AN5116-06B

Optical Line Terminal Equipment

Installation Guide

Version: B

Code: MN000000068

FiberHome Telecommunication Technologies Co., Ltd.

April 2012

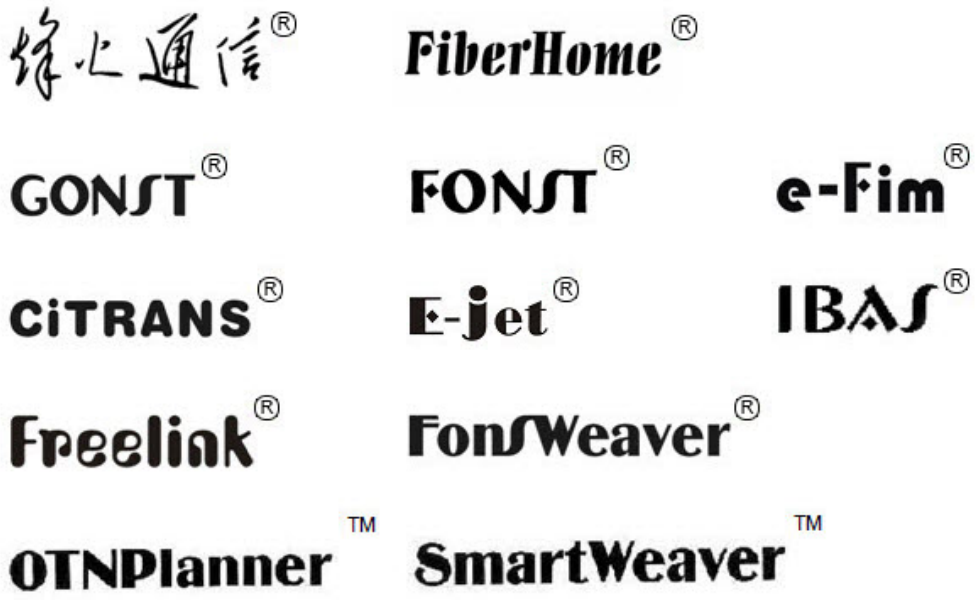
Thank you for choosing our products.

We appreciate your business. Your satisfaction is our goal. We will provide you with comprehensive technical support and after-sales service. Please contact your local sales representative, service representative or distributor for any help needed at the contact information shown below.

Fiberhome Telecommunication Technologies Co., Ltd.

Address: No.5 Dongxin Rd., Hongshan Dist., Wuhan, China
Zip code: 430073
Tel: +86 27 8769 1549
Fax: +86 27 8769 1755
Website: http://www.fiberhomegroup.com

Legal Notice



Preface

Related Documentation

Document	Description
AN5116–06B Optical Line Terminal Equipment Documentation Guide	Introduces the retrieval method, contents, releasing, reading approach, and suggestion feedback method for the complete manual set for the AN5116-06B.
AN5116–06B Optical Line Terminal Equipment Product Description	Introduces the AN5116-06B's network location, functional features, hardware structure, FTTx application model, equipment configuration, network management system and technical specifications. It is the foundation of the complete manual set. Other manuals extend and enrich the concepts introduced in the Product Description.
AN5116–06B Optical Line Terminal Equipment Feature Description	Introduces the key features supported by the AN5116-06B, including GPON / EPON access, GPON / EPON terminal management, VLAN, multicast, voice and safety; and introduces these functions in details in terms of definition, features, specification, principle description, references and so on..
AN5116–06B Optical Line Terminal Equipment Hardware Description	Introduces the appearance, structure, functions, technical specifications, and operating method for the AN5116-06B's cabinet, PDP, subrack, cards, cables and wires, facilitating users' mastery of the hardware features of the equipment.
AN5116–06B Optical Line Terminal Equipment Installation Guide	Introduces the overall installation and acceptance inspection procedures from unpacking inspection to power-on examination after the equipment is delivered on site, and provides reference information (e.g. safety principles and wiring scheme of various interfaces) to guide users to install the equipment.
AN5116–06B Optical Line Terminal Equipment EPON Configuration Guide	Introduces the method for configuring the EPON services supported by the AN5116-06B via the ANM2000, such as basic configuration, voice service configuration, data service configuration, multicast service configuration, and software upgrading configuration, to guide users on start-up for various services and software upgrading.

Document	Description
AN5116–06B Optical Line Terminal Equipment GPON Configuration Guide	Introduces the method for configuring the GPON services supported by the AN5116-06B via the ANM2000, such as basic configuration, voice service configuration, data service configuration, multicast service configuration, and software upgrading configuration, to guide users on startup for various services and software upgrading.
AN5116–06B Optical Line Terminal Equipment GUI Reference	Introduces the shortcut menu for every card of the AN5116-06B on the ANM2000, including the function, parameter explanation, precautions and configuration example of every command in the shortcut menu of each card, to help users master the operation of the AN5116-06B using the ANM2000.
AN5116–06B Optical Line Terminal Equipment Component Replacement	Introduces the operation procedures of replacing the AN5116-06B's components, including preparations, precautions, early operations, operation process and subsequent operations, so as to guide users with the component replacement on the hardware.
AN5116–06B Optical Line Terminal Equipment Routine Maintenance	Introduces the daily, weekly, monthly, quarterly and annual routine maintenance operations of the AN5116-06B. Users are able to eliminate the potential risks in the equipment operation process as early as possible via implementing the routine maintenance.
AN5116–06B Optical Line Terminal Equipment Alarm and Event Reference	Introduces the AN5116-06B's alarm / event information, including alarm / event names, alarm / event levels, possible reasons, effects on the system, and processing procedure, to guide users on effective alarm / event processing.
AN5116–06B Optical Line Terminal Equipment Troubleshooting Guide	Introduces the fault processing principles and methods of fault diagnosis and isolation for the AN5116-06B. Also discusses the typical fault cases of various EPON / GPON services. In case of complex issues, users can contact FiberHome for technical support according to the instructions in this document.

Version

Version	Description
A	This manual corresponds to EPON V1.0 and GPON V1.0 of the AN5116-06B. Initial version.
B	This manual corresponds to EPON V3.1 and GPON V3.1 of the AN5116-06B. Compared with Version A, Version B deletes the related description of the PDP (3.000.043) and cabinet installation, and adds the related description of the PDP (3.000.059) and the GU6F card.

Intended Readers

This manual is intended for the following readers:

- Planning and designing engineers
- Commissioning engineers
- Operation and maintenance engineers

To use this manual, these prerequisite skills are necessary:

- PTN technology
- Data communication technology
- Optical fiber communication technology
- SDH communication theory
- Ethernet technology

Conventions

Terminology Conventions

Terminology	Convention
AN5116-06B	AN5116-06B Optical Line Terminal Equipment
EC4B	4×EPON-C Interface Card (type B)
EC8B	8×EPON-C Interface Card (type B)
GC4B	4×GPON-C Interface Card (type B)
GC8B	8×GPON-C Interface Card (type B)
XG2B	2×10G EPON-C Interface Card (type B)
C155A	4×GE + 1×10GE Optical Interface Uplink Card (CES Mode)
CE1B	32×E1 Optical Interface Card (CES mode) (type B)
PUBA	Public Card (type A)
HSWA	Core Switch Card (EPON) (card No.: 2.115.334)
	Core Switch Card (type A) (card No.: 2.115.331)
HU1A	4×GE + 1×10GE Optical Interface Uplink Card
HU2A	2×GE + 2×10GE Optical Interface Uplink Card
GU6F	6×GE Optical Interface Uplink Card

Symbol Conventions

Symbol	Convention	Description
	Note	Important features or operation guide.
	Caution	Possible injury to persons or systems, or cause traffic interruption or loss.
	Warning	May cause severe bodily injuries.
➔	Jump	Jumps to another step.
→	Cascading menu	Connects multi-level menu options.
↔	Bidirectional service	The service signal is bidirectional.
→	Unidirectional service	The service signal is unidirectional.

Contents

Preface I

Related Documentation I

Version III

Intended Readers III

Conventions IV

1 Safety Precautions 1-1

1.1 General Safety Precautions 1-2

1.2 Laser Safety 1-4

1.3 Safety When Using a Ladder 1-4

1.4 Mechanical Safety 1-5

1.5 Other Safety Precautions 1-6

2 Equipment Introduction 2-1

2.1 Cabinet 2-2

2.1.1 19-inch Cabinet 2-2

2.1.2 21-inch Cabinet 2-7

2.2 Subrack 2-13

2.3 Fiber Passage Unit 2-14

2.4 PDP 2-15

2.5 Equipment Layout 2-16

3 Equipment Installation Flow 3-1

4 Installation Preparation 4-1

4.1 Preparing Technical Documents of Construction 4-2

4.2 Preparing Tools and Instruments 4-2

4.3 Inspecting the Installation Environment 4-3

4.3.1 Reference Standards for Equipment Installation 4-3

4.3.2 Equipment Room Environment 4-3

4.3.3 Equipment Room Construction 4-4

4.3.4 Equipment Room Interior Environment 4-5
4.3.5 Equipment Room Power Supply 4-8
4.3.6 Lightning-proofing and Grounding 4-9
4.3.7 Supporting Facilities 4-9
4.4 Unpacking Inspection 4-10
4.4.1 Inspecting the External Packing 4-10
4.4.2 Unpacking the Wooden Box 4-10
4.4.3 Unpacking the Carton 4-13
4.4.4 Unpacking the Card 4-14
4.5 Inspection and Acceptance 4-17
4.5.1 Checking Against the Packing List 4-17
4.5.2 Check against Equipment Configuration List 4-17
5 Installing the Cabinet 5-1
6 Installing the Subrack and Relevant Components 6-1
6.1 Installing the Subrack in the 19-inch Cabinet 6-2
6.1.1 Installing the Slide Rails 6-2
6.1.2 Installing the Subrack into the Cabinet 6-4
6.2 Installing the Subrack in the 21-inch Cabinet 6-5
6.2.1 Installing the Slide Rails 6-6
6.2.2 Installing the Subrack into the Cabinet 6-7
6.3 Installing the Fiber Passage Unit 6-9
6.3.1 Installing the Fiber Passage Unit in the 19-inch Cabinet 6-9
6.3.2 Installing the Fiber Passage Unit in the 21-inch Cabinet 6-10
6.4 Plugging / Unplugging the Card 6-11
6.4.1 Plugging the Card 6-11
6.4.2 Unplugging a Card 6-12
6.5 Installing and Removing the Fan Unit 6-13
6.5.1 Removing the Fan Unit 6-14
6.5.2 Installing the Fan Unit 6-14
6.6 Installing and Removing the Subrack Anti-dust Screen 6-16
6.6.1 Removing the Subrack Anti-dust Screen 6-16
6.6.2 Installing the Subrack Anti-dust Screen 6-17
7 Connection and Layout of the Wires and Cables 7-1

7.1 Requirements for the Layout of Wires and Cables 7-2
7.2 Introduction to the Wires and Cables 7-6
7.3 Connection and Layout of the Internal Wires and Cables 7-7
7.3.1 Connection and Layout of the Cabinet Protection Earth Ground Cable 7-8
7.3.2 Connection and Layout of the Subrack Protection Earth Ground Cable 7-10
7.3.3 Connection and Layout of the Subrack Power Cable 7-12
7.3.4 Connection and Layout of the Subrack Alarm Cable 7-16
7.4 Connection and Layout of the External Wires and Cables 7-18
7.4.1 Connection and Layout of the Cabinet Power Cable 7-18
7.4.2 Connection and Layout of the Alarm Cable for the Head of Row Cabinet 7-21
7.4.3 Connection and Layout of the E1 Cable.....7-22
7.4.4 Connection and Layout of the Clock Cable 7-27
7.4.5 Connection and Layout of the Dry Contact Cable.....7-31
7.4.6 Connection and Layout of the Ethernet Cable.....7-34
7.4.7 Connection and Layout of the Optical Fiber Jumper.....7-37
7.4.8 Connection of the Serial Port Line 7-41
8 Installing the Cabinet Doors 8-1
9 Checking the Installation 9-1
9.1 Checking the Cabinet Installation 9-2
9.2 Checking Connection and Layout of Wires and Cables 9-3
9.3 Checking the Power and Grounding 9-5
9.4 Checking the Environment and Security of the Equipment Room 9-7
9.5 Checking the Connectivity of Wires and Cables 9-8
10 Power-on Testing 10-1
10.1 Testing Power-on 10-2
10.1.1 Testing Cabinet Power-on 10-2
10.1.2 Testing Subrack Power-on 10-3
10.2 Testing Power-off 10-4
Appendix A PDP A-1
A.1 Front Panel A-1

A.2 Connectors A-1
A.3 Power Connectors A-2
A.4 Alarm Connectors A-3
A.5 Jumper Pin A-3
A.6 Lightning Protection Module A-4
Appendix B Adjustable Cabinet Base B-1
B.1 Classification of the Adjustable Cabinet Bases B-1
B.2 Adjustable Cabinet Base Structure (for the 19-inch Cabinet) B-2
B.3 Adjustable Cabinet Base Structure (for the 21-inch Cabinet) B-3

Figures

Figure 1-1 Slant angle of the ladder 1-5
Figure 2-1 The outline of the 19-inch cabinet 2-3
Figure 2-2 The exploded view of the 19-inch cabinet 2-4
Figure 2-3 The structure of the 19-inch cabinet 2-5
Figure 2-4 The outline of the 21-inch cabinet 2-8
Figure 2-5 The exploded view of the 21-inch cabinet 2-9
Figure 2-6 The structure of the 21-inch cabinet 2-11
Figure 2-7 The subrack structure 2-13
Figure 2-8 The fiber passage unit for the 19-inch cabinet 2-14
Figure 2-9 The fiber passage unit for the 21-inch cabinet 2-15
Figure 2-10 The layout of the 19-inch cabinet 2-16
Figure 2-11 The layout of the 21-inch cabinet 2-17
Figure 3-1 The equipment installation flow 3-1
Figure 4-1 Prying the steel tab 4-11
Figure 4-2 Unpacking the wooden box 4-12
Figure 4-3 Removing wooden side panels 4-12
Figure 4-4 Unpacking a carton 4-13
Figure 4-5 Unpacking a card 4-15
Figure 4-6 Wearing the ESD protection wrist strap 4-16
Figure 6-1 The slide rails for the 19-inch cabinet 6-2
Figure 6-2 Installing the floating nut for the 19-inch cabinet 6-3
Figure 6-3 Installing the slide rails for the 19-inch cabinet 6-3
Figure 6-4 Installing the subrack in the 19-inch cabinet 6-5
Figure 6-5 The slide rails for the 21-inch cabinet 6-6
Figure 6-6 Installing the floating nut for the 21-inch cabinet 6-6
Figure 6-7 Installing the slide rails for the 21-inch cabinet 6-7
Figure 6-8 Installing the subrack in the 21-inch cabinet 6-8
Figure 6-9 Installing the fiber passage unit for the 19-inch cabinet 6-10

Figure 6-10 Installing the fiber passage unit for the 21-inch cabinet 6-11
Figure 6-11 Installing the card 6-12
Figure 6-12 Unplugging a card 6-13
Figure 6-13 The fan unit 6-13
Figure 6-14 Removing the fan unit 6-14
Figure 6-15 The snap-in latch at the bottom of the fan unit 6-15
Figure 6-16 Installing the fan unit 6-15
Figure 6-17 The anti-dust screen 6-16
Figure 6-18 Pulling the anti-dust screen lightly 6-16
Figure 6-19 Pushing the anti-dust screen lightly 6-17
Figure 6-20 Removing the anti-dust screen 6-17
Figure 6-21 Installing the anti-dust screen 6-18
Figure 7-1 Binding of straight cables 7-4
Figure 7-2 Binding of lead-out cables 7-4
Figure 7-3 Arranging the wire binder 7-5
Figure 7-4 Binding of bent cables 7-5
Figure 7-5 Arranging the wires and cables 7-6
Figure 7-6 The cabinet protection earth ground cable 7-8
Figure 7-7 Removing the PDP's front panel 7-9
Figure 7-8 Connecting the cabinet protection earth ground cable for the 21-inch cabinet 7-10
Figure 7-9 The subrack protection earth ground cable 7-10
Figure 7-10 Installing the subrack protection earth ground cable at the equipment side 7-11
Figure 7-11 Connection of the subrack protection earth ground cable 7-12
Figure 7-12 The subrack power cable 7-13
Figure 7-13 Arranging the subrack power cable 7-14
Figure 7-14 Connecting the subrack power cable at the PDP side 7-15
Figure 7-15 The network cable 7-16
Figure 7-16 Arranging the alarm cable 7-17
Figure 7-17 Connecting the subrack alarm cable at the PDP side 7-18
Figure 7-18 The cabinet power cable 7-19

Figure 7-19 Connecting the cabinet power cable 7-20
Figure 7-20 The alarm cable for the head of row cabinet..... 7-21
Figure 7-21 Connecting the alarm cable for the head of row cabinet 7-22
Figure 7-22 The DB-44P connector 7-22
Figure 7-23 The pins of the DB-44P connector..... 7-23
Figure 7-24 Arranging the E1 cable in the top access wiring mode 7-25
Figure 7-25 Arranging the E1 cable in the floor access wiring mode..... 7-26
Figure 7-26 The coaxial clock cable 7-27
Figure 7-27 Arranging the clock cable in the top access wiring mode..... 7-29
Figure 7-28 Arranging the clock cable in the floor access wiring mode 7-30
Figure 7-29 Arranging the dry contact cable in the top access wiring mode 7-32
Figure 7-30 Arranging the dry contact cable in the floor access wiring mode 7-33
Figure 7-31 Arranging the network cable in the top access wiring mode..... 7-35
Figure 7-32 Arranging the network cable in the floor access wiring mode..... 7-36
Figure 7-33 The LC / PC-type fiber connector 7-37
Figure 7-34 The SC / PC-type fiber connector 7-37
Figure 7-35 Arranging the optical fibers in the top access wiring mode..... 7-39
Figure 7-36 Arranging the optical fibers in the floor access wiring mode..... 7-40
Figure 7-37 The serial port line 7-41
Figure 7-38 Connecting the serial port line 7-42
Figure A-1 The PDP 296B’s front panel A-1
Figure A-2 The PDP's connectors A-2
Figure B-1 The adjustable cabinet base (type I, II and III)..... B-2
Figure B-2 The adjustable cabinet base (type IV and V) B-3
Figure B-3 The adjustable cabinet base (type I, II and III)..... B-4
Figure B-4 The adjustable cabinet base (type IV and V) B-5

Tables

Table 2-1 The dimensions, codes and weights of the 19-inch cabinets 2-2
Table 2-2 The name and function of each main part on the cabinet.....2-6
Table 2-3 The available height inside the 19-inch cabinet.....2-6
Table 2-4 The dimensions, codes and weights of the 21-inch cabinets 2-7
Table 2-5 The name and function of each main part on the 21-inch cabinet ..2-12
Table 2-6 The available height inside the 21-inch cabinet.....2-12
Table 2-7 The description for the AN5116-06B subrack.....2-14
Table 4-1 The list of tools and instruments 4-2
Table 4-2 The reference standards for equipment installation.....4-3
Table 4-3 The checklist for the equipment room construction.....4-4
Table 7-1 The function of the cables and wires.....7-6
Table 7-2 The cabinet power cable 7-19
Table 7-3 The wiring scheme of the DB-44P connector 7-23
Table 7-4 The definition of the RJ-45 connector' pins 7-31
Table 7-5 The optical fiber connectors 7-37
Table 9-1 The checklist of the cabinet installation.....9-2
Table 9-2 The checklist of the wires and cables 9-3
Table 9-3 The checklist of the power and grounding.....9-5
Table 9-4 The checklist of the environment and security inside the equipment room.....9-7
Table 9-5 The checklist of the wires and cables' connectivity.....9-8
Table A-1 The description of the external power input connectors A-2
Table A-2 The description of the branch power rail output connectors A-2
Table B-1 The types and application of the adjustable cabinet bases B-1

1 Safety Precautions

This chapter mainly introduces the safety precautions that users should obey during the installation, operation and maintenance of the AN5116-06B. This chapter includes the following sections:

- ☑ General Safety Precautions
- ☑ Laser Safety
- ☑ Safety When Using a Ladder
- ☑ Mechanical Safety
- ☑ Other Safety Precautions

1.1 General Safety Precautions

This section introduces some general safety precautions that instruct users in installing FiberHome communication equipment.

