. Dry contact input/output

Postrequisite Continue to install the E1/T1, RS232/RS485, dry contact input/output cables.

Installing 75Ω E1 Cable

Prerequisite Install the SA module and its panel connection cable.

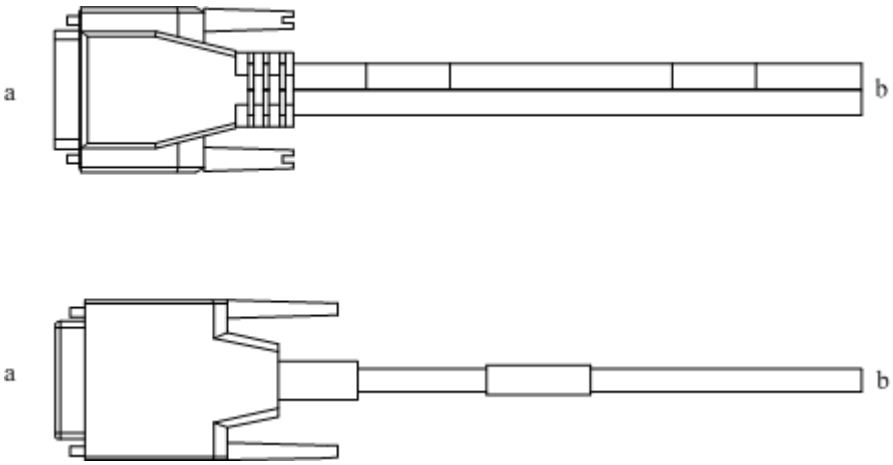
Context Abis-interface 75 Ω E1 cable is the transmission cable between ZXSDR BS8800 C200 and BSC, transmitting the interface message between ZXSDR BS8800 C200 and BSC.

The appearance of 75 Ω E1 cable is as shown in Figure 34. End a of the cable is a DB44 straight connector. There are two types of cable: in Figure 34, the above cable supports eight E1 cables and the following supports four E1 cables.

Note:

In eight E1 cable, 1–4 E1 cables are affixed with labels and others are not.

FIGURE 34 ABIS/IUB INTERFACE 75 Ω E1 CABLE APPEARANCE



Steps

1. Lead the 75 Ω E1 cable through a cable slot on the top into the cabinet.
2. Lay out the 75 Ω E1 cable along the vertical cable tray at the right side of cabinet to the B2 connector (E1 cable connector) of data cable belonging to the baseband.

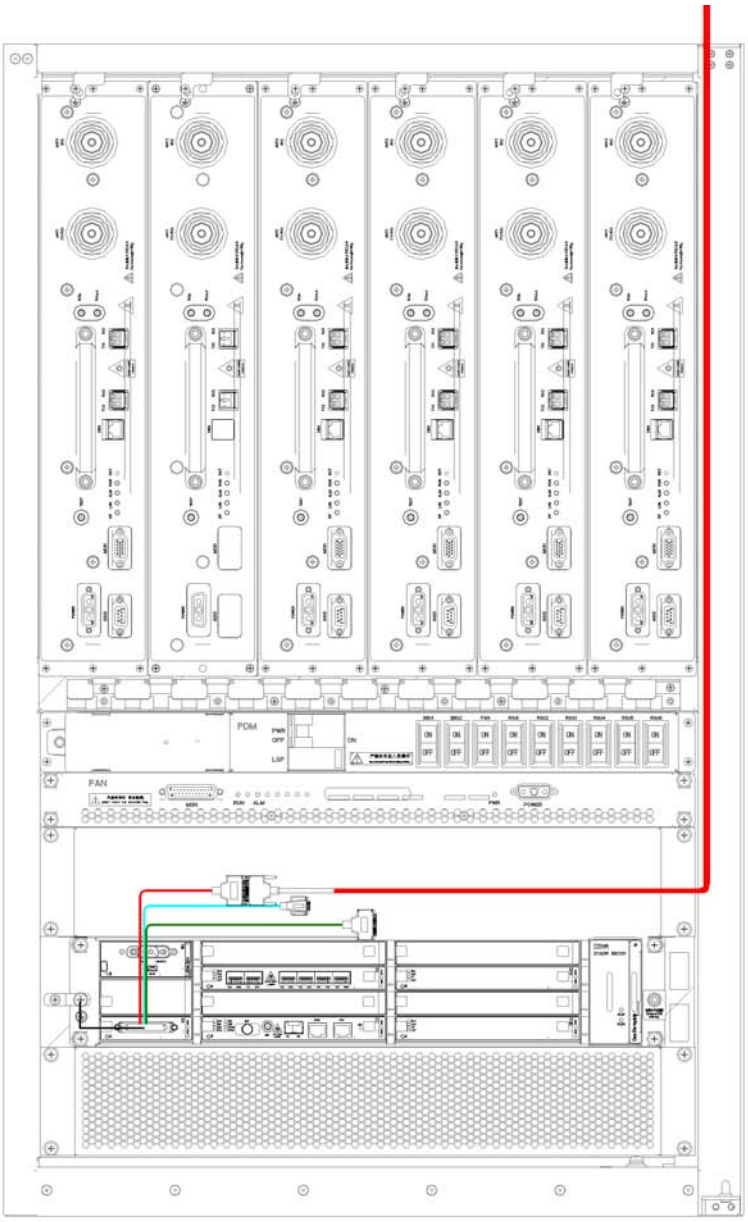
   Refer to Installing Data Cable for the instruction of data cable.
3. Connect the DB44 connector of 75 Ω E1 cable to the B2 interface (E1 cable interface) of data cable through the SA module.

END OF STEPS.

Result

After installation completed, the appearance of 75 Ω E1 cable is as shown in Figure 35.

FIGURE 35 75 Ω E1 CABLE INSTALLATION COMPLETION



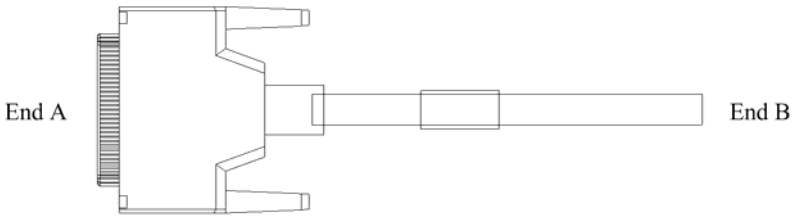
Installing 120Ω E1 Cable

Prerequisite Install the SA module and data cable.

Context The 120 Ω E1 cable is the transmission cable between ZXSDR BS8800 C200 and BSC, transmitting the interface message between ZXSDR BS8800 C200 and BSC.

The appearance of 120 Ω E1 cable is as shown in Figure 36. End A of cable is a DB44 straight plug.

FIGURE 36 120 Ω E1 CABLE APPEARANCE



There are two types of 120 Ω E1: one supports 8 E1 cables and the other supports 4 E1 cables. The appearances of two cables are similar, but the number of core wire is different.

Steps

1. Lead the 120Ω E1 cable through a slot on the top into the cabinet.
2. Lay out the 120 Ω E1 cable along the vertical cable tray at the right side of cabinet to the B2 connector (E1/T1 cable connector) of data cable.

   Refer to Installing Data Cable for the instruction of data cable.
3. Connect the DB44 connector of 120Ω E1 cable to the B2 interface (E1/T1 cable interface) of data cable through the SA panel.

END OF STEPS.

Result After installation completed, the appearance of 120 Ω E1 cable is as shown in Figure 35.

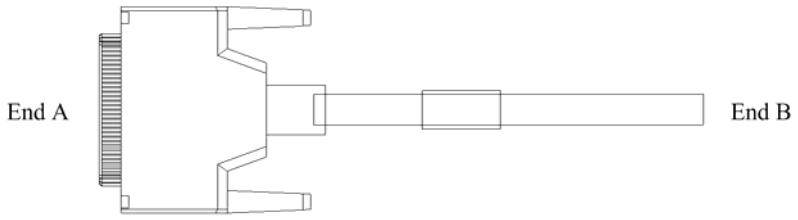
Installing 100Ω T1 Cable

Prerequisite Install the SA module and data cable.

Context The 100 Ω T1 cable is the transmission cable between ZXSDR BS8800 C200 and BSC, transmitting the interface message between ZXSDR BS8800 C200 and BSC.

The appearance of 100 Ω T1 cable is as shown in Figure 37. End A of cable is a DB44 straight plug.

FIGURE 37 100 Ω T1 CABLE APPEARANCE



Steps

1. Lead the 100 Ω T1 cable through a slot on the top into the cabinet.
2. Lay out the 100 Ω T1 cable along the vertical cable tray at the right side of cabinet to the B2 connector (E1/T1 cable connector) of data cable.

   Refer to Installing Data Cable for the instruction of data cable.
3. Connect the DB44 connector of 100 Ω T1 cable to the B2 interface (E1/T1 cable interface) of data cable through the SA module.

END OF STEPS.

Result After installation completed, the appearance of 120 Ω E1 cable is as shown in Figure 35.

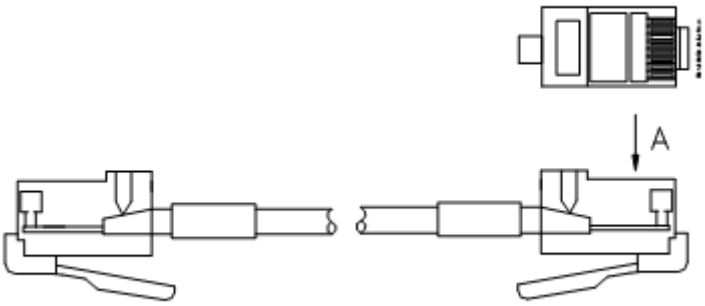
Installing Abis Interface Ethernet Cable

Prerequisite

- The transmission between BTS and BSC is based on the IP bearer network.
- Install the CC module.

Context Both ends of Ethernet cable are crimped with the RJ45 connector, as shown in Figure 38.

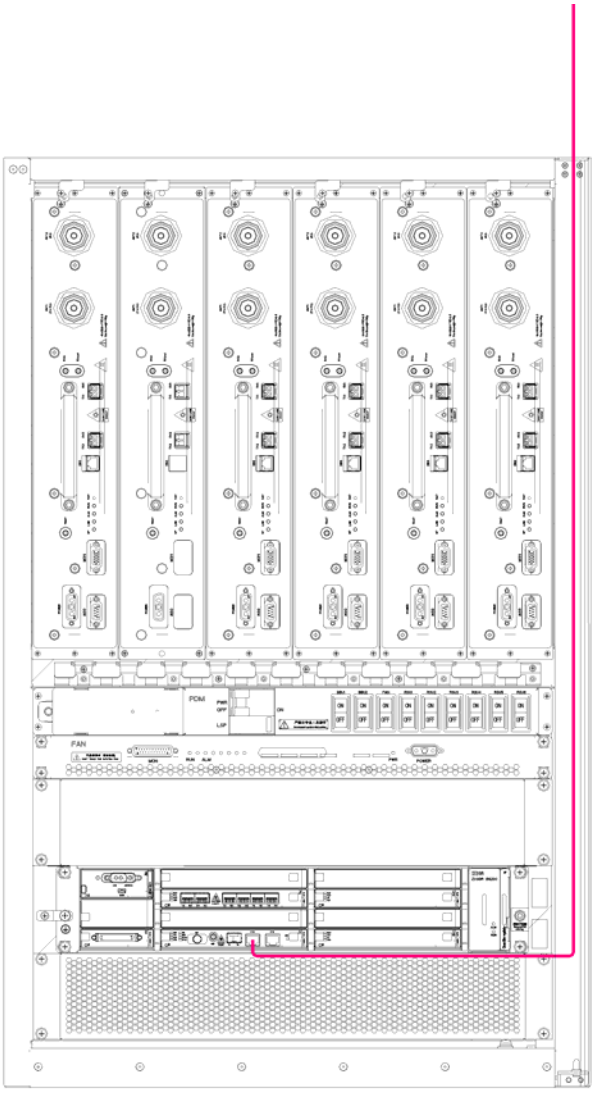
FIGURE 38 ETHERNET CABLE APPEARANCE



Steps

1. Lead the Abis interface through a wire inlet at the right side of cabinet.
2. Lay out the Abis interface Ethernet cable along the vertical cable tray at the right side of cabinet to CC module of the baseband, as shown in Figure 39.

FIGURE 39 ABIS INTERFACE ETHERNET CABLE LAYOUT



3. Connect the RJ45 connector of Ethernet cable to the ETH0 interface on the CC module.

END OF STEPS.

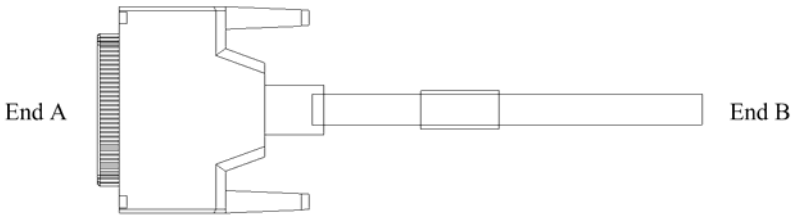
Installing Dry Contact Input/output Cable

Prerequisite Install the SA module and data cable.

Context The dry contact input/output cable is used to import/export dry contact signals from external equipment.

The appearance of dry contact input/output cable is as shown in Figure 40. End A of the cable is a DB25 straight plug and End B is naked wire.

FIGURE 40 DRY CONTACT INPUT/OUTPUT CABLE APPEARANCE



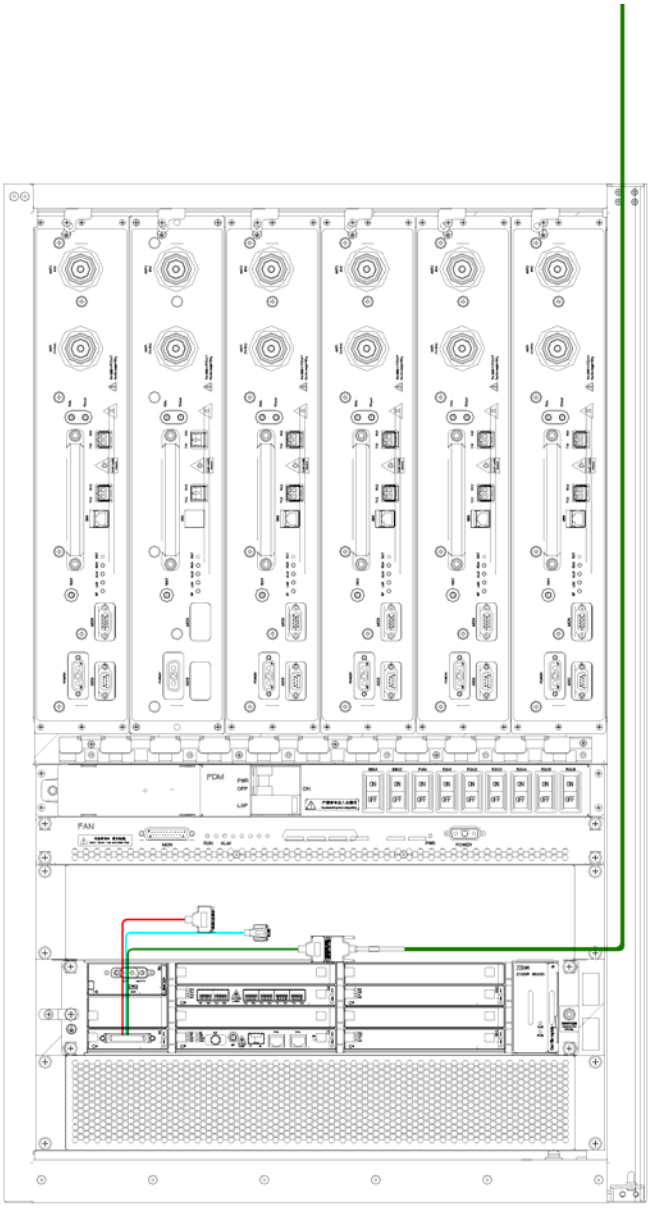
Steps

1. Lead the dry contact cable through a slot on the top into the cabinet.
2. Lay out the dry contact cable along the vertical cable tray at the right side of cabinet to SA module of the baseband.
3. Connect the DB25 connector of dry contact cable to the B4 interface (DB25) of data cable from the SA module.

END OF STEPS.

Result After installation completed, the appearance of dry cable is as shown in Figure 41.

FIGURE 41 DRY CONTACT INSTALLATION COMPLETION



Installing RS232/RS485 Monitoring Cable

Prerequisite

- Install the SA module.
- Connect the SA panel connection cable (data cable) to the SA module.

Context

The RS232/RS485 monitoring cable provides functions of internal and external environment monitoring for the ZXSDR BS8800 C200. The environment monitoring involves the smog monitoring, access control monitoring, temperature and humidity monitoring, and flooding monitoring. The appearance of RS232/RS485 monitoring cable is as shown in Figure 42. The definition of core-cable signals is described in Table 6.

FIGURE 42 RS232/RS485 MONITORING CABLE

TABLE 6 RS232/RS485 MONITORING CABLE DESCRIPTION

Signal Definition	GNDD	0_RS485-RX-_EM	0_RS485-RX+_EM	GNDD	1_RS485-RX-_EM	1_RS485-RX+_EM	0_UART-RX_EM	1_UART-TX_EM	GNDD	GND
End A Pin No.	1	6	7	4	8	9	2	3	5	DB9 metal sheath
Cable Color	White	White & Blue		Green	White & Orange		Blue	Orange	White	Shielding Layer
End B Name	B1						B2			Shielding Layer

Steps

1. Connect End A (DB9 connector) of RS232/RS485 monitoring cable to the B3 connector (DB9) of SA panel connection cable-data cable.
2. Fasten junctions of the connectors with tapes.

END OF STEPS.

Installing Fiber between BBU and RSU

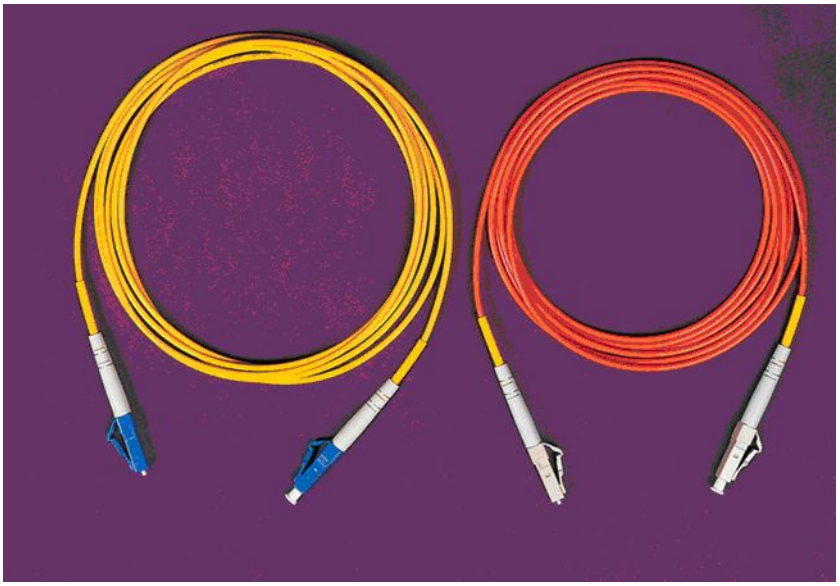
Prerequisite

- Install the cabinet completely.
- Install the ZXSDR BS8800 C200 and all modules.

Context

The appearance of ZXSDR BS8800 C200 optical fiber is as shown in Figure 43.

FIGURE 43 OPTICAL FIBER APPEARANCE



Steps

1. Connect one end of optical fiber to the optical interface of the FS module in the ZXSDR BS8800 C200.
2. Connect the other end of optical fiber to the TX1/RX1 optical interface of RSU.

END OF STEPS.

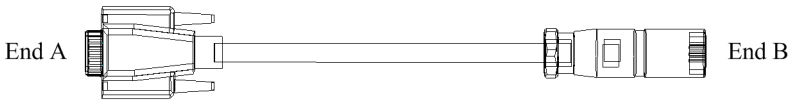
Installing AISG Control Cable

Context

The AISG control cable is used for control of the electric-adjustment antenna. The cable can fulfill a long-distance control of dip angles or phases of antenna to adjust the coverage range of wireless signal.

The structure of AISG control cable is as shown in Figure 44.

FIGURE 44 AISG CONTROL CABLE STRUCTURE



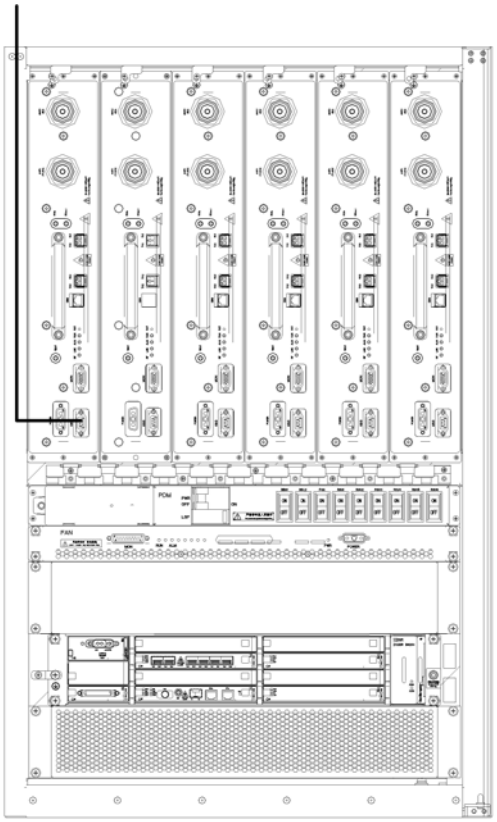
Steps

1. Connect End A of AISG control cable to the debugging interface (AISG) of ZXSDR BS8800 C200 and fasten screws of the interface.
2. Connect End B of AISG control cable to the control interface of electric-adjustment antenna and fasten screws of the interface.

END OF STEPS.

Result The AISG control cable is installed completely, as shown in Figure 45.

FIGURE 45 AISG CONTROL INSTALLATION COMPLETION



Installing GPS Jumper

Prerequisite

- Install the cabinet completely.
- Install the ZXSDR BS8800 C200 and modules.
- Install the GPS arrester.

Context

The GPS jumper is a sector of cable to connect the GPS interface of CC module with the GPS arrester, the appearance as shown in Figure 46.

