



ZXMBW RA25

Agile 2.5G Remote Radio Frequency Unit

Installation Manual

Version 2.00

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Contents

About this Manual	i
Purpose	i
Intended Audience	i
Prerequisite Skill and Knowledge.....	i
What is in This Manual.....	i
Related Documentation.....	ii
Conventions	iii
How to Get in Touch.....	iv
Chapter 1.....	1
Overview	1
Installation Flow	2
Installation Components	2
Hardware Installation Flow	4
Installation Precautions	5
Chapter 2.....	7
Installation Preparations	7
Installation Environment Check	8
Installation Location Check.....	8
Temperature/Humidity Check	8
Power Supply Check	9
Grounding Check	9
Other Checks	9
Tools and Instruments Preparation.....	10
Technical Documents Preparation	12
Unpacking Inspection	13
Wooden Case Unpacking Procedure.....	13
Carton Unpacking Procedure	14
Goods Acceptance and Handover	14
Chapter 3.....	15

Chassis Installation	15
Pole Mounting	16
Support Component Installation	16
Sunshade Component Installation	18
Chassis Body Installation.....	18
Wall Mounting	21
Support Component Installation	21
Sunshade Component Installation	24
Chassis Body Installation.....	24
Chassis Mounting Check	26
Chapter 4.....	27
Power and Grounding Cables Installation	27
Power Cable Installation	28
Power Cable Types	28
Power Cables Installation Procedure	30
Grounding Cable Installation	31
Installation Requirements	33
Chapter 5.....	35
External Power Cables Installation.....	35
Chassis External Interfaces	36
Optical Fiber Installation	37
External Monitoring Cable Installation.....	39
Cable/Fiber Installation Requirements	40
Cable Installation Requirements.....	40
Fiber Installation Requirements.....	40
Chapter 6.....	41
Main Antenna Feeder System Installation	41
Installation Preparation	42
Installation Personnel Preparation	42
Installation Environment Check	42
Safety Measure Check.....	43
Installation Tools Preparation.....	43
Antenna Feeder System Structure.....	45
Installation Flow	46
Antenna Installation	47

Technical Parameters	47
Antenna Installation Flow.....	48
Installation Location	48
Antenna Handling and Hoisting	49
Directional Antenna Installation	50
Omni Antenna Installation.....	52
Jumper and Antenna Connection and Sealing	53
Feeder Installation	54
Feeder Route Determination	54
Main Feeder Connector Making	55
Feeders Cutting	58
Main Feeder Hoisting	59
Main Feeder Laying and Fixing.....	60
Feeder Grounding Clip Installation	61
Chassis Jumper Installation	64
SWR Test.....	65
Water Proof Treatment	66
Chapter 7.....	69
Hardware Installation Check	69
Chassis Installation Check.....	70
Cable Installation Check	71
Power and Grounding Cables.....	71
Optical Fibers	72
1/2 "Jumper.....	72
Main Feeder	72
Antenna Feeder Installation Check	74
Environment Check	75
BTS Information	75
Chapter 8.....	77
Power- On / Off.....	77
Power – on/off Procedures	78
Power - on Check.....	78
Power - on	78
Power - off	78
Appendix A	79

Technical Indices.....	79
Physical Indices	79
Power Supply Indices	80
Power Consumption Indices	80
Abbreviations	81
Index	83
Figures.....	85
Tables	87

About this Manual

Purpose

This Manual provides procedures and guidelines that support the installation of the ZXMBW RA25 Agile 2.5G Remote Radio Frequency Unit.

Intended Audience

This document is intended for engineers and technicians who perform installation activities on the ZXMBW RA25 Agile 2.5G Remote Radio Frequency Unit.

Prerequisite Skill and Knowledge

To use this document effectively, users must have a general understanding of wireless telecommunications technology. Familiarity with the following is helpful:

- the ZXMBW system and its various components
- user interfaces on the AGW
- local operating procedures

What is in This Manual

This Manual contains the following chapters:

TABLE 1 CHAPTER SUMMARY

Chapter	Summary
Chapter 1 Overview	Describes the RA25 Agile 2.5 Remote Radio Frequency Unit's Installation flow and precautions
Chapter 2 Installation Preparations	Describes the Installation environment check, Tools and Instruments preparation, Technical documents preparation, and

Chapter	Summary
	Unpacking check.
Chapter 3 Chassis Installation	Describes the Pole mounting installation method, Wall mounting installation method and Chassis mounting check.
Chapter 4 Power and Grounding Cables Installation	Describes the Power cable installation, Grounding cable installation and Installation requirements.
Chapter 5 External Power Cables Installation	Describes the Chassis external interfaces, Optical fiber installation, External monitoring cable installation and Cable/fiber installation requirements.
Chapter 6 Main Antenna Feeder System Installation	Describes the Installation preparation, Antenna feeder system structure, Installation flow, Antenna installation, Feeder installation and Water proof treatment.
Chapter 7 Hardware Installation Check	Describes the Chassis installation check, cable installation check, Antenna feeder installation check, Environment check and BTS Information check.
Chapter 8 Power-On/Off	Describes the Power- on/off procedures
Appendix A Technical Indices	Describes the RA25 Physical indices and Power supply indices.

Related Documentation

The following documentation is related to this manual:

- ZXMBW RA25 Agile 2.5G Remote Radio Frequency Unit Guide to Documentation
- ZXMBW RA25 Agile 2.5G Remote Radio Frequency Unit Technical Manual
- ZXMBW RA25 Agile 2.5G Remote Radio Frequency Unit Hardware Manual
- ZXMBW RA25 Agile 2.5G Remote Radio Frequency Unit Maintenance Manual

Conventions

ZTE documents employ the following typographical conventions.

Typographical Conventions

TABLE 2 TYPOGRAPHICAL CONVENTIONS

Typeface	Meaning
<i>Italics</i>	References to other Manuals and documents.
'Quotes "	Links on screens.
Bold	Menus, menu options, function names, input fields, radio button names, check boxes, drop-down lists, dialog box names, window names.
CAPS	Keys on the keyboard and buttons on screens and company name.
Constant width	Text that you type, program code, files and directory names, and function names.
[]	Optional parameters.
{ }	Mandatory parameters.
	Select one of the parameters that are delimited by it.
	Note: Provides additional information about a certain topic.
	Checkpoint: Indicates that a particular step needs to be checked before proceeding further.
	Tip: Indicates a suggestion or hint to make things easier or more productive for the reader.

Mouse Operation Conventions

TABLE 3 MOUSE OPERATION CONVENTIONS

Typeface	Meaning
Click	Refers to clicking the primary mouse button (usually the left mouse button) once.
Double-click	Refers to quickly clicking the primary mouse button (usually the left mouse button) twice.
Right-click	Refers to clicking the secondary mouse button (usually the right mouse button) once.
Drag	Refers to pressing and holding a mouse button and moving the mouse.

How to Get in Touch

The following sections provide information on how to obtain support for the documentation and the software.

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If you have problems, questions, comments, or suggestions regarding your product, contact us by e-mail at support@zte.com.cn. You can also call our customer support center at (86) 755 26771900 and (86) 800-9830-9830.

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Chapter 1

Overview

This chapter explains:

- Installation flow
- Installation precautions

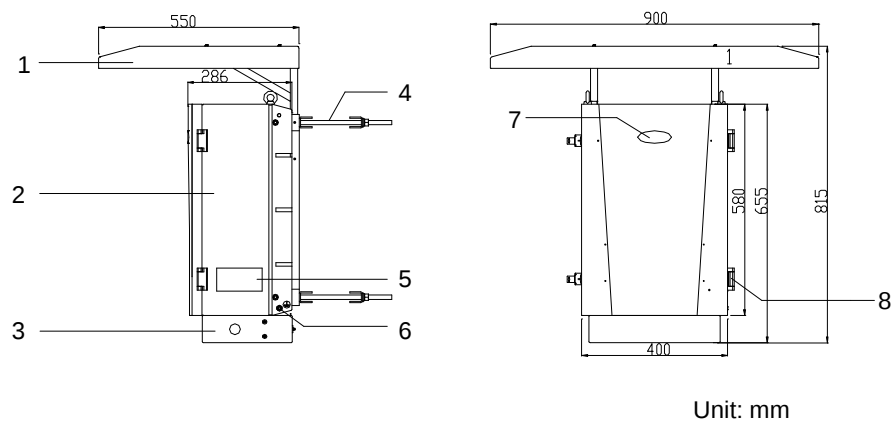
Installation Flow

This section describes the RA25 components to be installed on site and the RA25 installation flow.

Installation Components

Figure 1 shows RA25 chassis overall installation schematic diagram and dimensions.

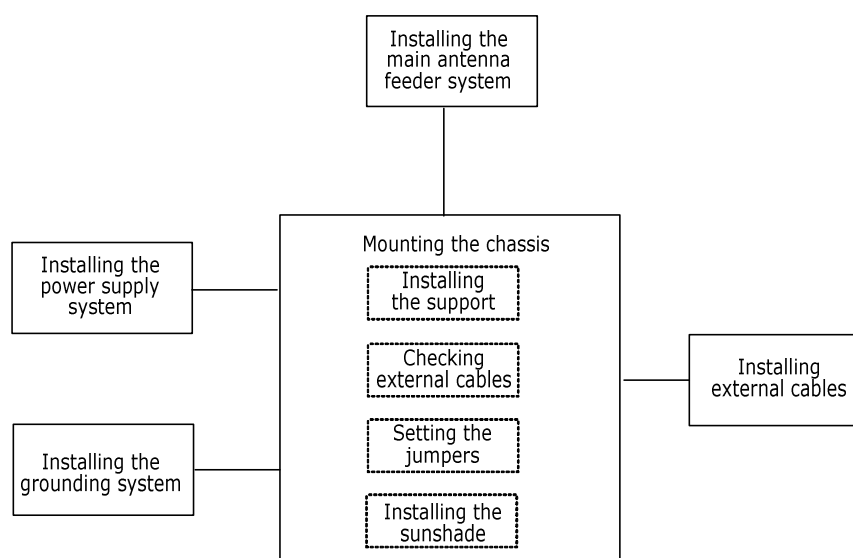
FIGURE 1 RA25 CHASSIS OVERALL INSTALLATION SCHEMATIC DIAGRAM



- 1 Sunshade 2 Chassis body 3 Base 4 Support 5 Name plate label
6 Chassis protection grounding terminal
7 RA25 label 8 Hinge

Figure 2 shows the operations to be performed on site.

FIGURE 2 RA25 ON-SITE INSTALLATION OPERATION SCHEMATIC DIAGRAM



You need to install the following components of the RA25:

1. RA25 chassis, including:

- Support
- Chassis body
- Internal cables
- Module
- Sunshade



Note: The cables and functional modules inside the chassis have already been installed before delivery. You only need to check whether their installations meet the requirements.

2. Power supply system

3. Grounding system

4. Main antenna feeder system, including:

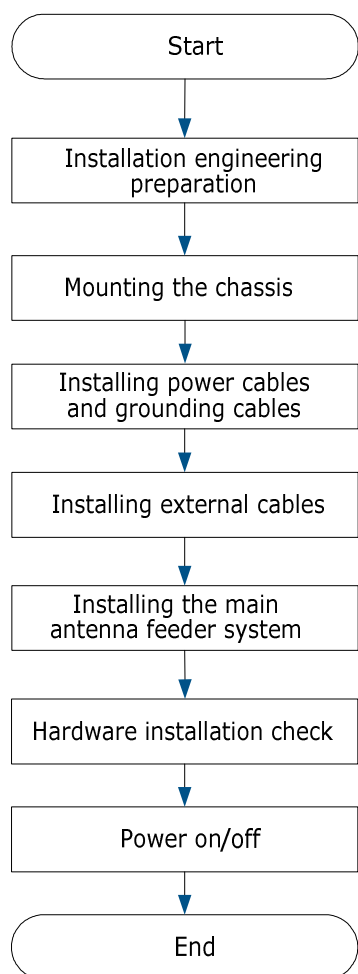
- Antenna
- Jumper
- Main feeder

5. External cable

Hardware Installation Flow

Figure 3 shows the general installation flow of the RA25. However, you do not necessarily have to follow strictly this flow on site. Some steps can be performed at the same time, and an earlier or later step may be performed later or earlier, depending on whichever is more convenient on site.

FIGURE 3 RA25 INSTALLATION FLOW



Installation Precautions

The installation personnel of the RA25 must check the running environment of the equipment and learn about the communication networking and data configuration of the operator, the status of the equipment in the network, the interfaces of the line transmission equipment, and the lengths of various cables prior to installation, for successful commissioning of the project. The hardware installation personnel must read carefully the installation manual before the installation.