Note:

When operating the equipment, always comply with local laws and regulations. The safety precautions provided in this guide are supplementary to local laws and regulations.

Installation requirements

- Personnel responsible for the installation of equipment must undergo a rigorous training, so as to keep various safety precautions in mind and master correct operation methods before they are allowed to start the installation.
- No operations on equipment unrelated to the project or entrance to the unrelated areas without permission from the user.
- During the equipment installation, operating personnel should be in strict accordance with the installation procedures and requirements.
- During the equipment installation, operating personnel should report promptly the faults and errors that might cause safety problems.

Grounding requirements

- Damaging the grounding conductor may inhibit proper operation of the equipment and should be avoided.
- A good protection earth ground should be provided before the equipment installation.
- Before the equipment is powered on, the protection earth ground cable of its chassis should be well grounded. Make sure that the insulation resistance and ground resistance meet the specification; and that the power ground is making a good connection.

Human safety

- Do not install / operate the equipment or lay cables during a lightning storm. Direct or indirect contact (through damp objects) with high voltage power supply can cause bodily harm and should be avoided.
- Do not connect or remove the power cable while it is powered. Do not insert the power cable without a plug directly into the socket.
- To prevent laser radiation from injuring eyes, do not look into the end face of the fiber or fiber connector directly with naked eyes.
- Before installing the equipment, users should wear ESD protection clothing and a wrist strap. Do not wear conductive articles such as jewelry and watches to prevent electric shock and burn.
- During the installation, the tools used (such as a soldering iron) should be electrically insulated and must be used and kept properly; otherwise they may do harm to human body and cause damage to the equipment or circuit board.
- In case of fire, users should evacuate the building or equipment area, and activate any alarm system or make a fire alarm call.

Equipment safety

- Do not install the equipment before construction of the equipment room is completed.
- When moving or lifting the equipment, avoid collisions with other hard objects.
- Never stack two or more devices to move together, so as to avoid collapse and wear.
- The equipment should be installed in a place that is away from direct sunlight but has good ventilation.
- Do not place the equipment near flammable, explosive, corrosive materials or in an atmosphere with solvent gases or smoke.

1.2 Laser Safety

Relevant knowledge

The laser transceivers are used in the optical transmission system and associated test tools. The laser being transmitted through the naked optical fiber and fiber connector produces a small beam of light, which has very high power density and is invisible to human eyes.

To reduce risk of injury to the eyes, do not look directly into the laser light. Viewing an un-terminated fiber or damaged fiber with the unaided eye at distances greater than 150 mm will normally not cause eye injury. However, damage may occur if an optical tool such as a microscope, magnifying glass or eye loupe is used to view the energized fiber end.

Safety measures

To avoid laser damage, obey the following descriptions:

- All operations should be performed by authorized personnel who have completed the required training courses.
- Wear a pair of eye-protective glasses when you are handling or near a strong laser.
- Never look directly into or near the end face of the optical fiber or connector before you ensure that the optical source is switched off.
- Use an optical power meter to check and make sure that the optical source is switched off by measuring the optical power.
- When handling or near a laser, do not wear reflective objects as jewelry and watches to prevent accidental eye injury.
- Before cutting or splicing optical fibers, make sure that the fibers is disconnected from the optical source.

1.3 Safety When Using a Ladder

- Before using a ladder, first check whether the ladder is solid enough to stand on; the ladder shall be put into use only after it is examined and found to be qualified.

- Make sure the ladder is safe for use. Overweight on the ladder is strictly prohibited.
- The suitable slant angle of the ladder ranges from 60° to 70°, as shown in Figure 1-1. The ladder should be placed on stable ground.

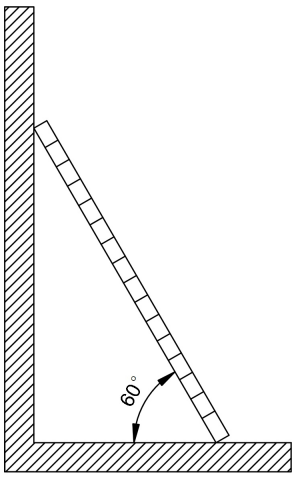


Figure 1-1 Slant angle of the ladder

- The width of ladder should be no less than 50cm; and the ladder should be equipped with anti-skid feet to prevent slipping.
- Ensure that your center of gravity does not deviate from the ladder edge. To reduce the danger and ensure safety, maintain your balance on the ladder before and during any operation.
- Installation personnel should wear anti-skid shoes.
- Avoid stepping on any cables, the cabinet or other equipment.
- Keep all objects secured, preventing them from falling on top of or hitting the equipment.
- Protect the cabinet top from the construction wastes such as metal filings.

1.4 Mechanical Safety

Various tools and instruments are needed for operating the equipment. Proper operation can help avoid damage to human body and the equipment. This section introduces the safety precautions in drilling and handling sharp objects.

Drilling

- Drilling on the cabinet without prior authorization is strictly prohibited. Drilling may damage the electromagnetic shield (EMS) performance and the wires and cables inside the equipment. If the metal filings from the drilling fall into the cabinet, it may result in an electrical shorting on one or more circuit boards.
- During the drilling, users should fully comply with the prescribed safety measures, and should confirm the position, dimension and depth first.
- Before drilling, wear close fitting sleeves or bind up the cuffs.
- Clean the metal shavings with a vacuum immediately after completing the drilling operation. Do not blow metal shavings away using compressed air, by mouth or other means. Do not pick metal shavings up by hand.

Sharp objects

- When carrying the equipment by hand, wear the protection gloves to avoid injury by sharp objects.
- Generally, two persons are needed for lifting or moving the cabinet. Lift the cabinet by grasping its lower edges from both ends, and place it on the ESD protective cushion with good grounding. When moving the cabinet, use care not to collide with other objects.
- When using an electric drill or other tools, follow the corresponding rules to avoid damage to human body.

1.5 Other Safety Precautions

Plugging / unplugging a card

- When plugging / unplugging a card, wear an ESD protection wrist strap and slide the card slowly along the slide rails to avoid distorting pins on the backplane.
- Prevent the circuit surfaces of cards from contacting each other, to avoid shorting or scratching.

- Always wear an ESD protection wrist strap and connect it to the ESD protection earth ground fastener on the cabinet when touching a card's circuitry, components, connectors, or wiring trough, so as to prevent damage to sensitive devices caused by electrostatic discharge.

Binding cables

- All the wires and cables used in onsite installation, such as power cables, alarm cables and optical fibers, should be laid out independently and bound separately according to their cable type. Note that optical fibers cannot be bound with typical wire binder.
- After completing the equipment installation, do not adjust the position of the equipment or cables.

Laying cables

- If the temperature is too low to allow proper cable handling, measures should be taken to warm cables before handling.
- When carrying cables, especially in low temperature, users should handle them with great care. When transporting cable for short distances, it is common practice to roll the cable spool. When rolling cable spool, always follow the direction indicated by the arrow on the spool. If there is no arrow indication on the spool, follow the direction that the cable is wound on the spool. Never roll the spool in the opposite direction as the cable ring may become loose.
- The cable staging area should be safe and stable, away from any heat sources.
- The cables' bends and branching elements should be kept in a proper order; that is, they should be arranged neatly without crossing or twisting. Any bends in the cable should be smooth and without any kinks. The power cable should be a single piece. Avoid connecting or welding two cables to form a longer one.
- When laying cables, it is better to lay, arrange and secure them one by one.
- The labels on the cables should be clear and complete.

2 Equipment Introduction

This chapter introduces the component parts of the AN5116-06B, including the following sections:

- ☑ Cabinet
- ☑ Subrack
- ☑ Fiber Passage Unit
- ☑ PDP
- ☑ Equipment Layout

2.1 Cabinet

The cabinet is the outer frame of the equipment. It provides support for power supply, supports layout of wires and cables, performs proper equipment cooling, prevents dust intrusion, and protects the equipment. The AN5116-06B can be installed in the 19-inch cabinet or the 21-inch cabinet. This section describes these two kinds of cabinets respectively.

2.1.1 19-inch Cabinet

Cabinet structure

The 19-inch cabinet has three specifications for choice, as shown in Table 2-1.

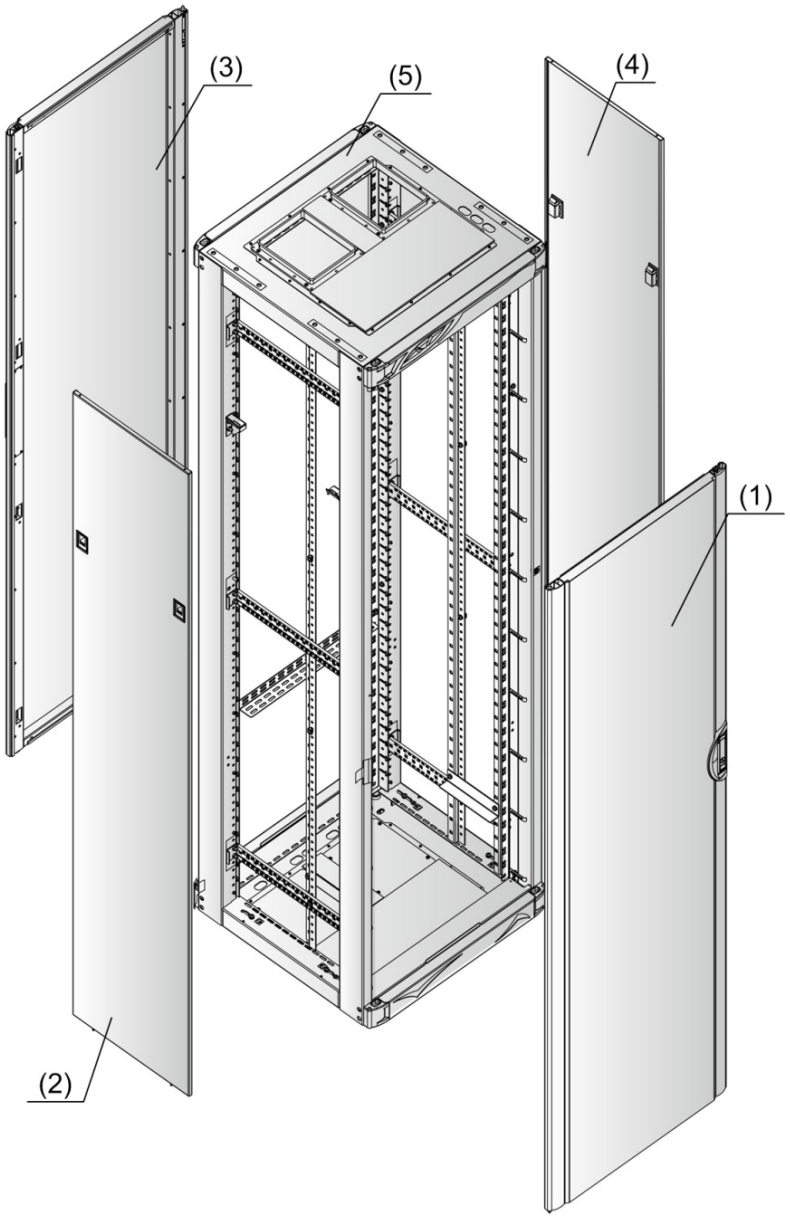
Table 2-1 The dimensions, codes and weights of the 19-inch cabinets

Type	Dimension (H × W × D) (mm)	Code	Weight (kg)
19-inch cabinet	2000 × 600 × 600	4.102.597	109
	2200 × 600 × 600	4.102.598	117
	2600 × 600 × 600	4.102.599	134

The 19-inch cabinet's outline is shown in Figure 2-1.

Figure 2-1 The outline of the 19-inch cabinet

The cabinet is composed of the cabinet body and cabinet doors, as shown in Figure 2-2.



(1) Front door (2) Left side door (3) Rear door

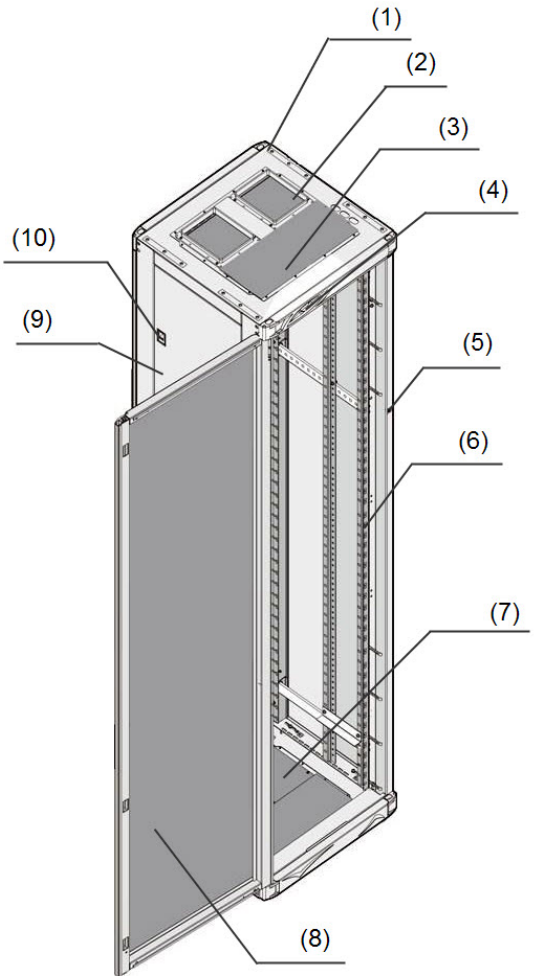
(4) Right side door (5) Cabinet body

Figure 2-2 The exploded view of the 19-inch cabinet

- The cabinet body consists of four vertical mounting flanges, the cabinet top, the cabinet base, as well as slide rails and connecting pieces between the vertical mounting flanges.

- The cabinet doors include the front door, the side doors and the rear door, all of which can be removed from the cabinet for easy access to the internal equipment.

Figure 2-3 shows the structure of the 19-inch cabinet and marks the position and name of each main component.



(1) Mounting hole for the top-connection bent angle bracket	(2) Wiring hole (top)
(3) Ventilation hole (top)	(4) Cabinet-top indicator LED
(5) ESD protection earth ground fastener	(6) Mounting hole on the vertical mounting flange
(7) Wiring hole (bottom)	(8) Front door
(9) Side door	(10) Switch of the side door

Figure 2-3 The structure of the 19-inch cabinet

Table 2-2 lists the name and function of each main part on the 19-inch cabinet.

Table 2-2 The name and function of each main part on the cabinet

Part	No.	Name	Function
Cabinet body	(1)	Mounting hole for the top-connection bent angle bracket	For installing the top-connection bent angle bracket on the cabinet top
	(2)	Wiring hole (top)	For leading in and out all wires and cables in the top access wiring mode
	(3)	Ventilation hole (top)	Located on the cabinet top, for ventilation and air cooling of the cabinet
	(4)	Cabinet-top indicator LED	For indicating cabinet alarm information with red, green, and yellow lights
	(5)	ESD protection earth ground fastener	For installing the ESD protection wrist strap to prevent the equipment from the electrostatic damage
	(6)	Mounting hole on the vertical mounting flanges	For securing the subrack and the PDP in the cabinet
	(7)	Wiring hole (bottom)	For leading in and out all wires and cables in the floor access wiring mode
Cabinet door	(8)	Front door	For protecting the subrack and preventing dust intrusion
	(9)	Side door	
	(10)	Switch of the side door	For opening and closing the side door

Internal space dimensions

Table 2-3 lists the available height inside the 19-inch cabinet.

Table 2-3 The available height inside the 19-inch cabinet

Height of Cabinet (mm)	Available Internal Height (mm)
2000	1875
2200	2075
2600	2475

2.1.2 21-inch Cabinet

Cabinet structure

The 21-inch cabinet has four specifications for choice, as shown in Table 2-4.

Table 2-4 The dimensions, codes and weights of the 21-inch cabinets

Type	Dimension (H × W × D) (mm)	Code
21-inch cabinet	1600 × 600 × 300	404000068
	2000 × 600 × 600	404000069
	2200 × 600 × 600	404000070
	2600 × 600 × 600	404000071

The 21-inch cabinet's outline is shown in Figure 2-4.