FIGURE 46 GPS JUMPER APPEARANCE

Steps

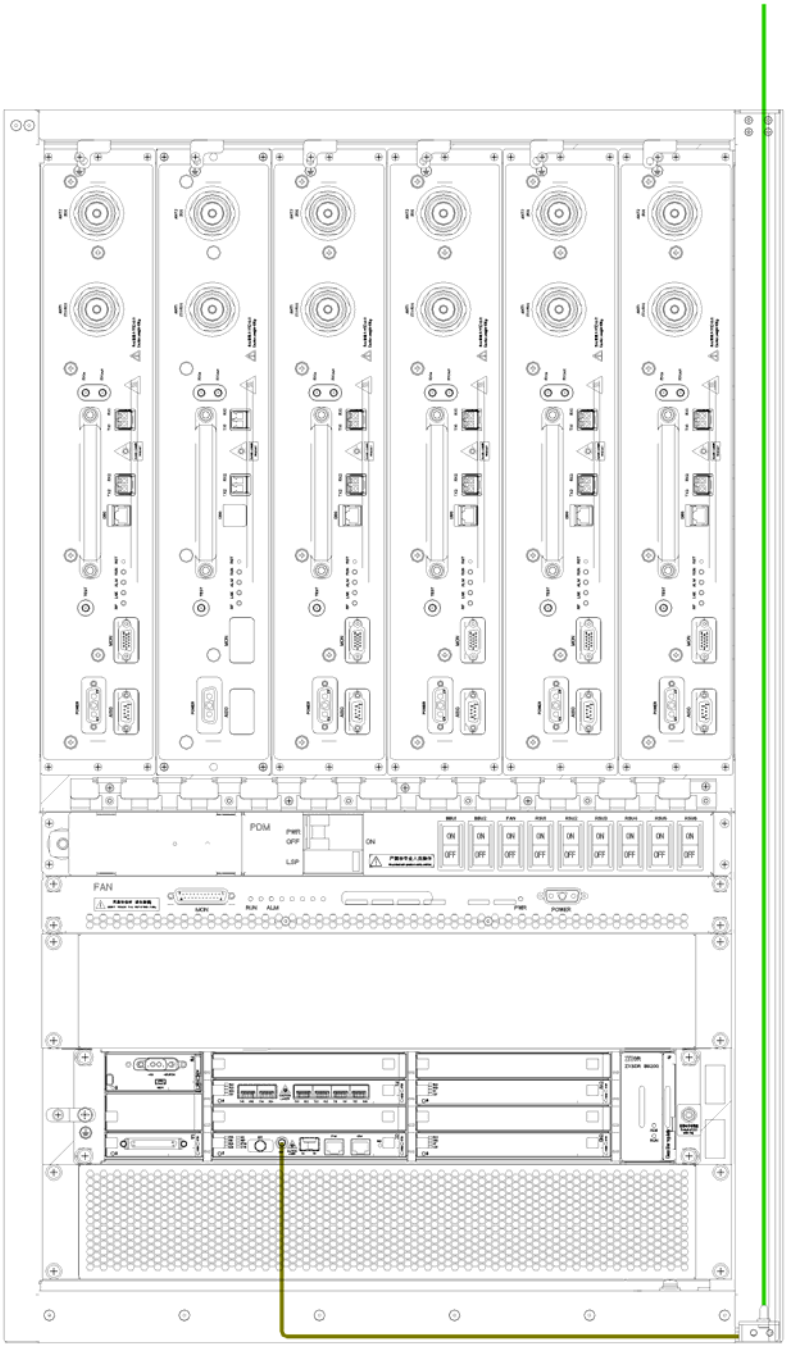
1. Connect End A of jumper to the "REF" antenna interface of CC module.
2. Connect End B to the GPS arrester.

END OF STEPS.

Result

The GPS jumper is installed completely, as shown in Figure 47.

FIGURE 47 GPS JUMPER INSTALLATION COMPLETION



Installing RF Jumper

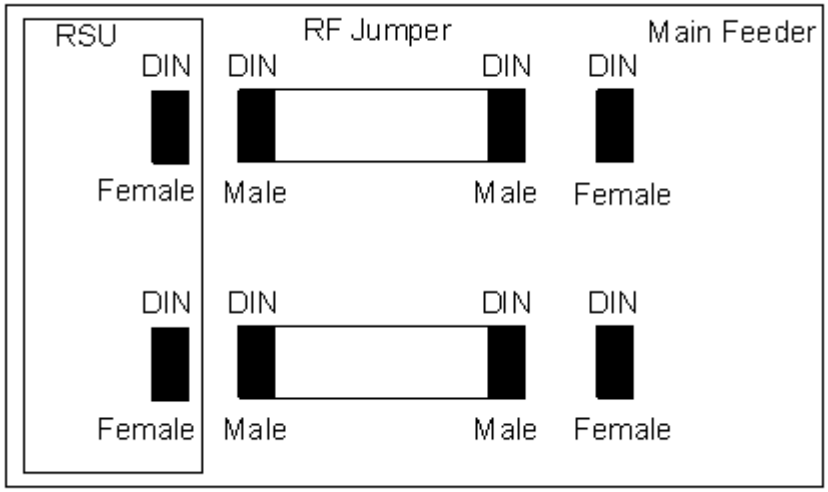
Context

The RF jumper is a section of cable to connect the main feeder with the antenna feeder interface of ZXSDR BS8800 C200. Usually, install the RF jumper after the main feeder installed completely.

The RF jumper adopts a finished 1/2”type with 5m.

The installation position of RF jumper is as shown in Figure 48.

FIGURE 48 RF JUMPER INSTALLATION POSITION



Steps

1. Connect the male DIN connector of RF jumper with the female DIN connector of main feeder.
2. Connect the male DIN connector of RF jumper to the RF antenna interface of RSU.
3. Carry out waterproof handling for connectors.

END OF STEPS.

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Chapter 7

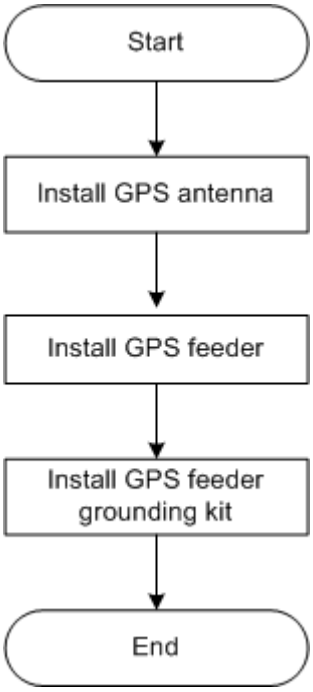
Installing GPS Antenna Feeder System

Table of Contents:

GPS Antenna Feeder System Installation Flow

The installation flow of GPS antenna feeder system is listed in Figure 49.

FIGURE 49 GPS ANTENNA FEEDER SYSTEM INSTALLATION FLOW



GPS Antenna Feeder System Installation Preparation

The installation preparation of the GPS antenna feeder system is as follows:

- Prepare the GPS antenna.
- Assign installation personnel.
- Prepare technical documents, tools and measure instrument.
- Make connectors of GPS feeder and jumper.

Installing GPS Antenna

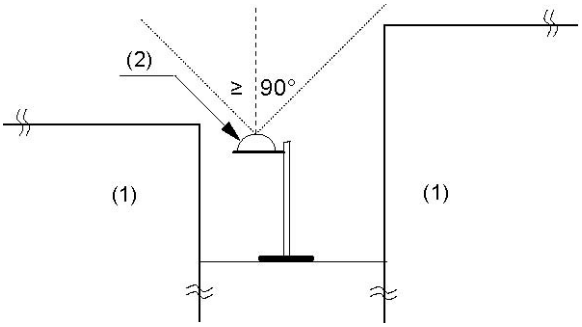
GPS Antenna Installation Position

GPS Antenna Installation Positioning

The GPS antenna installation position should meet the following requirements:

- The installation position should be far away from high and large buildings as well as some buildings on the top of which small affiliated constructions locate. The upward—vertically visual angle of antenna is more than 90°. The installation position of antenna is as shown in Figure 50.

FIGURE 50 GPS ANTENNA INSTALLATION POSITION



1. Ambient construction or other obstructions
2. GPS antenna

- The installation position can not be radiated in a near distance by a face of main lobe of mobile communication antenna. Do not locate the antenna under microwave signal from microwave antenna, high-voltage cables and strong radiation from a TV emission tower.

- Considering from lightning, select the center of roof for an installation position. Do not install the antenna on the sunk fence around the roof as well as at a corner of the roof, in order to prevent from lightning.
- There should be other special and similar equipment near to the installation position, such as other operation's tower. Make sure the antenna within a protective area of arrester. If there is no iron tower or arrester, install a special arrester to meet the requirement of lightning design. The level distance between arrester and GPS antenna should keep 2 ~ 3 m and be 0.5m higher than the receiving connector of GPS antenna at least.

Installing GPS Antenna in Vertical Placement

Prerequisite Following tools must be ready.

- Adjustable spanner
- Normal Spanner

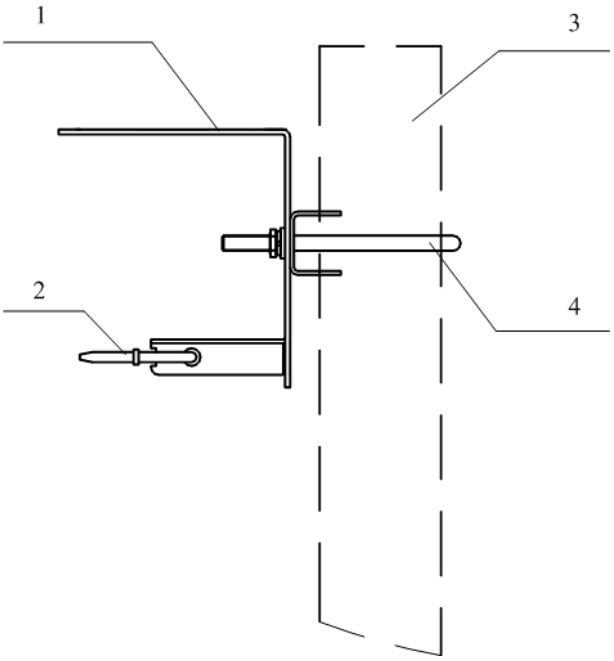
It is recommended to have a pole with a diameter between 30 mm ~ 60 mm (48 mm is recommended). The antenna should not be installed during rain and heavy wind.

Steps

1. Open the package and take out GPS antenna and the GPS rack.
2. Use the U-shape clamp to install the GPS rack to the mounting pole. Insert spring washer and washer between the U-shaped clamp and mounting pole.
3. Use M6 nut to fix the U-shape clamp and the pole together firmly.

   Figure 51 shows the fixing process.

FIGURE 51 U-SHAPED CLAMP INSTALLATION



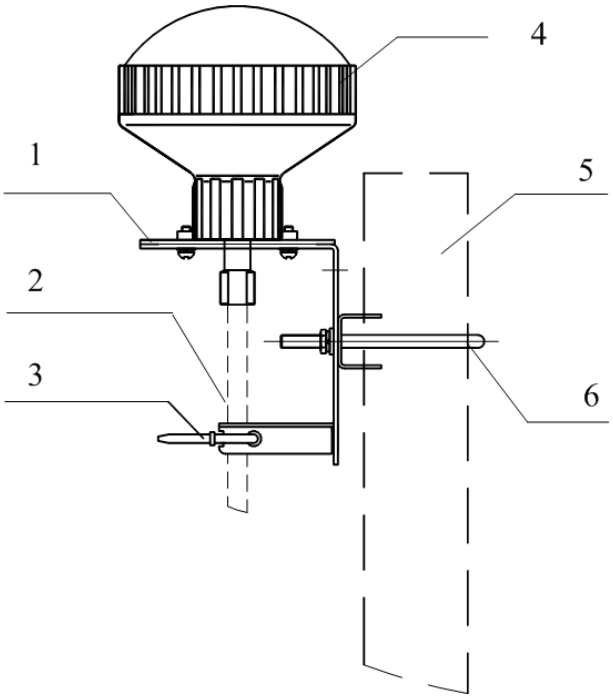
1. GPS settled clamp
2. Cable strip
3. Mounting pole
4. U-shape clamp

4. Fix the GPS antenna to the GPS settled clamp. Screw the bolt (M4x14) to firmly fix the antenna.

END OF STEPS.

Result Figure 52 shows the antenna fixed in the vertical position.

FIGURE 52 GPS ANTENNA VERTICAL INSTALLATION



1. GPS settled clamp
2. Feeder
3. Feeder strip
4. GPS antenna
5. Mounting pole
6. U-shape clamp

Installing GPS Antenna in Horizontal Placement

Prerequisite

Confirm the installation mode and installation position of GPS antenna.

Following tools must be ready:

- Adjustable spanner
- Normal Spanner

Context

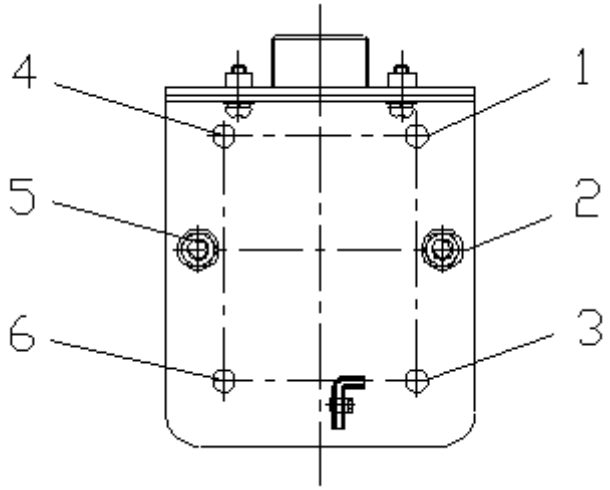
- It is recommended to have a pole with a diameter between 30 mm ~ 60 mm (48 mm is optimal).
- The pole used to fix GPS antenna must be grounded well.
- The antenna can not be installed during rain and heavy wind.

Steps

1. Open the package and take out GPS antenna and the GPS rack.
2. Use the U-shape clamp to install the GPS rack to the mounting pole.
3. The installation support of GPS antenna is as shown in Figure 53. Align holes on the U-shape clamp with Hole 1 and Hole 3, or Hole 4 and Hole 6 on the installation support. Then cover

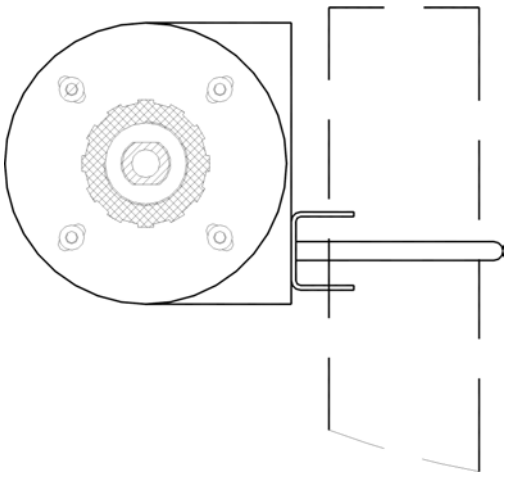
a spring wash and flat washer respectively on these holes and fasten them with M6 screws, as shown in Figure 54.

FIGURE 53 GPS ANTENNA RACK INSTALLATION SUPPORT



– 1~6 hole position

FIGURE 54 GPS RACK INSTALLATION (HORIZONTAL PLACEMENT)

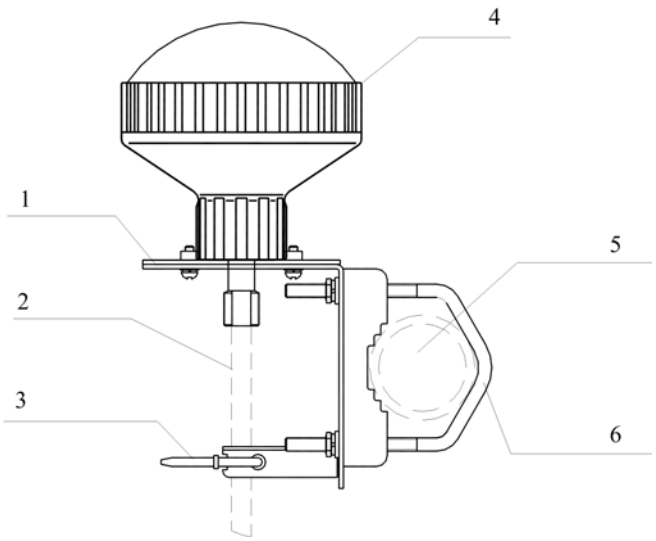


4. Fix the GPS antenna to the GPS settled clamp. Screw down the bolt (M4x14) to firmly fix the antenna.

END OF STEPS.

Result Figure 55 shows the GPS antenna fixed horizontally.

FIGURE 55 GPS ANTENNA FIXED HORIZONTALLY



1. GPS settled clamp
2. Feeder
3. Feeder strip
4. GPS antenna
5. Mounting pole
6. U-shape clamp

Installing GPS Antenna in Wall-mount Mode

Prerequisite Following tools must be ready.

- Adjustable spanner
- Normal Spanner
- Hammer
- Expansion Anchor Bolts (M5x30 or M5x40)

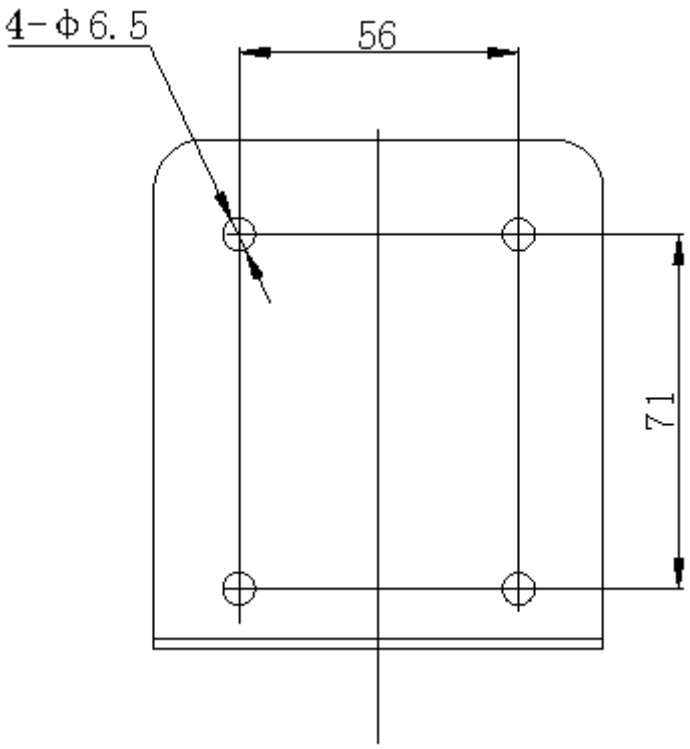
Context For installing the GPS Antenna on the wall, the U-shape clamp is not necessary.

Steps

1. Open the package and take out GPS antenna and the GPS rack.
2. Use the Design template for marking holes on the wall. Then drill holes on the wall according the size of the expansion anchor bolts that to be used.

   Figure 56 shows the design template.

FIGURE 56 DESIGN TEMPLATE FOR MARKING HOLES



3. Insert the expansion bolts, and hammer them to fix properly.
4. Install GPS antenna rack to the corresponding bolt position.
5. Insert a spring washer and flat washer onto expansion bolts and use the M6 nut to fix the rack on the wall firmly.

Note:

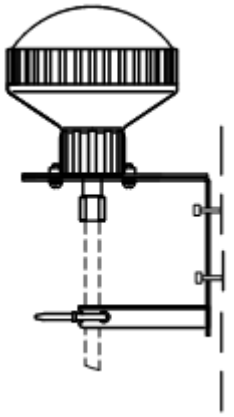
The torque used to fix the clamp is 45 Nm.

6. Fix the GPS antenna to the GPS settled clamp and screw the M4x14 bolt tightly.

END OF STEPS.

Result Figure 57 shows the GPS antenna fixed on the wall.

FIGURE 57 GPS ANTENNA FIXED ON WALL



Installing GPS Feeder

GPS Feeder Selection Principle

GPS feeder selection complies with the following principles:

- When the length of GPS feeder is less than 100 m, select 1/4" feeder.
- When the length of GPS feeder is more than 100 m, please contact with ZTE local office.

Wiring GPS Feeder

Prerequisite Before feeder layout, check layout environment such as the iron tower and roof; according to the requirements of engineering design drawing, make sure the planning and procedures of layout.

Context Take notice of the following items while performing layout of the GPS feeder:

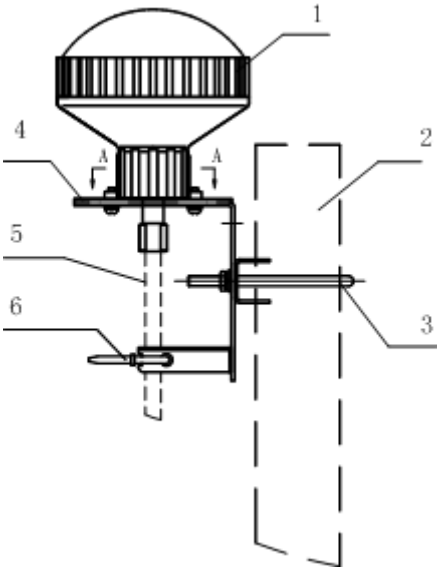
- The feeder passage from the installation position to the equipment room should be unhindered and accords with the wiring requirements; take some measurements for rain protection and anticorrosion.
- Make a water avoidance crook while the feeder is imported from outdoors to indoors; the lowest point of water avoidance crook keeps a vertical distance of 200 mm at least from the inlet for waterproof.
- Unused feeder connectors should be protected with solid material, such as packing bags, from damaging there connectors during cable layout.

- Unfold the feeder and lay out it; avoid twisting as possible as you can; if it is necessary for bending, make sure the radius of bending not less than the minimum radius of bending permitted by cables.
- If the GPS antenna is installed on the roof, fix the feeder along the wall foot on the roof with plastic clips which steel nails are attached to; keep an distance of 1m between plastic clips; the directions of plastic clip head are staggered mutually and regularly; two feeders after junction should be bound together in case of twisting mutually and bending.

Steps

1. Attach a mark respectively at the both ends of feeder.
2. Protect the feeder connector with linen (also adopt a antistatic paging bag with protective foam) and fasten the bag with a banding tape.
3. Move the GPS feeder near to the GPS antenna.
4. Make an GPS feeder connector at one end through the biding tape, connect with the GPS antenna and screw down the connector clockwise, as shown in Figure 58.

FIGURE 58 CONNECTION BETWEEN FEEDER TO GPS ANTENNA



1. GPS Antenna
2. Pole
3. Hoop Iron
4. GPS Mounting Panel
5. GPS Feeder
6. Feeder Binding Tape

Note:

While fixing the feeder, it is required to screw down the feeder clockwise. So considering the situation, after completing the above step, lay out the feeder, or else it is inconvenient for installation.

5. Accomplish the performance measure of antenna and feeder, make sure that the system operation is normal, and then make

a waterproof protection at the back of GPS mounting panel as well as at the junction of GPS feeder and GPS antenna.

6. Fix the GPS feeder with the binding tape and cut a redundant part flatly after binding.

END OF STEPS.