In addition, pay attention to the following:

- Do not operate with the chassis or any module when it is energized during the installation.
- Do not install the antenna feeder system in the case of lightning.
- Verify the various lightning arresters (including the power supply lightning arrester, RF lightning arrester, and main antenna feeder arrester) are in good contact and good condition. Replace any damaged ones.
- Lock the door in time after the chassis has been installed. If any maintenance needs the door being opened, all operations must be performed under the guidance of professionals.

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Chapter 2

Installation Preparations

This chapter explains:

- Installation environment check
- Tools and instruments preparation
- Technical documents preparation
- Unpacking inspection

Installation Environment Check

Prior to your installation of this equipment, check the installation environment in accordance with the requirements provided in the *ZTE Environment Acceptance Report*. The contents in this section are for reference only.

Installation Location Check

The installation location of the RA25 must meet the following requirements of engineering design:

- Stay away from the environment with heavy dust, poisonous gases, and inflammables and explosives;
- Stay away from the places with great shock or strong noise.
- Stay away from transformer substations;
- Stay away from pollution sources;
- Stay away from industrial boilers and heating boilers;
- Stay away from large-power radio interference sources.

Temperature/Humidity Check

Table 4 lists the temperature/humidity requirements for the operation of the RA25.

TABLE 4 TEMPERATURE AND HUMIDITY REQUIREMENTS

Name	Working Conditions
Temperature	Operating temperature: - 40 °C ~ + 50 °C Storage temperature: -45 °C ~ +75 °C
Humidity	Working humidity: 5% RH ~ 98% RH Storage humidity: 5% RH ~ 98% RH

Power Supply Check

Table 5 lists the power supply requirements for the RA25 chassis.

TABLE 5 POWER SUPPLY REQUIREMENTS

Type	Nominal Value	Operating Range
AC	110 V AC	85 V AC~138 V AC
	220 V AC	150 V AC~300 V AC
DC	-48 V DC	-40 V~-57 V

Grounding Check

The RA25 must use the joint grounding mode, with the grounding resistance less than 5 ohm.

Other Checks

- The support equipment or parts (for example, outdoor cabling rack, antenna pole, iron tower, and grounding copper busbar) must comply with the engineering design requirements of the RA25;
- The equipment to be interconnected with the BBUA and power equipment is ready.

Tools and Instruments Preparation

Make available the installation tools and test instruments, as listed in Table 6, and select the appropriate ones to use according to the project and on-site requirements.

TABLE 6 TOOLS LIST

Category	Name
Special-purpose tools	Feeder knife Coaxial cable stripper Coaxial crimping pliers Multi-functional crimping pliers
Drilling tools	Electrical percussion drill Several appropriate drill bits Dust cleaner Power connector board (with 2-phase, 3-phase sockets)
General-purpose tools	Cross screwdriver (4?, 6?, 8?) Straight screwdriver (4?, 6?, 8?) Adjustable wrench (6", 8", 10", 12") Combination benches (17", 19") Socket wrench (one set) Claw hammer, 5 kg Electric iron, 300 W Electric iron, 40 W Solder wires Hot air blower Tin sucker Tweezers Paint brush Electric knife Paper cutter Scissors
Measurement tools	Ribbon tape, 50 m Steel tape, 5 m Horizontal ruler, 400m Angle instrument Plumb
Protection tools	Antistatic wrist strap Safety helmet, slip-proof glove, etc.
Small tools	Hacksaw (with several spare saw blades)

Category	Name
	Sharp-nose pliers (8?) Diagonal pliers (8?) Carp-nose pliers (8?) Vice (8?) Needle file (medium-sized) Hydraulic crimper Pry
Auxiliary tools	Pulley block Rope Ladder Forklift Crane

TABLE 7 INSTRUMENTS LIST

Instrument Name	Manufacturer
VSWR tester	SITE MASTER
Optical fiber tester	-
Compass	-
Multimeter	-
Earth resistance tester	-



Note: No instruments can be used unless they are first found to be up to the standard in tests.

Technical Documents Preparation

Read and prepare the following manuals before installation.

- ZXMBW RA25 Agile 2.5G Remote Radio Frequency Unit Technical Manual
- ZXMBW RA25 Agile 2.5G Remote Radio Frequency Unit Hardware Manual
- ZXMBW RA25 Agile 2.5G Remote Radio Frequency Unit Maintenance Manual
- ZXMBW RA25 Agile 2.5G Remote Radio Frequency Unit Guide to Documentation

Unpacking Inspection

The ZTE Engineers must perform the unpacking inspection along with operator's side engineers.

1. Check whether the total pieces are correct, packages are in good condition, and the destination location matches the installation location. If the results are all normal, start unpacking inspection.
2. The equipment inspection list and unpacking inspection report are contained in package #1. First open the #1 package and take out the *Unpacking Inspection Report*. Check the total number of the goods against the inspection list and record it for filing.
3. If any item is missing, lack, incorrect, excessive or damaged, the reason must be found out, and the engineering supervisor should fill in the *Unpacking Inspection Feedback Table*, which must be fed back to ZTE in time for handling.



Note: When the equipment is moved a hotter and damper place, wait for 30 minutes before unpacking the equipment. Otherwise, moisture may condense on the surface of the equipment and damage the equipment as a result.

Wooden Case Unpacking Procedure

1. Insert the screwdriver or claw hammer into the tab hole on the cover plate of the wooden case, and turn the tab straight;
2. Lift and remove the cover plate after all tabs have been turned straight;
3. Turn straight the tabs of the plates on four sides of the wooden boxes, and remove the plates.

Carton Unpacking Procedure

1. Cut the straps by using the diagonal pliers;
2. Cut the adhesive tape along the slits on the cover by using a paper cutter. Note that the cut shall not be too deep to avoid damaging the goods inside;
3. Open the carton and take out the foam pads;
4. Check the contents in the carton against the attached delivery list.



Note: Do not damage the antistatic bags during the unpacking inspection process, as they may be useful in future storage of spare parts and return of failed parts.

Properly dispose of the desiccants to keep them away from children.

Goods Acceptance and Handover

1. Acceptance check

Check the goods carefully one by one for acceptance according to the names, models, and quantities shown on the packaging list:

- There must not be dents, bulges, scratches, peels, blithers, blisters or stains on the outer surface of the chassis.
- The surface paint on the cabinet must not peel off or be scratched.
- The fastening bolts must be tight, not fall off or be displaced;
- The accessories and fittings needed for installation shall be complete.
- Arrange the inspected goods in good order by category.

2. Handover

After inspection, the user representative and the engineering supervisor must sign on the *Unpacking Inspection Report*. In accordance with the contract, if the goods are to be kept by the equipment operator after inspection, the goods should be handed over to the equipment operator after both parties sign on the *Unpacking Inspection Report*.

Chapter 3

Chassis Installation

This chapter explains:

- Pole mounting
- Wall mounting
- Chassis mounting check

Depending on the installation environment, the RA25 chassis can be installed in two ways: pole mounting and wall mounting.

Pole Mounting

Figure 4 shows the installation flow for pole mounting of the chassis.

FIGURE 4 INSTALLATION FLOW - POLE MOUNTING

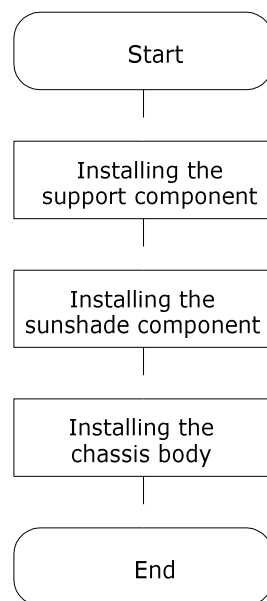
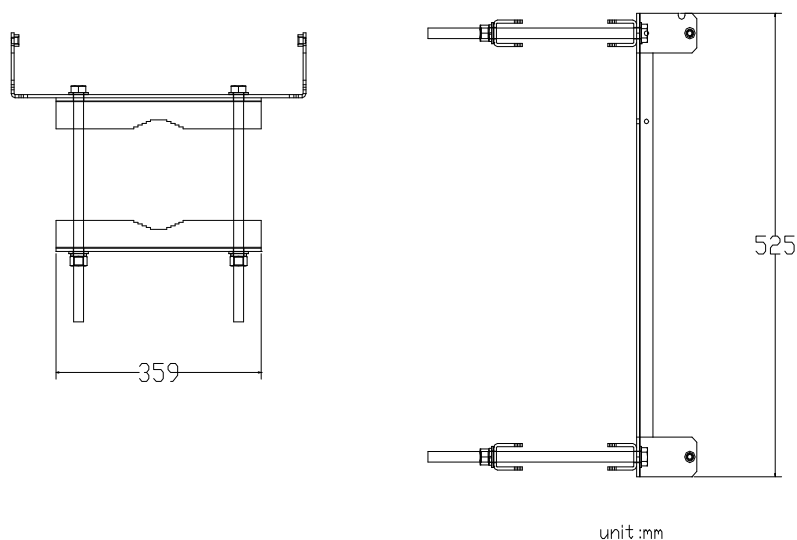


FIGURE 5 SUPPORT COMPONENT SCHEMATIC DIAGRAM

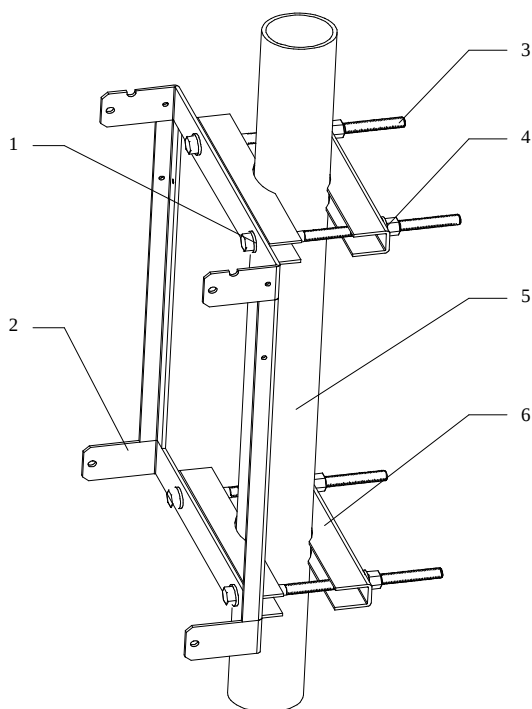


Top view

Side view

2. Fasten the support component onto the pole by using the fastening plate and bolts, as shown in Figure 6. The façade of the equipment must face south and the back of the equipment with the radiator face north. (This applies to the Northern Hemisphere and the contrary to the Southern Hemisphere).

FIGURE 6 SUPPORT COMPONENT FASTENING ONTO THE POLE



1. Plain washer
2. Support
3. Bolt
4. M12 nut, spring washer, plain washer
5. Pole
6. Fastening plate

END OF STEPS



Note: The diameter of the post is usually 60 mm ~ 90 mm, with 75 mm recommended.

Sunshade Component Installation

As shown in Figure 7, fasten the sunshade onto the support with four M4 bolts.

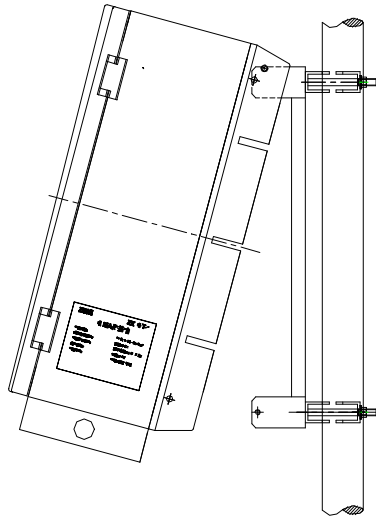
FIGURE 7 SUNSHADE INSTALLED -POLE MOUNTING



Chassis Body Installation

For installing the chassis body, perform the following steps:

1. Lift the chassis body and hang the upper part of the chassis onto the support component, as shown in Figure 8;

FIGURE 8 HANGING THE CHASSIS ONTO THE SUPPORT-POLE MOUNTING

2. The lower part of the chassis drops naturally. Gently press the chassis into position, as shown in Figure 9;

FIGURE 9 PUSHING CHASSIS INTO POSITION-POLE MOUNTING

3. Align the support with the screw holes on the chassis, and then tighten the four M8 internal hexagonal bolts, as shown in Figure 10.

FIGURE 10 FASTENING THE CHASSIS BODY -POLE MOUNTING

Figure 11 shows a mounted chassis.