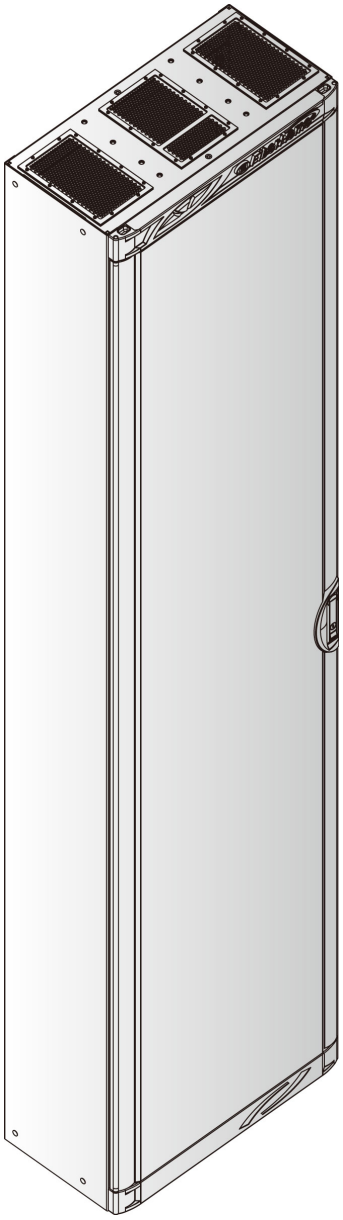
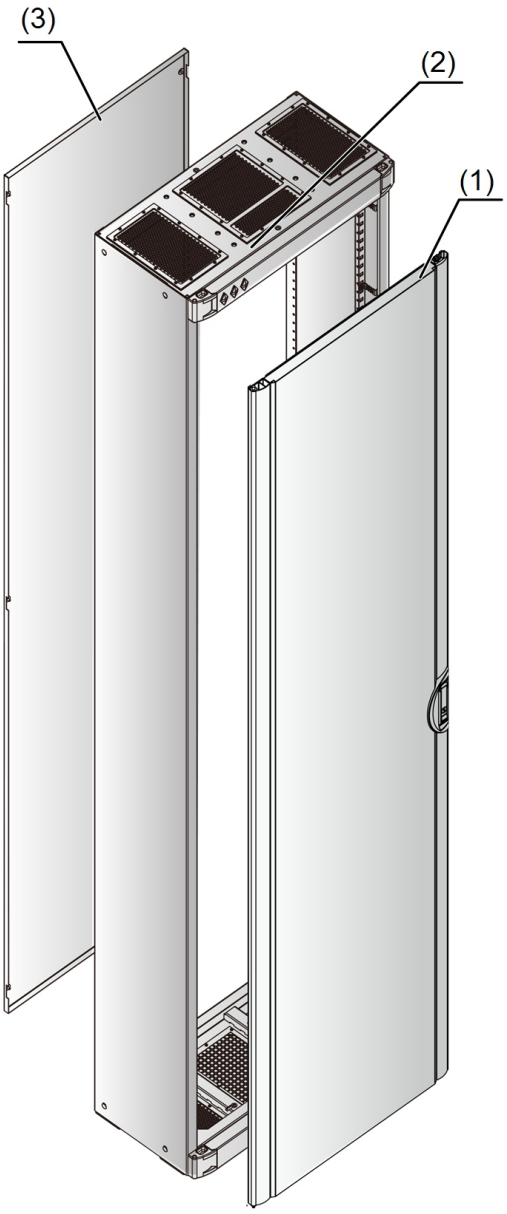


Figure 2-4 The outline of the 21-inch cabinet

The cabinet is composed of the cabinet body and cabinet doors, as shown in Figure 2-5.

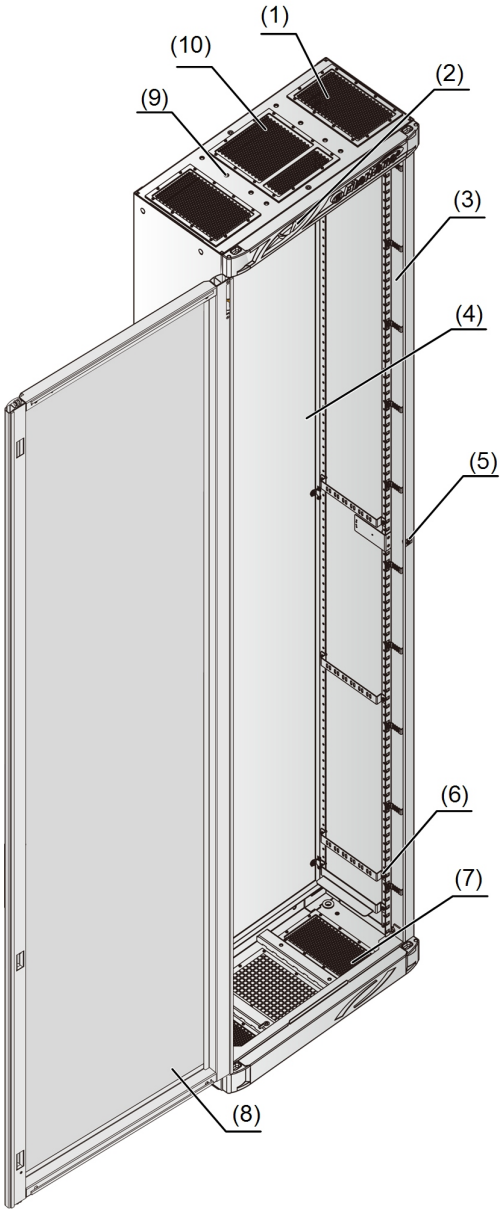


(1) Front door (2) Cabinet body (3) Rear door

Figure 2-5 The exploded view of the 21-inch cabinet

- The cabinet body consists of four vertical mounting flanges, the cabinet top, the cabinet base, as well as slide rails and connecting pieces between the vertical mounting flanges.
- The cabinet doors include the front door and the rear door, both of which can be removed from the cabinet for easy access to the internal equipment.

Figure 2-6 shows the structure of the 21-inch cabinet and marks the position and name of each main component.



(1) Wiring hole (top)
(2) Cabinet-top indicator LED
(3) Wiring channel
(4) Rear door
(5) ESD protection earth ground fastener
(6) Mounting hole on the vertical mounting flange
(7) Wiring hole (bottom)
(8) Front door
(9) Mounting hole for the top-connection bent angle bracket
(10) Ventilation hole (top)

Figure 2-6 The structure of the 21-inch cabinet

Table 2-5 lists the name and function of each main part on the 21-inch cabinet.

Table 2-5 The name and function of each main part on the 21-inch cabinet

Part	No.	Name	Function
Cabinet body	(1)	Wiring hole (top)	For leading in and out all wires and cables in the top access wiring mode
	(2)	Cabinet-top indicator LED	For indicating cabinet alarm information with red, green, and yellow lights
	(3)	Wiring channel	For laying wires and cables
	(5)	ESD protection earth ground fastener	For installing the ESD protection wrist strap to prevent the equipment from the electrostatic damage
	(6)	Mounting hole on the vertical mounting flanges	For securing the subrack and the PDP in the cabinet
	(7)	Wiring hole (bottom)	For leading in and out all wires and cables in the floor access wiring mode
	(9)	Mounting hole for the top-connection bent angle bracket	For installing the top-connection bent angle bracket on the cabinet top
Cabinet door	(10)	Ventilation hole (top)	Located on the cabinet top, for ventilation and air cooling of the cabinet
	(4)	Rear door	For protecting the subrack and preventing dust intrusion
	(8)	Front door	

Internal space dimensions

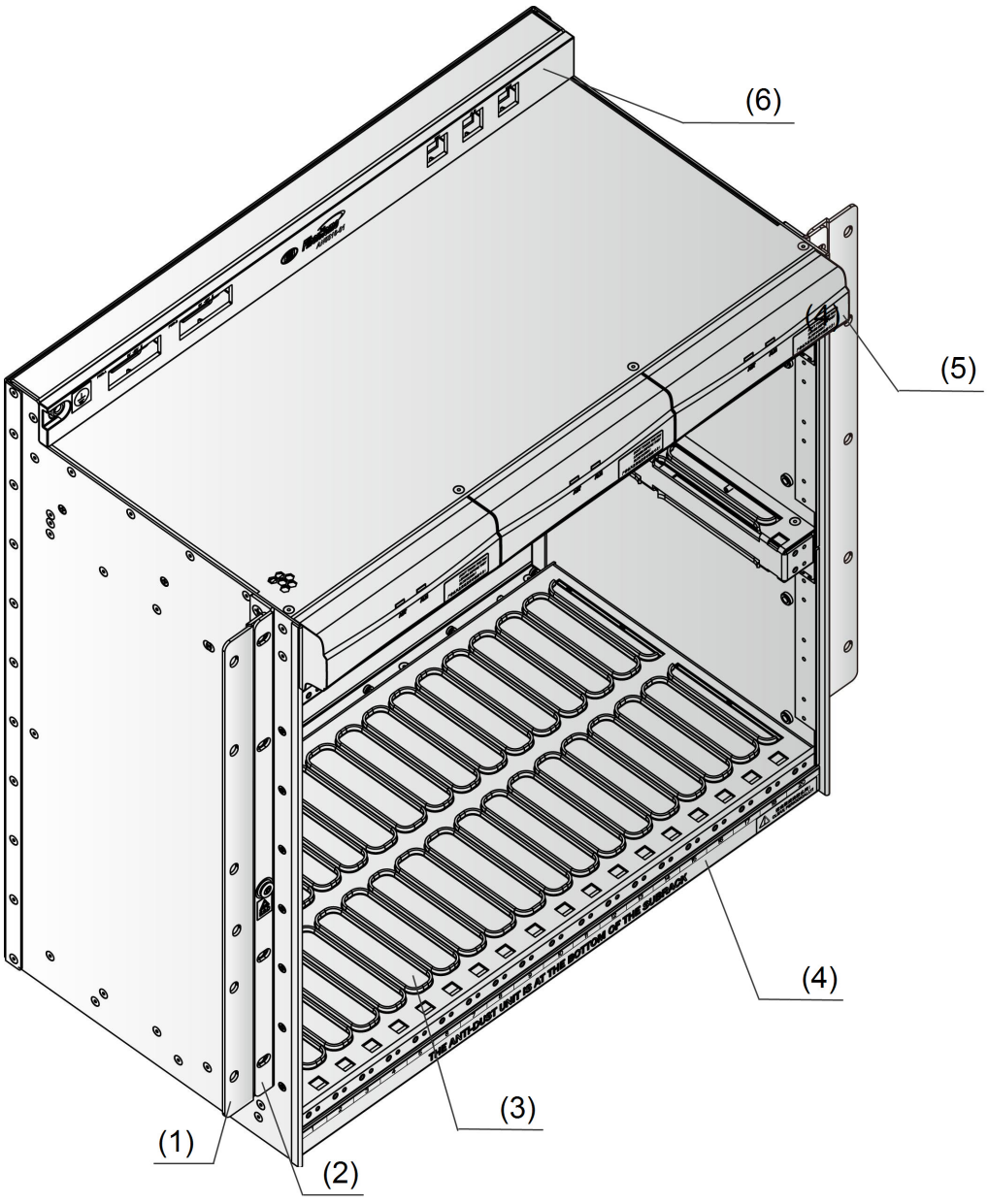
Table 2-6 lists the available height inside the 21-inch cabinet.

Table 2-6 The available height inside the 21-inch cabinet

Height of Cabinet (mm)	Available Internal Height (mm)
1600	1475
2000	1875
2200	2075
2600	2475

2.2 Subrack

The backplane of the AN5116-06B is located in the rear of the subrack. All cards of the equipment are plugged from the front of the subrack and the front wiring mode is used. The subrack structure and the component names are shown in Figure 2-7.



(1) Mounting ear (2) Adaptor mounting ear (3) Card area

(4) Anti-dust screen (5) Fan unit (6) Backplane

Figure 2-7 The subrack structure

Table 2-7 lists the description for each main part of the subrack.

Table 2-7 The description for the AN5116-06B subrack

No.	Name	Function
(1)	Mounting ear	Secures the subrack in a 19-inch cabinet.
(2)	Adaptor mounting ear	Secures the subrack in a 21-inch cabinet.
(3)	Card area	Holds cards to implement various functions of the equipment.
(4)	Anti-dust screen	Protects the subrack and prevents the dust from entering it.
(5)	Fan unit	For heat dissipation for the equipment.
(6)	Backplane	Provides subrack power interface and network interface.

2.3 Fiber Passage Unit

The AN5116-06B equipment has two fiber passage units: the upper one and the lower one, as shown in Figure 2-8 and Figure 2-9. The fiber passage units are generally installed in the lower part of the subrack. Each slot on the subrack corresponds to a fiber passage hole in the fiber passage unit. Fibers are arranged through the corresponding fiber passage holes to make the equipment's appearance more neat and orderly.

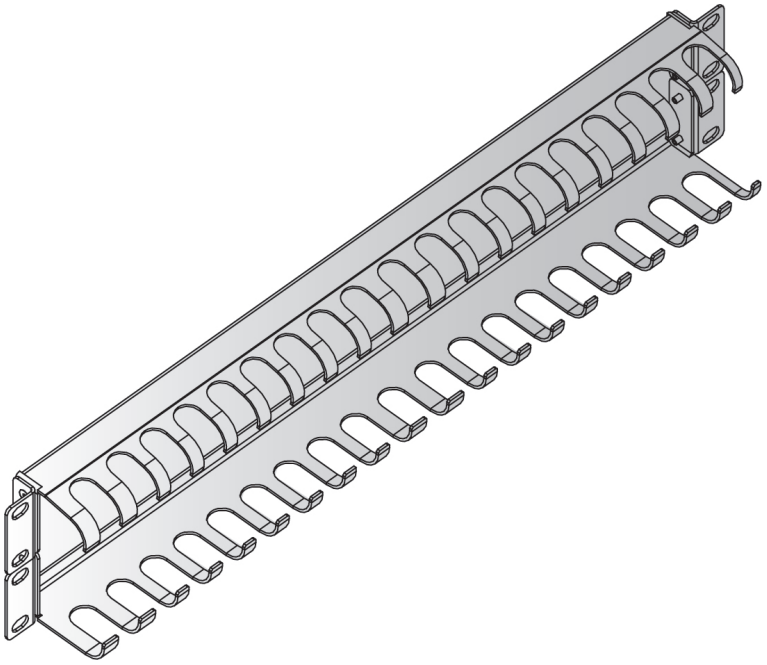


Figure 2-8 The fiber passage unit for the 19-inch cabinet

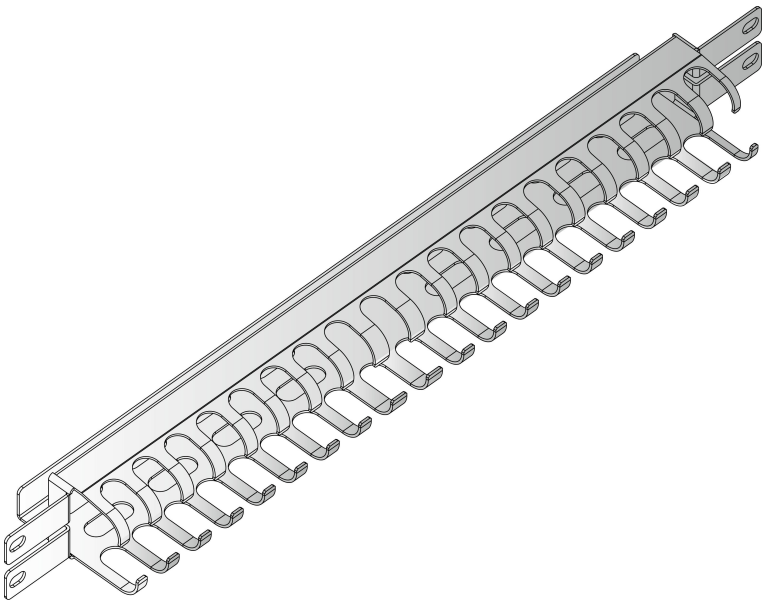


Figure 2-9 The fiber passage unit for the 21-inch cabinet

2.4 PDP

The AN5116-06B uses the PDP296B with dual power supplies. The primary functions of the PDP include power supply distribution, alarm signal processing, lightning protection and reverse polarity connection protection.

Note:

The PDP296B can be installed in the 19-inch 600mm-depth cabinet or the 21-inch 300mm-depth cabinet with different mounting ears.

The corresponding relationship between the cabinet and the extension code of the PDP is as follows:

- For a 21-inch cabinet (front installation): the 3000068-2FAR1A is used.
- For a 21-inch cabinet (rear installation): the 3000068-2BAR1A is used.
- For a 19-inch cabinet (front installation): the 3000068-1FAR1A is used.

2.5 Equipment Layout

From the top down, the cabinet hardware components are: the PDP and the subrack.

The AN5116-06B cabinet is equipped with two subracks by default. The typical configurations are shown in Figure 2-10 and Figure 2-11.