Installing GPS 1/4” Feeder Grounding Kit

Prerequisite

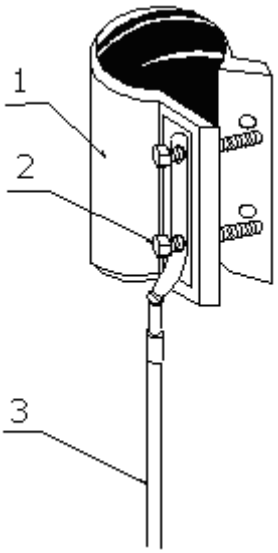
1. Complete the installation and routing of GPS feeder.
2. Prepare installation materials and tools.
   - The installation materials include:
     - Grounding kit (tinning copper braid attached)
     - Two M6×25 hexagon head screw (spring washer and plain washer attached)
     - One M8×25 hexagon head screw (spring washer and plain washer attached), used to connect the ground cable and ground bar.
     - Assembled 1/4" feeder ground cable
     - A package of tung oil (10 ml).
   - The installation tools include:
     - Electrical knife
     - M6 screwdriver
     - M8 screwdriver.

Context

Only install the GPS 1/4" feeder grounding kit before the feeder comes into the equipment room, and do not allow to install it at other any positions.

The structure of GPS 1/4" feeder grounding kit is as shown in Figure 59.

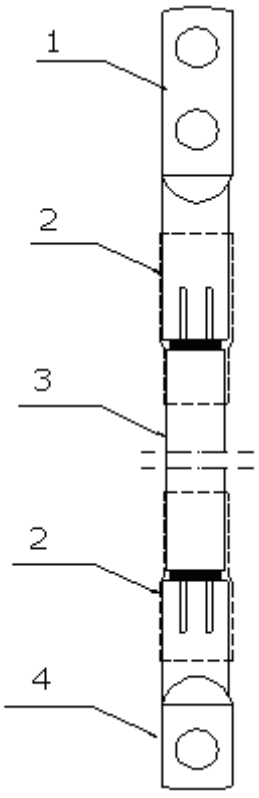
FIGURE 59 GPS 1/4" FEEDER GROUNDING KIT STRUCTURE



1. Grounding kit
2. M6 hexagon head screw (plain washer and spring washer attached)
3. Ground cable

The structure of ground cable is as shown in Figure 60.

FIGURE 60 1/4" FEEDER GROUND CABLE STRUCTURE



1. Ground terminal (on the side of grounding kit)
2. Φ12 heat shrinkable sleeve
3. Ground cable
4. Ground terminal (on the side of cooper ground bar)

Steps

1. Make sure the grounding position of 1/4" GPS feeder; strip a section of the sheath of GPS feeder (about 25mm) according to the size of grounding kit, and place the grounding kit through the stripped position of GPS feeder.
2. Fasten the ground terminal (on the side of grounding kit, with two grounding holes) onto the grounding kit with M6 hexagon head screws, place the attached spring washer and plain washer between screw and ground terminal, and screw down the screw with a M6 screwdriver.
3. Fasten the other ground terminal (on the side of cooper ground bar) onto the cooper ground bar with the M8×25 hexagon head screw, and place the plain washer and spring washer between screw and copper ground bar.
4. Cover a layer of tung oil on the exposed metal surface.

END OF STEPS.

Leading GPS Feeder into Room

Context

This step is adoptable for an indoor BTS. While installing the feeder for an outdoor BTS, the step is no need.

Through a feeder hermetic window, lead the GPS feeder into the equipment room. Detailed steps refer to Leading Main Feeder into Room .

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Chapter 8

Installing Main Antenna Feeder System

Table of Contents:

Antenna Feeder System Installation Preparation

Foundational Facility Requirements

Iron Tower

In order to insure equipment security, the following must be performed during installing:

- Make sure the height and strength of iron tower complying with the requirements of contract.
- Check whether a ground copper bar around the iron tower is made and its grounding resistance accords with the requirements.
- Check whether the platform of iron tower is prepared according to the requirements.

Installation Pole

Normally, an installation pole is made of galvanized steel tube. The outer diameter of installation pole is 48 mm~100 mm and the thickness of tube is not less than 2 mm. The height of pole is 3 m as a reference. Due to various antenna types, adjust the actual dimension of pole according to the specification of different antennas.

In order to insure equipment security, the following must be performed during installing:

- For installing antenna with a pole, the distance between poles should accord with the requirements of engineering design. In the same sector, a horizontal diversity distance of two 900 MHz receiving antennas maintains 4 m~6 m, and that of two 1800 MHz receiving antennas maintains 2 m~3 m. If there are other types, comply with the design document.
- On the iron tower, usually install the antenna pole on the enclosure of platform, more than 1 m away from the tower body.
- Complete antenna installation and check whether the pole is vertical with the level, an error not over 1°.
- Install the antenna pole close to the edge of building top possibly. While selecting a direct fixation mode on the side of wall, make sure that the wall can support adequate intensity.
- While adopting a direct fixation mode on the building top, make a cement base and prevent drilling on the building top from causing a fault of waterproof equipment.

Cable Tray

In order to insure equipment security, the following must be performed during installing:

- Adopt a standard cable tray with 400 mm width in the equipment room. The cable tray is usually installed above the cabinet at a vertical distance of 2600 mm from the floor of equipment room. After installation completion, make sure that the whole cable tray is unmovable.
- The lengths left of expansion bolts should be consistent. After screwing down nuts, remain a section of expansion bolt with 5 mm or more than two circles.
- The paint colors of cable tray keep consistent.
- The indoor cable tray should be grounded at interval of 5 m. After installation completion, perform an electric test and make sure grounding reliable.

Checking Incoming Material

Steps

1. Check whether the packing of feeder and installation accessories are intact.
2. Check material appearance and make sure it undamaged.
3. Check whether the quantity and dimension of materials accord with the requirements of packing list.
4. Before installation, make sure all material saved according to the requirements.

END OF STEPS.

Making Feeder Connector

Context

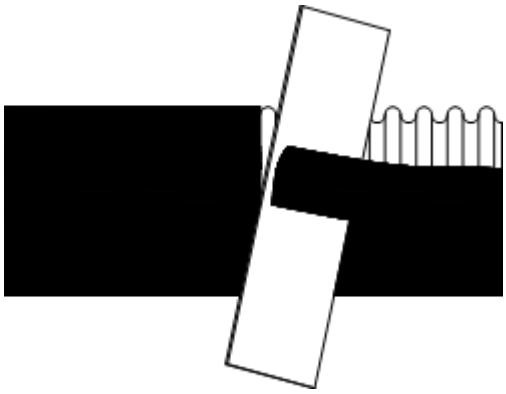
Make feeder connectors on site. Suggest that connectors installed at the tower should be prepared and wrapped with sponge before hang installation.

If a feeder connector is not made completely, or is a made connector but not connected with the jumper, perform simplified waterproof processing for it. There are two feasible processing methods: wrap the connector with waterproof adhesive tape, or after covering a plastic bag wrap it with waterproof adhesive tape again.

Steps

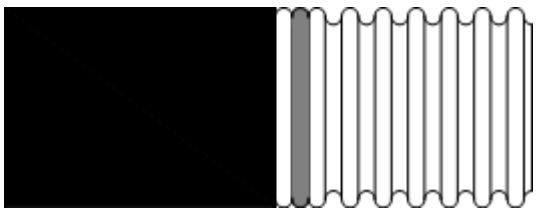
1. Straighten an end of connector. Then cut and strip off the feeder sheath at a 50 mm position off the end, as shown in Figure 61.

FIGURE 61 STRIP OFF SHEATH



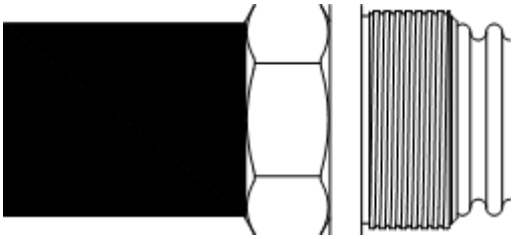
2. Put the feeder connector into a slot of cutting tool and make this slot close to the feeder sheath possibly. Close the cutting too slowly and press it slightly. Facing the feeder port, rotate the cutting tool clockwise until the front blade cuts off the inner and outer conductor completely. Rotate two circles with slight pressure again and make sure the back blade exscinding the feeder sheath.
3. Put an O-type ring in the first wave trough of outer conductor, outside the feeder sheath and cover a layer of lubricating oil. Locate the side with screw thread outwards, cover a fastening piece through the connector and push it to the position where one wave trough on the outer conductor is uncovered, as shown in Figure 62.

FIGURE 62 O-TYPE RING LOCATION



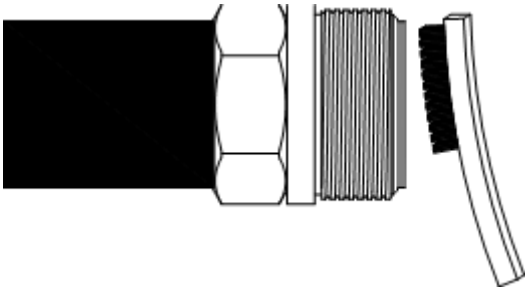
4. Put a spring ring into the wave trough on the outer conductor.
5. Press a foam material inside the connector from the outer conductor to the inner conductor forcibly.
6. Insert an end of connector assembly into the inner conductor carefully and install it, as shown in Figure 63.

FIGURE 63 CONNECTION



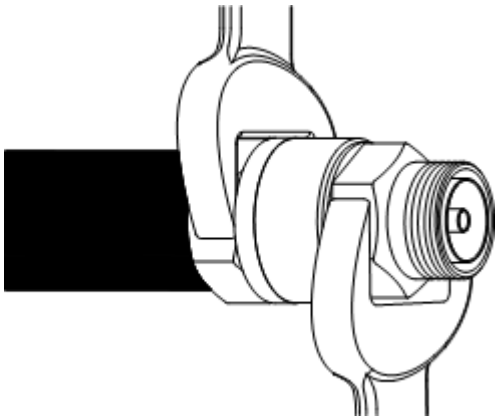
7. Move the connector assembly onto the fastening piece round and round. During operation, keep the connector assembly unmovable and only rotate the fastening piece with a wrench. Clear away copper scraps on the foam material with a brush, especially cooper scraps on the cross section of the foam material, as shown in Figure 64.

FIGURE 64 COPPER SCRAP CLEARNESS ON THE CROSS SECTION



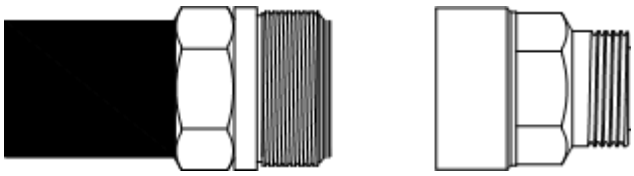
8. Take apart the connector and check the profile state of outer conductor. The profile of outer conductor should be orderly and clean. While disassembling the connector, first unscrew the connector assembly in an 1/4 circle, then keep the connector assembly unmovable and only rotate the fastening piece with a wrench, as shown in Figure 65.

FIGURE 65 ROTATING CONNECTOR FASTENING PIECE



9. Rotate the fastening piece onto the connector assembly again, as shown in Figure 66.

FIGURE 66 CONNECTING ASSEMBLY



END OF STEPS.

Assembling Omnidirectional Antenna

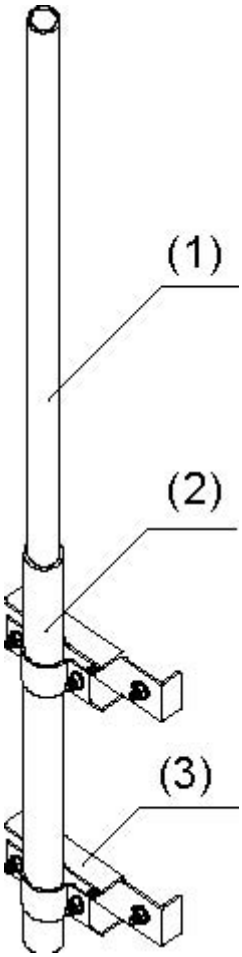
Context The appearance of omnidirectional antenna is as shown in Figure 67.

FIGURE 67 OMNIDIRECTIONAL ANTENNA APPEARANCE

Steps

1. Assemble two fixation clips of omnidirectional antenna and fasten junctions with the antenna, as shown in Figure 68.

FIGURE 68 FIXING OMNIDIRECTIONAL ANTENNA



1. Omnidirectional antenna
2. Antenna sheath
3. Fixation clip

Note:

There are various omnidirectional antennas with different installation modes. So, during the practical operation, perform installation based on a specified condition.

Install a spring washer and flat washer for antenna fixation. First put a flat washer and then a spring washer.

2. Connect and screw down the jumper connector and the antenna connector.
3. Perform waterproof processing for the connector between antenna and jumper, referring to Performing Outdoor-connector Waterproof Processing.

Note:

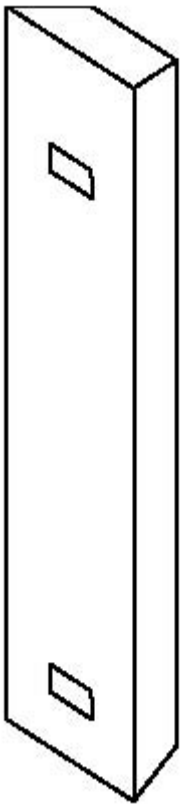
If the above two steps are performed on the tower, suggest wrapping a layer of electric insulation adhesive tape round the connector required to seal and then wrapping a layer of semiconductive self-adhesive tape again.

END OF STEPS.

Assembling Directional Antenna

Context The appearance of directional antenna is as shown in Figure 69.

FIGURE 69 DIRECTIONAL ANTENNA APPEARANCE



There are some accessories of directional antenna, as follows:

- Directional-antenna fixation clip, as shown in Figure 70.

FIGURE 70 DIRECTIONAL-ANTENNA FIXATION CLIP

- Depression angle and elevation angle adjustment, as shown in Figure 71.

FIGURE 71 DEPRESSION ANGLE AND ELEVATION ANGLE ADJUSTMENT

Note:

The fixation clip as well as depression angle and elevation angle adjustment must be both equipped with a spring washer and flat washer. First put a flat washer and then a spring washer.

Steps

1. According to the marks at the back of antenna, make sure two fixed adjustment points respectively at the top and bottom of antenna (the adjustment point at the top is used for the elevation angle adjustment and the adjustment point at the bottom is used to fix the antenna and the rack).
2. Referring to the accessory equipment drawing provides by suppliers strictly, install all accessories to corresponding positions.
3. Connect a jumper connector with antenna connector, and then screw down them.
4. Perform waterproof processing for the connector between antenna and jumper, referring to Performing Outdoor-connector Waterproof Processing.

   Connection between directional antenna and jumper as well as the jumper connector after processing are as shown in Figure 72.

FIGURE 72 CONNECTION BETWEEN DIRECTIONAL ANTENNA AND JUMPER

END OF STEPS.

Hoisting Antenna and Feeder

Context

While hoisting antenna and feeder, comply with the following:

- Installation personnel on the tower pulls rope upward and the other personnel under the tower draws the rope to control an ascending direction of antenna.
- During hoisting, make sure no people standing under the goods hung in the air. While walking out of the platform, installation personnel must wear safe belts.
- 。Some small metal goods or tools, for example, antenna fixation clips and wrenches, should be put in a canvas tool bag, sealed and then hoisted.
- After hoisting goods to the platform on the top of tower, put them in a secure position and take security measures.
- The above method is adoptable for hoisting of other goods.

Steps

1. Install a fixed pulley on the top of tower.
2. Make a rope through the fixed pulley and tie knots with the rope at the two ends of antenna.
3. Installation personnel on the tower and under the tower hoist the antenna to the position of fixing antenna together.

   Hoisting antenna is as shown in Figure 73.

FIGURE 73 HOISTING ANTENNA

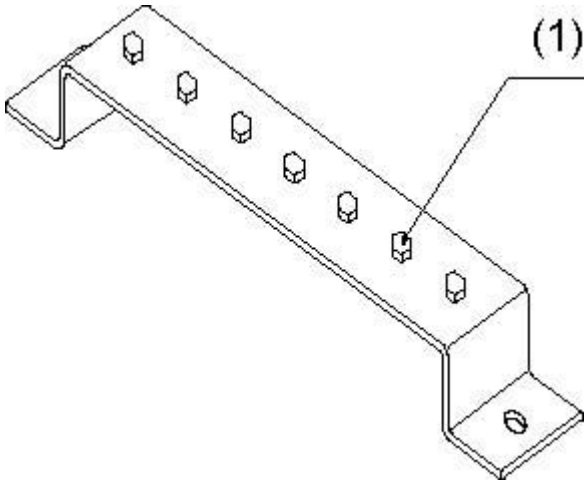
END OF STEPS.

Installing Indoor Grounding Bar

Prerequisite According to the engineering design drawing, confirm the installation location.

Context An indoor grounding bar is used to connect a protective ground with a work ground. Figure 74 shows the structure of indoor grounding bar.

FIGURE 74 INDOOR GROUNDING BAR STRUCTURE



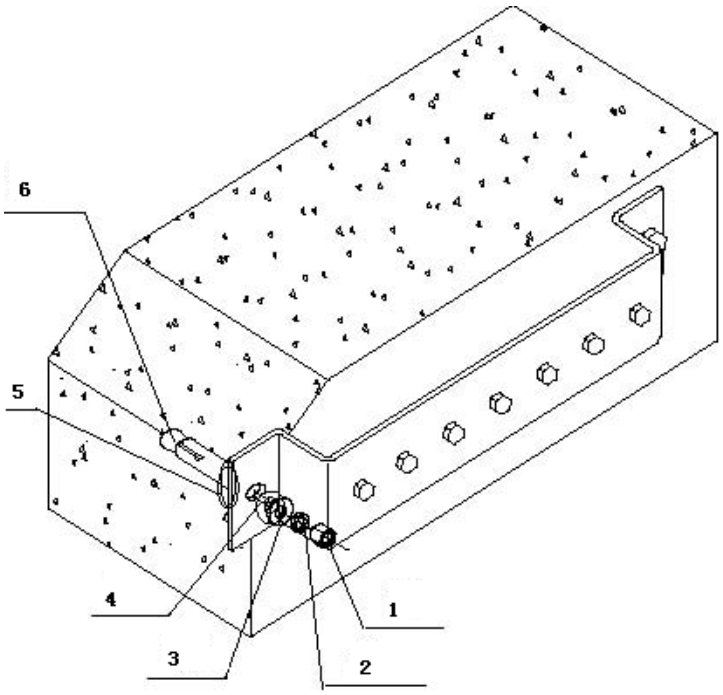
1. M8 bolt

While installing the indoor grounding bar, accord with the following requirements:

- Install the indoor grounding bar on the wall which is near to a cabinet and is the same height with a cable tray.
- The indoor grounding bar should be fixed parallelly on the wall.
- While installing expansion bolts, use an insulation washer and make sure the grounding bar insulated with the wall.

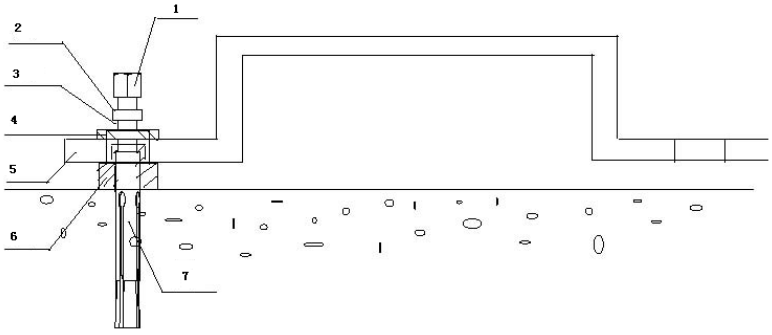
Steps Fix the grounding bar on the wall with expansion bolts, as shown in Figure 75 and Figure 76.

FIGURE 75 INDOOR GROUNDING BAR INSTALLATION (1)



1. M12 bolt
2. Spring washer 12
3. Big flat washer
4. Insulation washer a
5. Insulation washer b
6. Expansion pipe and expansion nut

FIGURE 76 INDOOR GROUNDING BAR INSTALLATION (2)



1. M12 bolt
2. Spring washer 12
3. Big flat washer
4. Insulation washer a
5. Indoor grounding bar
6. Insulation washer b
7. Expansion pipe and expansion nut

END OF STEPS.

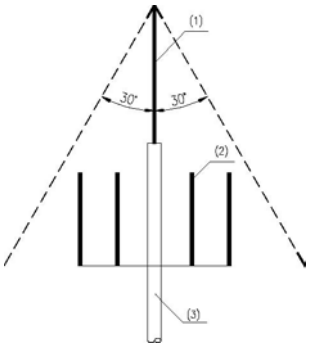
Installing Antenna

Installing Directional Antenna on Top-tower

Context Installation requirements are described as follows:

- An installation plane of antenna rack should keep vertical with the level.
- Install a mast of tower arrester singly. The height of mast meets protective requirements of all antenna arresters. When an antenna rack extends out of the platform of iron tower, make sure the antenna within a protective area of 30° downtilt of arrester top, as shown in Figure 77.

FIGURE 77 ARRESTER PROTECTIVE AREA



1. Arrester
2. Antenna
3. Arrester mast

- Make sure an installation direction of antenna rack not affecting receiving and transmitting performance of directional antenna as well as direction adjustment.
- Make sure the antenna within a protective area of iron arrester. The distance that the antenna extends out of iron platform is 1 m at least.
- The gain of antenna should be 15dBi, the isolation be 30dB and the half-power angle be 65°.
- Reinforce a rotational mast with an enhanced mast. The lengths of a collapsible mast and a rotational mast should be cut according to on-site condition. Weld a cover board on the cut section to avoid leakage.
- Make sure all welding parts fastened and no faulty or lacking welding. Suggest adopting galvanized steel for the rack and covering a layer of antirust sliver-powder paint on the surface of rack.
- While installing and adjusting the antenna, protect these installed antennas from any damage.

- While using a compass, keep far away from the iron as possible as you can and at the same time check whether there is abnormal geomagnetism phenomenon.
- The main and diversity of two ports of directional antenna in the same type should keep consistent in definition, for example, -45° port defines a main set port and 45° port defines a diversity port.