FIGURE 11 MOUNTED CHASSIS-POLE MOUNTING

END OF STEPS

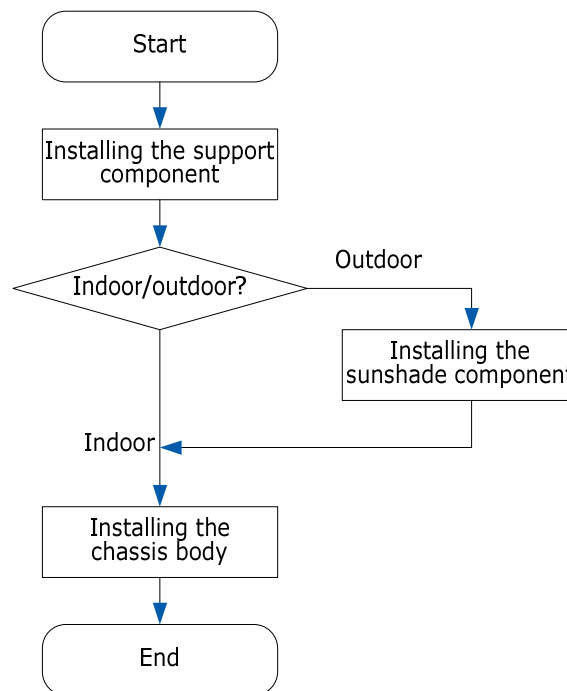


Note: The colors of the chassis and sunshade on the pictures in this manual may be different from the actual colors. Those in the diagrams are for reference only.

Wall Mounting

Figure 12 shows the flow for wall mounting of the chassis.

FIGURE 12 INSTALLATION FLOW -WALL MOUNTING



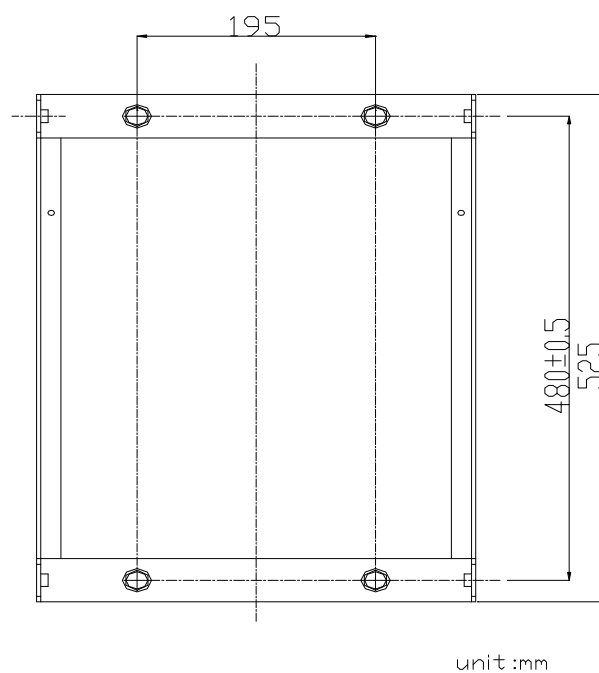
Support Component Installation

For wall mounting, you need to fasten the support component onto the wall.

1. Drilling

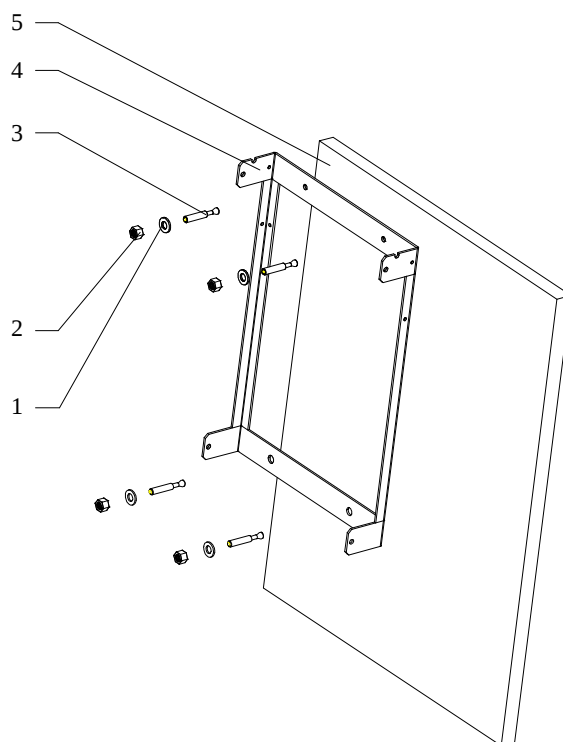
Drill holes on the target wall according to the hole sizes shown in Figure 13.

FIGURE 13 SUPPORT HOLES LAYOUT



2. Fasten the support component onto the wall using four M10 expansion bolts, as shown in Figure 14.

FIGURE 14 SUPPORT COMPONENT INSTALLATION SCHEMATIC DIAGRAM - WALL MOUNTING



1.Washer 2. Nut 3. Expansion bolt 4. Support 5. Wall

Figure 15 shows the installed support component.

FIGURE 15 INSTALLED SUPPORT COMPONENT SCHEMATIC DIAGRAM -WALL MOUNTING



END OF STEPS

Sunshade Component Installation

You may choose not to install the sunshade component if the chassis is mounted indoors. However, you must install the sunshade component if the chassis is mounted outdoors.

The sunshade component can be installed in the same way as the pole mounting mode. For details, see the Sunshade Component.

Chassis Body Installation

For installing the chassis body ,perform the following steps:

1. Hang the upper part of the chassis onto the support component, as shown in Figure 16;

FIGURE 16 HANGING THE CHASSIS ONTO THE SUPPORT-WALL MOUNTING



2. Push the chassis body into position, align the support with the screw holes on the chassis, and then tighten the four M8 internal hexagonal bolts, as shown in Figure 17.

FIGURE 17 FASTENING THE CHASSIS BODY-WALL MOUNTING

Figure 18 shows a mounted chassis, with no sunshade installed.

FIGURE 18 MOUNTED CHASSIS-WALL MOUNTING

END OF STEPS

Chassis Mounting Check

After the chassis has been installed, must check the installation quality, including:

- The arrangement, mounting location and direction of the chassis must meet the requirements on the engineering design drawing.
- The vertical deviation of the chassis must be less than 3 mm.
- The parts on the chassis must not come off or be damaged. The paint coating must not peel off or be damaged. Otherwise, the lost paint must be supplemented;
- All fastening screws must be tightened.

Chapter 4

Power and Grounding Cables Installation

This chapter explains:

- Power cable installation
- Grounding cable installation
- Installation requirements

Power Cable Installation

The RA25 uses two types of power supplies.

- 220 V/110 V AC power supply
- -48 VDC power supply

Power Cable Types

This topic describes the following four types of power cables.

1. 220 V AC power cable of the RA25 chassis

The RA25 equipment is provided with one AC power cable whose length is determined in the project survey. If cables of special lengths are required or it is not easy to determine the lengths needed on site, a coil of power cable and waterproof connectors can be provided on site for assembly on site.

The AC power cable is a 3-core power cable, with a waterproof connector.

Figure 19 shows the structure of the cable.

FIGURE 19 AC POWER CABLE STRUCTURE



End A of the cable consists of three cores of different colors: brown, blue, and yellow/green.

Table 8 shows the pinouts of the cable.

TABLE 8 220V AC POWER CABLE PINOUTS

Connector Name		Core Color	Description
End A	End A1	Blue	AC lightning Arrester-N
	End A2	Brown	AC lightning Arrester-L
	End A3	Yellow/green	AC lightning Arrester-PE (protective earth)

Note: As shown in Figure 19, the section within 60 mm on the right of the waterproof connector must be wrapped with conducted fabric in full shielding.

2. 110 V AC power cable of the RA25 chassis

The 110 V AC power cable have the same structure and pinouts as the 220 V cable.

3. -48 V DC power cable of the RA25 chassis

Usually, the RA25 equipment is provided with a 10 m Dc power cable. A ready cable can be provided by ZTE according to the on-site survey data. Alternatively, it can also be made on site as needed.

Figure 20 shows the structure of the DC power cable.

FIGURE 20 DC POWER CABLE STRUCTURE



Note: On End A are three fully insulated chip terminals. End B is crimped with the appropriate type of wiring terminal, according to the port type of the air switch of the user power distribution cabinet.

Table 9 shows the pinouts of the cable. For easy identification, end A is referred to as A1, A2, and A3 respectively, corresponding to cores of different colors.

TABLE 9 -48V DC POWER CABLE PINOUTS

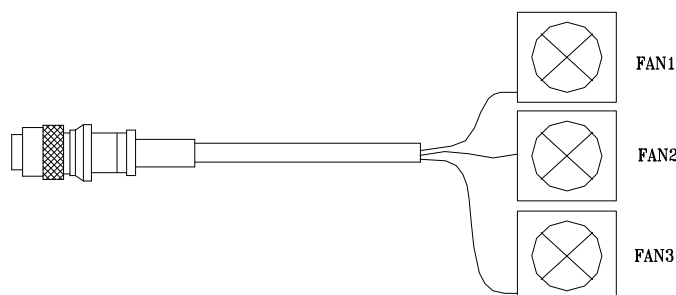
Connector Name		Core Color	Description
End A	End A1	Blue	-48 V
	End A2	Brown	-48 VGND
	End A3	Yellow/green	PE (protective earth)

Note: When the chassis of the equipment is mounted indoors, the power cable must be protected with PVC tubes.

4. Fan power cable in the RA25 chassis

Three fans are installed on the base of the RA25 chassis, and they are powered through the -24 V DC power supply provided by the chassis. Figure 21 shows the structure of the fan power cable.

FIGURE 21 FAN POWER CABLE STRUCTURE



Power Cables Installation Procedure

- External power cable of the chassis

Feed end A with a waterproof connector of the AC power supply through the jack identified with POWER on the transfer board at the bottom of the chassis, connect it to the power lightning arrester in the chassis, and then tighten the waterproof connector on the cable. Connect end B to the AC/DC power distribution cabinet of the user. In this manual, the typical installation and connection of the 220 VAC power cable is given. Other power cables can be installed in similar ways.

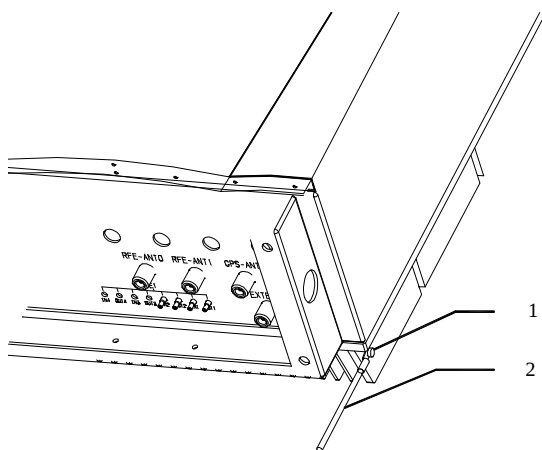
- Fan power cable in the chassis

Connect the 7-core round connector on end A to the FAN socket on the transfer board. FAN1, FAN2, and FAN3 on end B of the cable have already been connected to the three fan power ports at the bottom of the chassis.

Grounding Cable Installation

Usually, the user must be responsible for completing the basic ground grid construction of the grounding system, the grounding work of the iron tower and buildings, and the connection point construction of the indoor/outdoor grounding busbars. The on-site engineers need to install the enclosure PE cable of the RA25 chassis. The RA25 enclosure has no PE terminal, as shown in Figure 22.

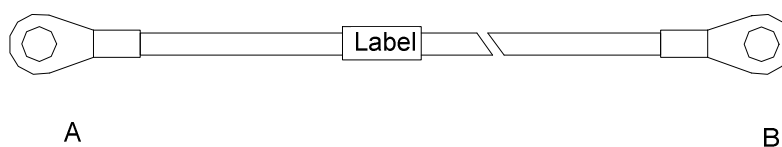
FIGURE 22 CHASSIS PE CABLE INSTALLATION SCHEMATIC DIAGRAM



1 Chassis PE terminal 2 Grounding terminal

Figure 23 shows the structure of the grounding cable.

FIGURE 23 CHASSIS GROUNDING CABLE STRUCTURE



- If the chassis is installed indoors, the PE terminal is connected to the specified indoor grounding copper busbar through the grounding cable;
- If the chassis is installed outdoors, the PE terminal can be connected to the specified iron tower grounding cable, roof grounding cable or outdoor grounding copper bus bar.



Note: The grounding cable must be connected by crimping of copper lugs.

Installation Requirements

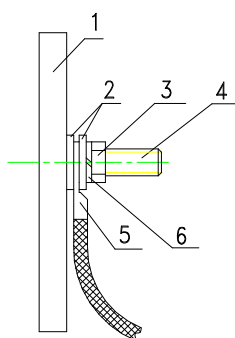


Note: When you install the power and grounding cables, you must be extremely cautious to ensure your safety and that of the equipment.