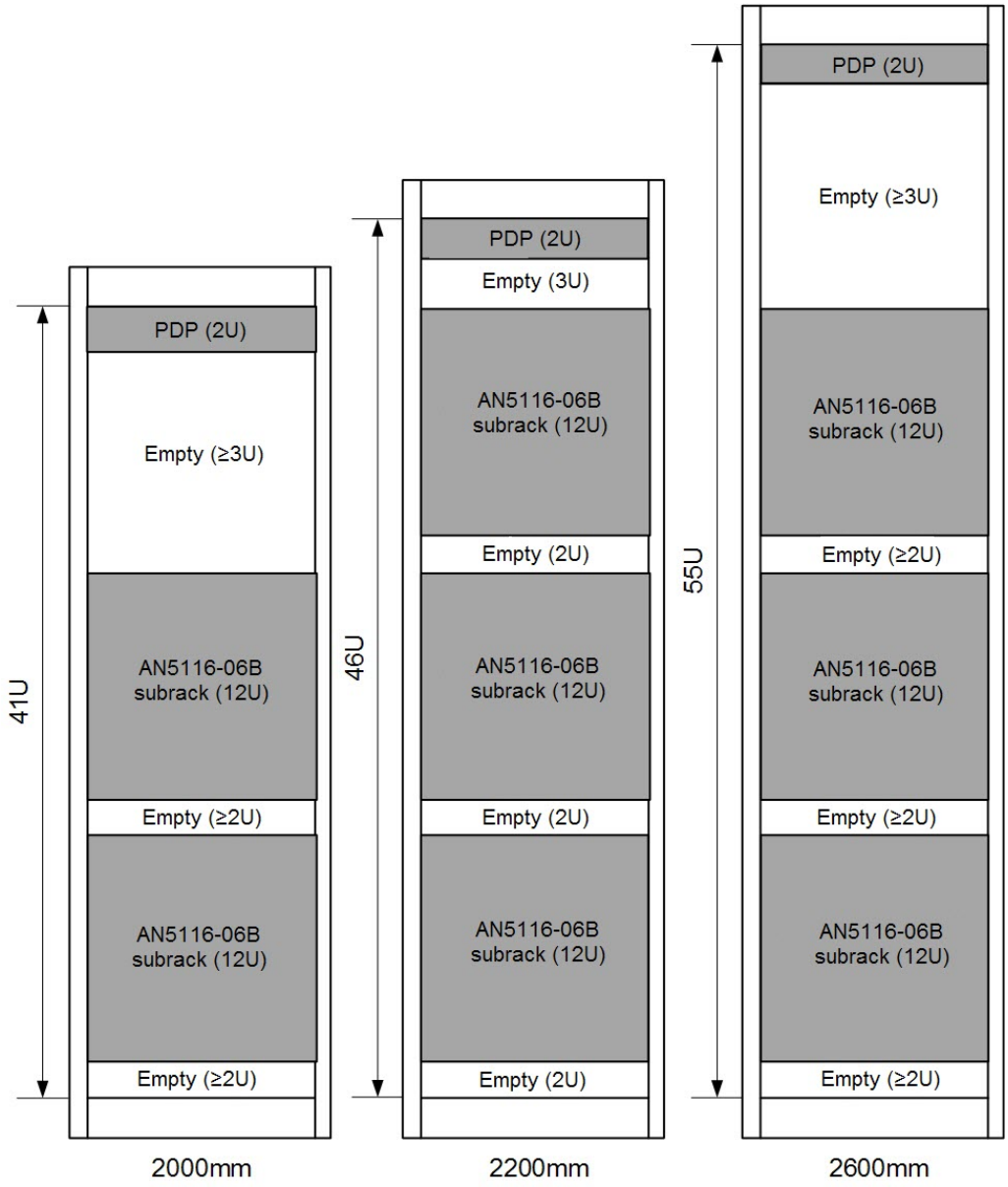


Figure 2-10 The layout of the 19-inch cabinet

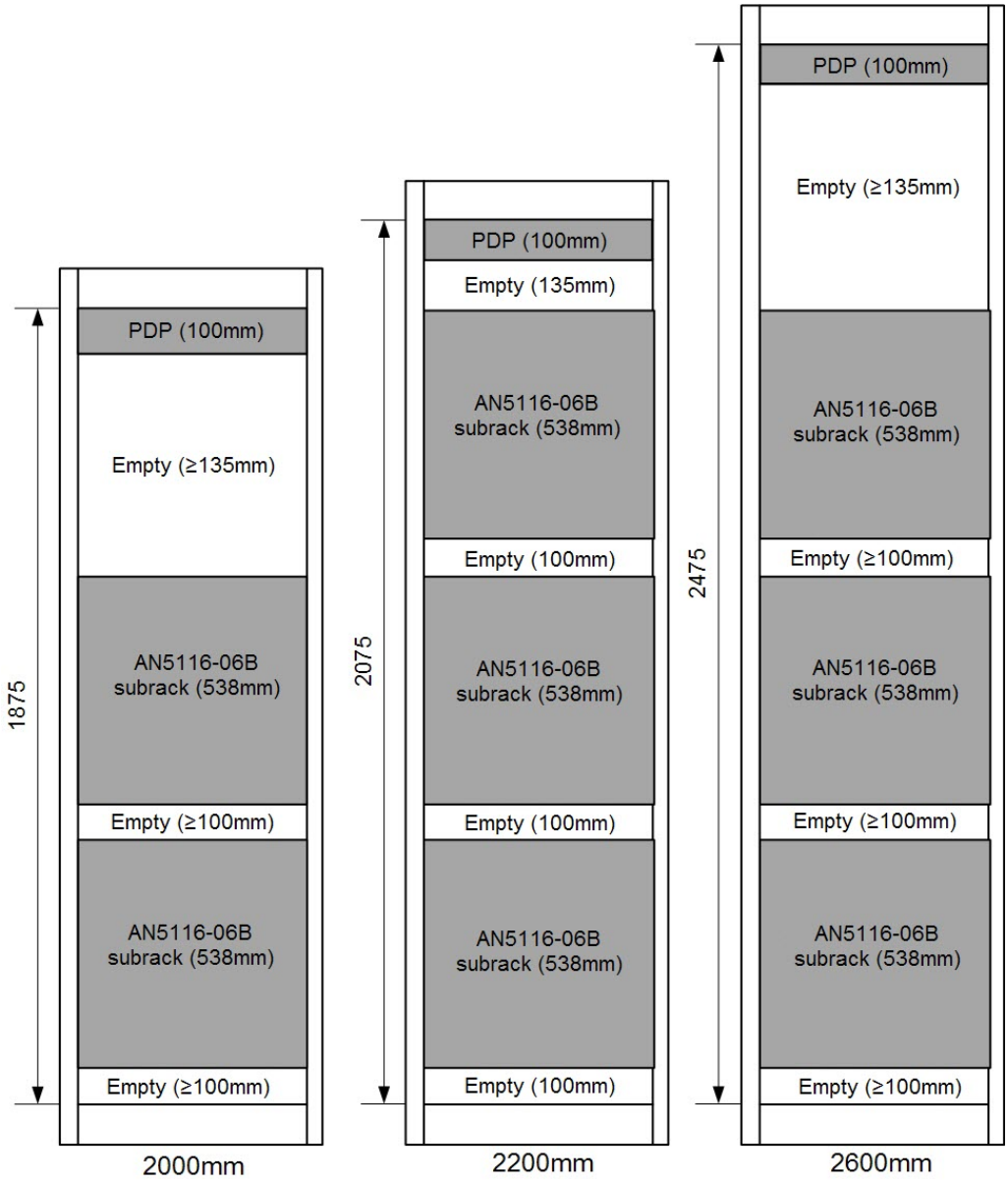


Figure 2-11 The layout of the 21-inch cabinet

Note:

If the cabinet is not fully occupied, lay the subracks from the bottom up to reserve the upper space for capacity expansion.

3 Equipment Installation Flow

To ensure the equipment installation quality and normal function after installation, please comply with the installation flow. The installation flow of the AN5116-06B is shown in Figure 3-1.

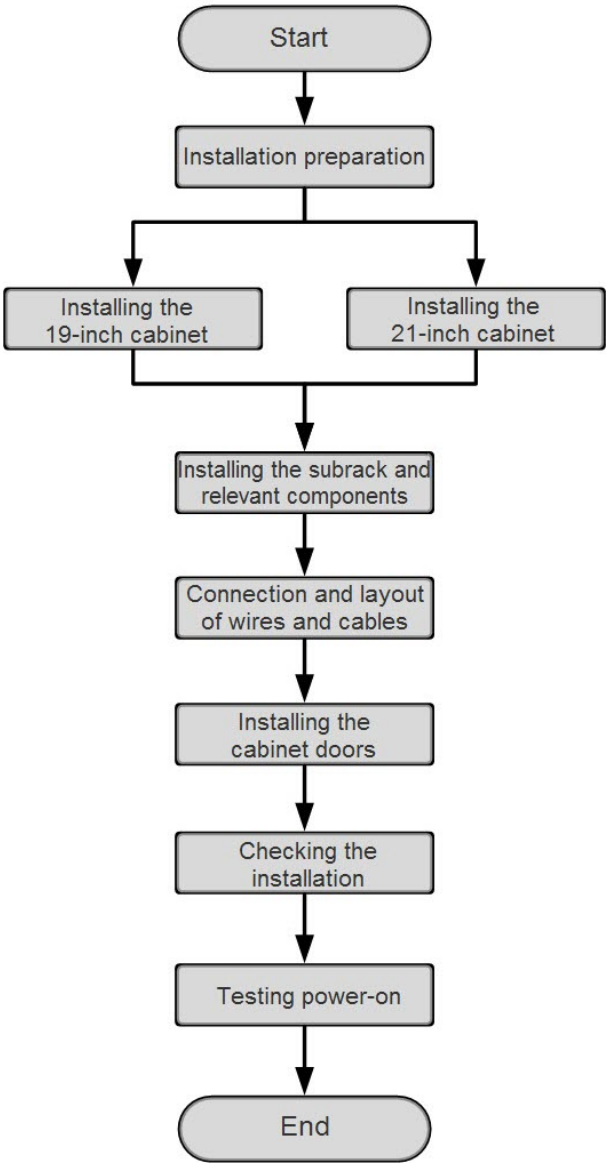


Figure 3-1 The equipment installation flow

4 Installation Preparation

Prior to installation, the installation personnel should read not only this manual but also the project design documents provided by the project design department or equivalent departments. They should understand the project as a whole including the equipment's location, arrangement and installation requirements.

- ☑ Preparing Technical Documents of Construction
- ☑ Preparing Tools and Instruments
- ☑ Inspecting the Installation Environment
- ☑ Unpacking Inspection
- ☑ Inspection and Acceptance

4.1 Preparing Technical Documents of Construction

Before the installation, installers should prepare the following technical documents:

- The contract agreement and equipment configuration list (provided by users).
- The design of the equipment room and construction details (provided by users).
- The *AN5116–06B Optical Line Terminal Equipment Installation Guide* (provided by FiberHome).

4.2 Preparing Tools and Instruments

Before the installation, installers should prepare the tools and instruments shown in Table 4-1.

Table 4-1 The list of tools and instruments

Category	Tool and Instrument
Measuring and marking tools	Measuring tape, ruler (1m), calipers, spirit level, marker pen, pencil
Drilling tools	Electric drill, matched drill bit, electric hammer, chisel, vacuum cleaner
Fixture tools	Flat screwdriver: M3, M4, M5, M6
	Cross screwdriver: M3, M4, M5, M6
	Adjustable spanner
	Female spanner: M6, M8, and M12
	Double offset ring spanner: M6, M8, and M12
Small tools	Sharp nose pliers, diagonal pliers, pliers, file, handsaw, crowbar, rubber hammer
Assistant tools	Brush, forceps, paper knife, bellow, ladder, soldering iron, solder wire, marble cutter
	ESD protection wrist strap/glove, wire stripper, crimping pliers, crystal head crimping pliers, cutting pliers
Test instruments	Multimeter, 500V megohmmeter (for testing insulation resistance), error detector, optical power meter, earth resistance tester, network cable tester

4.3 Inspecting the Installation Environment

The environment in and around the equipment room is related to the proper installation and operation of the equipment. Before installing the equipment, installers must inspect the installation environment. If some conditions do not meet the requirements, relevant corrective measures should be taken before installation begins to avoid unforeseen problems during installation and ensure stable operation of the equipment.

4.3.1 Reference Standards for Equipment Installation

The equipment room's structure, heating, ventilation, power supply, illumination and fire protection must be designed in accordance to the environmental requirements for access equipment. This environment must also satisfy current national standards and regulations, as well as relevant requirements of the user. The reference standards for the equipment installation are shown in Table 4-2.

Table 4-2 The reference standards for equipment installation

Number	Title
IEC 61000	Electromagnetic compatibility (EMC)
ETSI EN 300 386	Electromagnetic compatibility and Radio spectrum Matters (ERM) Telecommunication network equipment; Electro Magnetic Compatibility (EMC) requirements
ETS 300 019-1-3	Class 3.2 Partly temperature-controlled location
NEBS GR-63-CORE	Network Equipment-Building System (NEBS) Requirements:Physical Protection

4.3.2 Equipment Room Environment

Below are the four requirements for the location of the equipment room:

- Abundant water supply, stable and reliable power supply, convenient traffic and communication.
- Clean natural environment free of excessive dust, other airborne particulates, noxious gas, corrosive vapors, flammable material and explosive goods.
- Away from the strong vibration sources.

- Avoid interference from strong electromagnetic fields.

4.3.3 Equipment Room Construction

Table 4-3 lists the requirements for the construction of the equipment room.

Table 4-3 The checklist for the equipment room construction

Item	Requirement
Preparation	The construction of the equipment room and the corridor should be entirely completed and the wall inside the room should be adequately dried.
Area	The available space in the equipment room must be sufficient to contain all equipment and should allow for future growth. The distance between equipment should be convenient for operation.
Net height	The indoor clear height of the equipment room should be no less than 3m.
Load-bearing of floor	Load-bearing capability of the equipment room floor must be at least 600kg/m^2. If the equipment room cannot meet this requirement, users must reinforce the floor before beginning installation.
Doors	Height of the major doors in the equipment room should be no less than 2.2m and the width should be no less than 1m for a single swinging door and 1.5m for a double swinging door.
	The external door of the equipment room should be a vertical hinged door that opens in the direction of escape. Make sure the door can be opened from the inner side of the equipment room under any circumstance.
Windows	If the equipment room has windows, they should not be broken or have any part missing. If possible, use double-glazing. The window should be sealed with anti-dust rubber strip and cleaned regularly.
Wall surface	The wall surface of the equipment room should be smooth, clean, dustless, and not cracked. Avoid unnecessary moldings to prevent dust accumulation.
Grooves inside the room	The number, location and dimension of the concealed pipes, bottom wiring channels and holes that are reserved in the equipment room should meet the requirements for the layout of wires and cables and comply with the standards of the project design.
	The holes that cross the building envelope or floor slab should receive water-proofing, fire-proofing, moisture-proofing, insect-resistant and other protective treatments according to local conditions.
Water-proofing	Leaking or seeping of water in the equipment room is strictly prohibited. Thus do not array pipes that are irrelevant to the equipment room (such as water supply pipes, drain pipes, rainwater pipes, and sewage pipes) across the room.
	The windows and doors should not have water leakage or seepage.

Table 4-3 The checklist for the equipment room construction (Continued)

Item	Requirement
	The rooms above the equipment room should not be installed with water facilities, so as to prevent water leakage or seepage into the equipment room.
	The fire hydrants should be put in the obvious and accessible place rather than in the equipment room.
	The use of automatic water spraying system is prohibited in the equipment room.
Fire prevention	The equipment room should be equipped with effective fire-fighting devices. If the equipment is required to be configured with automatic fire alarm system or fixed gas fire-extinguishing system, users must keep the systems in good condition.
Seismic resistance	The seismic reinforcement of equipment rooms should be one level higher than the normal architectural requirements (typically level 7). Otherwise additional seismic reinforcement should be implemented.

4.3.4 Equipment Room Interior Environment

The interior environment of the equipment room includes illumination, temperature, humidity, dust-proofing, ESD protection, electromagnetic radiation protection, air-conditioning and ventilation.

Illumination requirements

Install adequate lighting (and emergency lighting) in the proper position between the cabinet racks, providing illumination for the installation and maintenance of the equipment. The average intensity of illumination is recommended to be 150lx to 200lx at horizontal plane and 30lx to 50lx at vertical plane.

Note:

Please avoid long-term sunlight exposure of the equipment or the circuit boards and components may age prematurely or distort due to high temperatures.

Temperature and humidity requirements

The values of the working environment temperature and humidity in the equipment room are measured at the point that is 1.5m above the floor and 0.4m in front of the cabinet when there is no protection board either in front of or behind the cabinet. The measured value should meet the following requirements:

- Temperature range: 0℃ to 45℃
- Relative humidity range: 10% to 90%

Dust-proofing requirements

Dust falling inside the equipment room on the cabinet body will cause electrostatic adherence, which reduces the service life of the equipment and easily leads to equipment failure. Therefore, users should control the density of dust particles inside the equipment room.Under static condition, the number of dust particles that are larger or equal to 0.5μm in one liter of air should be less than 18,000. The following anti-dust measures are recommended: The following anti-dust measures are recommended:

- The doors and windows should be completely airtight.
- Use dust-free materials for the floor, wall surfaces and ceiling of the equipment room.
- Clean the equipment room and the anti-dust screens on the equipment regularly.
- Don shoe covers and ESD protective clothing before entering the equipment room. Keep the shoe covers and ESD protective clothing clean and frequently replace.

ESD protection requirements

The electrostatic induction is usually caused by the external electric field such as high voltage transmission line and lightning, as well as internal systems such as interior environment, material of the floor and equipment structure. Contact between the operation and maintenance engineers and the equipment may also bring the static electricity on human body to the equipment.

In order to eliminate the harmful effects of ESD, users should take the following measures:

- Flooring material: Lay an ESD protection raised floor and provide adequate earth grounding for the floor. The electric resistance of an ESD protection raised floor should comply with Specification for Raised Floor of Computer Rooms. When there is no raised floor, lay static electrically conductive floor (volume resistivity: 1.0×10^{7} Ω·cm to 1.0×10^{10}Ω·cm). Static electrically conductive floor and access floor both should have electrostatic grounding. They should be connected with the ground cable and ground equipment via a current-limiting resistance of 1MΩ.

Note:

Do not use wooden floor, fur, flax, chemical fiber carpet or plastic flooring.

- Ceiling material: Choose ESD protection materials. Plasterboard is allowed under normal circumstances; normal plastic material is prohibited.
- Wall surface material: Choose ESD protective wallpaper. Painting the wall with plaster or lime is allowed under normal circumstances. Do not use normal wallpaper or plastic wallpaper.
- There should be a mark for ESD protection in the equipment room.
- Operation and maintenance engineers should be required to wear an ESD protection wrist strap while working. The ESD protection wrist strap should be connected with the ESD protection earth ground fastener on the cabinet.

Electromagnetic radiation protection requirements

The electric field intensity of the equipment room is suggested to be less than 126dB and the magnetic field intensity less than 800A/m. Usually, users should take the following electromagnetic radiation protection measures:

- Keep away from the high-voltage transmission lines, high-power equipment and high-power broadcast transmitters.
- Shield the interference source of electromagnetic radiation.

- To restrict EMC effectively, the building where the equipment room is located should be designed with sound grounding, and the network with clear ground marks should be used.
- Do not use handheld wireless communication devices near the equipment in the equipment room.

Air conditioning and ventilation

In order to meet the operating room requirements, users should install air conditioners and ventilators in the equipment room.

Note:

The equipment room should be equipped with an air conditioner that operates all year round. The air-conditioner should be appropriately positioned so that it will not blow directly on the equipment.

4.3.5 Equipment Room Power Supply

The equipment room should provide power supply outlets and meet the requirements for construction. The power should meet the equipment's needs and provide adequate margin. The equipment room power cabinet should be equipped with adequate connectors.

AC power supply requirements

The major AC power supply should be the AC mains supply. In order to guarantee reliable communication, besides the AC mains supply, a diesel-engine generator may also be equipped as the standby power supply. For increased reliability, the equipment should be supplied with redundant power rails.