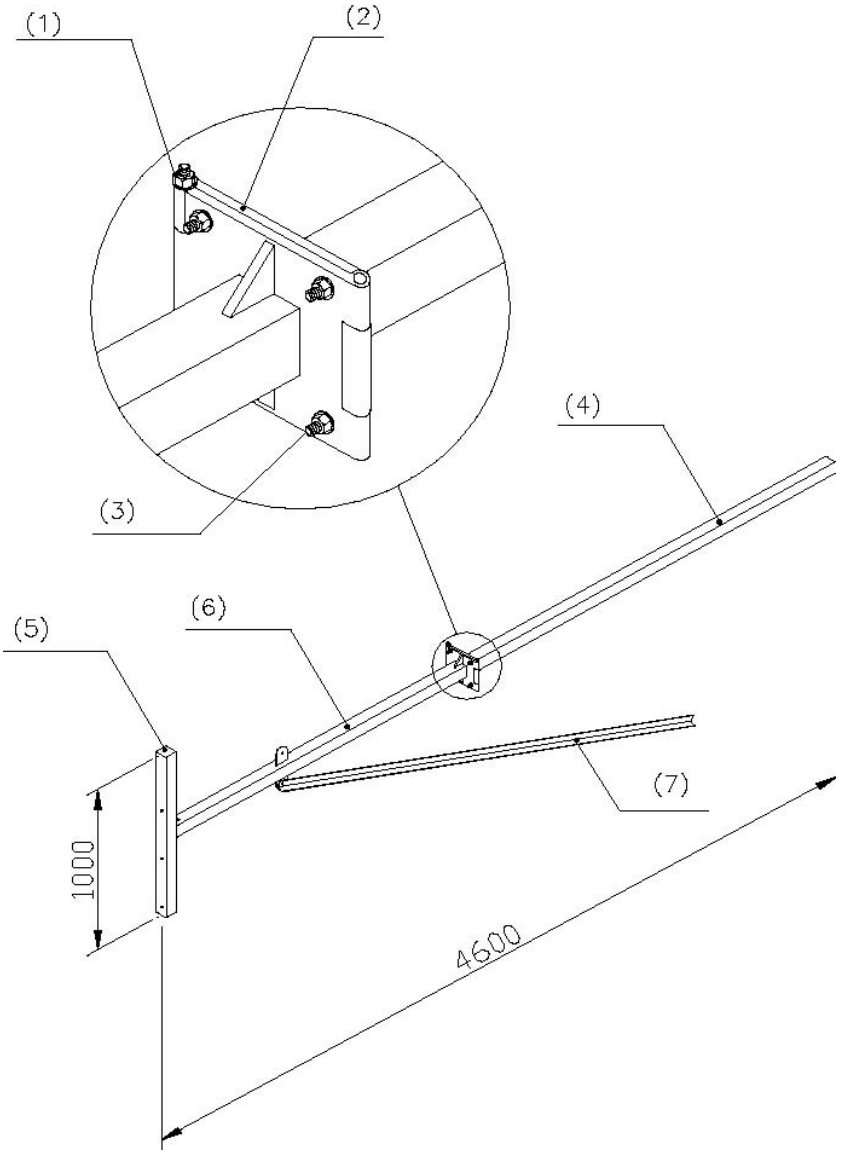
Steps

1. Installing the antenna rack

   There are various types of iron antenna racks. Take one type for example.

   The rack structure is as shown in Figure 78.

FIGURE 78 IRON ANTENNA RACK STRUCTURE (UNIT: MM)



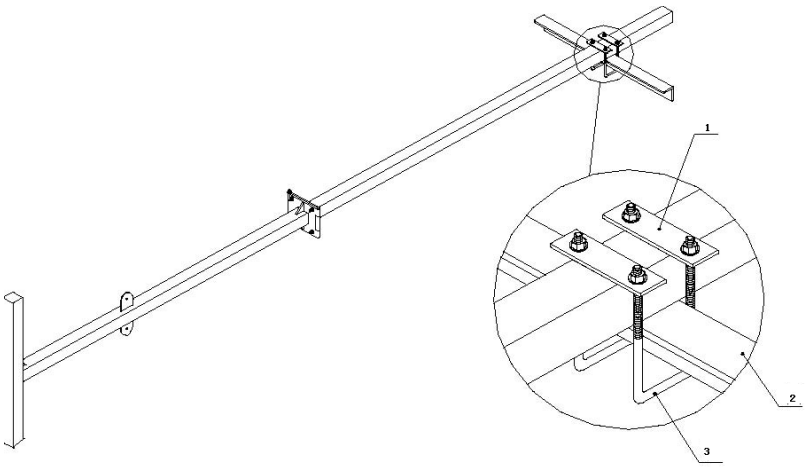
1. M12×220 bolt
2. Connecting bottom plate
3. M12×45 bolt
4. Collapsible mast
5. Fixed mast
6. Rotational mast
7. Enhanced mast

i. Install a fixed pulley at top of the tower the tower. Hoist the rack onto the iron platform with one or two ropes through the crown block. In addition, control an ascending direction of rack with another rope.

ii. According to the installation drawing of antenna and feeder in the engineering design drawing, confirm the installation position of antenna rack.

iii. Extend the rack out of the iron platform and fasten it on the tower body with U-shape fixation clips (connection bar and U-shape bolt included), as shown in Figure 79.

FIGURE 79 ANTENNA RACK INSTALLATION



1. Connection bar
2. U-shape bolt
3. Iron platform

iv. Connect guard bars of platform and connect bottom plates. If it is inconvenient to connect the antenna rack with the guard bars, weld them and make sure welding fastened. Cover a layer of antirust paint on the all parts welded and on the surface of rack.

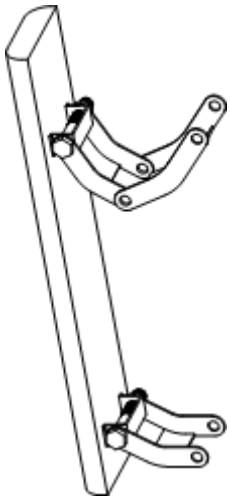
2. Installing the directional antenna

i. According to the engineering design drawing, make sure the installation direction of antenna.

ii. Hoist the antenna to a specified position with a block and rope. Make sure the antenna within the protective area of arrester.

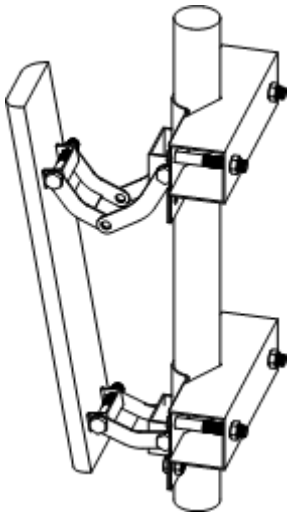
iii. Install a fixation rack of antenna and make the rack collapsed, as shown in Figure 80.

FIGURE 80 ANTENNA FIXATION RACK



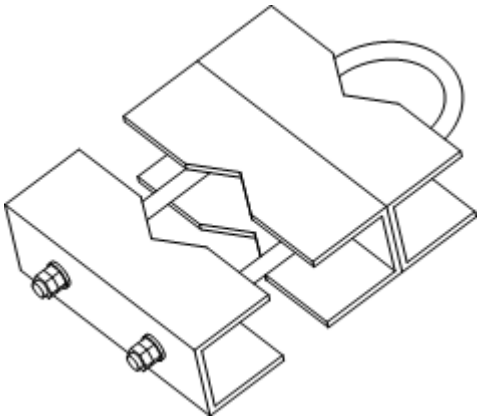
iv. Adjust the antenna to a proper height. Fix the fixation rack on the antenna pole with bolts and U-shape bolts. Make sure input and output ports of antenna downward, as shown in Figure 81.

FIGURE 81 FIXING ANTENNA



The appearance of U-shape bolt is as shown in Figure 82.

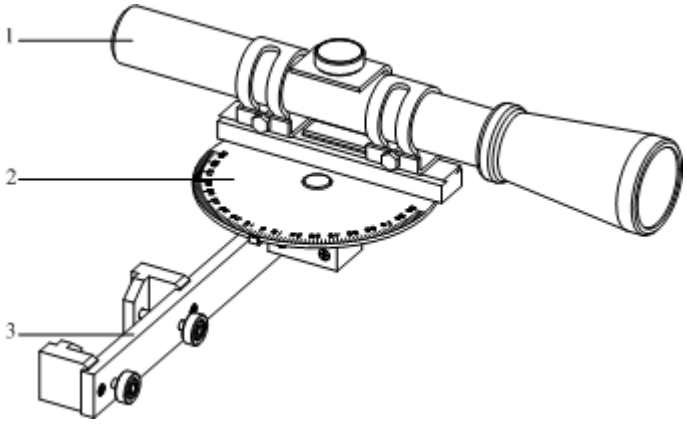
FIGURE 82 U-SHAPE BOLT



3. Adjusting the azimuth of antenna

   With Kathrein azimuth adjustment tools, make sure a normal direction of antenna radiation consistent with an azimuth of antenna in the networking planning. Kathrein azimuth adjustment tools are as shown in Figure 83.

FIGURE 83 KATHREIN AZIMUTH ADJUSTMENT TOOLS



1. Telescope
2. Dial
3. Fastening piece

Note:

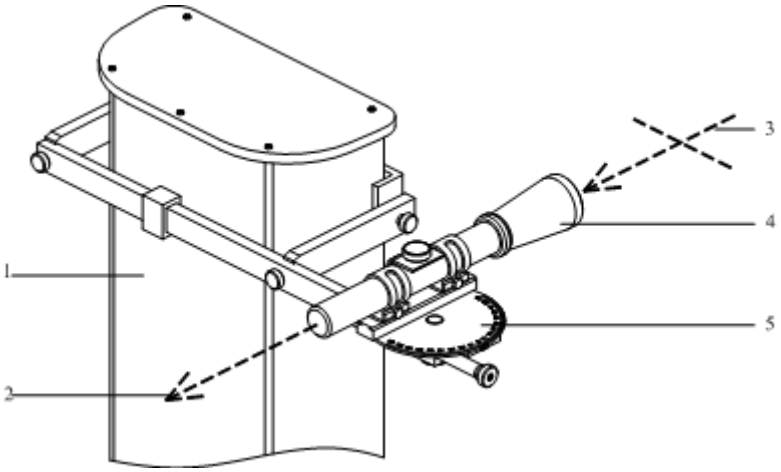
In this manual, explain the azimuth adjustment method by Kathrein azimuth adjustment tools. During practical commissioning, the adjustment method is determined by on-site tools.

i. Use a map to find an obvious aim (for example, tall building, mountain or tower). Measure the angle difference between the aim and the designed azimuth.

ii. Adjust an angle of special azimuth adjustment tool to the angle difference value measured by the above step.

iii. Put the special azimuth adjustment tool on the antenna, aim at the target by telescope, and rotate the antenna to the designed angle, as shown in Figure 84.

FIGURE 84 USAGE OF AZIMUTH ADJUSTMENT TOOL



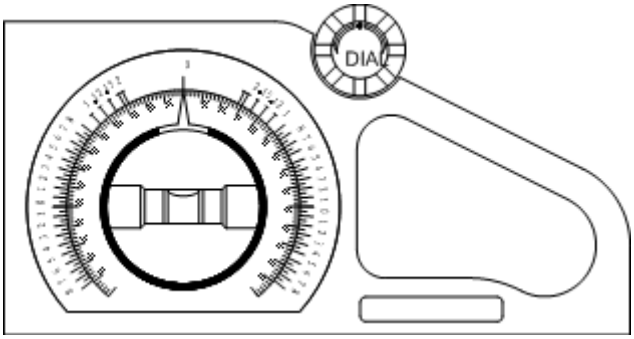
1. Antenna
2. Target direction
3. Observation direction
4. Telescope
5. Dial

iv. Fasten all screws with a wrench.

4. Adjusting the antenna downtilt

Adjust the downtilt of antenna with a downtilt measuring instrument. The downtilt measuring instrument is as shown in Figure 85.

FIGURE 85 DOWNTILT MEASURING INSTRUMENT APPEARANCE



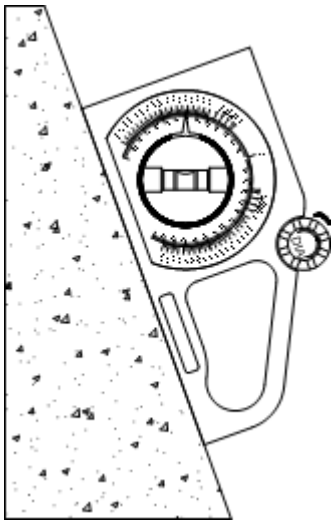
Note:

The downtilt of antenna should be consistent with an angle of downtilt fixation rack, the error not beyond 1◦ .

i. Rotate a dial of downtilt measuring instrument to a set angle.

ii. Put the declining object close to the chassis of dial and move them synchronously until air bubbles in the air-bubble pipe locate at the middle of two rings, as shown in Figure 86.

FIGURE 86 ADJUSTING DOWNTILT

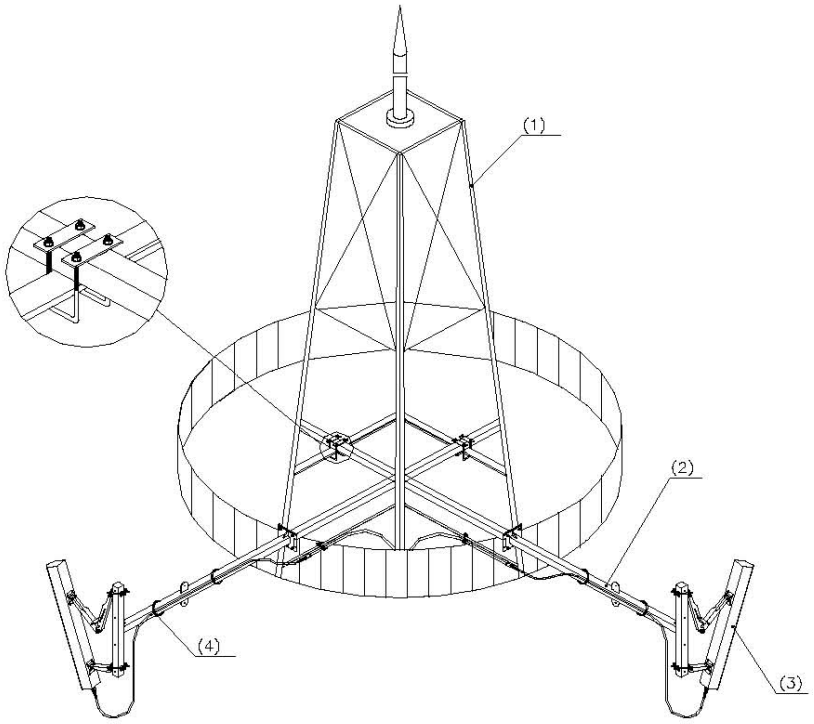


iii. Fasten all screws with a wrench.

END OF STEPS.

Result The directional antenna installation on the iron tower is as shown in Figure 87.

FIGURE 87 DIRECTIONAL ANTENNA INSTALLATION ON THE TOWER PLATFORM



1. Iron tower
2. Antenna rack
3. Directional antenna
4. Wire fastener

Installing Directional Antenna on Roof

Context Installation requirements are described as follows:

- Keep away from obstructors and blind areas.
- The installation position of connector of enhanced mast should have no impact on adjustment of antenna direction and angle.
- Keep an antenna rack vertical with the level.
- When the directional antenna is installed atop a building, the rack must be equipped with an arrester and be also connected with a lightning net of the building.
- All welding parts of antenna rack should be covered a layer of antirust paint on the surface. Make sure all welding parts fastened and no faulty or lacking welding.

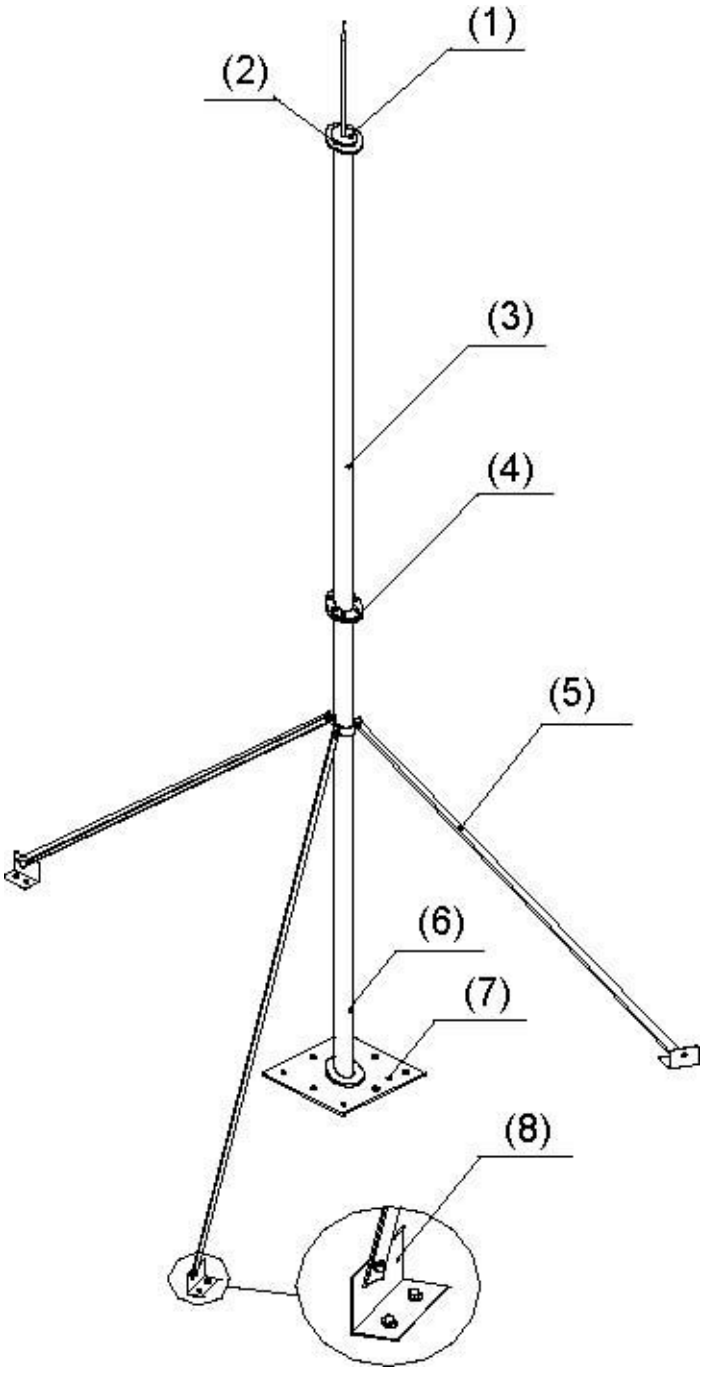
Steps 1. Installing the antenna rack on the roof

There are two conditions for installation:

- Installing the rack on the roof without a wall
- Installing the rack inconvenient to fix on the roof with a wall

There are various types of antenna racks. Take one type for example. The structure of antenna rack is as shown in Figure 88.

FIGURE 88 ANTENNA RACK STRUCTURE



1. Antenna arrester
2. Welded joint
3. Support pole 2
4. M10×80 bolt
5. Enhanced mast
6. Support pole 1
7. Support pole base
8. Enhanced mast foundation

Installing the rack on the roof without a wall

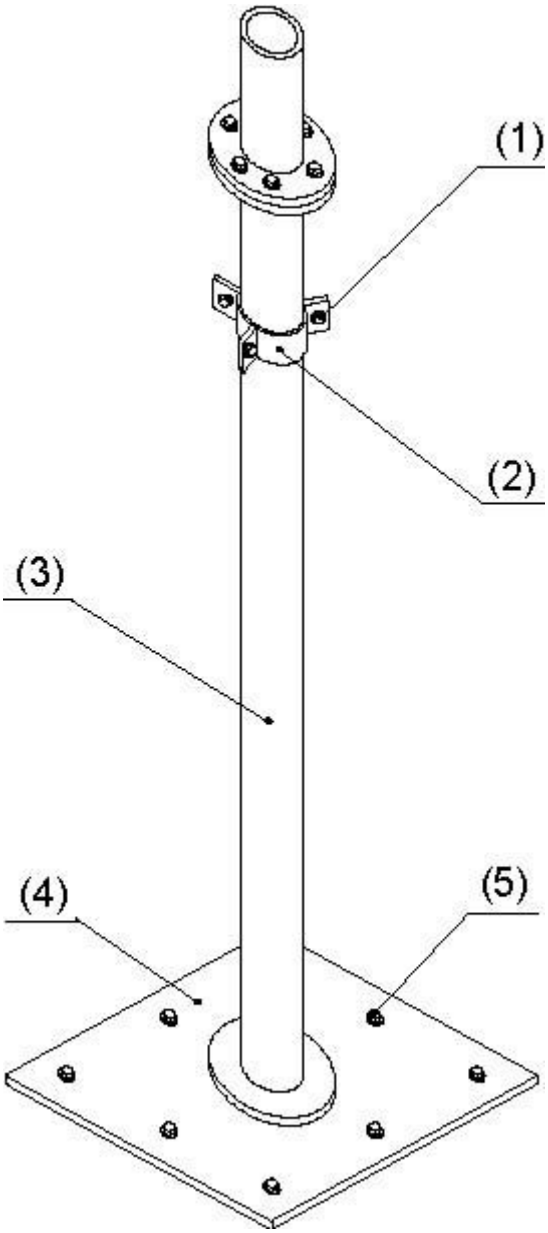
i. Move the rack to the roof.

ii. According to the installation drawing of antenna and feeder in the engineering design drawing, confirm the installation position of antenna rack.

iii. Weld an arrester onto a support pole 1.

iv. Fasten the antenna rack base with eight M10×45 expansion bolts on the roof, as shown in Figure 89.

FIGURE 89 ANTENNA RACK BASE STRUCTURE AND INSTALLATION



1. M10×50 hexagon bolt
2. Connector of enhanced mast
3. Support pole 1
4. Support pole base
5. M10×50 expansion bolt

v. Fix the support pole with the enhanced masts. The length of enhanced mast is determined by the length of support pole. Connect the enhanced masts with the support pole by a connector. Then connect the enhanced mast foundations with the enhanced masts. Fix every foundations on the roof with two M10×45 expansion bolts and make sure junctions of enhanced masts not be twisted.

vi. Connect the support pole 2 to the support pole 1 with six M10×80 bolts.

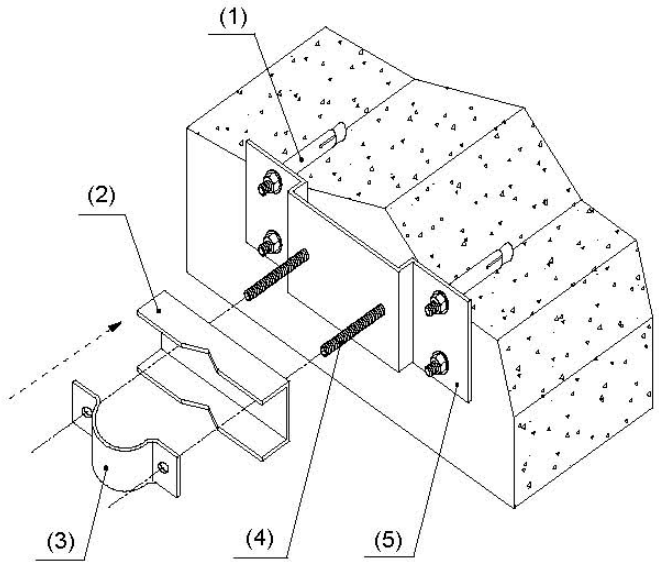
vii. If the antenna rack on the roof is not welded with an outdoor cable tray, or the outdoor cable tray welded with the antenna rack is not connected with the lightning net of building, the antenna rack base must be connected with the lightning net via a lightning junction bar.

viii. Cover a layer of antirust paint on the surface of all welded parts and the rack base. Cover concrete on the antenna rack base, enhanced mast and expansion bolts.

Installing the rack inconvenient to fix on the roof with a wall

When it is inconvenient to install the rack on the roof, if the roof is surrounded by the wall, install it onto the wall, as shown in Figure 90.