Keep the following requirements in mind while installing the cables:

- Before you connect the power cables, mark both ends of each cable, and attach the label at the location about 2cm from the lug. On one end, fill in the location of the power supply. On the other end, fill in the location of the chassis;
- The power cables and grounding cables must be laid separately from other cables. When they are laid side on side with the signal cables, a horizontal spacing of 200 mm must be maintained between them;
- Cable ties must be spaced 200 mm to protect the rocking cable jackets from rubbing with the iron tower and thus being damaged. Cable ties must cut flat.
- Measure the lengths needed before laying the cables. If a cable is found not long enough in the laying process, replace it with a longer one for redistribution. Do not connect or weld it with another one to form a longer cable;
- When fixing the cable lugs, add plain washers and spring washers to ensure secure fixation and good contact between the cable and copper bar, as shown in Figure 24.

FIGURE 24 POWER CABLE CONNECTION METHOD 1

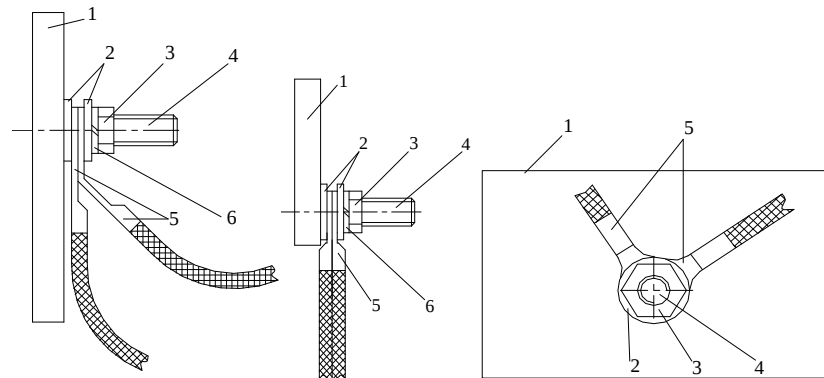


1. Copper busbar 2. Plain washer 3. Nut 4. Bolt 5. Lug 6. Spring washer

If one wiring post needs to be connected with two or more cables, the lugs of the cables cannot be installed in an

overlaid manner. Instead, they must be installed crossly or in back-to-back manner. When they have to be overlaid, they must be bent by 45° or 90° before the installation. The bigger one must be underneath the smaller one. This method is recommended for all cable installations with lugs. Figure 25 illustrates the specific connection method.

FIGURE 25 POWER CABLE CONNECTION METHOD 2



45 ° or 90 ° manner Back-to-back manner Crossed manner

1. Copper busbar 2. Plain washer 3. Nut 4. Bolt 5. Lug 6. Spring washer

Chapter 5

External Power Cables Installation

This chapter explains:

- Chassis external interfaces
- Optical fiber installation
- External monitoring cable installation
- Cable/fiber installation requirements

Chassis External Interfaces

Figure 26 shows the external interfaces of the RA25.

FIGURE 26 RA25 EXTERNAL INTERFACES

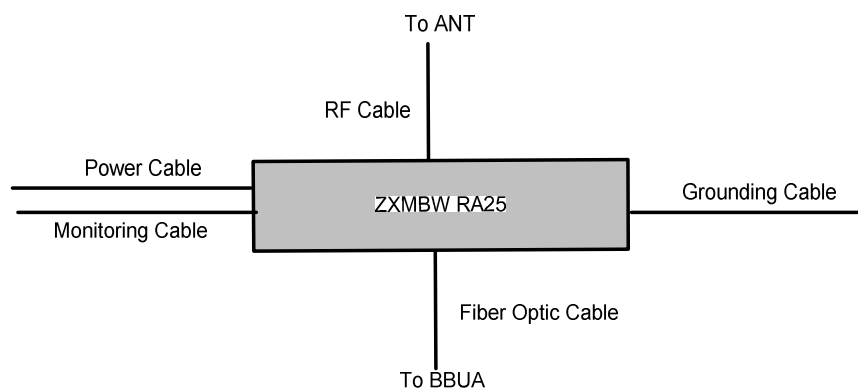


Table 10 lists the external interfaces on the transfer board.

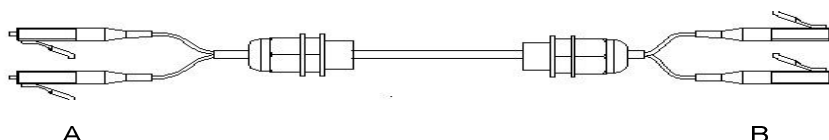
TABLE 10 EXTERNAL INTERFACES ON THE TRANSFER BOARD

Interface Name	Description
POWER	AC/DC power input
FIBER	Optical interface
MONITOR	485/trunk node monitoring interface
FAN	External fan interface
RFE-ANT0	Antenna feeder interface
RFE-ANT1	Antenna feeder interface

Optical Fiber Installation

Figure 27 shows the structure of the optical fiber between the BBUA and RA25.

FIGURE 27 OPTICAL FIBER STRUCTURE



The optical fiber is a two-core single-mode waterproof pigtail fiber with a waterproof connector of the LC/PC type. The pigtail fiber on end A is connected to the RA25, while that on end B is connected to the BBUA.

The optical fiber between the BBUA and RA25 can be installed in the following three ways:

- When the BBUA is close to the RA25

Also, when the BBUA is installed outdoors, they can be connected directly with the optical fiber. The optical fiber is a waterproof pigtail fiber, with waterproof end caps and LC connectors at both ends. The length of the core at either end is 0.7 m. End A is connected to the RA25, while the MGB16 waterproof connector is connected to the FIBER1 port on the interface board of the chassis. End B is connected to the BBUA, while the MGB20 waterproof connector is connected to the OPT1 port on the OMU interface board.
- When the BBUA is far away from the RA25

When the BBUA is installed indoors and the RA25 is installed outdoors, they can be connected directly with the optical fiber. The middle of the optical fiber is a waterproof pigtail fiber, with LC connectors on both ends. The waterproof end cap on end B is removed. With a waterproof end cap, End A is connected to the RA25, while end B is connected to the BBUA.
- When the RA25 and the BBUA are installed at two different places, and the ODF or optical fiber box is needed, two optical fibers must be provided. One is for connection between the BBUA and ODF, and the other is for connection between the ODF and RA25.
 - i. BBUA to ODF

The optical fiber is an indoor fiber jumper, of which one end is a square LC/PC connector, and other end is a

round FC/PC connector. The LC/PC end is connected to the BBUA, while the FC/PC end is connected to the ODF.

ii. ODF to RA25

The optical fiber is a waterproof pigtail fiber. Its end with a waterproof end cap is a square LC/PC connector, and the other end without waterproof end cap is a round FC/PC connector. The length of the core at the end with a waterproof end cap is 0.7 m, and that at the other end is 3 m. The end with a waterproof end cap is connected to the RA25, and the other end is connected to the ODF.



Note: The lengths of the pigtail fibers are available in 20 m, 50 m, 100 m, 130 m, 150 m, and 180 m. You can select the appropriate ones to suit side conditions.

External Monitoring Cable Installation

The RA25 provides one external monitoring interface for receiving/transmitting the 485 and trunk node signals.

Figure 28 shows the structure of the external monitoring cable.

FIGURE 28 EXTERNAL MONITORING CABLE STRUCTURE



End B of the cable is a D-type 9-core straight welded connector (male), connected to the monitored object, for example, the UPS DB9 connector, which can be welded on site.

End A is a 7-core straight welded round connector (female), connected to the **MONITOR** interface at the bottom of the chassis. Table 11 lists the signal definitions of the 7-core aeronautic connector cable.

TABLE 11 7-CORE AERONAUTIC CONNECTOR CABLE SIGNAL DEFINITIONS

Signal Definition	Dry_0	Dry_1	Dry_2	Dry_3	GND	GND	485 +	485 -
End A	1	2	3	4	5	5	7	8
Cable	White	Blue	White	Orange	White	Brown	White	Green
End B	1	2	3	4	6	7	5	8



Note: The user can determine whether to install the external monitoring cable according to the site condition.

Cable/Fiber Installation Requirements

The following requirements must be met for the installation of cables and optical fibers.

Cable Installation Requirements

- The cables installed outdoors must all be PE sheathed cables in principle. If common cables need to be used in special cases, the PVC tubes must be used to protect them.
- Cables must be laid in good order. Power cables and signal cables must be laid separately, with spacing over 200 mm in between.
- When cables are laid on the iron tower, the cable ties must be spaced less than 0.5 m, to protect the rocking cable jackets from rubbing with the iron tower and thus being damaged.

Fiber Installation Requirements

- Do not bend optical fibers into right angles. The bend radius of outdoor optical fibers must be 90 mm for the minimum, and that of indoor optical fibers must be 30 mm for the minimum.
- If an optical fiber is overlong, the excessive part must be arranged in the fiber winder. Fibers must not entangle with each other, for easy identification;
- The optical fibers must go naturally with minimum bends and without being dragged violently. The binding must be in proper tightness, and the spacing between cable items must be less than 0.5 m.
- The marks on both ends of an optical fiber must be clear.

Chapter 6

Main Antenna Feeder System Installation

This chapter explains:

- Installation preparation
- Antenna feeder system structure
- Installation flow
- Antenna installation
- Feeder installation
- Water proof treatment

This chapter describes the installation preparation for the RA25 main antenna feeder system, and its structure, installation flow, installation procedure of each component, SWR test, and water prevention treatment of the feeder connector.

Installation Preparation

Before the installation of the main antenna feeder system, verify the installation persons for their qualifications of work high above the ground, and prepare and check the installation environment, measures, tools and accessories.

Installation Personnel Preparation

The installation of the antenna feeder is generally conducted by the antenna feeder installation personnel under the supervision of the installation supervisor.

1. Requirements for the installation supervisor:
 - Familiar with the materials, tools and procedures for the installation of the antenna feeder.
 - Responsible for organizing and coordinating the installation personnel, and reasonably assigning the work to the appropriate personnel according to the **safety as top priority** principle, particularly the work on the tower.
2. Requirements for the installation personnel:
 - Skillfully installing the antenna feeder under the guidance of the supervisor.
 - Bearing the qualification certificate for work high above the ground and being in good physical status (for personnel working on the tower).
 - Observing the regulations for the use of the safety tools and having purchased the personal safety insurance.
 - No drinking.

Installation Environment Check

The installation environment check of the main feeder includes the following items:

- Lightning protection and grounding

The network operator must install lightning rod, lightning prevention grounding pole, and outdoor lightning protection grounding cable. The engineering supervisor must check if

the outdoor lightning protection grounding cable has been connected to the position, and if the it has a sectional area greater than 50 mm².

- Pole and support

The antenna support and pole must have been installed according to the engineering design requirements. The firmness and wind resistance of the support and pole must comply with the design requirements.

- Connecting the feeder

The cables must have been installed according to the engineering design. Usually, the drilling on the walls and ceiling required for the installation of the outdoor wiring rack and feeder entry window must be completed by the network operator as a condition of the equipment room, since it involves the infrastructure of the equipment room.

- The outdoor construction of the antenna feeder must be carried out in the sunny daytime without strong wind.

Safety Measure Check

The personnel working on the tower must use safety belts.

They must not wear loose clothes or slippery shoes when working on the tower.

The personnel working under the tower must wear helmets.

Obvious signs must be set up in the installation site to notify irrelevant people to keep away from the site.

- The personnel under the tower are responsible for urging irrelevant persons, especially kids to stay away from the construction site.
- Tools and metallic installation parts temporarily not used on the tower must be reliably put into the canvas tool bag, which must be opened only when taking tools from it and closed immediately after.

Installation Tools Preparation

The installation tools include:

- Measurement tools
Compass, multimeter, angle meter, and tape;
- Lifting tools
Pulley, and rope for drawing the main feeder;
- Special-purpose tools

Tools/instruments for making the main feeder connector, and for test;

- General-purpose tools

Adjustable wrench, sharp-nose pliers, diagonal pliers, electrical knife, file, and hacksaw;

- Safety protection tools

Safety belt (for the personnel who step out of the platform on the tower), helmet, safety rope, thick work clothes, RF-proof clothes, canvas tool bag, gloves, and multi-purpose power socket;

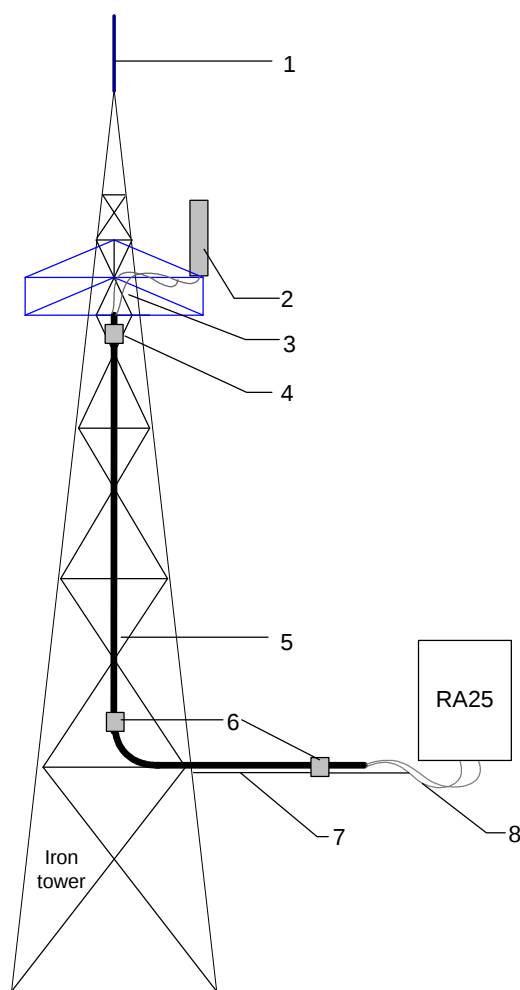
- Others

Trestle ladder, and lifting tool for the main feeder wooden axle.