DC power supply requirements

The DC power supply system includes storage battery, rectifier and DC power distribution equipment. The nominal DC working voltage is -48V, the variation range allowed is -40V to -57V. The DC power supply should have over-voltage and / or over-current protection.

4.3.6 Lightning-proofing and Grounding

Recently constructed equipment rooms usually use a combined grounding scheme. In a combined grounding scheme the AC working ground, DC working ground, protection earth ground, lightning-proofing ground of all communication equipment share one set of grounding bodies. Below are the general requirements:

- The ground resistance should be less than 5Ω.
- The ground cables are arranged independently and cannot form an electrical path via a connection between construction bars or form a path via cabinet racks.
- Ensure that the ground cable and the ground bar in the equipment room are securely connected.
- The equipment room should be equipped with a lightning rod or a lightning protection network in geographical areas that are subject to lightning strikes.
- The ground body of lightning conductor and lightning arrester are designed in a radial pattern or a ring pattern.
- The cabling racks, iron hanging racks, cabinet racks or shells, metal ventilation ducting, metal doors and windows should be properly grounded.

4.3.7 Supporting Facilities

- Relevant supporting facilities including the MDF, ODF, and DDF should be provided.
- Supporting facilities should have adequate terminals and are correctly connected.
- The construction site should be equipped with necessary facilities such as tables, chairs, telephones and AC power supply sockets for construction.

4.4 Unpacking Inspection

Unpacking inspection should be performed in the presence of representatives from all interested parties. The service provider should notify the FiberHome representatives in advance of the time and location of the equipment acceptance check.

4.4.1 Inspecting the External Packing

When equipment arrives, first check the external packing according to the checklist prior to unpacking. The following aspects should be verified:

- The contract number, name and address of the consignee, and the project name are correct.
- The numbers and quantity of the packing cases are correct.
- The packing cases are not damaged or found with leakage.

If the actually received equipment does not comply with any of the above items, do not accept the equipment and contact the local office or FiberHome headquarters immediately.

4.4.2 Unpacking the Wooden Box

Wooden boxes, usually used to pack heavy equipment such as the cabinet, the subrack, the card or wires, have various outside dimensions but the same unpacking method.

The following part will introduce the unpacking procedures using the unpacking of a wooden box containing the cabinet as an example.

Note:

Avoid any nonstandard unpacking actions. Excessive use of force with a hammer on the body of packing case is extremely undesirable and may cause damage to the equipment.

Prerequisite

- The external package has been inspected visually and verified to be satisfactory.
- Move the packing box to the equipment room or somewhere near the equipment room.

Tools and Instruments

A flat screwdriver and a pair of pliers.

Procedure

1. Lay the packing case down horizontally with the wooden supporting pallet on the ground.
2. Insert the end of the flat screwdriver into the slot of the steel tab on the upper cover of the wooden box, turn upwards and pry the steel tab to the angle of 90°, as shown in Figure 4-1.

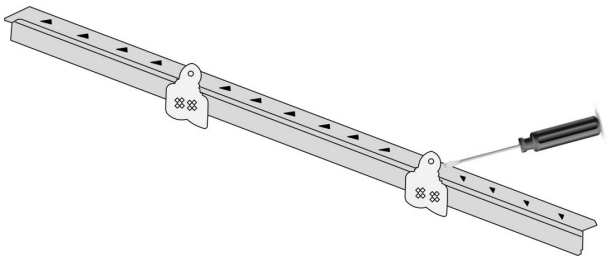


Figure 4-1 Prying the steel tab

3. Straighten all the steel tabs on the upper cover of the wooden box with the pliers. And then lift and remove the cover as shown in Figure 4-2.

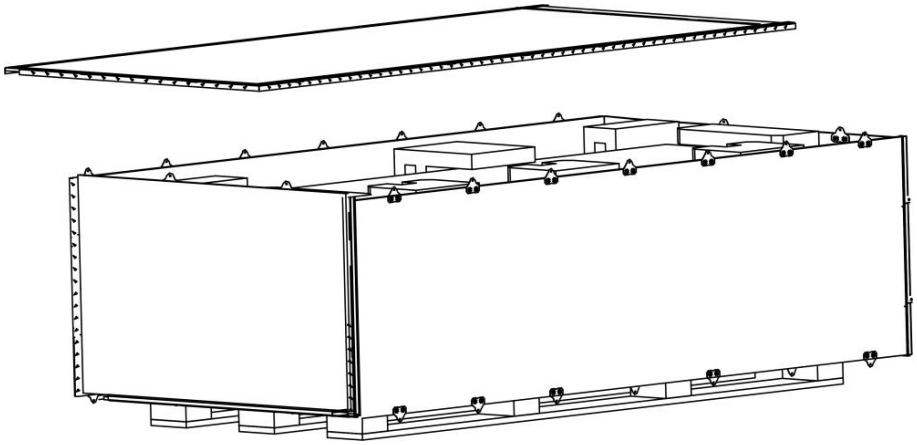


Figure 4-2 Unpacking the wooden box

4. Take out the shakeproof foam, document bag and accessories from the box.
5. Remove the wooden panels on the sides of the box in the same way, as shown in Figure 4-3.

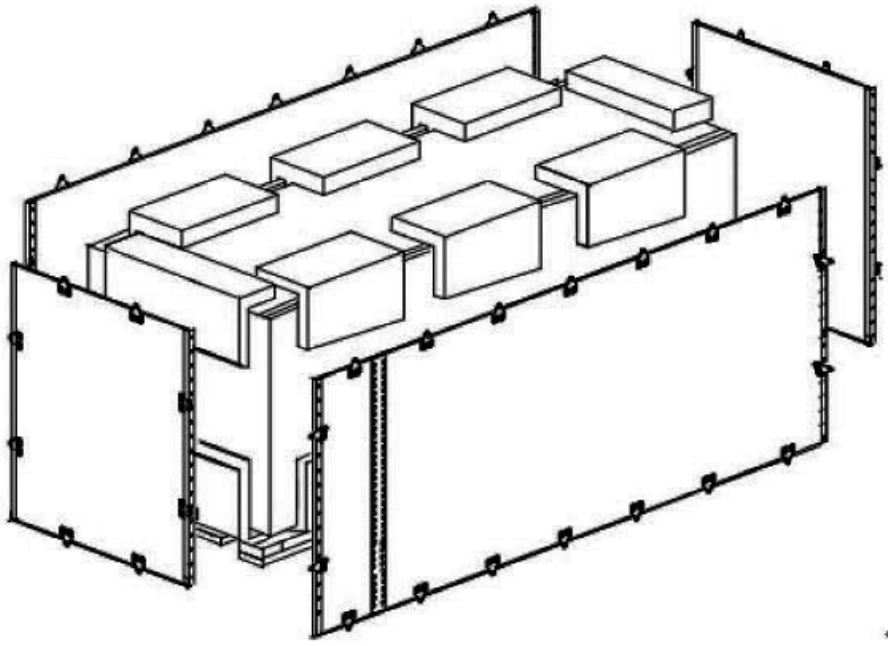


Figure 4-3 Removing wooden side panels

6. Carry the cabinet out with two to four people and move it to the specified position. Then take off the plastic bag wrapping the cabinet and stand the cabinet on end.

4.4.3 Unpacking the Carton

Cartons are usually used to pack small goods such as the cards, accessories or small terminal devices. The paragraphs below introduce how to unpack the carton using the unpacking of a carton containing a card box as an example.

Prerequisite

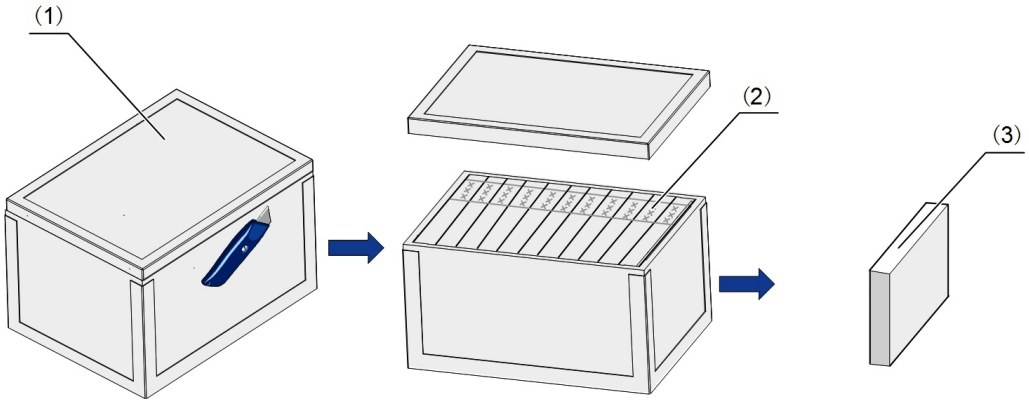
The external package has been inspected visually and verified to be satisfactory.

Tools and Instruments

A paper knife and a pair of gloves

Procedure

See Figure 4-4 for the procedure of unpacking a carton.



(1) Carton (2) Card box label (3) Card box

Figure 4-4 Unpacking a carton

1. Wear a pair of ESD protection gloves or take other protection measures.
2. Lay the carton stably on the ground with the right side up.
3. Use the paper knife to cut the adhesive tape on the seam of the carton lightly; and then open the carton.

Note:

When cutting the adhesive tape, do not cut too deep into the carton, making sure that you cut only the tape without damaging the goods inside the carton.

4. Make sure that the package of the card box in the carton is intact, and then take out the card box.

4.4.4 Unpacking the Card

Note:

1. The card is packed in ESD protection bag. Do not remove the card from the protective bag before you are ready to install the card.
2. When a card is moved from a cold and dry place to a hot and damp place, you should wait at least 30 minutes before unpacking it. Otherwise, humid air may condense on the surface of the card and damage the card.

Prerequisite

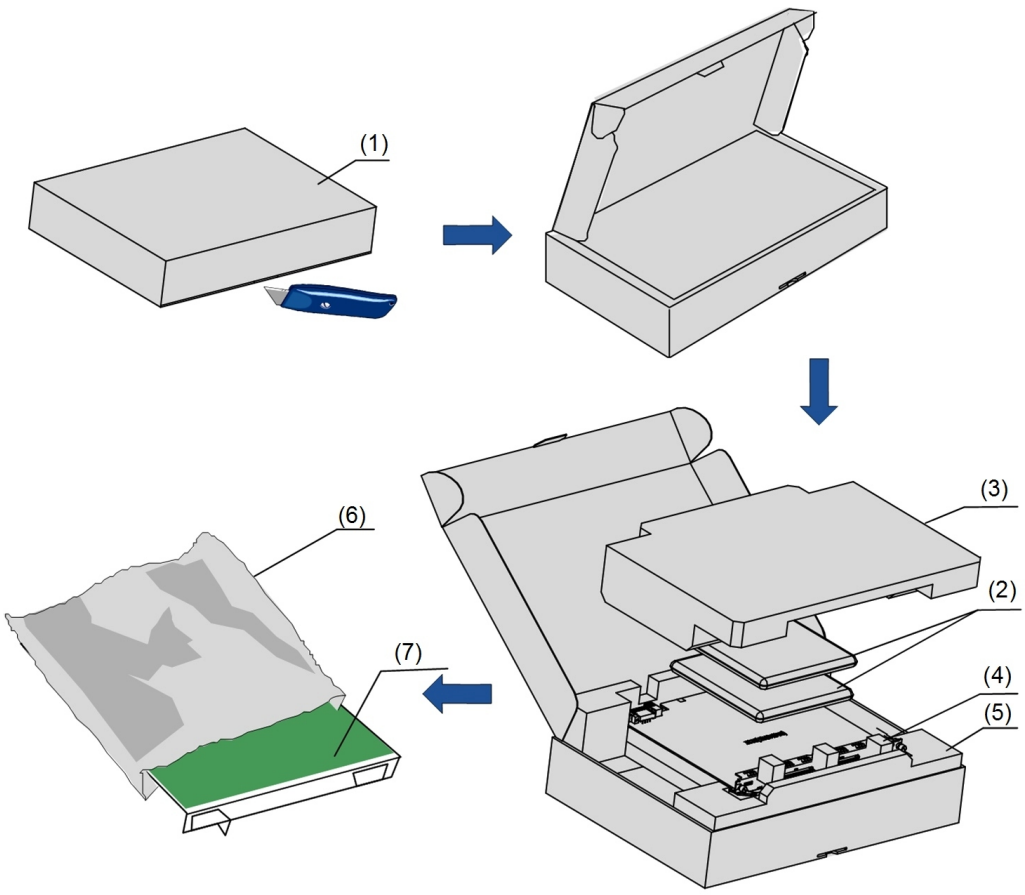
- The external package of the card box has been inspected and verified to be satisfactory.
- The installers should keep their both hands clean and dry.

Tools and Instruments

A paper knife and an ESD protection wrist strap or a pair of ESD protection gloves

Procedure

Figure 4-5 shows the procedures of unpacking a card.



(1) Card box
(2) Inflatable packaging cushion
(3) to (5) Shakeproof foam
(6) ESD protection bag
(7) Card

Figure 4-5 Unpacking a card

1. Wear the gloves or take other protection measures.
2. Lay the card box stably on the ground with the right side up.
3. Cut the adhesive tape on the seam of the box and then unpack the card.

Note:

When cutting the adhesive tape, do not cut too deep into the box, making sure that you cut only the tape without damaging the article inside the box.

4. Open the card box, and take out the shakeproof foam on the uppermost layer as well as the inflatable packaging cushion in sequence.
5. Take out the card together with the shakeproof foams around it.
6. Remove the shakeproof foams around the card, and take out the card.
7. Wear the ESD protection gloves or the wrist strap that has been properly connected to the ESD protection earth ground fastener, as shown in Figure 4-6.

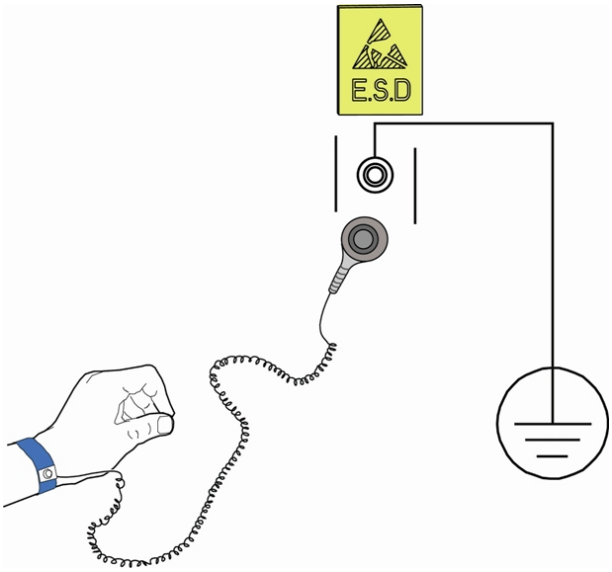


Figure 4-6 Wearing the ESD protection wrist strap

8. Check whether the card's ESD protection bag is in good condition; if not, stop unpacking and report the situation to the local FiberHome representative.
9. Open the ESD protection bag that contains the card, and check whether the card is in good condition.

Note:

If the unpacked card is a spare card, it will not be installed immediately. After implementing Step 9 in the above section, users can put the card with its original ESD protection bag in a dry and cool place, keeping it away from sunlight and strong electromagnetic radiation sources.

10. Install the unpacked card according to the corresponding operation procedures.

4.5 Inspection and Acceptance

The packing list and the equipment configuration listare inside the package. After the unpacking, the equipment acceptance should be done in the presence of representatives from each party, following the steps below.

4.5.1 Checking Against the Packing List

The packing list provides the type and quantity of accessories, including installation accessories, wires and cables, tags and product documentation. Service Providers should check against the packing list on site for the type and quantity of items listed on the packing list.

Below are the procedures for checking against the packing list:

1. Check the contract number, project name and installation station, making sure that they are compliant with the information listed on the packing list.
2. Check the type and quantity of the accessories, cables and other items inside the box.
   - If they are compliant with the information listed on the packing list, representatives from all parties should sign the packing list.
   - If they are not compliant with the information listed on the packing list, ask the onsite FiberHome representative to initiate corrective action or contact the local office or FiberHome headquarters.

4.5.2 Check against Equipment Configuration List

The equipment configuration list provides the type and quantity of equipment component parts (including the cabinet, the subrack and the card). Users should check against the packing list on site for the type and quantity of the items listed on the equipment configuration list.

Below are the procedures of checking against the equipment configuration list:

1. Check the contract number, project name and installation station, making sure that they are compliant with the information listed in the equipment configuration list.

2. Unpack the external packing of the cabinet, and then open the cabinet door (if there is no cabinet, skip this step).

Note:

Be careful not to bump, strike or scratch the cabinet's outside surface.

3. Wear the ESD protection gloves or the ESD protection wrist strap (with its plug inserted in the ESD protection earth ground fastener on the cabinet properly), as shown in Figure 4-6.
4. Check whether the material specification and quantity of component parts such as subracks and cards are compliant with the information listed on the equipment configuration list.
   - If they are compliant with the information listed on the equipment configuration list, representatives from all parties should sign the packing list.
   - If they are not compliant with the information listed on the equipment configuration list, ask the onsite FiberHome representative to initiate corrective action or contact the local office or FiberHome headquarters.
5. After the equipment has been checked and accepted, the user has the responsibility to keep them properly.

5 Installing the Cabinet

Before installing the equipment, you should first install the cabinet.

The AN5116-06B can be installed in the 19-inch cabinet and the 21-inch cabinet with front vertical mounting flanges.

Refer to *Quick Installation Guide for the 19-inch Cabinet (600mm-deep) (596-599)* and *Quick Installation Guide for the 21-inch Cabinet (300mm-deep) (068-071)* for detailed installation method.

6 Installing the Subrack and Relevant Components

Introduces the installation of the AN5116-06B equipment's subrack and relevant components.

- ☑ Installing the Subrack in the 19-inch Cabinet
- ☑ Installing the Subrack in the 21-inch Cabinet
- ☑ Installing the Fiber Passage Unit
- ☑ Plugging / Unplugging the Card
- ☑ Installing and Removing the Fan Unit
- ☑ Installing and Removing the Subrack Anti-dust Screen

6.1 Installing the Subrack in the 19-inch Cabinet

Generally, the subracks are already installed in the cabinet before delivery, and the onsite installation is unnecessary. But if the subracks are packed separately for delivery, or adding or replacing a subrack is necessary, installers may be required to install and remove the subracks.