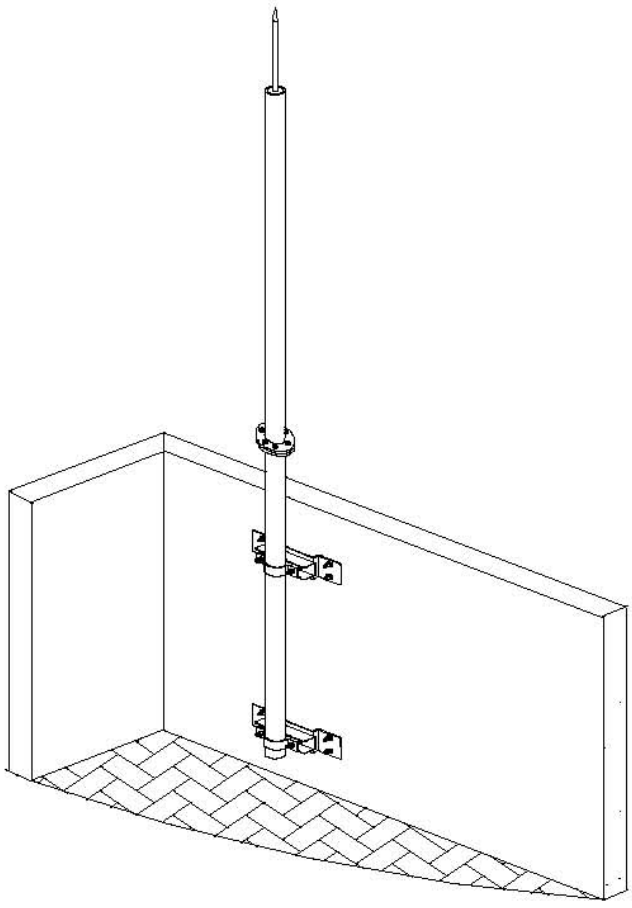
FIGURE 90 INSTALLING ANTENNA RACK ON THE WALL



1. M12×120 expansion bolt
2. V-shape connector
3. 180°connector
4. M12×140 bolt
5. Fastness board

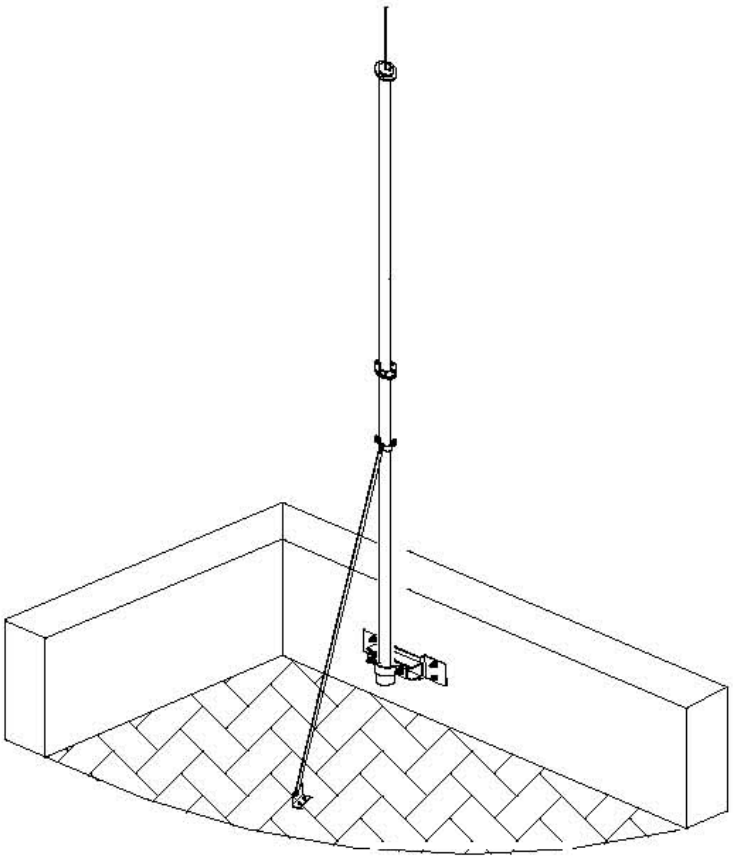
If the height of wall is not less than 1200 mm, fix the support pole on the wall with expansion bolts and fixation clips, as shown in Figure 91.

FIGURE 91 ANTENNA RACK FIXED ON THE WALL COMPLETELY (HEIGHT OF WALL NOT LESS THAN 1200 MM)



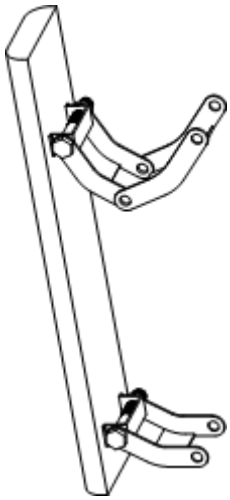
If the height of wall is less than 1200 mm, fix an end of support pole on the wall with expansion bolts and a fixation clip, and fix the other point of support pole with the roof, as shown in Figure 92.

FIGURE 92 ANTENNA RACK FIXED ON THE WALL (HEIGHT OF WALL LESS THAN 1200 MM)



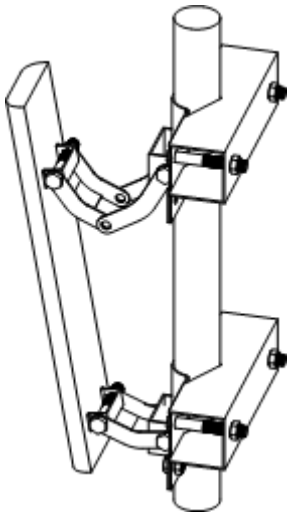
2. Installing the directional antenna
   i. According to the engineering design drawing, make sure the installation direction of antenna.
   ii. Hoist the antenna to a specified position with a block and rope. Make sure the antenna within the protective area of arrester.
   iii. Install a fixation rack of antenna and make the rack collapsed, as shown in Figure 93.

FIGURE 93 FIXATION RACK



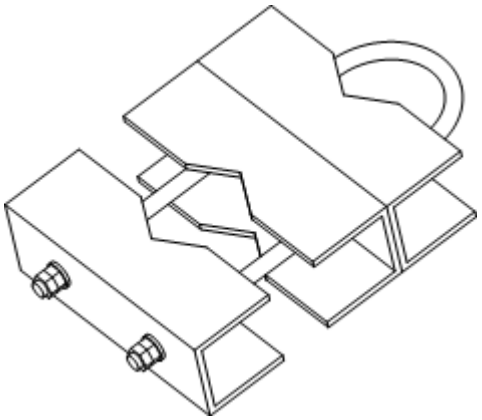
iv. Adjust the antenna to a proper height. Fix the fixation rack on the antenna pole with bolts and U-shape bolts. Make sure input and output ports of antenna downward, as shown in Figure 94.

FIGURE 94 FIXING ANTENNA



The appearance of U-shape bolt is as shown in Figure 95.

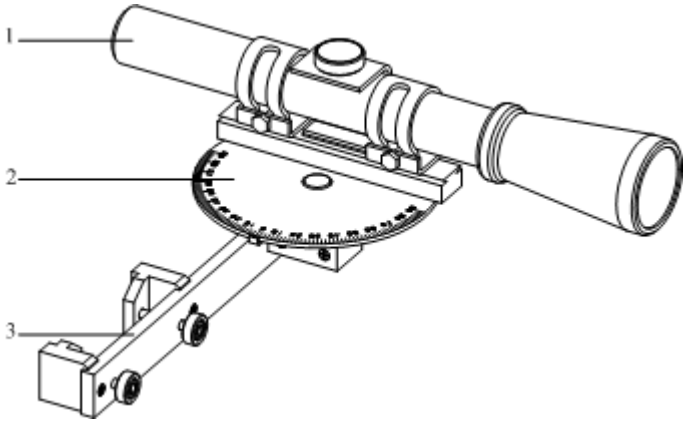
FIGURE 95 U-SHAPE BOLT



3. Adjusting the azimuth of antenna

   With Kathrein azimuth adjustment tools, make sure a normal direction of antenna radiation consistent with an azimuth of antenna in the networking planning. Kathrein azimuth adjustment tools are as shown in Figure 96.

FIGURE 96 KATHREIN AZIMUTH ADJUSTMENT TOOLS



1. Telescope
2. Dial
3. Fastening piece

Note:

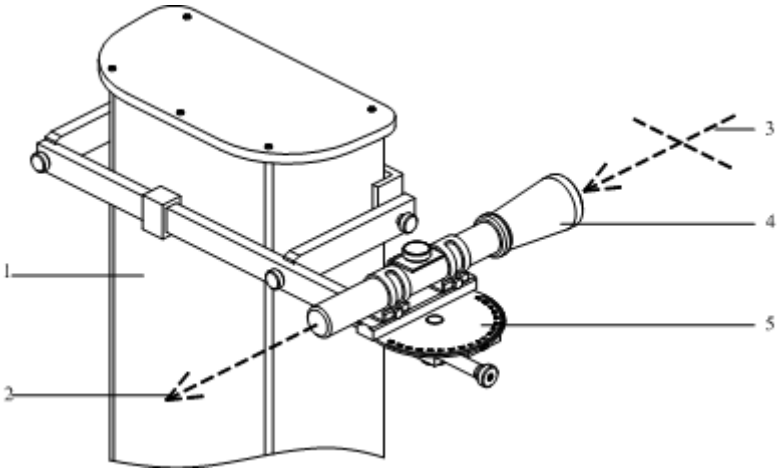
In this manual, explain the azimuth adjustment method by Kathrein azimuth adjustment tools. During practical commissioning, the adjustment method is determined by on-site tools.

i. Use a map to find an obvious aim (for example, tall building, mountain or tower). Measure the angle difference between the aim and the designed azimuth.

ii. Adjust an angel of special azimuth adjustment tool to the angel difference value measured by the above step.

iii. Put the special azimuth adjustment tool on the antenna, aim at the target by telescope, and rotate the antenna to the designed angel, as shown in Figure 97.

FIGURE 97 USAGE OF AZIMUTH ADJUSTMENT TOOL



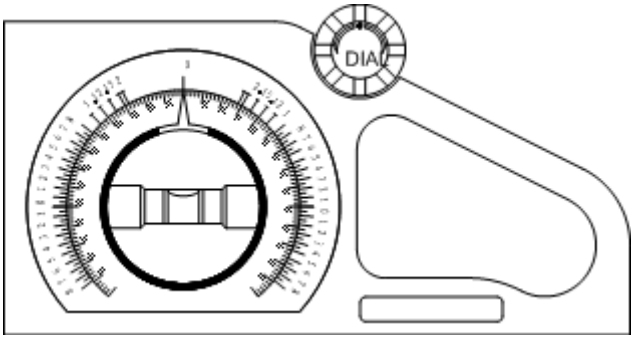
1. Antenna
2. Target direction
3. Observation direction
4. Telescope
5. Dial

iv. Fasten all screws with a wrench.

4. Adjusting the antenna downtilt

Adjust the downtilt of antenna with a downtilt measuring instrument. The downtilt measuring instrument is as shown in Figure 98.

FIGURE 98 DOWNTILT MEASURING INSTRUMENT APPEARANCE



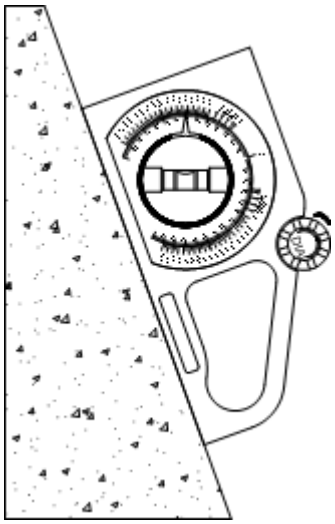
Note:

The downtilt of antenna should be consistent with an angel of downtilt fixation rack, the error not beyond 1◦ .

i. Rotate a dial of downtilt measuring instrument to a set angle.

ii. Put the declining object close to the chassis of dial and move them synchronously until air bubbles in the air-bubble pipe locate at the middle of two rings, as shown in Figure 99.

FIGURE 99 ADJUSTING DOWNTILT

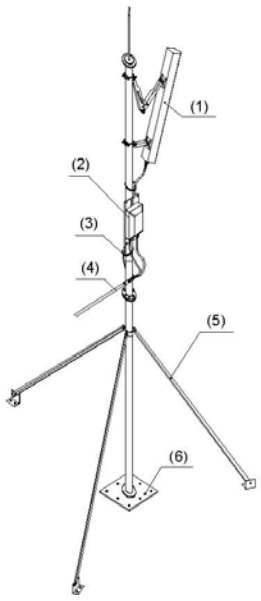


iii. Fasten all screws with a wrench.

END OF STEPS.

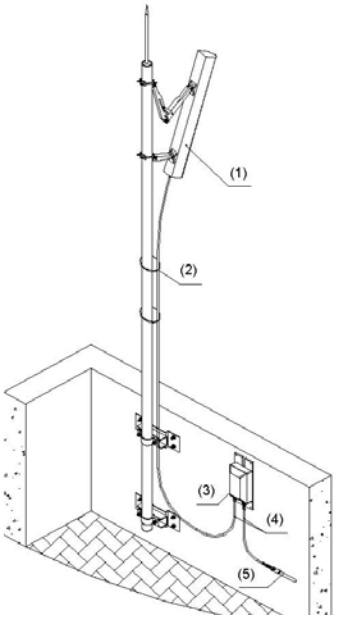
Result The directional antenna installation on the roof is as shown in Figure 100 and Figure 101.

FIGURE 100 DIRECTIONAL ANTENNA INSTALLATION ON THE ROOF (WITHOUT WALL BUT WITH TOWER AMPLIFIER)



1. Antenna
2. Wire fastener
3. Feeder
4. Enhanced mast
5. Support pole base

FIGURE 101 DIRECTIONAL ANTENNA INSTALLATION ON THE ROOF (WITH WALL AND TOWER AMPLIFIER)



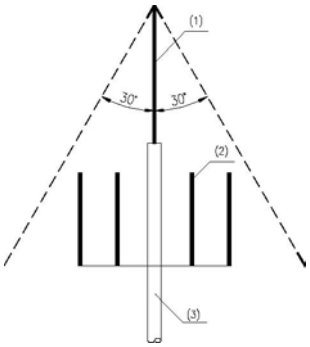
1. Antenna
2. Wire fastener
3. Tower amplifier
4. Jumper
5. Feeder

Installing Omnidirectional Antenna on Top-tower

Context Installation requirements are described as follows:

- An installation plane of antenna rack should keep vertical with the level.
- Install a mast of tower arrester singly. The height of mast meet protective requirements of all antenna arresters. When an antenna rack extends out of the platform of iron tower, make sure the antenna within a protective area of 30° downtilt of arrester top, as shown in Figure 102.

FIGURE 102 ARRESTER PROTECTIVE AREA



1. Arrester
2. Antenna
3. Arrester mast

- Make sure an installation direction of antenna rack not affecting receiving and transmitting performance of directional antenna as well as direction adjustment.
- Make sure the antenna within a protective area of iron arrester. The distance that the antenna extends out of iron platform is 1 m at least.
- Reinforce a rotational mast with an enhanced mast. The lengths of a collapsible mast and a rotational mast should be cut according to on-site condition. Weld a cover board on the cut section to avoid leakage.
- Make sure all welding parts fastened and no faulty or lacking welding. Suggest adopting galvanized steel for the rack and covering a layer of antirust sliver-powder paint on the surface of rack.
- Make sure the antenna within a protective area of iron arrester. The distance from the body of iron tower is 2 m at least.
- The axes of antenna should be vertical with the level and the error should be less than ±1◦ .
- The gain of antenna should be 11dBi and the isolation be 30dB.

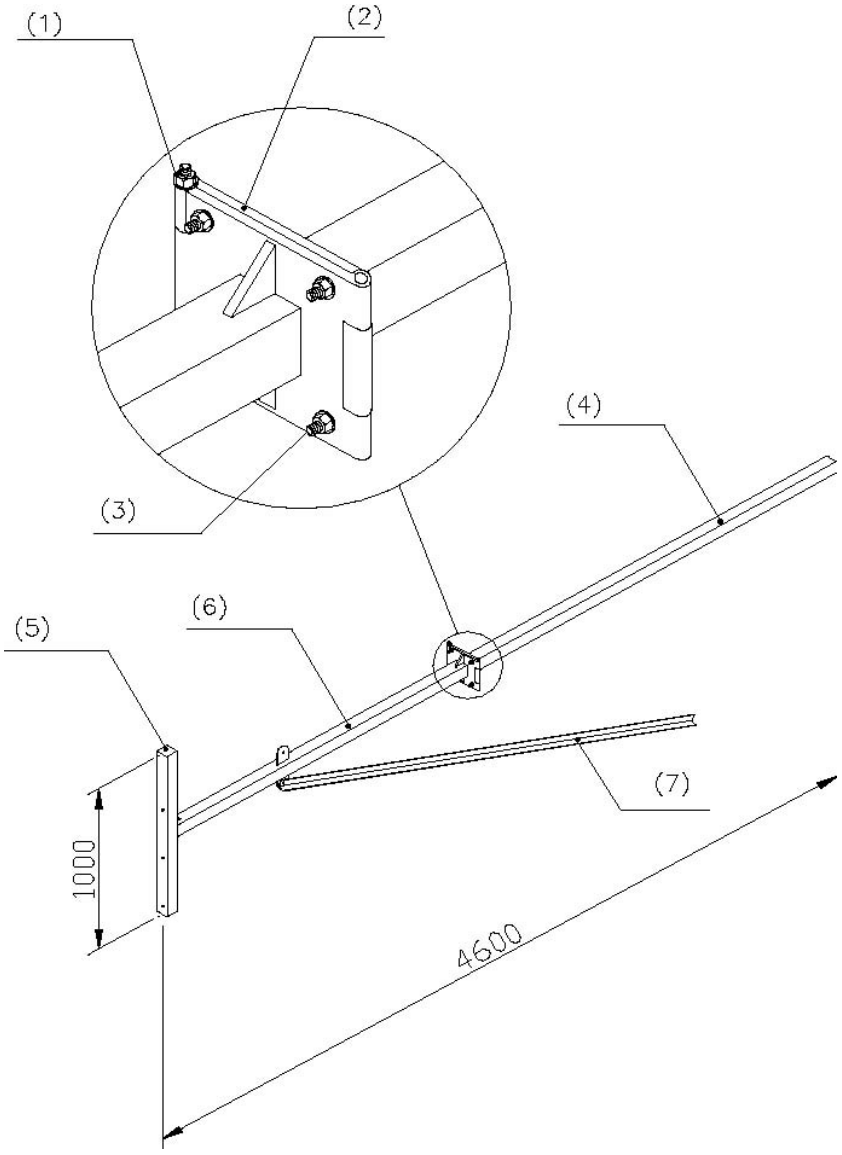
- Make a waterproof bending for the jumper.

Steps 1. Installing the antenna rack

There are various types of iron antenna racks. Take one type for example.

The rack structure is as shown in Figure 103.

FIGURE 103 IRON ANTENNA RACK STRUCTURE (UNIT: MM)



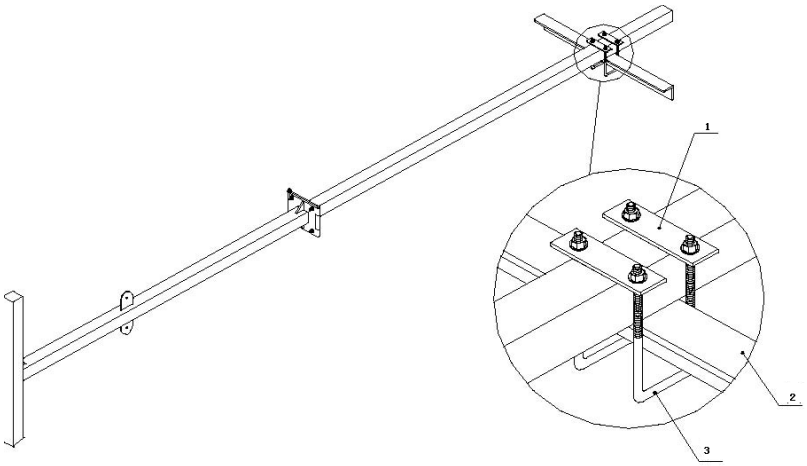
1. M12×220 bolt
2. Connecting bottom plate
3. M12×45 bolt
4. Collapsible mast
5. Fixed mast
6. Rotational mast
7. Enhanced mast

i. Install a crown block atop the tower. Hoist the rack onto the iron platform with one or two ropes through the crown block. In addition, control an ascending direction of rack with another rope.

ii. According to the installation drawing of antenna and feeder in the engineering design drawing, confirm the installation position of antenna rack.

iii. Extend the rack out of the iron platform and fasten it on the tower body with U-shape fixation clips (connection bar and U-shape bolt included), as shown in Figure 104.

FIGURE 104 ANTENNA RACK INSTALLATION



1. Connection bar
2. U-shape bolt
3. Iron platform

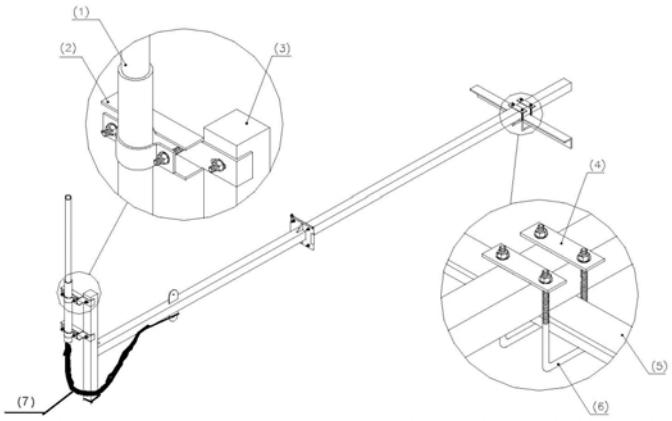
iv. Connect guard bars of platform and connect bottom plates. If it is inconvenient to connect the antenna rack with the guard bars, weld them and make sure welding fastened. Cover a layer of antirust paint on the all parts welded and on the surface of rack.

2. Installing the omnidirectional antenna

i. According to the engineering design drawing, make sure the installation direction of antenna.

ii. Fix the antenna on the fixation mast of rack, as shown in Figure 105.

FIGURE 105 OMNIDIRECTIONAL ANTENNA INSTALLATION



1. Omnidirectional antenna
2. Fixation clip
3. Fixation pole
4. Connection piece
5. Iron beam
6. U-shape bolt
7. Jumper waterproof bending

Caution:

The sheath top of omnidirectional antenna should be in a level with the fixation mast top of rack or higher than the fixation mast top. The emission part of antenna should be higher than the top of fixation mast. The degree of tightness of antenna should be moderate to avoid damaging the antenna sheath.

iii. Check whether the antenna axes is vertical with the level with an angle test instrument. If the error is equal or more than ±1◦ , refasten it after adjustment.

iv. Fix the antenna until not push it.

v. Make the waterproof bending of jumper. While distributing the jumper, bind the jumper along the rack rail with black wire fasteners. Cut off redundant tails of wire fasteners.