Antenna Feeder System Structure

The main antenna feeder system consists of the antenna, jumper, main feeder, and grounding part, as shown in Figure 29.

FIGURE 29 RA25 MAIN ANTENNA FEEDER SYSTEM STRUCTURE

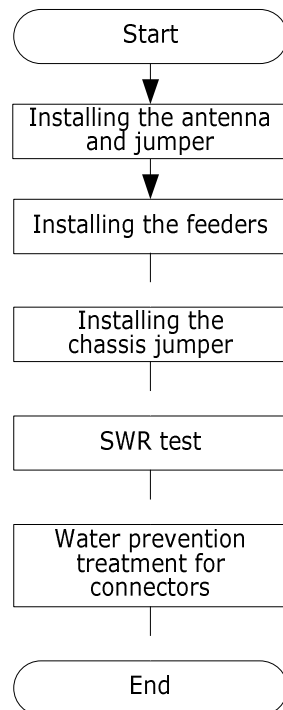


1. Lightning arrester 2. Antenna 3. Antenna jumper (1/2 ') 4. Lightning protection grounding clip 5. Main feeder (7/8 ') 6. Lightning protection grounding clip 7. Cable rack 8. Chassis jumper (1/2 ')

Installation Flow

Figure 30 shows the installation flow of the antenna feeder system.

FIGURE 30 INSTALLATION FLOW



Antenna Installation

Antennas of different models must be installed in different ways. The installation supervisor should operate according to the engineering design document and the safety instructions provided with the antenna.

Caution: Take precaution for personal and equipment safety during the whole antenna installation process;

When adjusting the antenna that is already in operation, take appropriate measures (for example, wear radiation-shielding clothing) to avoid the direct radiation from the antenna to human body.

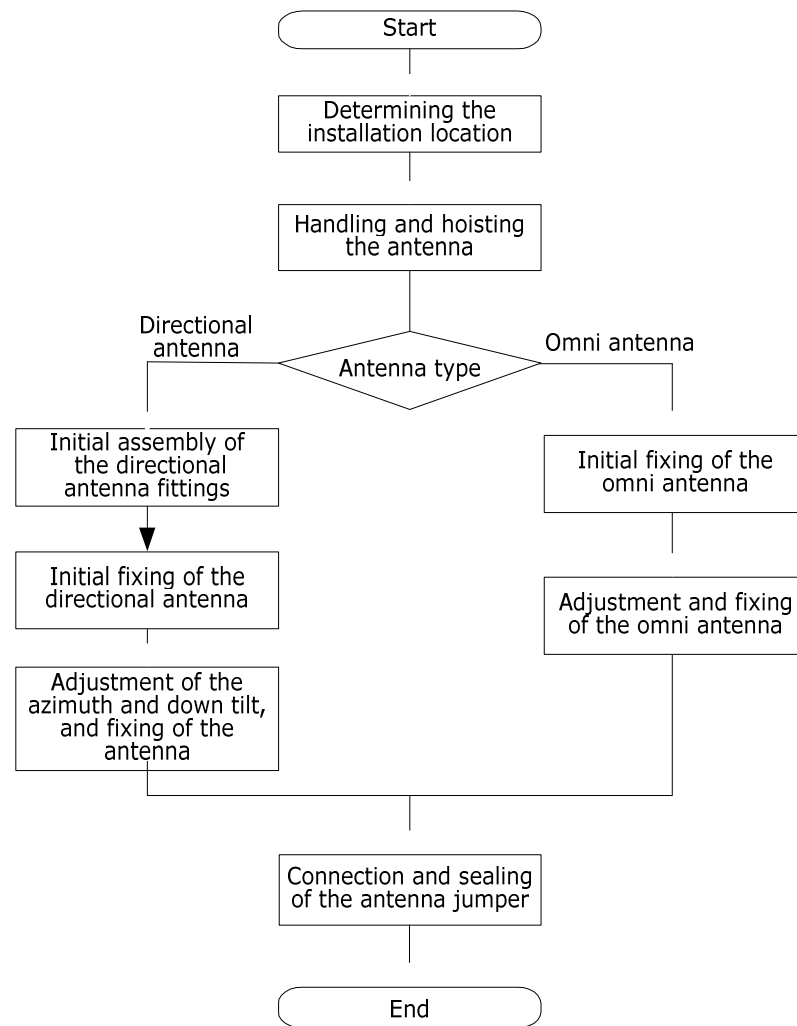
Technical Parameters

- Mounting height of the antenna
It is determined by network planning.
- Azimuth of the antenna
It is determined by network planning.
- Pitch angle of the antenna
It is determined by network planning, usually $0^{\circ} \sim 10^{\circ}$, adjustable.
- Antenna direction
It is determined by the azimuth of the antenna. Two antennas in the same sector must point to the same direction.
- Distance between diversity antennas
When diversity antennas are used (that is, the two antennas in the same sector serve as mutual diversity reception antenna, and the two antennas have the same vertical height), the horizontal distance (d) between two antennas must be as large as possible, with the following requirement:
 $d=10\lambda \sim 20\lambda$ (or $H/d=11$)
Where, where d is the horizontal distance between the diversity antennas, and H is the vertical height from the antenna to the ground, λ is the carrier wavelength in meters.
For example, when the carrier is 2.5 GHz, the diversity distance must be greater than 1.2 m.

Antenna Installation Flow

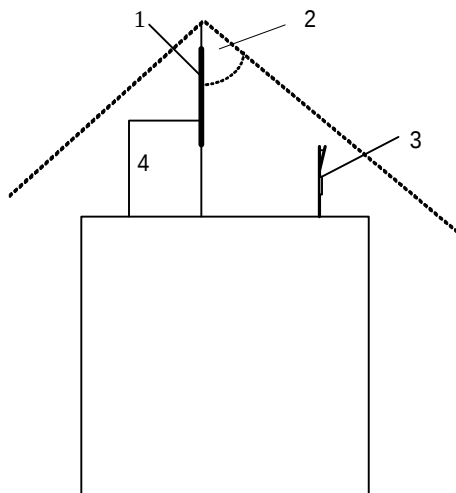
Figure 31 shows the antenna installation flow.

FIGURE 31 ANTENNA INSTALLATION FLOW



The installation location of the antenna must be provided with good lightning protection, as shown in Figure 32.

FIGURE 32 ANTENNA LIGHTNING PROTECTION SCHEMATIC DIAGRAM



1. Lightning rod 2. 45° protection angle 3. Antenna 4. Grounding cable

The installation requirements are as follows:

- The antenna must be installed within the 45° protection angle of the existing lightning rod;
- Where necessary, the antenna pole must be provided with a separate lightning rod, which must be grounded reliably.

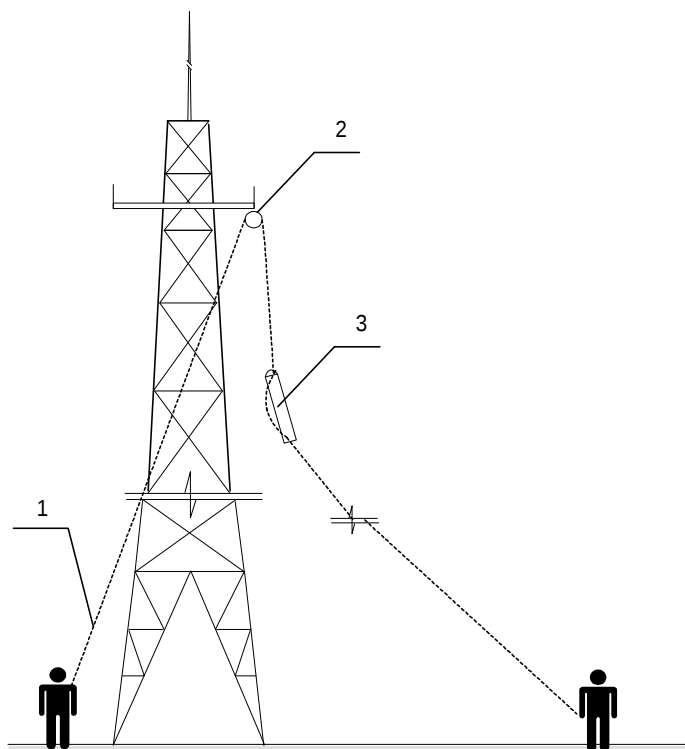
Antenna Handling and Hoisting

Caution: The personnel on and under the tower must work together to hoist the antenna. During the hoisting process, the personnel under the tower must pull the antenna away from the tower body by pulling the rope, to avoid the crash between the antenna and the tower body.

- In the case the antenna is to be mounted on the tower, use the rope and pulley block to hoist the antenna, the jumper and all the accessories (such as tools, safety belts, adhesive tapes and cable ties) to the tower-top platform and place them in a safe place. Take appropriate safety measures during the process. Small objects must be put into the canvas bag before they can be hoisted.
- Knots must be tied at both ends of the antenna during hoisting, so that the personnel on the tower and those under the tower can work together, as shown in Figure 33.

- In the case the antenna is to be mounted on a roof, move the antenna and the installation materials to the installation position manually.

FIGURE 33 ANTENNA HOISTING SCHEMATIC DIAGRAM



1. Lower pulling rope 2. Pulley block 3. Upper pulling rope tied with knots at the upper/lower ends of the antenna

Directional Antenna Installation



Note: This section describes the install process as reference for installation personnel. During the on-site installation process, please carefully read the installation manual provided with the antenna, and carry out the construction according to the actual conditions.

1. Initial assembly of the directional antenna fittings

Before fastening the antenna, assemble fastener C onto the upper/lower ends of the antenna, as shown in Figure 34, and then connect fasters B and A, to complete the initial installation of the directional antenna. All accessories must be installed with spring and plain washers.

Usually the antenna fastening accessories and the angle adjustment device accessories have already been installed on the antenna under the tower.

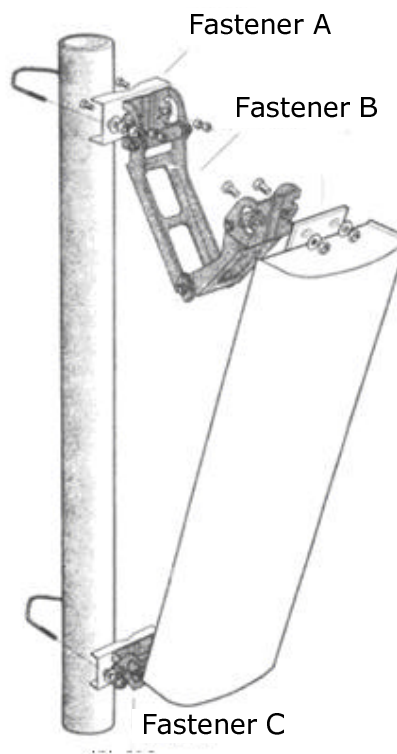
2. Initial fixing of the directional antenna on the pole

Attach the directional antenna installed with fixtures onto the pole. First do not tighten the screws too tightly to allow easy adjustment of the direction and down tilt of the antenna. However, the tightness must be high enough to ensure that the antenna does not slid downward.

3. Adjusting the azimuth of the antenna

- i. Determine the azimuth of the antenna using a compass. And determine the installation direction of the directional antenna according to the engineering design drawing;
- ii. Turn the antenna slightly to adjust its face direction, as shown in Figure 34. At the same time, measure the direction of the antenna with a compass until the error is within the engineering design requirements (generally not more than 5 °);
- iii. After adjusting the azimuth of the antenna, tighten fastener A;

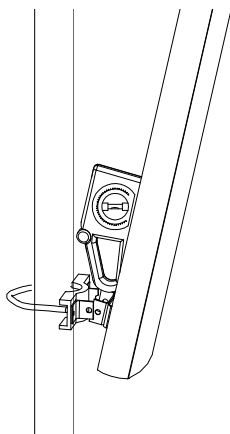
FIGURE 34 ANTENNA INSTALLATION



4. Adjusting the tilt angle of the antenna

- i. Adjust the tilt angle of the measurement meter to the angle required by the engineering design.
- ii. Turn the top of the antenna slightly and loose or hold fast the antenna at its top. Adjust the down tilt angle of the antenna till the bubble is centered when the adjusted measurement meter is close to the directional antenna, as shown in Figure 35.
- iii. After adjusting the tilt angle of the antenna, tighten fastener B.