6.1.1 Installing the Slide Rails

Prerequisite

The cabinet installation is completed.

Tools and Instruments

A cross screwdriver, slide rails

The slide rails are shown in Figure 6-1.

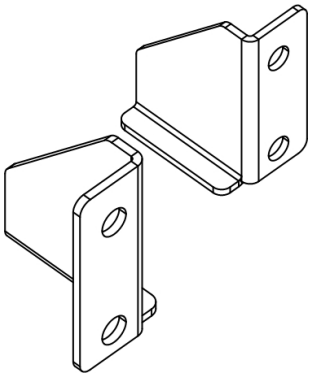


Figure 6-1 The slide rails for the 19-inch cabinet

Procedure

1. Refer to the equipment layout drawing to determine the position of installing slide rails (that is, determine the mounting holes on the vertical mounting flanges for securing slide rails).
2. Insert the floating nut from the accessories into each determined mounting hole on the vertical mounting flange, as shown in Figure 6-2.

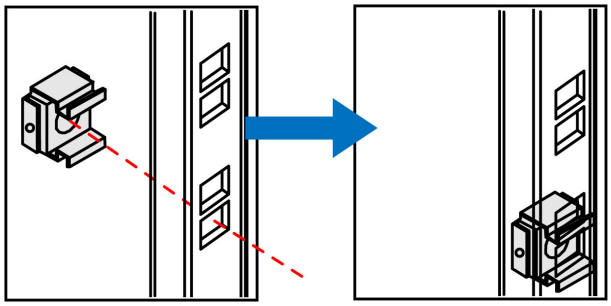


Figure 6-2 Installing the floating nut for the 19-inch cabinet

3. Align the two holes on the right slide rail with the floating nuts on the mounting holes of the vertical mounting flange.
4. Use the panel screws with the flat washers to secure the slide rail, as shown in Figure 6-3.

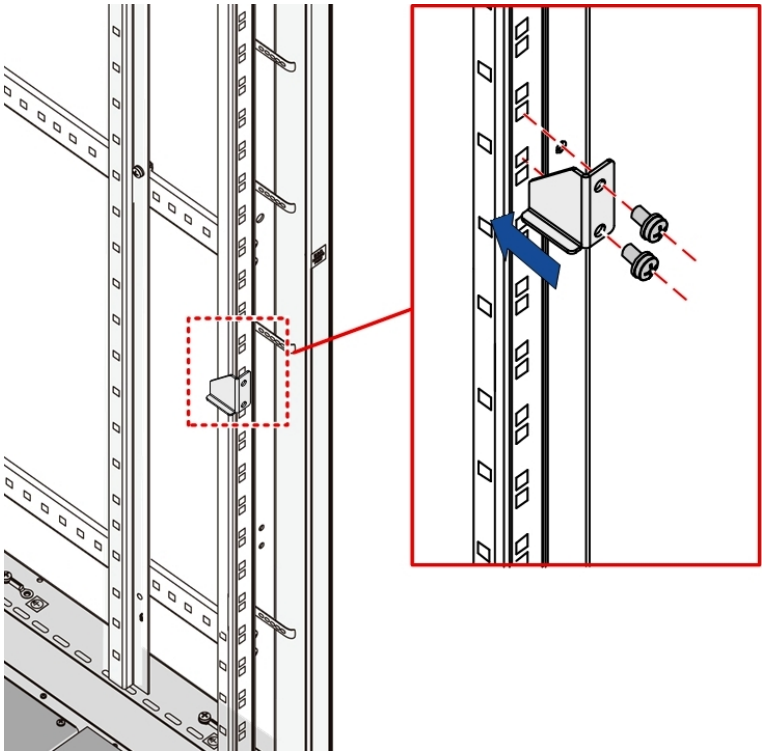


Figure 6-3 Installing the slide rails for the 19-inch cabinet

5. Follow the steps 3 to 4 to secure the left slide rail.

6.1.2 Installing the Subrack into the Cabinet

Prerequisite

The installation of the slide rails is completed.

Tools and Instruments

A cross screwdriver.

Procedure

1. Wear an ESD protection wrist strap (with its plug inserted in the ESD protection earth ground fastener properly).
2. According to the positions of the mounting holes on the subrack mounting ears, respectively install the floating nuts into the corresponding square mounting holes on the vertical mounting flanges at both sides of the cabinet, as shown in Figure 6-2.
3. Put the subrack on the slide rails, and then slowly push it in until the mounting holes on the subrack's mounting ears respectively align with those floating nuts on the mounting holes of the cabinet’s vertical mounting flanges, as shown in ① of Figure 6-4.
4. Use the panel screws with the flat washers to secure the subrack in the cabinet, as shown in ② of Figure 6-4.

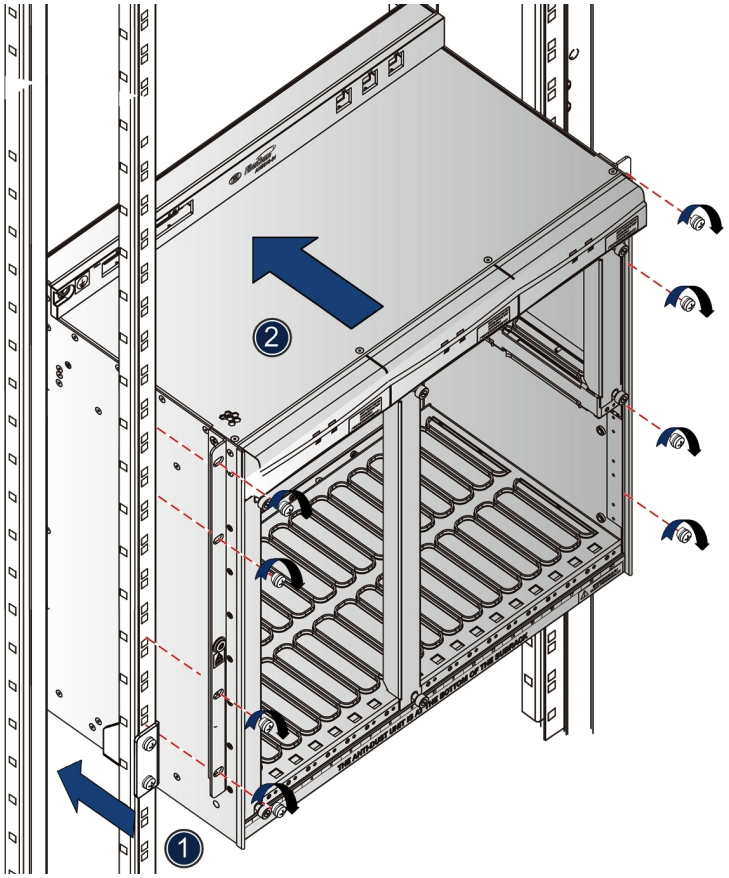


Figure 6-4 Installing the subrack in the 19-inch cabinet

6.2 Installing the Subrack in the 21-inch Cabinet

Generally, the subracks are already installed in the cabinet before delivery, and the onsite installation is unnecessary. But if the subracks are packed separately for delivery, installers may be required to install the subracks.

Caution:

The E1 cable of the AN5116-06B is so thick that the front door of the 21-inch cabinet cannot be closed, thus the AN5116-06B cannot be installed into the 21-inch cabinet when it is equipped with CE1B card.

6.2.1 Installing the Slide Rails

Prerequisite

The cabinet installation is completed.

Tools and Instruments

A cross screwdriver, slide rails

The slide rails are shown in Figure 6-5.

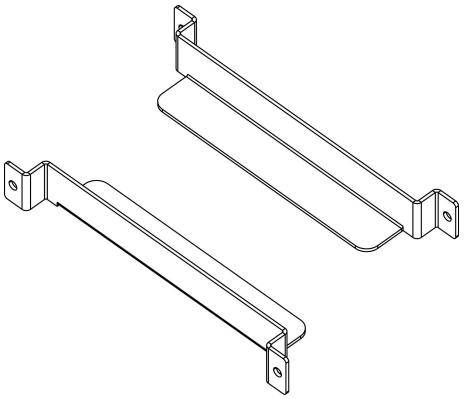


Figure 6-5 The slide rails for the 21-inch cabinet

Procedure

1. Refer to the equipment layout drawing to determine the position of installing slide rails (that is, determine the mounting holes on the vertical mounting flanges for securing slide rails).
2. Insert the floating nut from the accessories into each determined mounting hole on the vertical mounting flange, as shown in Figure 6-6.

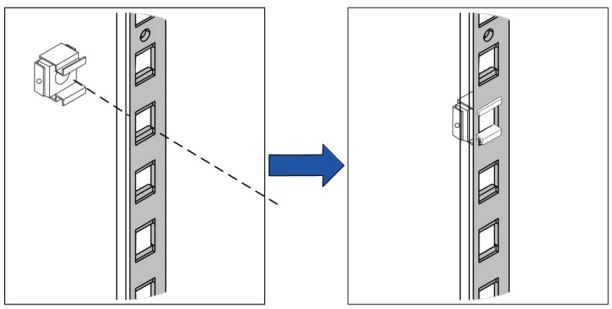


Figure 6-6 Installing the floating nut for the 21-inch cabinet

3. Align the two holes on the right slide rail with the floating nuts on the mounting holes of the vertical mounting flange.
4. Use the panel screws with the flat washers to secure the slide rail, as shown in Figure 6-7.

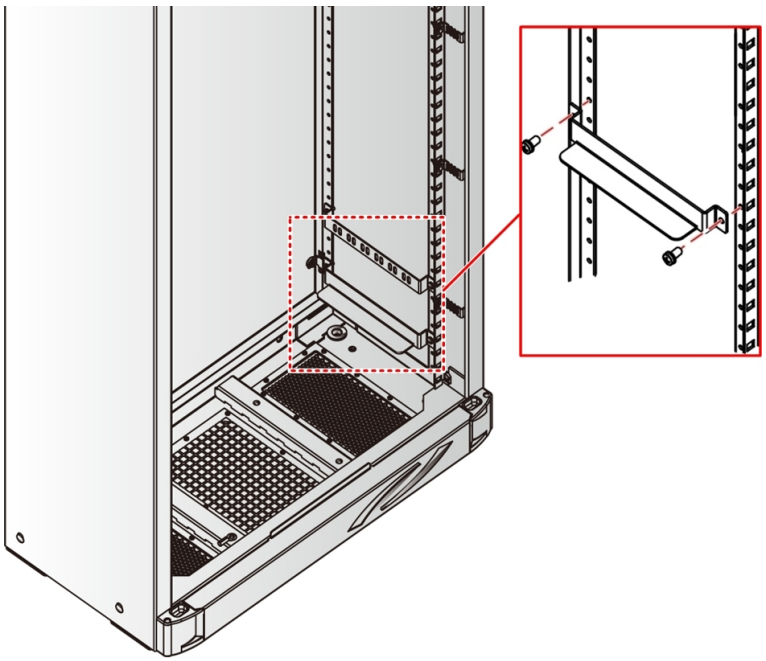


Figure 6-7 Installing the slide rails for the 21-inch cabinet

5. Follow the steps 3 to 4 to secure the left slide rail.

6.2.2 Installing the Subrack into the Cabinet

Prerequisite

The installation of the slide rails is completed.

Tools and Instruments

A cross screwdriver.

Procedure

1. Wear an ESD protection wrist strap (with its plug inserted in the ESD protection earth ground fastener properly).

2. According to the mounting holes on the adaptor mounting ears of the subrack, respectively insert the floating nuts into the corresponding square mounting holes on the vertical mounting flanges at both sides of the cabinet, as shown in Figure 6-6.
3. Put the subrack on the slide rails, and then slowly push it in until the mounting holes on the subrack's adaptor mounting ears respectively align with those floating nuts on the mounting holes of the cabinet’s vertical mounting flanges, as shown in ① of Figure 6-8.
4. Use the panel screws with the flat washers to secure the subrack in the cabinet, as shown in ② of Figure 6-8.

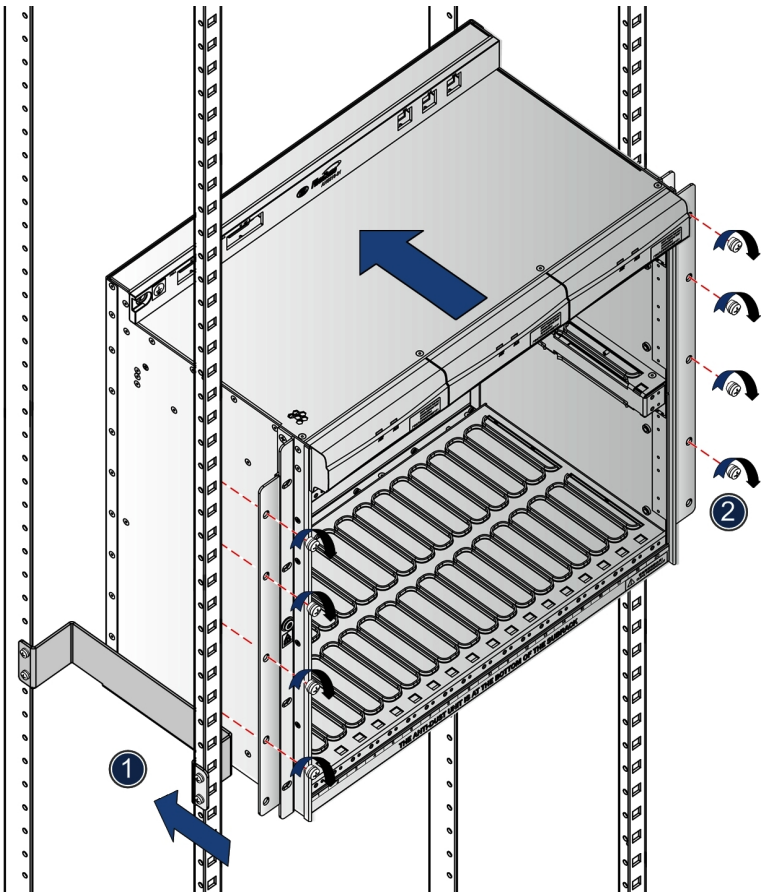


Figure 6-8 Installing the subrack in the 21-inch cabinet

6.3 Installing the Fiber Passage Unit

Note:

The installers can just install the upper fiber passage unit according to the actual condition of the project.

6.3.1 Installing the Fiber Passage Unit in the 19-inch Cabinet

Tools and Instruments

A cross screwdriver.

Procedure

1. Refer to the equipment layout drawing to determine the position of installing the fiber passage units (that is, determine the mounting holes on the vertical mounting flanges for securing the fiber passage units).
2. Insert the floating nut from the accessories into each determined mounting hole on the vertical mounting flange, as shown in Figure 6-2.
3. Align the four holes on the left and right mounting ears of the fiber passage unit with the floating nuts on the mounting holes of the vertical mounting flange.
4. Use the panel screws with the flat washers from the accessories to secure the fiber passage unit, as shown in Figure 6-9.

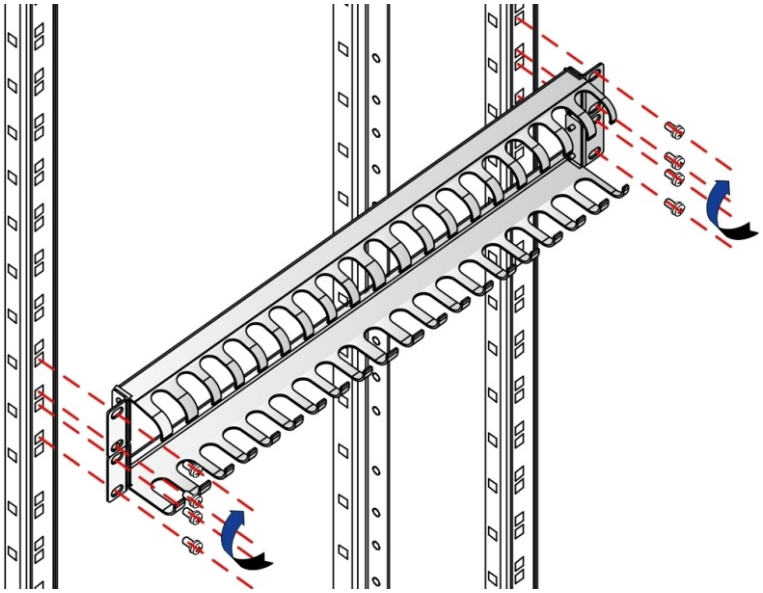


Figure 6-9 Installing the fiber passage unit for the 19-inch cabinet

6.3.2 Installing the Fiber Passage Unit in the 21-inch Cabinet

Tools and Instruments

A cross screwdriver.

1. Refer to the equipment layout drawing to determine the position of installing the fiber passage units (that is, determine the mounting holes on the vertical mounting flanges for securing the fiber passage units).
2. Insert the floating nut from the accessories into each determined mounting hole on the vertical mounting flange, as shown in Figure 6-6.
3. Align the four holes on the left and right mounting ears of the fiber passage unit with the floating nuts on the mounting holes of the vertical mounting flange.
4. Use the panel screws with the flat washers from the accessories to secure the fiber passage unit, as shown in Figure 6-10.

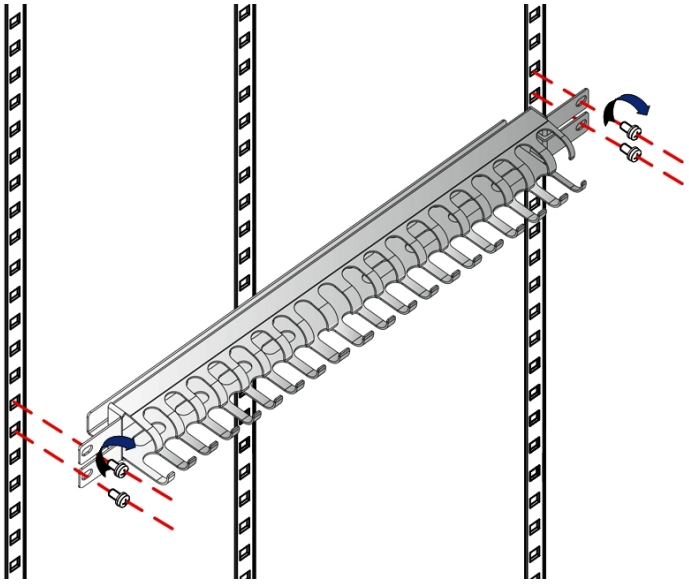


Figure 6-10 Installing the fiber passage unit for the 21-inch cabinet

6.4 Plugging / Unplugging the Card

Generally, the cards have been already installed in their corresponding slots of the subrack before delivery. But if the cards are packed separately for delivery, or adding or replacing a card is necessary, the installers may be required to install and remove the cards.