Caution:

During jumper layout, the bending is natural and the radius of bending is usually 20 times more than the diameter of jumper. Keep wire fasteners in the same direction. Remain 5~10mm redundancy while cutting the tail of wire fastener. The cutting section should be flat and orderly.

vi. Extend the installed rational mast out of the iron platform and fix the connecting bottom plate with bolts.

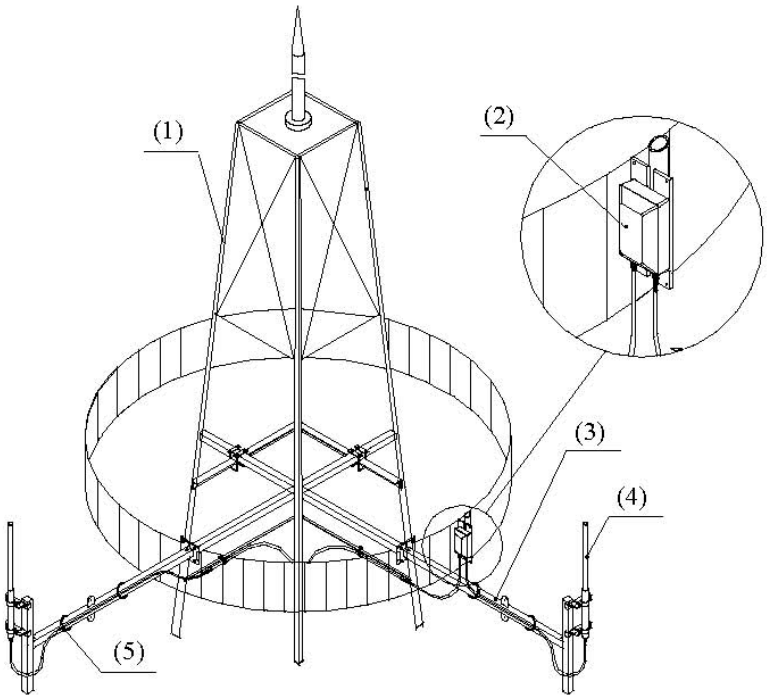
Note:

If there is no guard bars on the platform, for operation security, bind a piece of solid board to two arms of two racks to build up a springboard. While fixing a side of antenna, tower amplifier and feeder connection, modify the position of board on the rack arms to fix others.

END OF STEPS.

Result The omnidirectional antenna installation on the Iron Tower is as shown in Figure 106.

FIGURE 106 OMNIDIRECTIONAL ANTENNA INSTALLATION ON THE IRON TOWER



1. Iron tower
2. Tower amplifier
3. Antenna rack
4. Omnidirectional antenna
5. Wire fastener

Installing Omnidirectional Antenna on Roof

Context Installation requirements are described as follows:

- Keep away from obstructors and blind areas.

- The installation position of connector of enhanced mast should have no impact on adjustment of antenna direction and angle.
- Keep an antenna rack vertical with the level.
- If installing an arrester on the rack of omnidirectional antenna, extend the rack 1 ~ 1.5 m away.
- If there is no arrester on the antenna rack, install an arrester. The horizontal interval between omnidirectional antenna and arrester should be not less than 2.5 m. Locate the antenna within a protective area of 30° downtilt of arrester top.
- All welding parts of antenna rack should be covered a layer of antirust paint on the surface. Make sure all welding parts fastened and no faulty or lacking welding.

Steps

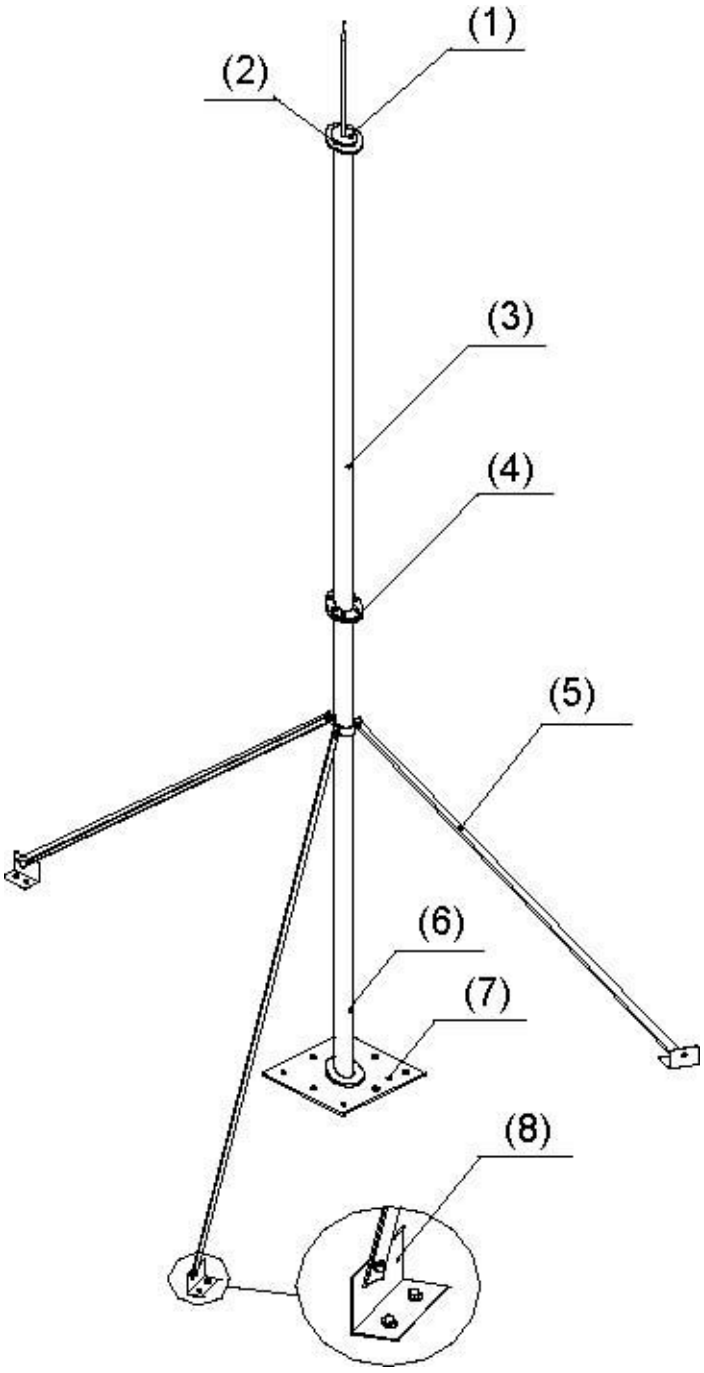
1. Installing the antenna rack on the roof

   There are two conditions for installation:

   - Installing the rack on the roof without a wall
   - Installing the rack inconvenient to fix on the roof with a wall

   There are various types of antenna racks. Take one type for example. The structure of antenna rack is as shown in Figure 107.

FIGURE 107 ANTENNA RACK STRUCTURE



1. Antenna arrester
2. Welded joint
3. Support pole 2
4. M10×80 bolt
5. Enhanced mast
6. Support pole 1
7. Support pole base
8. Enhanced mast foundation

Installing the rack on the roof without a wall

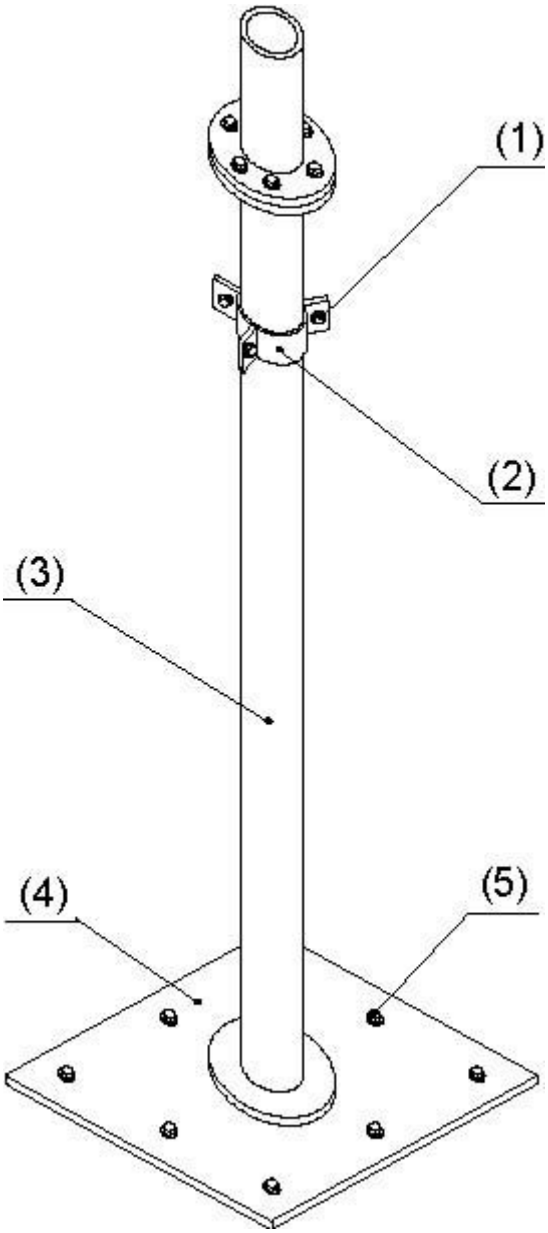
i. Move the rack to the roof.

ii. According to the installation drawing of antenna and feeder in the engineering design drawing, confirm the installation position of antenna rack.

iii. Weld an arrester onto a support pole 1.

iv. Fasten the antenna rack base with eight M10×45 expansion bolts on the roof, as shown in Figure 108.

FIGURE 108 ANTENNA RACK BASE STRUCTURE AND INSTALLATION



1. M10×50 hexagon bolt
2. Connector of enhanced mast
3. Support pole 1
4. Support pole base
5. M10×50 expansion bolt

v. Fix the support pole with the enhanced masts. The length of enhanced mast is determined by the length of support

pole. Connect the enhanced masts with the support pole by a connector. Then connect the enhanced mast foundations with the enhanced masts. Fix every foundations on the roof with two M10×45 expansion bolts and make sure junctions of enhanced masts not be twisted.

vi. Connect the support pole 2 to the support pole 1 with six M10×80 bolts.

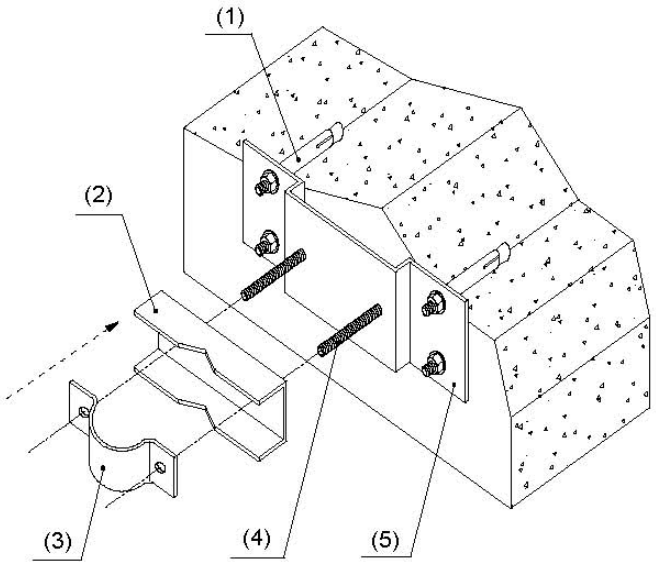
vii. If the antenna rack on the roof is not welded with an outdoor cable tray, or the outdoor cable tray welded with the antenna rack is not connected with the lightning net of building, the antenna rack base must be connected with the lightning net via a lightning junction bar.

viii. Cover a layer of antirust paint on the surface of all welded parts and the rack base. Cover concrete on the antenna rack base, enhanced mast and expansion bolts.

Installing the rack inconvenient to fix on the roof with a wall

When it is inconvenient to install the rack on the roof, if the roof is surrounded by the wall, install it onto the wall, as shown in Figure 109.

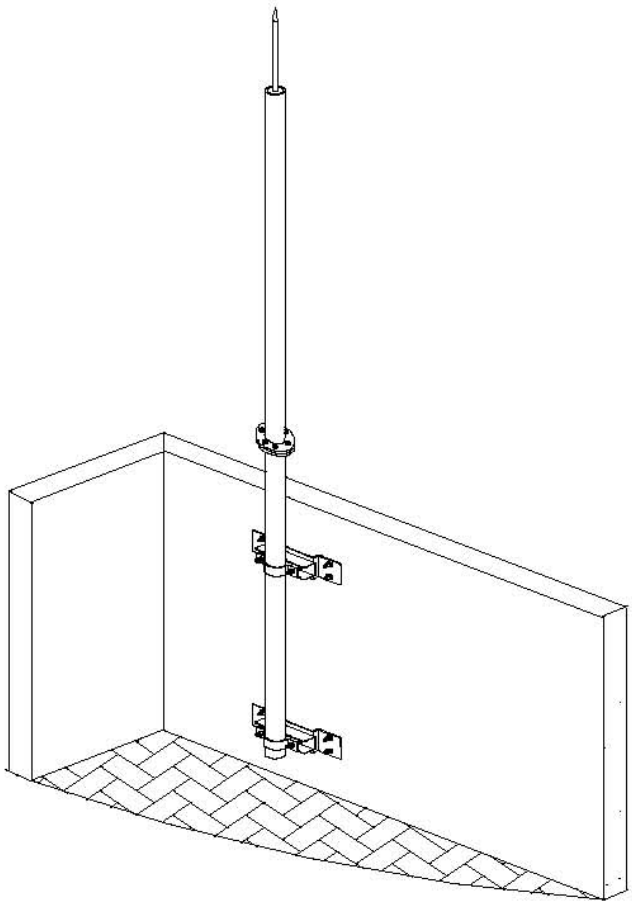
FIGURE 109 INSTALLING ANTENNA RACK ON THE WALL



1. M12×120 expansion bolt
2. V-shape connector
3. 180°connector
4. M12×140 bolt
5. Fastness board

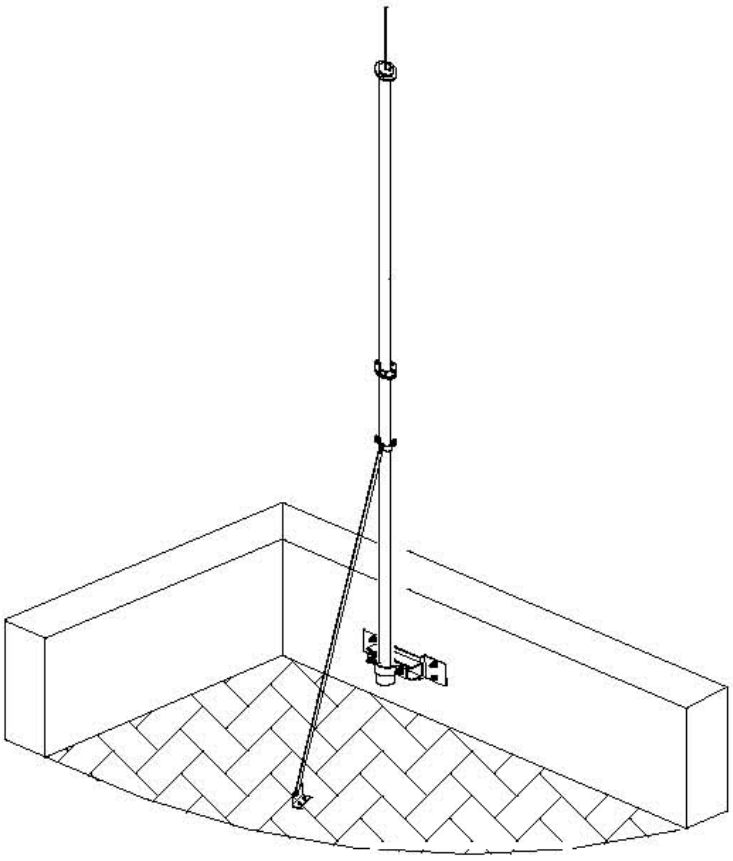
If the height of wall is not less than 1200 mm, fix the support pole on the wall with expansion bolts and fixation clips, as shown in Figure 110.

FIGURE 110 ANTENNA RACK FIXED ON THE WALL COMPLETELY (HEIGHT OF WALL NOT LESS THAN 1200 MM)



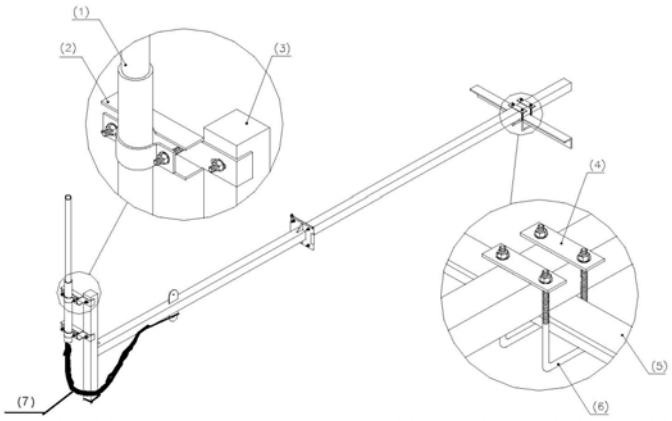
If the height of wall is less than 1200 mm, fix an end of support pole on the wall with expansion bolts and a fixation clip, and fix the other point of support pole with the roof, as shown in Figure 111.

FIGURE 111 ANTENNA RACK FIXED ON THE WALL (HEIGHT OF WALL LESS THAN 1200 MM)



2. Installing the omnidirectional antenna
   i. According to the engineering design drawing, make sure the installation direction of antenna.
   ii. Fix the antenna on the fixation mast of rack, as shown in Figure 112.

FIGURE 112 OMNIDIRECTIONAL ANTENNA INSTALLATION



1. Omnidirectional antenna
2. Fixation clip
3. Fixation pole
4. Connection piece
5. Iron beam
6. U-shape bolt
7. Jumper waterproof bending

Caution:

The sheath top of omnidirectional antenna should be in a level with the fixation mast top of rack or higher than the fixation mast top. The emission part of antenna should be higher than the top of fixation mast. The degree of tightness of antenna should be moderate to avoid damaging the antenna sheath.

iii. Check whether the antenna axes is vertical with the level with an angle test instrument. If the error is equal or more than ±1◦ , refasten it after adjustment.

iv. Fix the antenna until not push it.

v. Make the waterproof bending of jumper. While distributing the jumper, bind the jumper along the rack rail with black wire fasteners. Cut off redundant tails of wire fasteners.

Caution:

During jumper layout, the bending is natural and the radius of bending is usually 20 times more than the diameter of jumper. Keep wire fasteners in the same direction. Remain 5~10mm redundancy while cutting the tail of wire fastener. The cutting section should be flat and orderly.

vi. Extend the installed rational mast out of the iron platform and fix the connecting bottom plate with bolts.

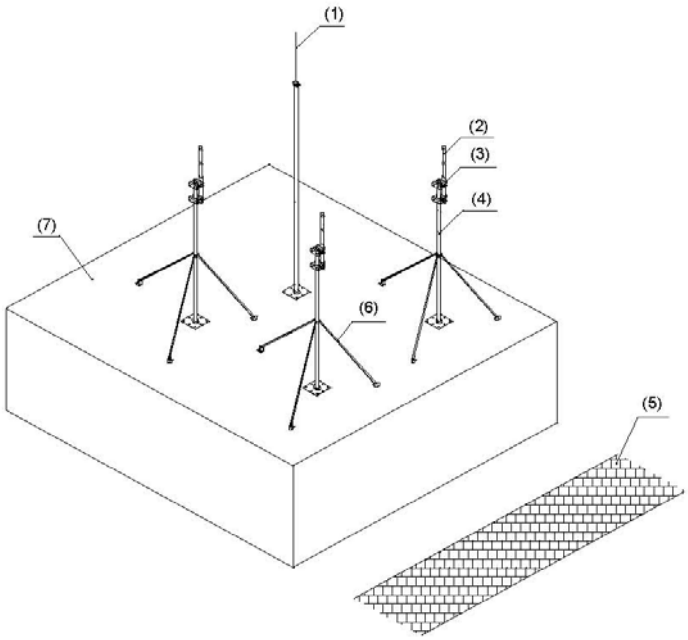
Note:

If there is no guard bars on the platform, for operation security, bind a piece of solid board to two arms of two racks to build up a springboard. While fixing a side of antenna, tower amplifier and feeder connection, modify the position of board on the rack arms to fix others.

END OF STEPS.

Result The omnidirectional antenna installation on the roof is as shown in Figure 113.

FIGURE 113 OMNIDIRECTIONAL ANTENNA INSTALLATION ON THE ROOF



1. Arrester
2. Antenna
3. Omnidirectional antenna fixation clip
4. Antenna support pole
5. Road
6. Enhanced mast
7. Roof

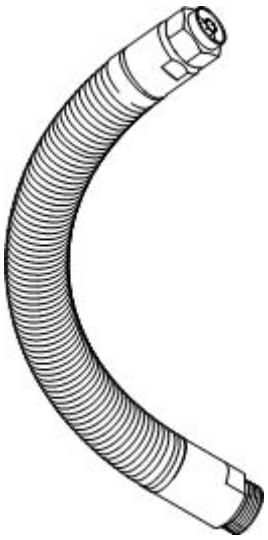
Installing Antenna Jumper

Context The antenna jumper is a supersoft jumper connecting an antenna with a main feeder. For a mobile BTS , adopt 1/2 inch super soft jumper. A connector of jumper is determined by the antenna and the main feeder. Normally, two connectors of jumper are both male DIN-type.

Steps

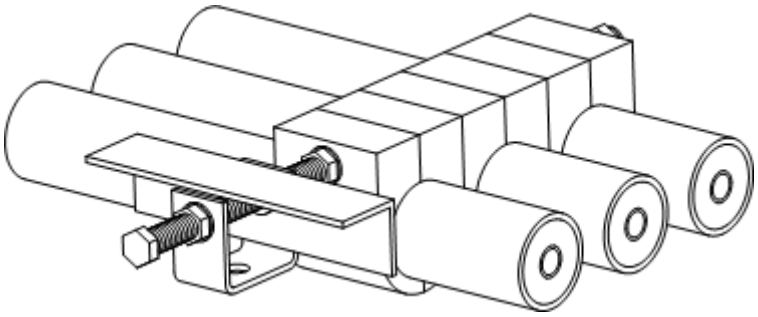
1. Confirm a proper jumper route which should be reliable, convenient, short as possible it can. Make sure rain drop in the middle of jumper but not at the connector.
2. Make sure a proper torque (connection torque of DIN is 1.7 N.m typically and the maximum value is not more than 2.3 N.m) to connect a connector between antenna and jumper. And make sure this connector no lateral force, as shown in Figure 114.

FIGURE 114 JUMPER CONNECTION



3. Make sure a proper torque (connection torque of DIN is 1.7 N.m typically and the maximum value is not more than 2.3 N.m) to connect a connector between main feeder and jumper. And make sure this connector no lateral force.
4. Fix the jumper with feeder kits, as shown in Figure 115. The distance of feeder kits is not beyond 0.76 m. When the speed of wind is over 160 km/h, shorten the distance between feeder kits appropriately.