FIGURE 35 ANTENNA -DOWN TILT ANGLE ADJUSTMENT



END OF STEPS

Omni Antenna Installation

1. Put the jacket at the antenna lower part close to the support backbone. The top of the jacket must be flush with or slightly higher than the support top.
2. Fasten the antenna (the lower part with jacket) onto the support with two fixing clips. Do not fasten it too tightly or too loosely. If too tightly, the jacket might be damaged; if too loosely, the weight-bearing and wind-resistance requirements cannot be met.
3. Check the verticality of the antenna. An omni antenna must be kept vertical. After you verify that the antenna is vertical, tighten the antenna onto the pole;.
4. Protrude the antenna support on which the antenna is installed out of the tower platform. Adjust the support to keep the antenna vertical.

END OF STEPS

Jumper and Antenna Connection and Sealing



Note: The antenna jumper can be connected before the antenna is mounted onto the pole and treated for water prevention. This reduces the time of work high above the ground and improves the connection and water prevention quality of the connector.

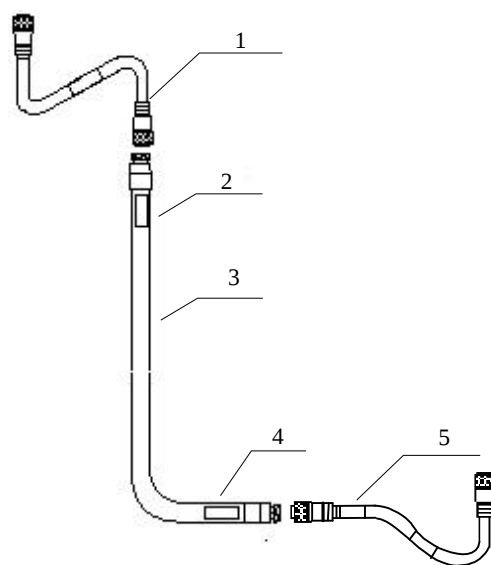
1. Connect the jumper connector to the antenna port and tighten it.
2. After that, treat the connector for water prevention.
 - i. Wrap the antenna connector with waterproof tape from its root in the same direction as the one in which the jumper is tightened;
 - ii. Pull the waterproof tape to twice its length. Note that the next circle must cover half of the previous circle, and the wrap must stop at the position about 5 cm away from the jumper connector.
 - iii. Grip the tape with your hands to make the tape tightly adhered.
 - iv. Wrap PVC tapes on top of the waterproof adhesive tape. During the process, make sure the upper layer overlaps the lower layer by half the width of the tape.

END OF STEPS

Feeder Installation

This section uses the 7/8" feeder as example. Figure 36 shows the structure of one 7/8" feeder.

FIGURE 36 7/8" FEEDER STRUCTURE



1. Antenna jumper 2. Label 3. 7/8" feeder 4. Label 5. Chassis jumper

Feeder Route Determination

You must determine the route of the feeder according to the feeder wiring diagram in the engineering design drawing. If the route needs to be changed due to the site conditions, consult with the user representative as soon as possible for a solution. The length of the main feeder must be determined according to the final wiring route.

Main Feeder Connector Making

Caution: Making the feeder connectors is the most important procedure in the installation of the antenna feeder system, since the quality of them directly affects the performance of both the equipment and network. Be cautious when using knives and cutters, for they are sharp and may cause injury.

This section describes this process by using the ROSENBERGER 7/8" feeder connector as example. For the details on installing a connector of another specification, please refer to the related installation manual.

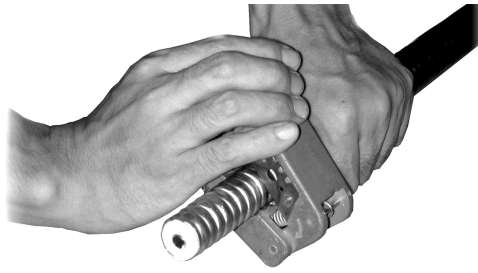
1. The common cutting tool to make the feeder connector is as shown in Figure 37.

FIGURE 37 7/8" FEEDER CONNECTOR CUTTING TOOL



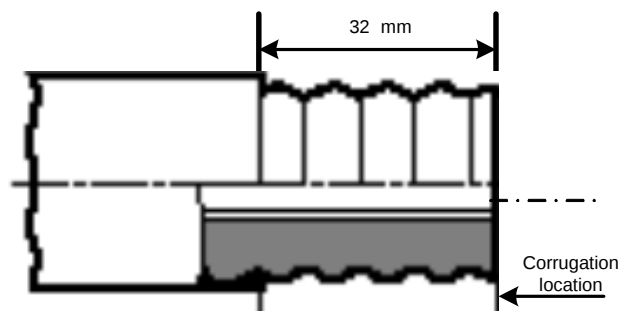
2. Measure a straight feeder section of about 150 mm to be installed with the connector, and cut and strip the feeder sheath 50 mm away from the end using a safety cutting tool.
3. Put the feeder into the notch of the cutter (EASIAx), leaving a length of four sheath threads behind the main blade. And then close the cutter handles. Since the position of the cutter is determined by the threads on the external copper sheath of the feeder, the main blade must just be aligned with the crest at the center of a thread of the feeder.
4. Turn the cutter in the direction as marked on the cutter until the handles are completely closed by the protection cover and the cutter cuts the internal and external copper conductors of the feeder completely. At the same time, the auxiliary blade of the cutter cuts the external plastic protection sheath of the feeder, as shown in Figure 38.

FIGURE 38 FEEDER - CUTTING



5. Check the length of the feeder, as shown in Figure 39;

FIGURE 39 FEEDER LENGTH CHECKING



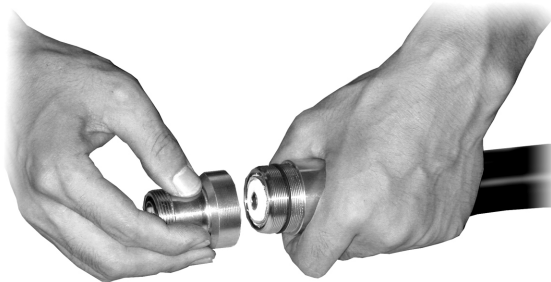
6. Separate the front part and back part of the feeder connector, and insert the back part into the feeder till it touches the first corrugation of the feeder;
7. Firmly insert the tube expander of the cutter into the feeder and turn it left and right to expand the external copper conductor of the feeder, so that it presses against the back part of the feeder connector, as shown in Figure 40;

FIGURE 40 FEEDER EXTERNAL CONDUCTOR EXPANSION



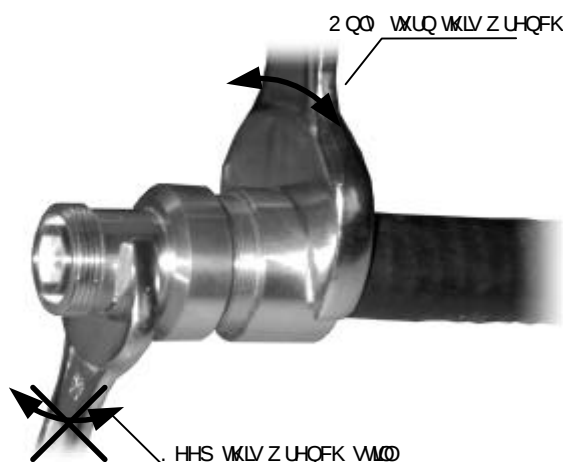
8. Check for any residual copper scraps. The external copper sheath must be evenly expanded without burrs. Pull the back part of the feeder connector outward, during which process the connector must not slip away from the feeder. If these requirements are not met, make it again.
9. Connect the front part and the back part of the feeder connector, as shown in Figure 41;

FIGURE 41 FEEDER CONNECTOR'S FRONT PART AND BACK PART



10. 1Screw the front part of the feeder connector in position, and fix it with an appropriate wrench, so that it does not move against the feeder. Then screw the back part of the feeder connector with the wrench till it is fixed, as shown in Figure 42;

FIGURE 42 FEEDER CONNECTOR'S FRONT PART AND BACK PART FIXING



END OF STEPS

Feeders Cutting

Caution: When cutting the main feeder, label it at both ends. Temporary labels can also be attached to the middle of the feeder. All the labels must be consistent. Otherwise, the feeder may not be correctly connected and the sectors may not correspond to the feeder.

Determine the length of the feeder according to the final feeder route determined together with the user on site, and cut the feeders according to the needed length of each feeder.

1. If the antenna feeder system is to be installed on the roof of a building
 - i. Measure the length of the main feeder for each sector according to the feeder route;
 - ii. Add an appropriate margin (1m ~ 2m) to the measured lengths when cutting the feeders.
 - iii. After cutting one main feeder, attach the appropriate temporary labels onto both ends of the feeder, such as ANT0 and ANT2. Attach the formal labels to the feeder after it is installed;
 - iv. Carry the cut feeders to the roof of the building and makes sure they are not squeezed or damaged during the process.
2. If the antenna feeder system is to be installed on an iron tower:
 - i. Hoist one end of the feeder to the top of the tower by using a pulley block and pulling rope. Before hoisting, make the upper main feeder connector;
 - ii. The personnel on the tower must cut the feeder according to the distance from the point where the feeder enters the room to the lightning arrester rack, with an appropriate margin reserved. Make a temporary for the lower part. Attach the formal labels to the feeder after it is installed.

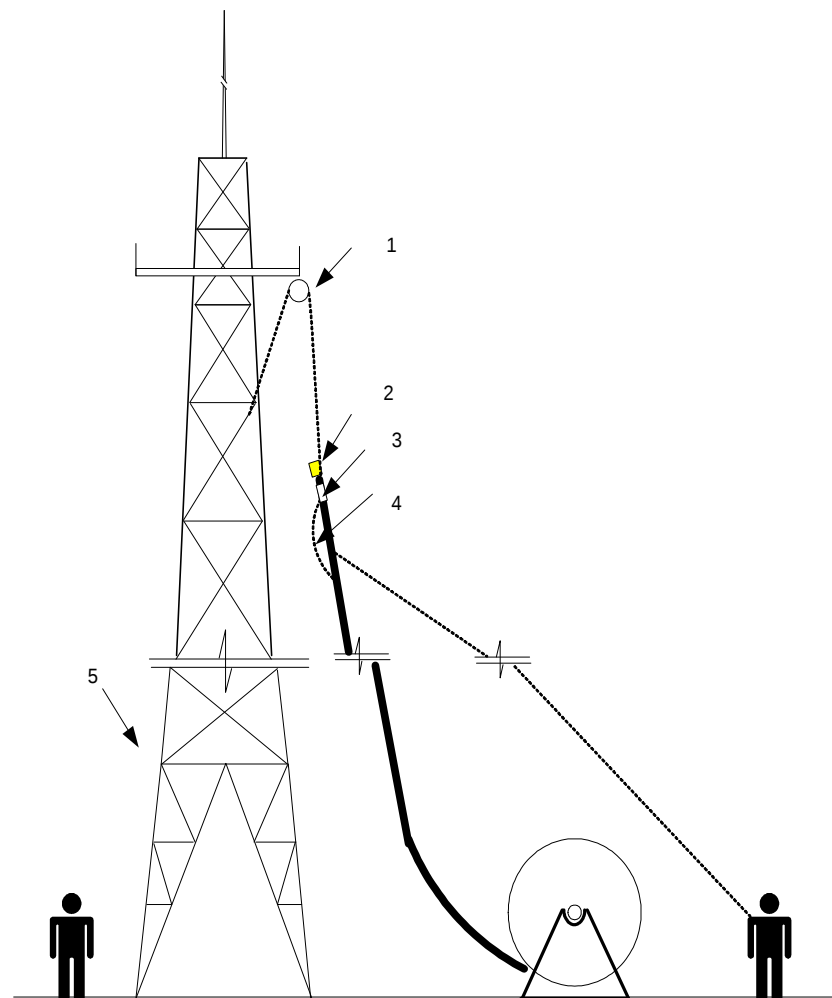
Main Feeder Hoisting

Caution: Hoist the primary feeder with care to avoid damaging its sheath. Any local damage to a single main feeder may cause the entire feeder to be discarded.

Ensure the personal safety during the hoisting process.