Caution:

- Do not remove the power card PWR while it is running.
- Always use care when handling cards, especially installing and removing a card. Removing an in-service card will impact the normal operation of equipment and can cause an interruption of services!

6.4.1 Plugging the Card

Tools and Instruments

An ESD protection wrist strap, a screwdriver.

Procedure

1. Wear an ESD protection wrist strap (with its plug inserted in the ESD protection earth ground fastener properly).
2. Determine the slot for the card according to the equipment configuration list.
3. Open and extend the card's latches. Align the left and right edges of the card with the inner slide rails of the corresponding slot inside the subrack (keep its component side to the right) and push it in along the slide rails slowly, as shown in ① of Figure 6-11.
4. Push the card to its position; that is, the card is inserted in its socket on the subrack’s backplane completely.
5. Close and secure the card's latches as shown in ② of Figure 6-11.
6. Tighten the captive screws on the card panel, as shown in ③ of Figure 6-11.

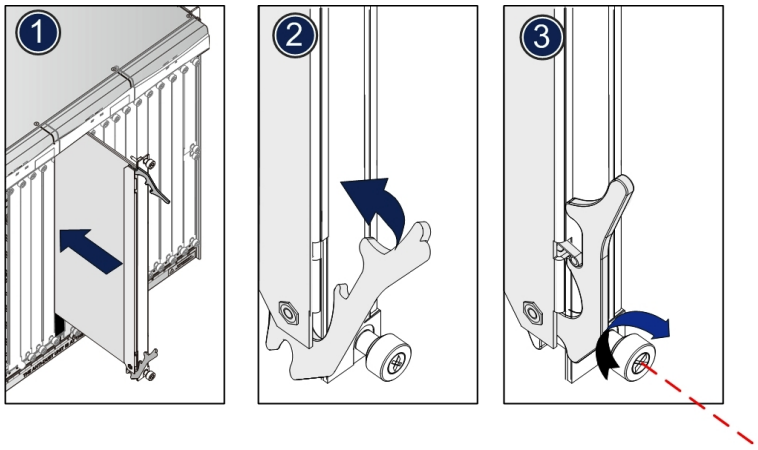


Figure 6-11 Installing the card

6.4.2 Unplugging a Card

Tools and Instruments

An ESD protection wrist strap, a screwdriver.

Procedure

1. Wear an ESD protection wrist strap (with its plug inserted in the ESD protection earth ground fastener properly).

2. Disconnect the optical fibers and cables connected to the card.
3. Loosen the captive screws on the card, as shown in ① of Figure 6-12.
4. Open and extend the card's latches as shown in ② of Figure 6-12. Draw out the card to make it separate from the socket on the subrack's backplane.
5. Pull out the card along the slide rails slowly and smoothly, as shown in ③ of Figure 6-12.

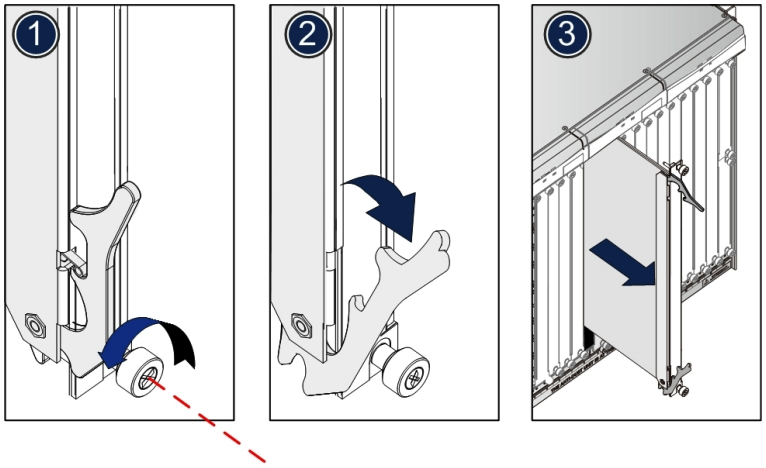


Figure 6-12 Unplugging a card

6.5 Installing and Removing the Fan Unit

The fan unit has been already installed in the subrack before delivery, so its onsite installation is not needed. However, when the fan unit needs regular cleaning and maintenance, installers may be required to remove and install it.

The fan unit is shown in Figure 6-13.

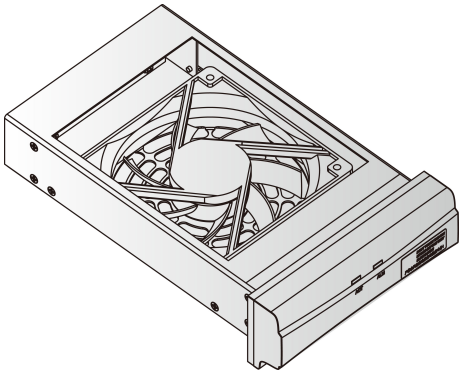


Figure 6-13 The fan unit

6.5.1 Removing the Fan Unit

Tools and Instruments

A cross screwdriver.

Procedure

1. Hold the fan and press the fan’s bottom snap-in latch, as shown in Figure 6-15.
2. Pull the fan unit outward 10mm to 20mm slowly and smoothly to make the fan unit separate from its socket on the subrack's backplane, as shown in Figure 6-14.

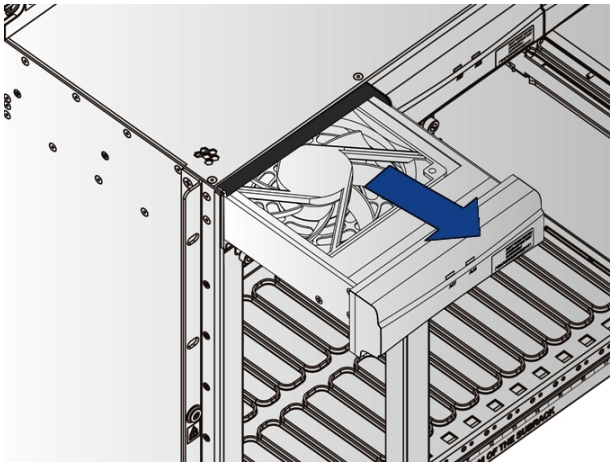


Figure 6-14 Removing the fan unit

3. Wait 30 seconds after the fan unit is powered off and then draw out the fan unit from the subrack completely.

6.5.2 Installing the Fan Unit

Tools and Instruments

None

Procedure

1. Hold the fan and press the fan's bottom snap-in latch, as shown in Figure 6-15.

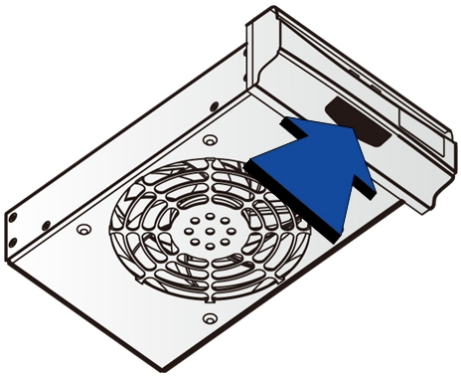


Figure 6-15 The snap-in latch at the bottom of the fan unit

2. Align the slide rails of the fan unit with the subrack's slide rail grooves. Push the fan lightly into the corresponding slot along the slide rails on the subrack, as shown in Figure 6-16.
3. After the fan is pushed into the proper position, release the latch spring, and the fan will be locked into the subrack automatically.

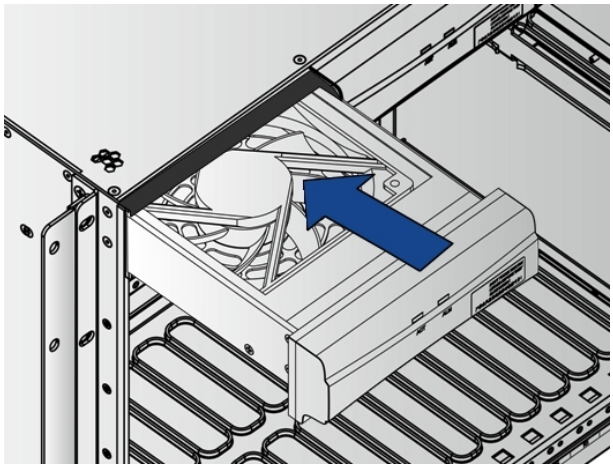


Figure 6-16 Installing the fan unit

6.6 Installing and Removing the Subrack Anti-dust Screen

Generally, the subrack anti-dust screen has been already installed in the subrack before delivery, so its onsite installation is not needed. However, when the anti-dust screen needs regular cleaning and maintenance, installers may be required to remove and install it.

The subrack anti-dust screen is shown in Figure 6-17.

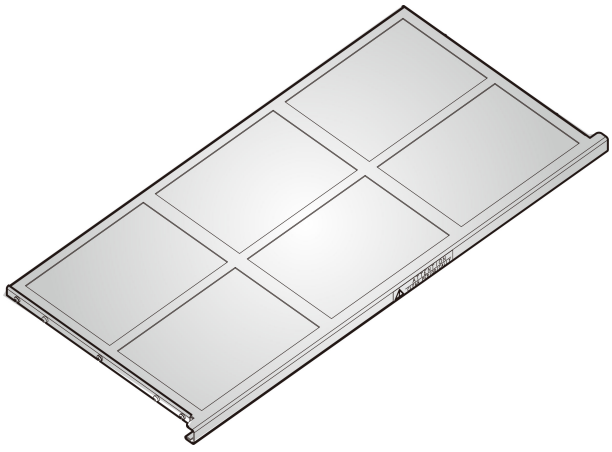


Figure 6-17 The anti-dust screen

6.6.1 Removing the Subrack Anti-dust Screen

1. Draw out the anti-dust screen slightly, allowing its end to be detached from the subrack, as shown in Figure 6-18.

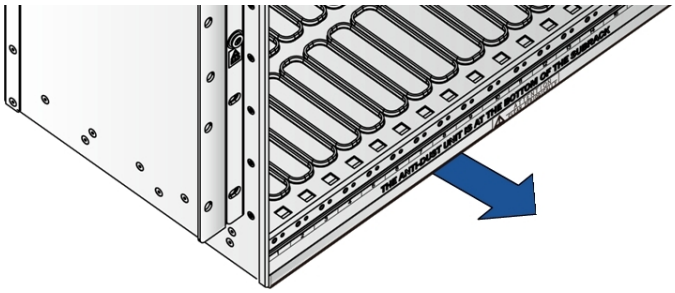


Figure 6-18 Pulling the anti-dust screen lightly

2. Push in the anti-dust screen slightly, allowing its top to be detached from the slide rail grooves, as shown in Figure 6-19.

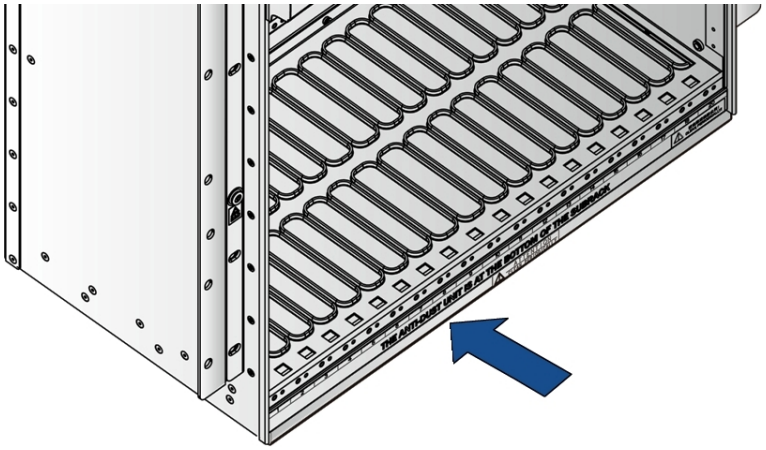


Figure 6-19 Pushing the anti-dust screen lightly

3. Remove the subrack anti-dust screen, as shown in Figure 6-20.

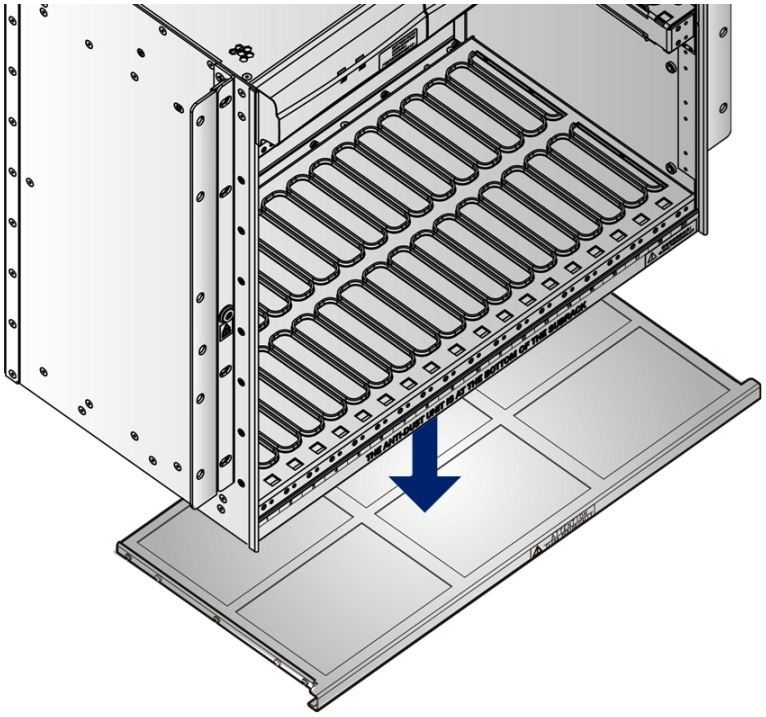


Figure 6-20 Removing the anti-dust screen

6.6.2 Installing the Subrack Anti-dust Screen

1. Align the two slide rails on both sides of the anti-dust screen with the slide rails of the subrack respectively.
2. And then, push the anti-dust screen into the subrack slowly, as shown in Figure 6-21.

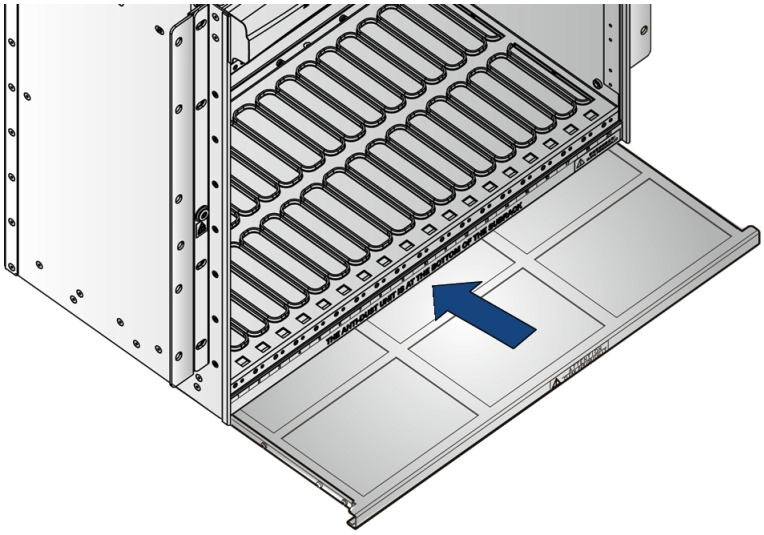


Figure 6-21 Installing the anti-dust screen

7 Connection and Layout of the Wires and Cables

This chapter introduces the connection and layout methods and principles for the AN5116-06B's various wires and cables according to their functions.

- ☑ Requirements for the Layout of Wires and Cables
- ☑ Introduction to the Wires and Cables
- ☑ Connection and Layout of the Internal Wires and Cables
- ☑ Connection and Layout of the External Wires and Cables

7.1 Requirements for the Layout of Wires and Cables

Layout principles for the wires and cables

- The specifications, routes, cross-sectional area, and position of the cables arrays should be compliant with the construction plan drawing. Take future maintenance and capacity expansion into account when arranging the cables and connecting the ports.
- When arranging the cables on the floor, keep the floor clean and smooth. A dirty or rough floor may contaminate or damage the insulating sheath of the cables.
- Arrange the cables in good order, without damaging their insulating sheaths. Do not drag or draw the cables forcibly.
- Arrange the AC / DC power cables and the signal cables separately in different bundles. If they cannot be arranged in different routes, leave an interval of more than 5cm between them.
- The optical fiber jumpers should be arranged last to prevent them from being kinked, bent excessively or pressed.

Wiring principles for the wires and cables

- If the equipment room is equipped with wiring channels mounted under an ESD protection raised floor, installers can use the floor access wiring mode. In this mode, wires and cables enter via the wiring holes at the cabinet bottom from the channel under the ESD protection raised floor.
- If the equipment room is equipped with the upper support channels, installers can use the top access wiring mode. In this mode, wires and cables enter via the wiring holes at the cabinet top from the upper support channel.
- Arrange the wires and cables in the wiring channels located on both inner sides of the cabinet and pass through the wiring holes.

Bending principles for wires and cables

- To prevent the cable cores from being damaged, do not apply too much force when bending the cables at the corners.

- The bend radius of the optical cable should not be smaller than 20 times the optical cable's external diameter.
- The bend radius of the electrical cable should not be smaller than 5 to 10 times the electrical cable's diameter.

Layout principles for power cables

- With the premise that the cables must be arranged in compliance with the route, the power cables (including protection earth ground cables) should be processed on site according to the "shortest" route principle.
- The power cables should be made of a continuous segment of copper core with no intermediate connections.
- A single-core or multiple-core power cable whose cross-sectional area is under 10mm^2 can be directly connected to the equipment. Installers should bend the end of the power cable into a circle connector whose bending direction is consistent with the direction of fasten bolt and nut, and then add the flat washer and the locking spring washer between the wire and the nut, finally fasten the nut.
- The end of the multiple-core power cable whose cross-sectional area is above 10mm^2 should be installed with a tin plated connector. The size of the connector should fit the diameter of wire. The connector should be crimped onto the wire with the appropriate tool or soldered. The surface of the connector that contacts the equipment should be smooth. Installers must add flat washer and locking spring washer between the connector and the nut, and then fasten the nut.