FIGURE 115 FEEDER KIT FIXATION



5. Carry out performance measurement of antenna and feeder and make sure the system running normally. Finally seal the connector with self-adhesive waterproof tape and PVC tape.

END OF STEPS.

Installing Feeder Hermetic-window

Context Installation requirements are described as follows:

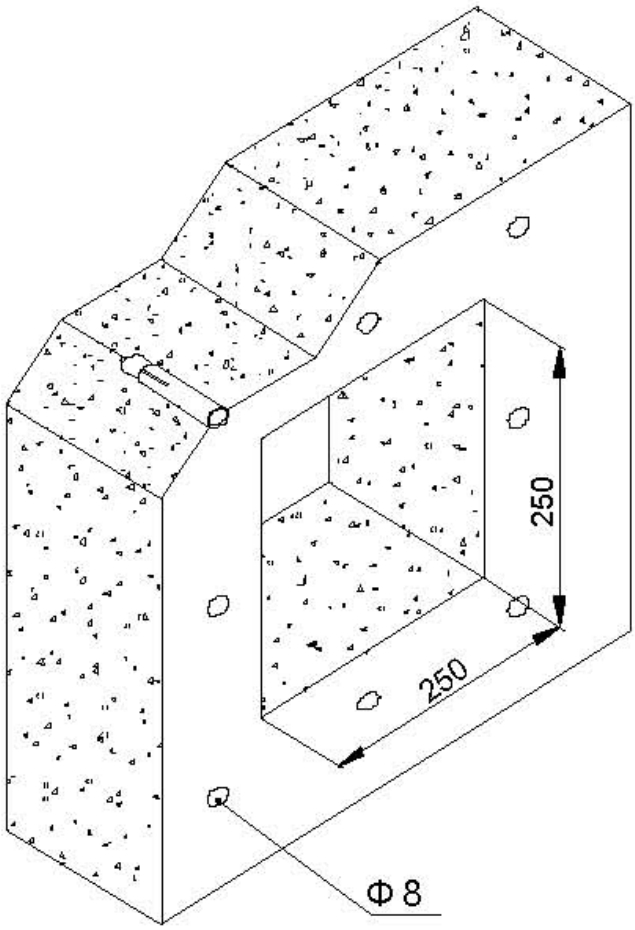
- The installation position of hermetic window should be close to a cable tray possibly.
- The hermetic window can be mounted against an indoor wall or outdoor wall and the side of protuberant metal circles must put towards outdoors
- If the feeder enters into a room from a roof, the hermetic window can be mounted on the roof and the side of protuberant metal circles must put towards outdoors.

The follow describes the steps of 12 hole hermetic window installed against the wall.

Steps

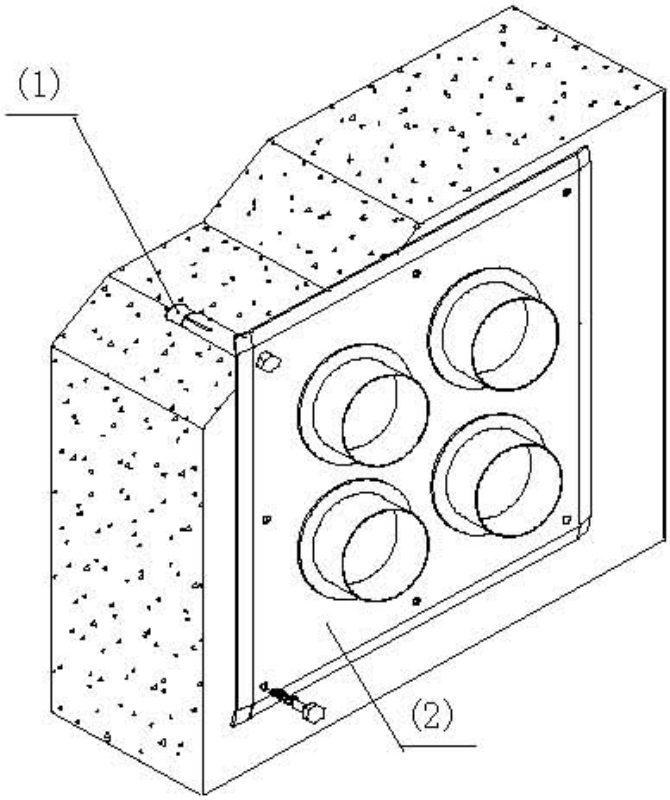
1. According to the requirements of engineering design drawing and the dimension of hermetic window, make sure the installation position of hermetic window on the wall and at the same time mark hole positions of expansion bolts and a hollow room left for the hermetic window.
2. Cut a 250mm×250mm square big hole and then drill eight holes of expansion blots with a percussive drill, as shown in Figure 116.

FIGURE 116 INSTALLATION HOLE POSITIONS (UNIT: MM)



3. Fix a feeder hermetic-window panel with expansion bolts, as shown in Figure 117. While installing expansion bolts, first put a flat washer and then a spring washer.

FIGURE 117 HERMETIC WINDOW INSTALLATION



1. M8×80 expansion bolt
2. Feeder hermetic-window panel

END OF STEPS.

Installing and Grounding Feeder and Jumper

Feeder Cutting Principle

According to the final feeder route consulted with users, confirm the length of feeders on site. Cut feeders based on the length of various feeders. Considering different installation positions, there are two modes of cutting feeder, as follows:

Feeder Installation on the Building Top

1. According to the practical feeder route, measure the feeder length of every sector with a tape.
2. Cut the feeder and remain an 1 m ~ 2 m redundant length compared with the practical length in measure.

3. After cutting one feeder, affix relevant temporary labels at the two ends of feeder, such as: ANT0 and ANT0.
4. Move the cut feeder to the top of building , and make sure the feeder undamaged and not pressed.
5. Finally affix a formal label on the feeder.

Feeder Installation on the Iron

1. Hoist an end of feeder to the top of tower. Before hoisting, make an upper feeder connector.
2. Installation personnel under the tower cut the feeder according to a required length of feeder into a room and remain a certain redundant length. A temporary label must be affixed to the feeder.
3. Finally affix a formal label on the feeder.

Feeder Layout Principle

The principles of feeder layout are described as follows:

- Feeder layout should be orderly and proper. Avoid crossed layout of feeder.
- Before feeder layout, know the route of feeder well. To prevent from crossed feeder, suggest drawing a practical route of feeder on the paper .
- The minimum bending radius of feeder is not less than twenty times than the radius of feeder.
- The requirements of bending radius are listed in Table 7.

TABLE 7 BENDING RADIUS REQUIREMENTS OF VARIOUS FEEDERS

Feeder Type	The minimum bending radius recommended	
	Bending for once	Continuous bending (≤15 times)
Supersoft 1/2" feeder	15 mm	30 mm
1/2" feeder	50 mm	125 mm
7/8" feeder	90 mm	250 mm
5/4" feeder	150 mm	380 mm

Installing Feeder on Tower

Steps

1. Make sure feeder marks correct affixed to two ends of feeder .
2. Protect a feeder connector with flax or an antistatic bag adding foam and bind them tightly with binding tape.
3. Hoist the feeder atop the tower with a group of hoisting pulleys.
4. Install a three-linkage feeder kit to fix the feeder every 1.5 m along a tower or a cable tray. The detailed interval is determined by an on-site installation condition, but the interval between two feeder kits can not be beyond 1.65 m. The internal between feeder kits should keep equal and the directions

should keep consistent. In the same cable tray, if two lines of feeder kits are installed, keep them paralleled and orderly.

Fixation of feeder on the tower is as shown in Figure 118 and Figure 119.

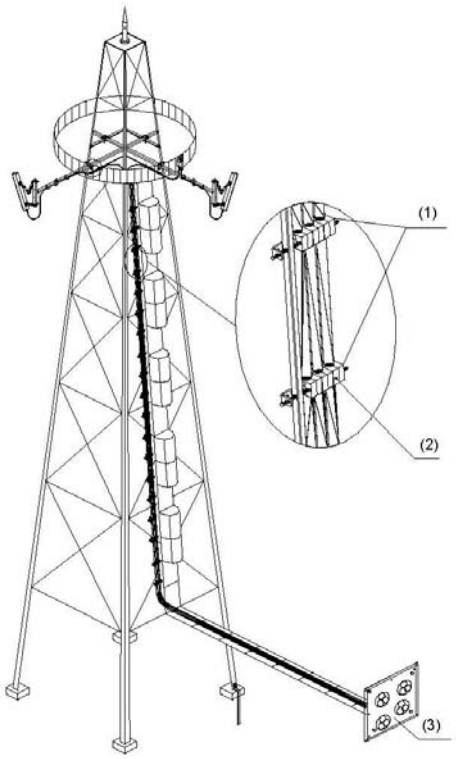
FIGURE 118 FEEDER FIXATION ON THE TOWER (ONE KIT AND TWO FIXATION CLIPS)

FIGURE 119 FEEDER FIXATION ON THE TOWER (ONE KIT AND THREE FIXATION CLIPS)

END OF STEPS.

Result Complete feeder installation on the tower, as shown in Figure 120.

FIGURE 120 FEEDER LAYOUT FROM TOWER TOP TO HERMETIC WINDOW



1. Interval between fixation kits
2. Fixation kit
3. Feeder hermetic window

Installing Feeder on Roof

Steps

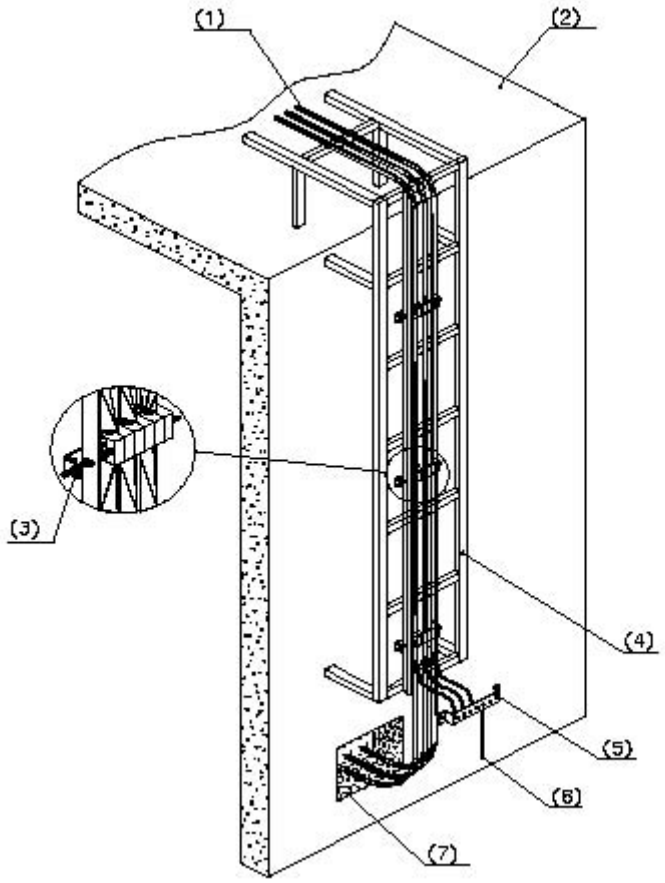
1. Make sure feeder marks correct affixed to two ends of feeder .
2. According to the labels, fix the feeder into feeder fixation clips. Screws on the fixation clips are not fastened temporarily. After completing feeder layout, screw down these screws.

   The fixation clips should keep vertical with the feeder. The feeders in a fixation clip should keep paralleled mutually, as shown in Figure 121.

FIGURE 121 FIXING FEEDER INTO FIXATION CLIP

3. The feeder enters into a room along a wall from the roof. If the distance from the roof to the room is beyond 1 m, prepare a cable ladder and fasten the feeder on the cable ladder with fixation clips, as shown in Figure 122.

FIGURE 122 FEEDER LAYOUT FROM ROOF TO HERMETIC WINDOW



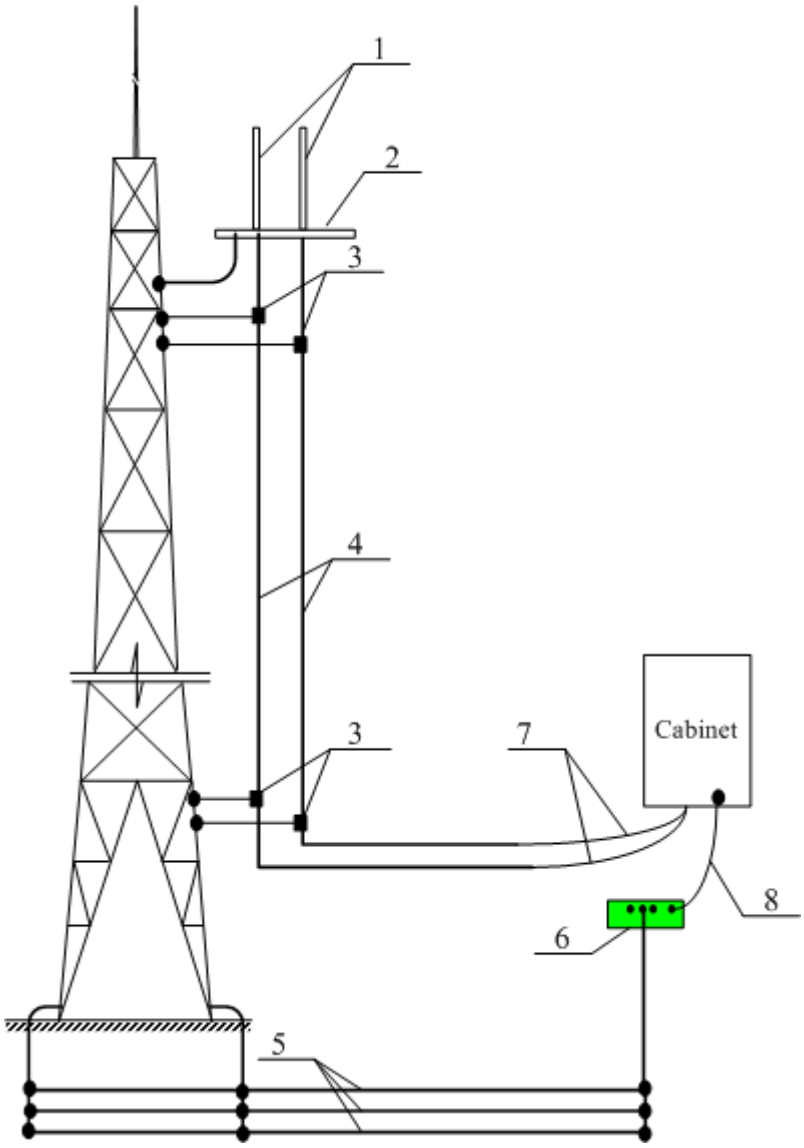
1. Feeder
2. Building top
3. Feeder fixation clip
4. Outdoor cable tray
5. Outdoor grounding bar
6. Connecting outdoor lightning grounding
7. Feeder hermetic window

END OF STEPS.

Feeder Grounding Principle

- In the on-tower installation, two feeder grounding kits should be installed on the main feeder. One grounding kit locates around the tower platform and the other locates at the position of main feeder off the tower, as shown in Figure 123.

FIGURE 123 FEEDER GROUNDING



1. Antenna
2. Tower platform
3. Grounding kit
4. Feeder
5. Ground grid
6. Copper ground bar
7. Cabinet jumper
8. Ground cable

Note:

i. If the height of tower is over 60 m, add a ground point in the middle of tower.

ii. If the feeder length off the tower is over 5 m, add a ground point before connecting to the cabinet jumper.

- The antenna feeder system, antenna bracket and cable tray installed atop buildings should be welded to the lightning net of buildings. Two grounding kits should be installed on the feeder at least, and the positions respectively is: the feeder off the

antenna pole and the feeder off the building-top platform. If the feeder length off the pole is over 5 m, install a grounding kit before connecting the cabinet jumper. If the length of main feeder is over 60 m, add a grounding kit in the middle of main feeder, usually installing one per 20 m.

- The outdoor wiring ladder of main feeder must be grounded.

Note:

If the length of feeder is less than 5 m, the ground processing is unnecessary.

Installing Feeder Grounding Kit

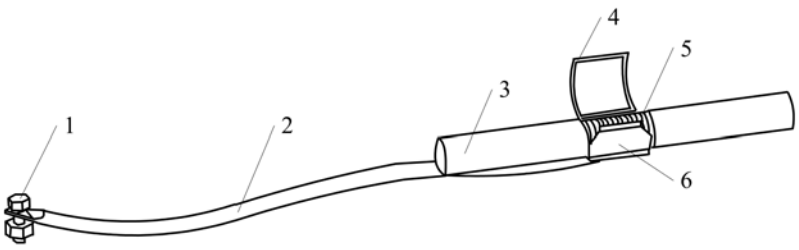
Prerequisite

- Install the feeder.
- Prepare grounding kits in proper type and quantity as well as installation tools, such as paper knife, flathead screwdriver, wrench and sharp-nose pliers.

Steps

1. Select an appropriate installation position for a grounding kit, and cut off the sheath of feeder according to the size of grounding kit, the structure as shown in Figure 124.

FIGURE 124 GROUNDING KIT STRUCTURE

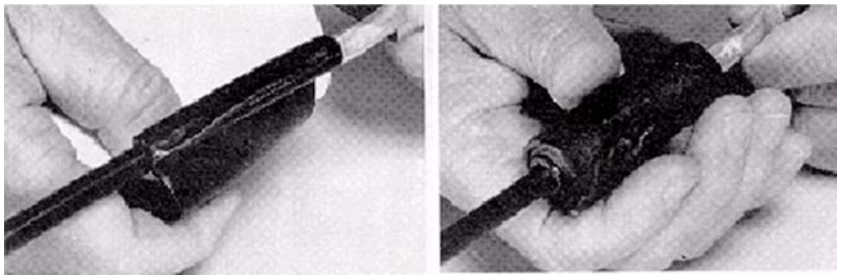


1. Ground terminal
2. Ground cable
3. Feeder
4. Ground cable circlip
5. Feeder outer cooper core
6. Ground cable copper sheet

2. Lead the ground cable of grounding kit towards a ground grid. The angle between ground cable and main feeder should be not more than 15°. The orientation of ground cable should comply with the following specifications:
   i. While installing the antenna feeder system on a tower, make sure the ground cable of grounding kit downwards along the tower.
   ii. While installing the antenna feeder system atop a building, lead the ground cable of grounding kit towards a lightning net.
3. Before installing the grounding kit, in order to enhance sealing effect and avoid water into feeder inner along the ground ca-

ble, first wrap waterproof self-adhesive tape round the ground cable close to a copper sheet, as shown in Figure 125.

FIGURE 125 WATERPROOF ADHESIVE TAPE WRAP



4. Clamp an outer conductor of feeder with a copper sheet of ground cable and a snap spring and make the copper sheet combined with the outer conductor.
5. Perform waterproof and sealed processing for junction between ground kit and feeder. The methods are listed as follows:
   i. First wrap waterproof self-adhesive tape and then wrap PVC adhesive tape.
   ii. For waterproof self-adhesive tape, first wrap from lower to upper layer by layer, then wrap from upper to lower layer by layer, and finally wrap from lower to upper layer by layer. During wrapping, the former layer covers a half of the next layer.
6. The grounding terminal of ground kit can be connected to a body of tower or a cable tray on the top of building. This cable tray connects with the lightning net of building. Clear away oil paint and oxide around the junction and cover a layer of antioxidation cream on this area for good electricity contact. Finally, cover a layer antirust paint again.

END OF STEPS.

Feeder Indoor Ingoing

Feeder Indoor Arrangement Principle

The arrangement principles of feeder into a room comply with the following:

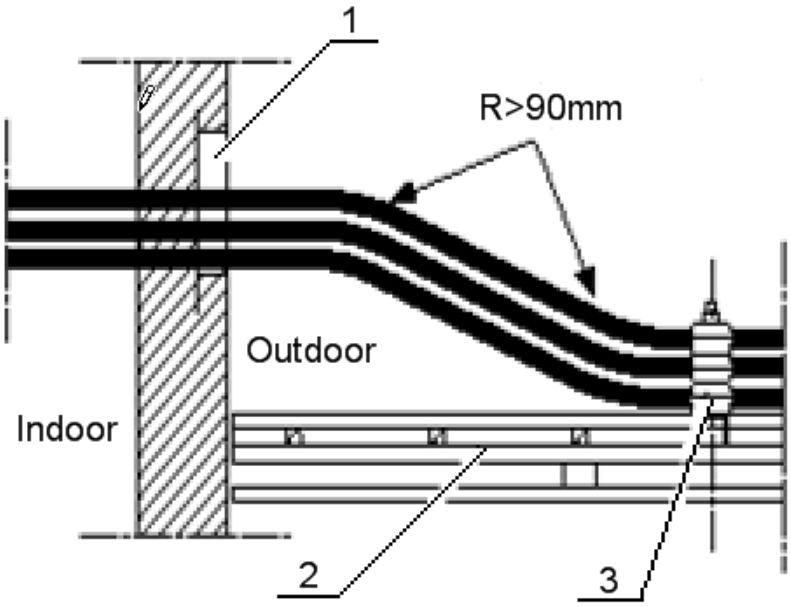
- There are four big holes on a 12–hole feeder hermetic-window. Every big hole has three small holes, every of which a feeder passes through.
- According to the serial No. on the engineering labels attached on the feeder, lay out the feeder through three small holes in the same big hole clockwise or anticlockwise.

- Feeder layout in the hermetic window should be convenient for capacity expansion. Do not modify the initial feeder layout in the hermetic window during capacity expansion, and only allow adding feeder or modify jumper connection of cabinet.
- Feeder layout in the hermetic window should be convenient for layout on a cable tray and connection to a cabinet. The feeder should be parallel and not crossed during routing and connecting.

Leading Main Feeder into Room

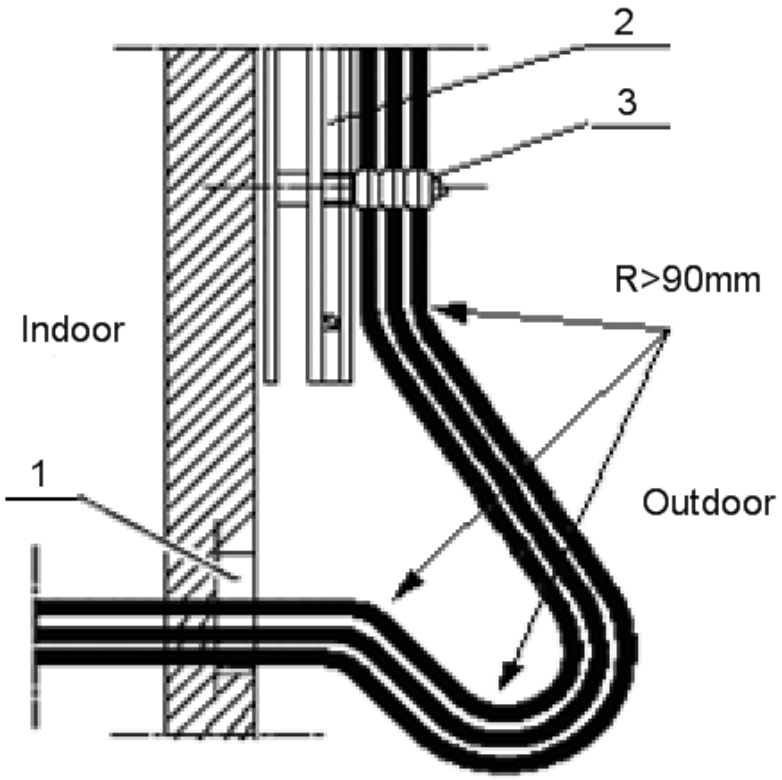
Context Figure 126 and Figure 127 show two common modes of main feeder into a room. While the main feeder is entering into the equipment room, do not bring water into the equipment room.