When the main feeder is to be installed on a tower, a pulley block is needed, as shown in Figure 43.

FIGURE 43 FEEDER HOISTING- SCHEMATIC DIAGRAM



1. Pulley block 2. Feeder head wrap 3. Feeder label 4. Knot for the upper pulling rope 5. Lower pulling rope

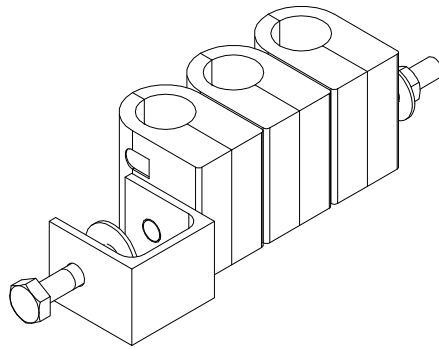
1. Check the labels at both ends (0.3 m) of the primary feeder to ensure that it is the right cable.
2. Wrap the main feeder connector with a piece of flax or an antistatic plastic bag filled with foam, and then bind it tightly with cable ties.
3. Knot the hoisting rope at the place about 0.4 m away from the connector and knot the rope again at the place about 3.4 m away from the connector to allow cooperation between personnel on the tower and ground and protect the feeder and its connector from being damaged by hitting the tower.
4. After the feeder has been hoisted to the tower top, fasten it tightly at multiple points to prevent it from sliding from the tower.

END OF STEPS

Main Feeder Laying and Fixing

- Laying requirements
 - ▶ The main feeder must be laid in good order, without crossing.
 - ▶ Learn its route before connecting the main feeder. You are recommended to mark the actual route on the drawing to avoid reworks due to crossings of the main feeder.
 - ▶ The minimum bending radius of the main feeder must be no less than 20 times of the radius of the main feeder. The radius of a single bend must not be less than 90 mm. The minimum bending radius of repeated bends must be 200 mm.
 - ▶ Spacing of the triple feeder clip: 1.65 m for the maximum.
- Main feeder connecting steps:
 1. Triple feeder clips must be installed in advance along the tower or cable rack at spacing of about 1.5 m. The spacing can be lengthened or shortened depending on the actual situation, but must not exceed 1.65 m. The spacing between the triple feeder clips must be as even as possible and in the same direction. If two rows of feeder clips are installed on one cabling ladder, keep them in parallel and in good order. Figure 44 shows a triple feeder clip.

FIGURE 44 TRIPLE FEEDER CLIP



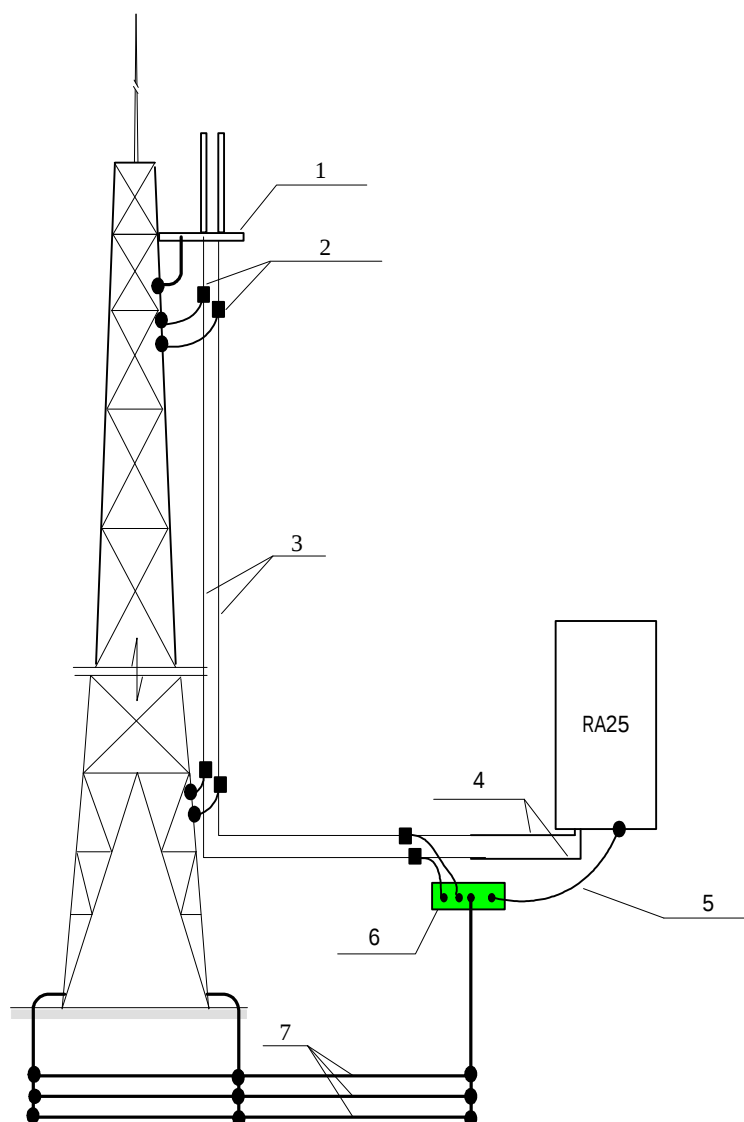
2. Arrange the main feeder in good order preliminarily;
3. Fasten the main feeders from top downward with the triple feeder clips as you arrange the main feeders. When the main feeders are arranged in good order, tighten the triple feeder clips. The main feeders must be kept straight without bulge between two triple feeder clips. Do not fasten the feeders at both ends at the same time.

END OF STEPS

Feeder Grounding Clip Installation

- Main feeder grounding principles
 - ▶ For the antenna feeder system installed on the tower, the main feeder must be installed with the feeder grounding clips at least three places: tower platform, place where the main feeder leaves the tower, and place before which the main feeder is connected to the chassis. When the main feeder is over 60 m in length, feeder grounding clips must be added in the middle. Generally, a grounding clip must be installed on the feeder every 20m, as shown in Figure 45.

FIGURE 45 FEEDER GROUNDING –SCHEMATIC DIAGRAM



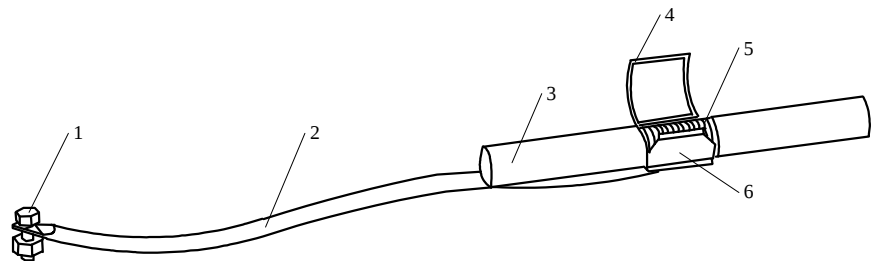
1. Tower platform 2. Feeder grounding clip 3. Feeder 4. Cabinet jumper 5. Grounding cable 6. Grounding busbar 7. Ground grid

- ▶ For the antenna feeder system installed on the roof, its antenna support and cable rack must be welded to the lightning protection grid of the building. The main feeder must also be grounded at three places: the place where the feeder leaves the pole, the place where the feeder leaves the roof, and the place before which the main feeder is connected to the jumper of the chassis.
- ▶ The outdoor wiring ladder of the main feeder must be grounded.
- Grounding clip installation steps:

Caution: The grounding clip shall not be installed in lightning weather to avoid personal injury. When installing the grounding clip, keep the feeder at the joint of the grounding clip and the feeder straight.

1. Prepare the tools: Paper cutter, straight screwdriver, wrench and sharp-nose pliers.
2. Select a proper installation position for the grounding clip, and cut open the sheath of the 7/8" feeder according to the size of the grounding clip. Figure 46 shows the structure of the grounding clip.

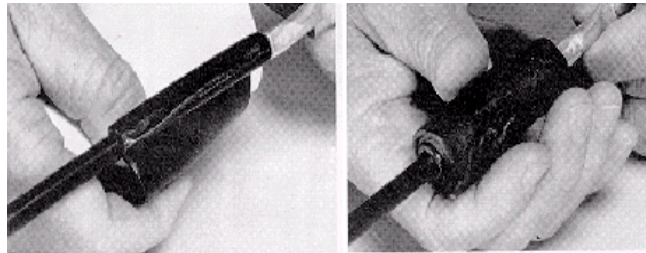
FIGURE 46 THE GROUNDING CLIP STRUCTURE



1 Grounding end 2 Grounding cable 3 Feeder 4 Grounding cable cir clip 5 Feeder outer copper core 6 Grounding cable sheet copper

3. Lead the grounding cable of the feeder lightning grounding clip to the ground grid. No reverse direction is allowed. The angle formed by the grounding cable and the main feeder must not be more than 15°. No reverse folding is allowed.
 - ▶ In the case that the antenna feeder system is installed on the tower, the grounding cable of the grounding clip must be led downward along the tower body.
 - ▶ In the case that the antenna feeder system is installed on the roof, the grounding cable of the grounding clip must be led close to the building lightning protection grid.
4. Before installing the grounding clip, wrap the grounding wire at the grounding clip end that is close to the grounding cable sheet copper with the waterproof adhesive tape, as shown in Figure 47. This can improve the sealing effect and prevent the rain from falling into the feeder interior along the grounding cable.

FIGURE 47 GROUNDING CABLE WRAPPING WITH WATERPROOF TAPE



5. Clamp the feeder external conductor with the grounding cable sheet copper and the circlip, so that the grounding clip sheet copper and the feeder external conductor are fully locked together.
6. Conduct the water prevention treatment to the joint of the grounding clip and the feeder by performing the following steps:
 - i. First wrap the waterproof adhesive tapes and then the PVC tapes.
 - ii. To wrap the waterproof adhesive tapes, wrap them layer by layer from bottom to top first, then from top to bottom once again, and finally from bottom to top, that is, three layers of them. During the process, make sure the upper layer overlaps the lower layer by about half the width of the tapes.
7. The grounding end of the grounding clip can be connected to the main tower body or the outdoor cable rack (connected to the lightning protection grid of the building) on the roof. Remove the paint and oxide within the radius of about 13 mm at the connection place, and cover the clean area with antioxidant to ensure good electric contact. When the grounding end is connected, apply another coating of antirust paint.

END OF STEPS

Chassis Jumper Installation

The chassis jumper must be installed between the main feeder and the chassis. Usually, the finished 2 m jumpers are used. You can also prepare the jumpers on site as per the actual length required.

- If the finished jumpers are used, they can be directly installed between the feeder and the chassis.
- If the jumpers are prepared on site, 1/2" feeders must be prepared through cutting according to the specific length of each jumper. Assemble the appropriate feeder connector

according to the feeder connector assembly instructions, and connect the jumpers between the feeder and chassis.

SWR Test

After you have installed the antenna feeder system, you must test the SWR of each antenna feeder, which must be no greater than 1.3. If this requirement is not met, must check if the feeder connector has been installed properly, and any fault or damage in Antenna, feeder or jumper.

Water Proof Treatment

Caution: The water prevention sealing for the outdoor jumpers and the feeder grounding clips of the antenna feeder system is an important part of the antenna feeder installation. During the installation process, must use waterproof tapes properly to ensure the quality of installing the antenna feeder system.

Connect and seal the 1/2" jumper and the feeder as follows:

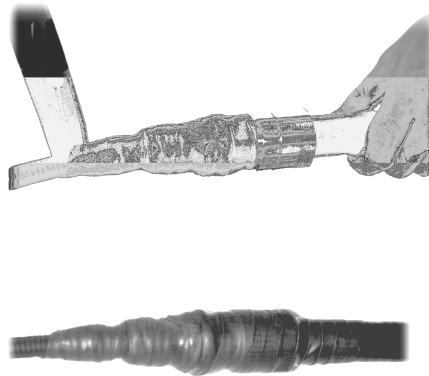
1. Connect and lighten the antenna jumper and the main feeder connector
2. Make water prevention treatment on the connectors in the following steps
 - i. Wrap the waterproof adhesive tapes from a low position where the connector is connected and wrap them about 200 mm to fill in the low-lying parts of the connector, as shown in Figure 48.

FIGURE 48 WATERPROOF ADHESIVE TAPE WRAPPING (1)



- ii. Extend the adhesive tapes to double their length when wrapping them. The direction of wrapping must be the same as the direction of screwing the feeder connector, in case that the feeder connector may be loosened during the wrapping process.
- iii. As shown in Figure 49, wrap the adhesive tapes layer by layer and then wrap them again in the reverse direction. The upper layer must cover the lower layer by about 1/3 to avoid water penetration. Finally, wrap them layer by layer again in the reverse direction. Wrap the tape with three layers without any cut in the entire process. Wrap the tapes around the feeder connector till they protrude about 20 mm from the feeder connector.

FIGURE 49 WATERPROOF ADHESIVE TAPE WRAPPING (2)



- iv. Grip the waterproof adhesive tapes with your both ends after wrapping them to ensure firm bonding between the tapes and the feeders/feeder connectors, as shown in Figure 50.

FIGURE 50 WATERPROOF ADHESIVE TAPE WRAPPING (3)



- v. Apply two layers of the PVC tape on top of the waterproof adhesive tape. During the process, make sure the upper layer overlaps the lower layer by half the width of the tape. Wrap two layers in total.
- vi. Grip the PVC tapes and the waterproof adhesive tapes with both hands to make them tightly adhered to each other.
- vii. Tie the two ends of the adhesive tape with straps to prevent it from being aged or falling off.

END OF STEPS

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Chapter 7

Hardware Installation Check

This chapter explains:

- Chassis installation check
- Cable installation check
- Antenna feeder installation check
- Environment check
- BTS information check

Chassis Installation Check

- The chassis installation position must match that on the design drawing.
- The chassis must be installed securely, meeting the level 7 earthquake-resistant requirement.
- The horizontal and vertical deviation of the chassis must be less than 3 mm.
- The surface must be clean and the paint must be in good condition. No part must fall off or get damaged. Signs on the chassis must be correct, clear and complete.
- The inside of the chassis must be clean. The corners inside the chassis must be free from messes such as metallic scraps and wires.
- All bolts must be tightened. No plain washer or spring washer is placed in reverse.

Cable Installation Check

The cables of the RA25 include power and grounding cables, optical fibers, and RF cables.

The overall installation requirements are as below:

- Various cables are straight and level, without evident wave or deflection. There is no crossover or space jumper.
- Cables must be bent smoothly and evenly and the outer part of the bend must be as vertical or horizontal as a direct line.
- Various cables must be attached with labels on both ends, which must indicate the purposes of the cables. Labels on both ends must have the same contents;
- Every connector must be plugged reliably, correctly and in good contact without being broken or bent.
- Cable ties must be in good order, even spacing, and appropriate tightness, and face the same directions. Extra ties must be cut off down from their roots, without pointed ends.
- The connecting terminals must be equipped with plain washers and spring washers.

Power and Grounding Cables

- Power cables and signal cables must be laid separately, keep distance no less than 200 mm between the two types of cable.
- Power and grounding cables must be made of a complete piece of wire, without joints in the middle.
- Each grounding point on the grounding copper busbar must be connected with one device only.
- The remaining length of each power/ground cable must cut off, but not be coiled.
- The lugs at both ends of the power/ground cables must be welded or crimped securely.
- The grounding cables must take the shortest route.
- The bare wires at the connecting terminals and lug handle must be tightly wrapped with insulation tape or put in a heat-shrink tube instead of being exposed.

Optical Fibers

- Do not bend optical fibers into right angles. The bend radius of outdoor optical fibers must be 90 mm for the minimum, and that of indoor optical fibers must be 30 mm for the minimum.
- Optical fibers must not entangle with each other.
- The optical fibers must be arranged naturally, with binding spacing less than 0.5 m.
- The marks on both ends of an optical fiber must be clear.
- Connectors on both ends of an optical fiber must not get loose.
- The optical fibers must not be damaged.

1/2" Jumper

- The labels of the jumpers must be at conspicuous locations and easily identifiable.
- Jumpers must be laid in a way that makes easy maintenance and future expansion.
- Jumpers must be laid by layer and sector.
- The jumper at the joint with the equipment must keep straight for 30 cm.

Main Feeder

- The cut of the main feeder must be smooth and free from messes. The copper tube of the main feeder must be free from messes such as copper scraps. The connector of the feeder must be made properly, and must not get loose.
- The 7/8" feeder connector must be tightened with a big spanner and installed in place to avoid any abnormal SWR due to false connections, and ensure normal system running.
- The grounding clip must be installed correctly.
 - ▶ From the tower top to the equipment room, the feeder must be grounded at three places: the place within 1 m after the feeder leaves the tower top, the place within 1m before led to the outdoor cable rack after leaving the tower body, and the place within 1 m of the RA25.

- ▶ If a tower is above 60 m and needs a longer feeder, another feeder grounding clip must be placed in the middle of the tower.
- ▶ If a feeder is routed for above 20 m at the building top or on the cabling rack after leaving the tower before it enters the room, another grounding clip for lightning protection must be added at the building top or on the cable rack.

Caution: When you install the grounding clip, must pay attention to water prevention. The end with the grounding cable must face upward to prevent the rainwater from flowing to the feeder along the grounding cable.

- The terminals of the grounding clip of a feeder must be fixed on the steel plate of a nearby tower.
- For a building without a tower, the antenna feeder at the top must be grounded by connection to the nearby lightning protection ground grid on the roof.
- The grounding cable of a feeder must be led up down, and the angle between the feeder and grounding cable must be no more than 15° .
- The minimum bending radius of feeders must be 20 times of the radius of feeder cables. The bending radius of the primary feeder must be more than 0.3 m.
- There must be no bare copper sheet at each feeder connector. Same labels must be attached to both ends of each feeder to ensure it can be connected correctly to the antenna, and each label must indicate the length of the cable.

Antenna Feeder Installation Check

- The mounting height of the antenna must match the network planning, and the installation location of the antenna must comply with the design.
- The azimuth angle and down tilt of the antenna must match the design.
- The antenna support must be firmly and reliably fastened to the tower.
- The antenna must be located within the protection area of the lightning rod.
- The SWR of the antenna feeder must be no more than 1.3.
- The connections between the antenna and the 1/2 " jumper and between the 1/2 " jumper and the main feeder must be correct.
- At the joint between the jumper and the antenna, the jumper must be parallel to the antenna with 30 cm in between.
- All outdoor jumper connectors must undergo water prevention sealing treatment.

Environment Check

Any outdoor engineering waste must be cleaned. After the installation is over, the outdoor work site must be restored to its original status, without any cable strap, stub, waste paper box, waste cable or waste plastic bag. The whole site must be clean and tidy.

BTS Information

When you install the BTS, record the model and serial number of each part to fill in the BTS information table required in the engineering installation acceptance report.

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Chapter 8

Power- On/Off

This chapter explains:

- Power –on/off procedures

Power – on/off Procedures

Power - on Check

- Verify that the supply voltage meets the requirements of the RA25.
- Verify that the power and grounding cables of the chassis have been properly connected.
- Verify that the power connector of the chassis is disconnected.

Power - on

- There is no additional power switch inside the RA25 chassis. The equipment is powered on once you close the power switch.
- If any abnormality occurs after power-on, turn off the power switch immediately and check for the causes.

Power - off

- Disconnect the external AC/DC switch.

Appendix A

Technical Indices

Physical Indices

Table 12 lists the physical indices of the RA25.

TABLE 12 RA25 PHYSICAL INDICES

Category	Specification Name	Specification
Dimensions	Outer dimensions	655 mm (H) × 400 mm (W) × 285 mm (D)
	Inner dimensions	580 mm (H) × 396 mm (W) × 200 mm (D)
	Base height	75 mm (with three base fans)
Weight	Weight of single chassis	37 kg
Temperature /humidity requirements	Temperature requirement	Operating temperature: - 40 °C ~ + 50 °C Storage temperature: -45 °C ~ +75 °C
	Humidity requirement	Working humidity: 5% RH ~ 98% RH Storage humidity: 5% RH ~ 98% RH

Power Supply Indices

Table 13 lists the normal AC/DC power supply indices of the RA25.

TABLE 13 RA25 POWER SUPPLY INDICES

Type	Nominal Value	Operating Range
AC	110 V AC	85 V AC~138 V AC
	220 V AC	150 V AC~300 V AC
DC	-48 V DC	-40 V~ -57 V

Power Consumption Indices

Table 14 lists the power consumptions of different carriers.

TABLE 14 RA25 POWER CONSUMPTION INDICES

Average Power	Maximum Power Consumption (at Full Load)
200 W	290 W

Abbreviations

Abbreviation	Full Name
BBUA	Agile Baseband Base Unit
BSC	Base Station Controller
BSS	Base Station subsystem
BTS	Base Transceiver Station
GPS	Global Position System
PE	Protective Earth
SDH	Synchronous Digital Hierarchy
UPS	Uninterruptible Power Supply

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Index

AC, 2, 3	LEGAL, 1
AC/DC, 2, 3	MASTER, 2
ANT0, 2	MONITOR, 2
ANT1, 2	N/A, 1
B, 2	ODF, 2
BSC, 3	P, 1
BSS, 3	POWER, 2
BTS, 2, 3	R&D, 1
CAPS, 1	R1, 1
DB9, 2	RF, 1, 2
DC, 2, 3	RFE, 2
E, 1, 2	ROSENBERGER, 2
FAN, 2	SDH, 3
FAN1, 2	SITE, 2
FAN2, 2	SWR, 2
FAN3, 2	URL, 1
FIBER, 2	V, 2, 3
GND, 2	VGND, 2
GPS, 3	VSWR, 2
INFORMATION, 1	

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Figures

Figure 1 RA25 Chassis Overall Installation Schematic Diagram..	2
Figure 2 RA25 On-site Installation Operation Schematic Diagram	3
Figure 3 RA25 Installation Flow	4
Figure 4 Installation Flow - Pole Mounting	16
Figure 5 Support Component Schematic Diagram	17
Figure 6 Support Component Fastening onto the Pole	17
Figure 7 Sunshade Installed -Pole Mounting.....	18
Figure 8 Hanging the Chassis onto the Support-Pole Mounting	19
Figure 9 Pushing Chassis into Position-Pole Mounting.....	19
Figure 10 Fastening the Chassis Body -Pole Mounting	20
Figure 11 Mounted Chassis-Pole Mounting	20
Figure 12 Installation Flow -Wall Mounting	21
Figure 13 Support Holes Layout	22
Figure 14 Support Component Installation Schematic Diagram - Wall Mounting.....	23
Figure 15 Installed Support Component Schematic Diagram - Wall Mounting.....	23
Figure 16 Hanging the Chassis onto the Support-Wall Mounting	24
Figure 17 Fastening the Chassis Body-Wall Mounting	25
Figure 18 Mounted Chassis-Wall Mounting	25
Figure 19 AC Power Cable Structure	28
Figure 20 DC Power Cable Structure	29
Figure 21 Fan Power Cable Structure	30
Figure 22 Chassis PE Cable Installation Schematic Diagram	31
Figure 23 Chassis Grounding Cable Structure.....	31
Figure 24 Power Cable Connection Method 1.....	33
Figure 25 Power Cable Connection Method 2.....	34
Figure 26 RA25 External Interfaces	36
Figure 27 Optical Fiber Structure.....	37

Figure 28 External Monitoring Cable Structure	39
Figure 29 RA25 Main Antenna Feeder System Structure	45
Figure 30 Installation Flow	46
Figure 31 Antenna Installation Flow	48
Figure 32 Antenna Lightning Protection Schematic Diagram....	49
Figure 33 Antenna Hoisting Schematic Diagram	50
Figure 34 Antenna Installation	51
Figure 35 Antenna -Down Tilt Angle Adjustment	52
Figure 36 7/8 "feeder Structure	54
Figure 37 7/8" Feeder Connector Cutting Tool.....	55
Figure 38 Feeder - Cutting.....	56
Figure 39 Feeder Length Checking	56
Figure 40 Feeder External Conductor Expansion	56
Figure 41 Feeder connector § Front Part and Back Part	57
Figure 42 Feeder connector § Front Part and Back Part Fixing .	57
Figure 43 Feeder hoisting- Schematic Diagram	59
Figure 44 Triple Feeder Clip	61
Figure 45 Feeder Grounding –Schematic Diagram	62
Figure 46 the Grounding clip Structure.....	63
Figure 47 Grounding Cable Wrapping with Waterproof Tape....	64
Figure 48 Waterproof Adhesive Tape Wrapping (1)	66
Figure 49 Waterproof Adhesive Tape Wrapping (2)	67
Figure 50 Waterproof Adhesive Tape Wrapping (3)	67

Tables

Table 1 Chapter Summary	i
Table 2 Typographical Conventions.....	iii
Table 3 Mouse Operation Conventions.....	iii
Table 4 Temperature and Humidity Requirements	8
Table 5 Power Supply Requirements	9
Table 6 Tools List	10
Table 7 Instruments List	11
Table 8 220V AC Power Cable Pinouts	28
Table 9 -48V DC Power Cable Pinouts	29
Table 10 External Interfaces on the Transfer Board	36
Table 11 7-core Aeronautic Connector Cable Signal Definitions	39
Table 12 RA25 Physical Indices	79
Table 13 RA25 Power Supply Indices	80
Table 14 RA25 Power Consumption Indices	80