FIGURE 126 FEEDER INTO ROOM MODE (1)



1. Feeder window
2. Cable tray
3. Feeder kit

FIGURE 127 FEEDER INTO ROOM MODE (2)



1. Feeder window
2. Cable tray
3. Feeder kit

Steps

1. Unscrew a fastness hoop of feeder window to proper extent. Pull out sealing covers of small holes that the feeder passes through.
2. Lead the main feeder into the equipment room. When the main feeder enters into an indoor cable tray from an outdoor cable tray, it is necessary for two installation personnel's cooperation respectively indoors and outdoors. In this way, avoid damaging the main feeder and other indoor devices by improper force during installation. Screw down the fastness hoop until the main feeder is pull to the specified position.
3. Cut the main feeder. Before and after cutting, make sure temporary labels on the main feeder intact.

Note:

According to detailed equipment environment (for example, cabinet installation position, jumper length on the cabinet top, arrester configuration or arrester rack installation position), the bending radius requirement of main feeder and the beautiful requirement of cable layout in the equipment room, select a cutting position of main feeder cable.

4. Make an indoor connector of main feeder.
5. Connect the main feeder with an arrester.

Note:

- For an arrester without ground cable, during installation, connect the arrester to the main feeder directly.
- For an arrester with an arrester rack, during installation, adjust every main feeder carefully. Make sure a screw fastener connected well which connects the main feeder connector with the arrester.

END OF STEPS.

Installing Top-equipment Jumper

Context The requirements of jumper installation are as follows:

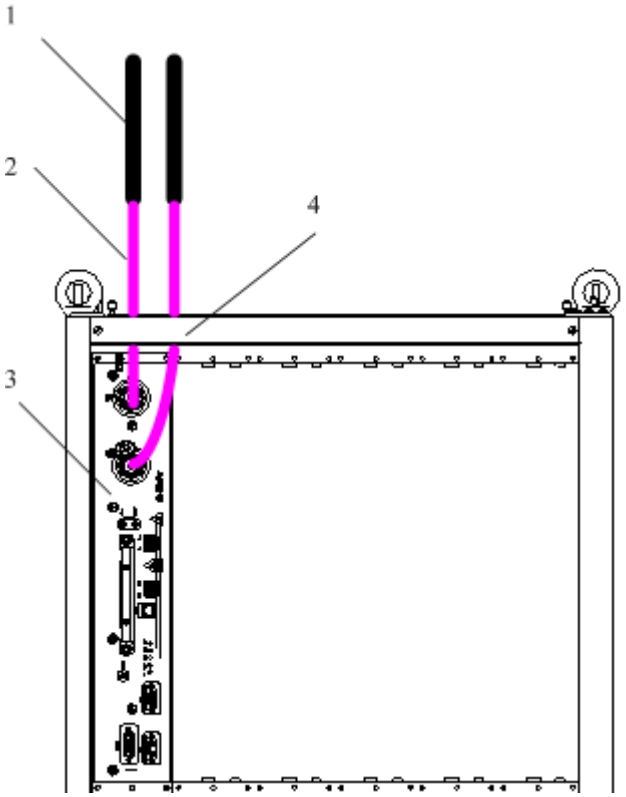
- Jumper layout from cabinet top to cable tray should be parallel and orderly, but not crossed.
- During routing, the jumper must pass through the cable tray inner to its upper side. Prohibit jumping the cable tray outsides directly.
- The bending of jumper is reasonable and natural. Suggest that the bending radius of jumper should be twenty times more than its diameter.
- During layout from cabinet top to cable tray, the tensile strength for the jumper should be moderate.
- The jumper should be bound with every rail of cable tray. The directions of all wire fasteners keep consistent and after binding, the wire fasteners are cut flatly.
- Labels must be affixed to all indoor jumpers at a 100 mm distance from both ends of jumper.

Steps

1. The jumper passes through a wiring slot on the top of cabinet.
2. Connect a DIN connector of feeder to an ANT interface of RSU.
3. Connect the other DIN connector of jumper to a DIN connector of feeder.

Figure 128 shows the installation process.

FIGURE 128 ANTENNA, FEEDER AND JUMPER INSTALLATION



1. Feeder
2. Jumper
3. RSU
4. Wiring slot

4. Affix jumper engineering labels.

END OF STEPS.

Performing Antenna Feeder System Test

Steps

1. After unpacking, check whether a surface of antenna and antenna connectors are undamaged.
2. After connecting antenna and jumper, and screwing down the connector, check the SVWR with a SVWR tester.

If	Then
SVWR≥1.5	Unqualified
SVWR < 1.5	Qualified

Note:

During measuring, move an antenna or change the position of antenna. If the SVWRs in all directions are unqualified, it indicates that the antenna is faulty. If the SVWRs in some directions are unqualified, check the antenna after the whole antenna and feeder system installed completely.

END OF STEPS.

Performing Outdoor-connector Waterproof Processing

Prerequisite While an overall installation of antenna feeder system is completed and gets through a test, perform waterproof processing for a connector between outdoor jumper and tower top amplifier as well as a connector between jumper and feeder immediately.

Context There are two types of adhesive tapes for waterproof processing: waterproof insulation adhesive tape, as shown in Figure 129, and PVC adhesive tape, as shown in Figure 130.

FIGURE 129 WATERPROOF INSULATION ADHESIVE TAPE

FIGURE 130 PVC ADHESIVE TAPE

Steps

1. Clean out dust and stain on the feeder connector or feeder grounding clip.
2. Expand the waterproof insulation adhesive 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 clip .
3. 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 covers a half of the lower adhesive tape, as shown in Figure 131.

FIGURE 131 WATERPROOF INSULATION ADHESIVE TAPE WRAP

Caution:

The extended width of adhesive tape is not over 1/2 than the former width, or else destroy molecular structure of adhesive tape due to extension too much.

4. While wrapping to the connector, repeat it for twice and the sequence respectively is: from upper to lower and from lower to upper.
5. After wrapping the waterproof insulation adhesive tape, press the adhesive tape at the binding with hands make it affixed tightly.
6. Wrap a layer PVC adhesive tape around the waterproof insulation adhesive tape to avoid abrasion and aging.
7. Wrap the PVC adhesive tape in an overlapping mode, similar to the waterproof insulation adhesive tape. The overlapping rate is about 1/2 . Wrap three layers in total, and the sequence respectively is: from lower to upper, from upper to lower and from lower to upper. Make sure proper stretch strength during wrapping.

END OF STEPS.

Result The appearance of connector after processing is as shown in Figure 132.

FIGURE 132 CONNECTOR AFTER PROCESSING

Performing Feeder Hermetic-window Waterproof Processing

Context There are two types of feeder hermetic-window:

- 12 hole feeder hermetic-window
- 27 hole feeder hermetic-window

Normally, adopt the 12 hole feeder hermetic-window, its dimension as shown in Figure 133 and its structure as shown in Figure 134.

FIGURE 133 FEEDER HERMETIC-WINDOW DIMENSION (UNIT: MM)

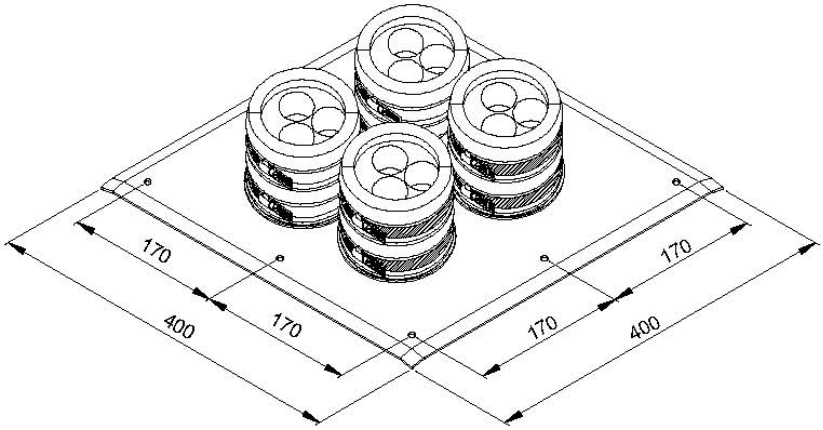
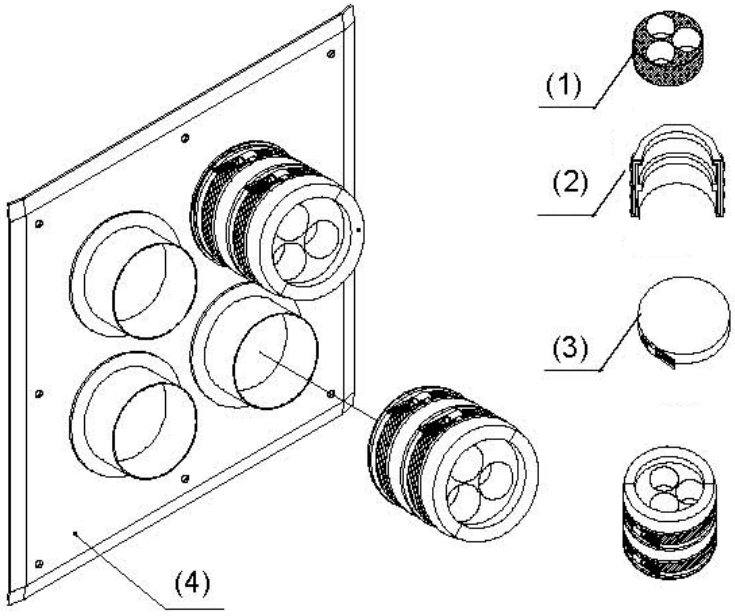


FIGURE 134 12 FEEDER HERMETIC-WINDOW STRUCTURE



Installation requirements:

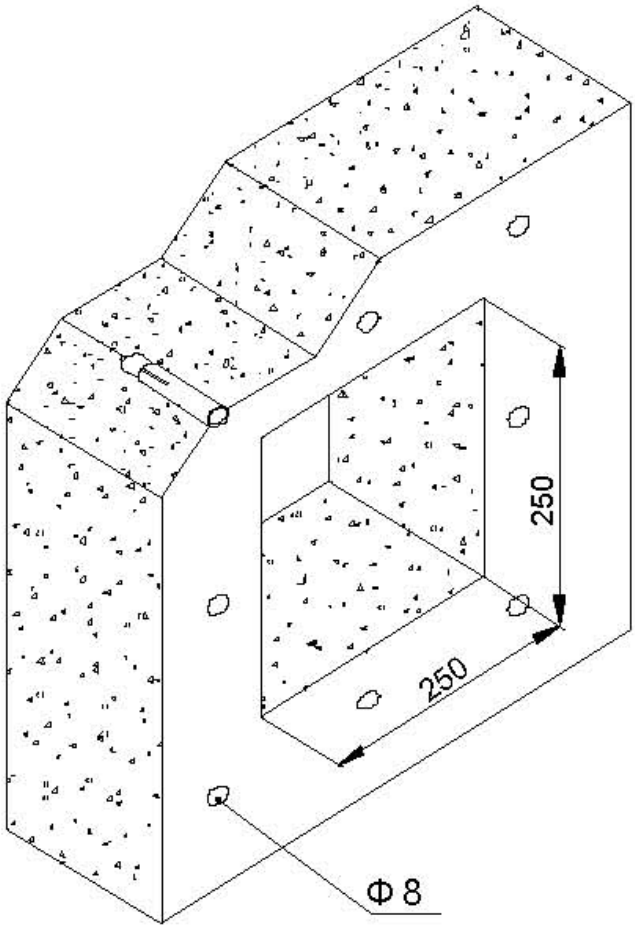
- The installation position of hermetic window should be close to a cable tray.

- The hermetic window can be mounted against an indoor wall or outdoor wall and the side of protuberant metal circles must put towards outdoors.
- If the feeder enters into a room from a roof, the hermetic window can be mounted against the roof and he side of protuberant metal circles must put towards outdoors.

Steps

1. According to the requirements of engineering design drawing and the dimension of hermetic window, make sure the installation position of hermetic window on the wall and at the same time mark hole positions of expansion bolts and a hollow room left for the hermetic window.
2. Cut a 250mm×250mm square big hole and then drill eight holes of expansion blots with a percussive drill, as shown in Figure 135.

FIGURE 135 INSTALLATION HOLE POSITIONS (UNIT: MM)

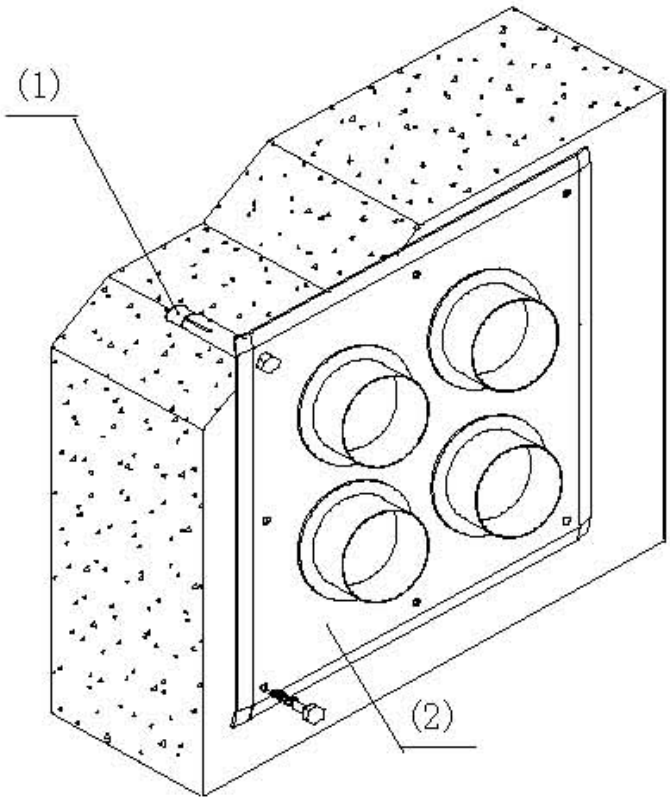


3. Fix a feeder hermetic-window panel with expansion bolts, as shown in Figure 136.

   While installing expansion bolts, a flat washer and a spring washer must be installed in turn.

A sealing washer and a sealing cover may be installed together with feeder entering into the room.

FIGURE 136 FEEDER HERMETIC-WINDOW INSTALLATION



1. M8×80 expansion bolt
2. Feeder hermetic-window panel

END OF STEPS.

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Chapter 9

Installation Check

Table of Contents:

Checking Equipment Installation

Cabinet Inspection Items

Cabinet inspection items include:

- After completing cabinet installation, make sure the cabinet fixed and orderly. A row of cabinets should be in line. The sides of a line of cabinets should keep in the same level, the error less than 5 mm.
- Check whether all fastening pieces are screwed down.
- Check whether all components on the cabinet are intact, and connection are unbroken. Make sure marks orderly, intact and clear.
- Check whether the cabinet surfaces inside and outside are clean. After cabinet installation completed, it is necessary to clean up the cabinet surfaces.
- Check whether the push-and-pull cover plates of cable outlets are in proper position. After completing all cable layout, the cover plate should be pushed forward to the proper position in case of animals intruding.

Cable Check Items

Power Cable and ground cable Inspection

Power cable and ground cable inspection items included:

- Check whether all cables are connected well and their polarities are correct.

- Check whether the PE wire pole of ground cable is proper and firm.

Internal Cable Inspection

Check the internal cables as follows, and make sure:

- The internal cable of rack is hung in the air.
- The RF cable of the front panel, clock cable, power and alarm cable as well as test cable are connected well and properly.
- The cable layout route and binding space are reasonable and correct.
- Layout of the fiber bellows inside the rack is beautiful and reasonable.
- The protective ground cable of rack door is connected well, avoiding lack and looseness phenomena.
- The cable surface is clean without any engineering mark and the sheath insulation layer is undamaged.

Socket, Plug and Locking Piece Inspection Items

The socket, plug and locking piece inspection items include:

- Check whether connection of the socket, plug and locking piece is proper, avoiding misconnection and leaking connection.
- Check whether connection between plug and socket is fastened. The fastness screw on the boards should be screwed down, and the locator card should be put in proper position without any damage.
- Check whether the plug made on site does not damage the core cable.
- Check whether the cable plug and licking piece are fastened. Make sure no bin-lacked or bin bent-phenomenon occurring in the socket and plug.

Label Inspection Items

Label inspection items include:

- Check whether the label adopts a special adhesive paper for ZTE.
- Check whether the directions of affixed labels are consistent. To be convenient for reading, a side of label that indicates cable orientation should be placed upwards or towards a maintenance and operation side.
- Check whether label content of rack row and rack line accords with the requirements of engineering design. All ZTE devices in the equipment room should be distributed in order.

- Check whether circuit breakers of power cable are affixed in a power cabinet and power distribution cabinet in order .
- Check whether circuit breakers of power cable in a power cabinet and power distribution cabinet indicate connection orientation with a label.
- Check whether labels are affixed to both ends of all cables (ground cable, transmission cable and jumper, except protective ground cables of cabinet door and side door). Make sure handwriting clear on the labels and label positions consistent.
- If a label is required to cling to a board, make sure handwriting clear and affixed label positions orderly.

On-site Environment Inspection Items

On-site environment inspection items include:

- Check whether redundant sundries left inside the cabinet, as well as the front, back and side door are clean. After cabinet installation completion, clean up the cabinet surfaces inside and outside.
- Check whether redundant goods in the equipment room is cleared out as well as the operation platform and floor are clean and in order. Make sure goods in the equipment room orderly.
- Check whether the cable tray, cabinet bottom and floor round the cabinet are clean up. Make sure all cables in order.

Checking Antenna Feeder System Installation

Checking Feeder

Prerequisite Install the GPS antenna feeder system.

Steps

1. Make sure the hung height of antenna consistent with network planning.
2. Make sure the installation position of antenna in accordance with the design drawing.
3. Make sure that connection between antenna rack and iron tower is fastened.
4. Make sure the antenna position within a protective area of arrester.
5. Make sure clamping nuts screwed down and spring washes pressed levelly.

6. Make sure the VSWR of antenna feeder not less than 1.3.
7. Make sure all outdoor jumper connectors with waterproof and sealed handling.
8. Make sure feeders bound equally and the maximum distance is not beyond 0.5 m.

END OF STEPS.

VSWR Test

Prerequisite

- Install the system of main antenna feeder completely.
- Prepare SiteMaster instrument for VSWR test.

Steps

1. Use SiteMaste to perform a VSWR test of antenna feeder. The VSWR must be lower than 1.5.
2. If the VSWR test is failed, check the antenna feeder system, as follows:
   - Whether feeder connector installation is faulty.
   - Whether antenna is faulty.
   - Whether feeder surface is damaged and the bending of feeder is smaller than the minimal bending radius permitted.
   - Whether arrestor installation is faulty.
3. Repeat the above steps to finish VSWR tests of all antenna feeder cables.

Note:

The method how to use SiteMaster for a VSWR test refers to *Appendix B SiteMaster Usage*.

END OF STEPS.

Checking Water-proof Processing

Steps

1. Check whether a proper waterproof handling is carried out for all feeder connectors.
2. Make sure feeders leading into the room through the feeder hermetic window.

END OF STEPS.

Checking Power on

Prerequisite

- Install power cables and ground cables of cabinet and power supply.
- Install power cable and ground cable inside the cabinet.
- Install subracks and modules inside the cabinet.
- Check whether all required tools are prepared.

Context

The cabinet adopts DC power supply. The nominal value of input power is -48 V (-57 V~-40 V), referring to *Cabinet Power Supply Requirements*.

Steps

1. Wear antistatic wrist straps properly and make sure it grounding.
2. Set up all power switches of distribution subrack in OFF status.
3. Adjust a multimeter to a resistance grade. Measure the power input terminal of distribution subrack with the multimeter and make sure -48V power not short circuit.
4. Adjust the multimeter to a voltage end. Measure the -48V output terminal of DC power with the multimeter and make sure that output voltage is -48V.
5. One end of power cable connects to the -48V output terminal of DC power, and the other end connects to the -48V output terminal of cabinet. The front panel indicators of distribution subrack in ON status (PWR IN) indicates that the cabinet is provided with power supply but do not power on.
6. Set up the PWR switch of power subrack in ON status. The indicators in ON status shows that power subrack powers on.
7. Considering a subrack as a unit, set up its relevant switch on the cabinet power subrack in ON status. Table 8 describes the status of all power indicators on the distribution subrack corresponding to various subracks.

TABLE 8 DISTRIBUTION SUBRACK PANEL INDICATOR DESCRIPTION

Silk Screen	Name	Description
PWR	Overall cabinet power and embedded transmission subrack power	ON indicates power on , and OFF indicates power off.
BBU1	Digital subrack power	ON indicates power on , and OFF indicates power off.
BBU2	Digital subrack power	ON indicates power on , and OFF indicates power off.
FAN	Fan subrack power	ON indicates power on , and OFF indicates power off.
RU1	RFU 1 power	ON indicates power on , and OFF indicates power off.

Silk Screen	Name	Description
RU2	RFU 2 power	ON indicates power on , and OFF indicates power off.
RU3	RFU 3 power	ON indicates power on , and OFF indicates power off.
RU4	RFU 4 power	ON indicates power on , and OFF indicates power off.
RU5	RFU 5 power	ON indicates power on , and OFF indicates power off.
RU6	RFU 6 power	ON indicates power on , and OFF indicates power off.

8. Normally, after subrack powers on, the RUN indicator on the panel shows in ON or Flashing state. If this module has no reaction (all indicators are off), subrack power cables, the module or module slot may be faulty. If make sure power cables normal, replace the module with a normal module. However, if the indicators on the normal module are still off, please contact with ZTE engineers for troubleshooting. For the indicator description, refer to *BS8800 C200 Hardware Manual*.
9. Repeat Step 7 and Step 8 to finish power-on inspection for all subracks and module.

END OF STEPS.

Figures

Tables

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List of Glossary

AISG - Antenna Interface Standards Group
BBU - BaseBand Unit
BSC - Base Station Controller
CC - Control and Clock Module
CH - Channel Processing Module
FA - Fan Array Module
FS - Fabric Switch Module
GPS - Global Positioning System
LMT - Local Maintenance Terminal
PCB - Printed Circuit Board
PM - Power Module
RSU - RF System Unit
SA - Site Alarm Module