Layout principles for optical fibers

- Protection measures, such as using corrugated conduits or channels, should be used when the optical fibers are routed outside the cabinet.
- Take the fragility of the optical fibers into consideration when arranging optical fiber jumpers. The bend radius of optical fibers should be no less than 38mm.
- To prevent laser radiation from injuring the eyes, never look at the end face of the optical fibers directly during handling.
- The fiber connectors that are not in use should be protected by the anti-dust caps.

Principles of binding wires and cables

- After arranging the wires and cables in the fiber passage areas, use the binder to stabilize the wires and cables carefully, but do not bind the fiber pigtail excessively.
- You should not bind the cables when they pass the wiring channel; make the cables inside the channel neat, without crossing or twisting them. Always keep the cables within the channel.
- Secure the cables near the entrances of the channels and at the corners with the correct binding method.
- Bind the cables with wire binders carefully at equal intervals with appropriate tightness; and the bound cables are arranged close to each other in good order, without crossing or twisting. See Figure 7-1.

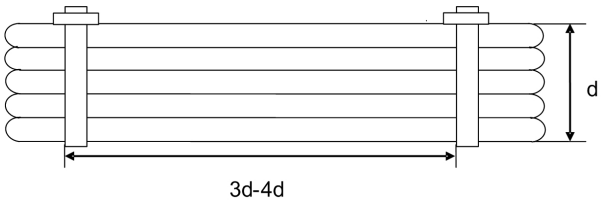


Figure 7-1 Binding of straight cables

- Cables that are led out from connectors should be bound in order. Do not cross or twist them. See Figure 7-2.

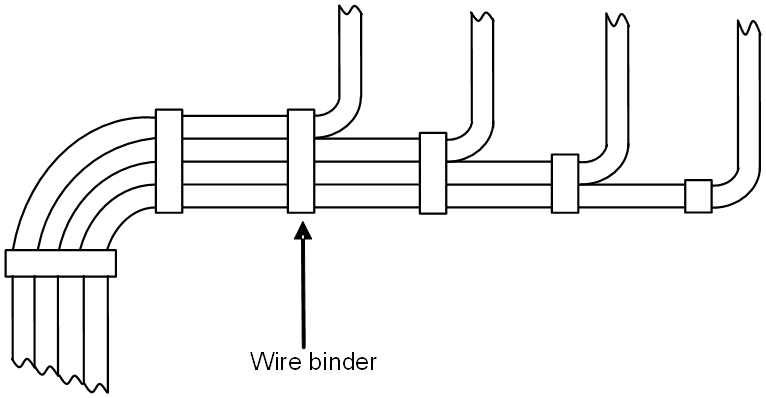


Figure 7-2 Binding of lead-out cables

- Installers should cut all sharp points at the ends of cables. And arrange all wire binders in the same direction. See Figure 7-3.

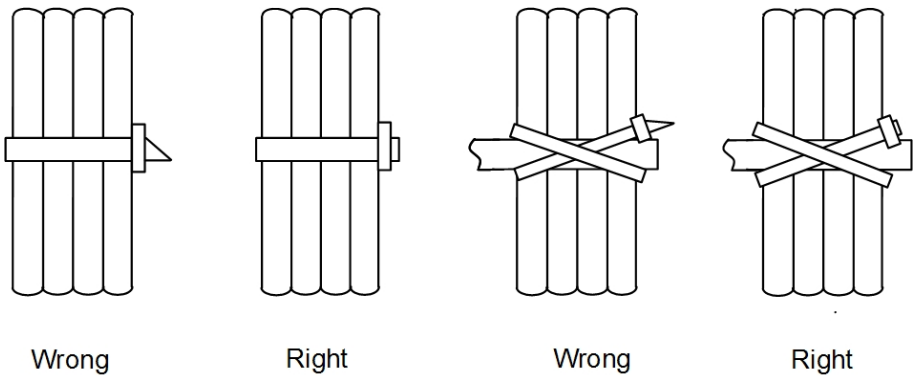


Figure 7-3 Arranging the wire binder

- When binding the bent cables, do not bind them midway through the bend; otherwise, it will break the cores inside the cables. Figure 7-4 shows the proper binding method.

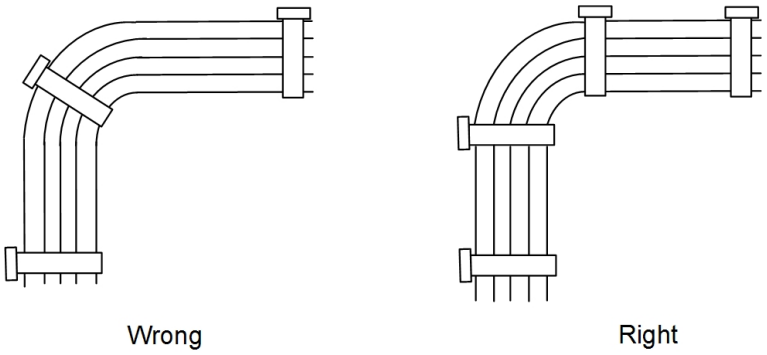


Figure 7-4 Binding of bent cables

- The principle of arranging the cables inside the cabling rack is: the shorter the cable is, the higher the location is. Figure 7-5 shows the arranging method.

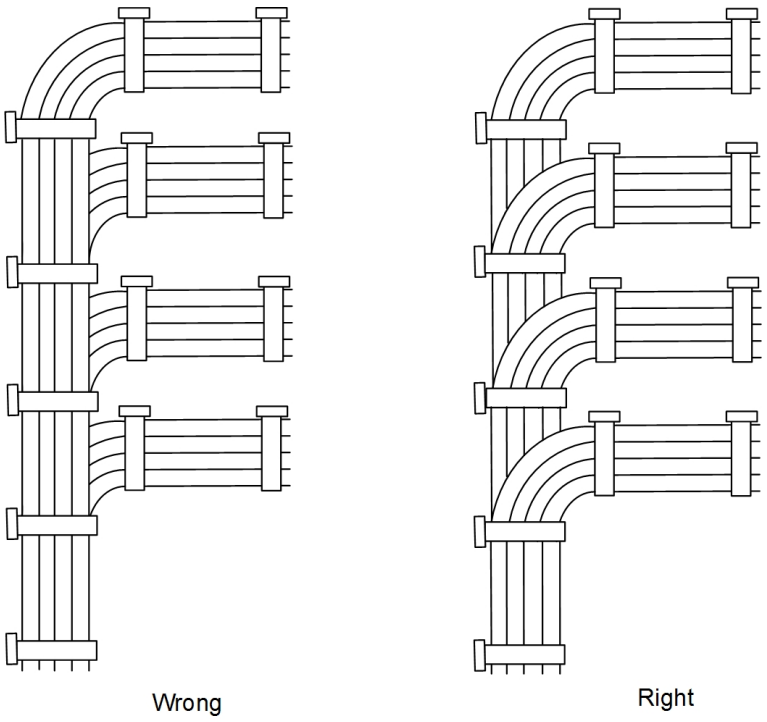


Figure 7-5 Arranging the wires and cables

7.2 Introduction to the Wires and Cables

The wires and cables can be divided into the internal cables and the external cables depending on their positions.

- The internal cables are the wires and cables that are connected inside the cabinet; these are usually connected before delivery.
- The external cables are the wires and cables that connect the equipment and other devices outside the cabinet; these are usually connected on site.

The function of the cables and wires is shown in Table 7-1.

Table 7-1 The function of the cables and wires

Type	Name	Remark
Internal wires and cables	Cabinet protection earth ground cable	Achieves protection earth grounding for the cabinet
	Subrack power cable	Connects the branch power supplies from the PDP to the subracks

Table 7-1 The function of the cables and wires (Continued)

Type	Name	Remark
	Subrack protection earth ground cable	Achieves protection earth grounding for the subrack
	Subrack alarm cable	Outputs the subrack's alarm to the PDP
External cable	Cabinet power cable	Inducts the external power supply to the PDP
	Alarm cable for the head of row cabinet	Outputs the equipment's alarm to the head of row cabinet
	Clock cable	Connects the CLK interface of the TDM interface card with the external clock device
	Dry contact cable	Connects Interfaces DC1 to 7 or DC8 to 14 of the public card with the dry contact equipment
	Network management cable	Connects the Ethernet electrical interface of the uplink card with the network management computer; connects the Ethernet interface of the core switch card with the out-of-band network management computer
	Ethernet cable	Connects the Ethernet electrical interface of the uplink card with the uplink equipment
	Serial port line	Connects the CONSOLE interface of the core switch card with the serial port of the network management computer
	Optical fiber	Connects the optical interface of the cards with the ODF

7.3 Connection and Layout of the Internal Wires and Cables

The internal cables are the wires and cables that are connected inside the cabinet; these are usually connected before delivery. Installers should check the connection of the internal cables on site. The items to check include whether the cable distribution is reasonable, whether the wires and cables are neatly arranged and clean, whether the connection plugs are connected firmly, whether incorrect insertion or poor insertion occurs, and whether any part is missing.

7.3.1 Connection and Layout of the Cabinet Protection Earth Ground Cable

The AN5116-06B's cabinet protection earth ground cable is used to connect the cabinet earth ground point with the PDP. The cable is connected before delivery. Installers should check the connection of the cabinet protection earth ground cable on site according to the introduction.

Component

As shown in Figure 7-6, the cabinet protection earth ground cable at the PDP side is the M6 uninsulated copper tube terminal, and the other end of the cable at the cabinet side is the M6 pre-insulation ring terminal. They are connected through the yellow- / green cable.

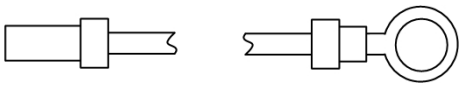


Figure 7-6 The cabinet protection earth ground cable

Procedure

1. Loosen the screws on the PDP’s front panel and remove the front panel, as shown in Figure 7-7.

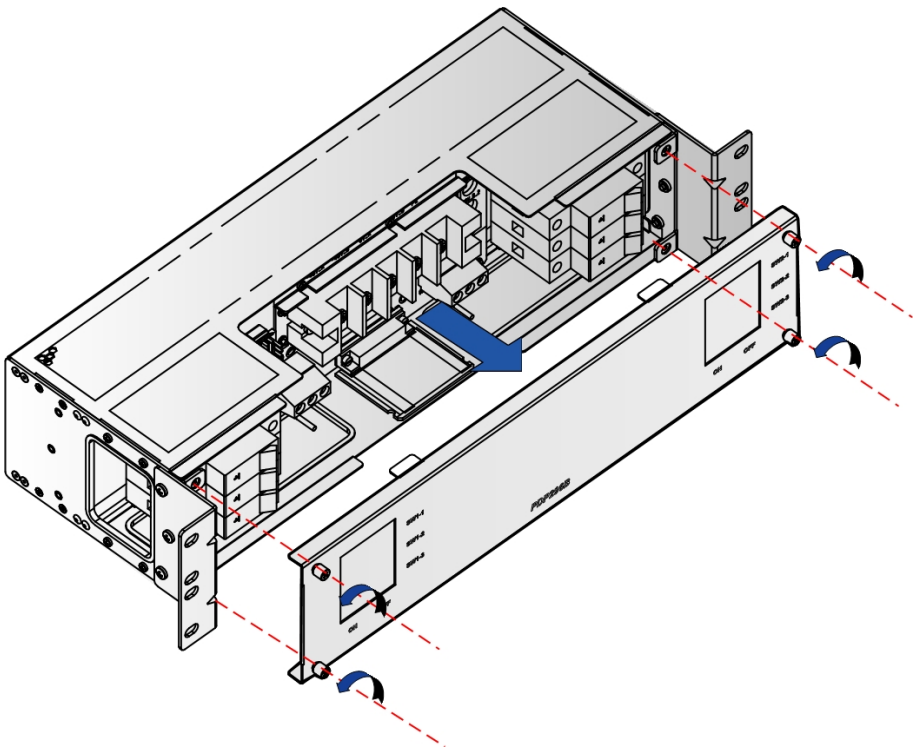


Figure 7-7 Removing the PDP's front panel

Note:

The uninsulated copper tube terminal of the cabinet protection earth ground cable at the PDP side is connected to the inner PE connector of the PDP before delivery, so its onsite installation is not needed.

2. Lead the other end of the cable to the cabinet top earth ground point.
3. Attach the pre-insulation ring terminal to the cabinet top earth ground point, and secure it with the screw. Refer to Figure 7-8 when installing the PDP into a 21-inch cabinet.

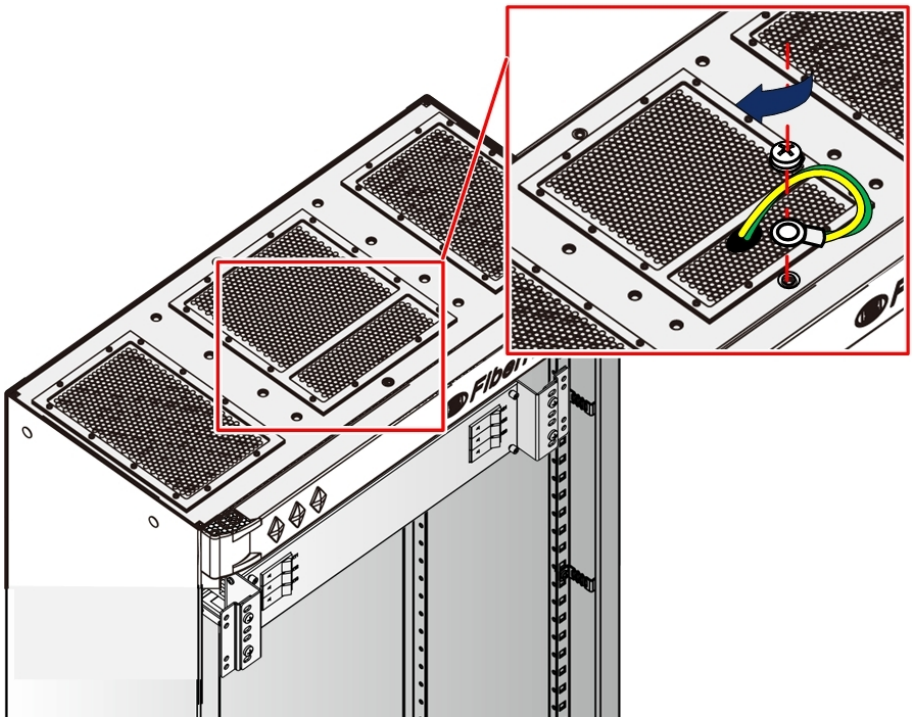


Figure 7-8 Connecting the cabinet protection earth ground cable for the 21-inch cabinet

7.3.2 Connection and Layout of the Subrack Protection Earth Ground Cable

The subrack protection earth ground cable is used to connect the subrack and the cabinet. This cable is connected in the cabinet before delivery. If more subracks need to be added, installers should connect the subrack protection earth ground cables according to the following descriptions.

Component

The AN5116-06B's subrack protection earth ground cable is shown in Figure 7-9. Both ends of the cable are pre-insulation ring terminals connected through a yellow-/ green cable.

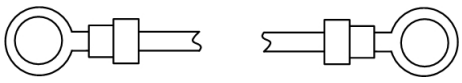


Figure 7-9 The subrack protection earth ground cable

Procedure

1. Attach one pre-insulation ring terminal of the subrack protection earth ground cable to the ESD protection earth ground point on the subrack, and use the panel screw with a washer from the accessories to secure it, as shown in Figure 7-10.

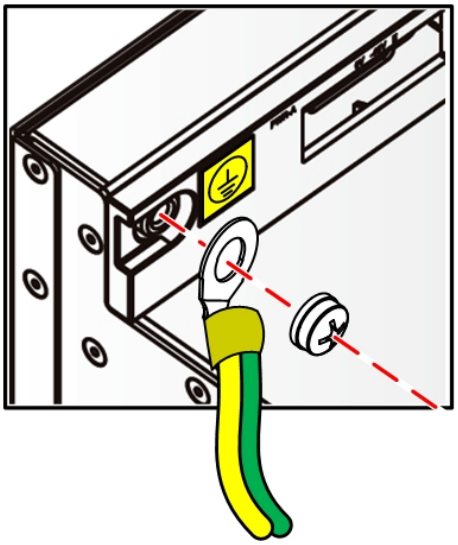


Figure 7-10 Installing the subrack protection earth ground cable at the equipment side

2. Install the floating nut from the accessories into the determined mounting hole on the vertical mounting flange (Installers may select a convenient mounting hole to account for distance and position), as shown in Figure 6-2.
3. Attach the other pre-insulation ring terminal to the mounting hole installed with the floating nut on the vertical mounting flange, and choose a panel screw with a washer from the accessories to secure this terminal of the cable, as shown in Figure 7-11.

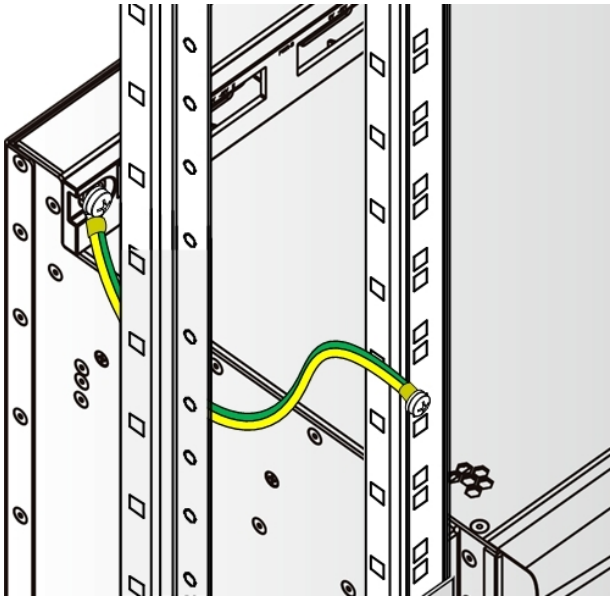


Figure 7-11 Connection of the subrack protection earth ground cable

7.3.3 Connection and Layout of the Subrack Power Cable

The subrack power cable is used to connect the PDP and the subrack and provide power input to the subrack. The subrack power cables have been already connected in the cabinet before delivery. If more subracks need to be added, installers should connect the subrack power cables according to the following descriptions.

Component

One end of the subrack power cable is composed of three wires in blue, brown and black. The other end is a D-type three-conductor connector. The cable is shown in Figure 7-12.

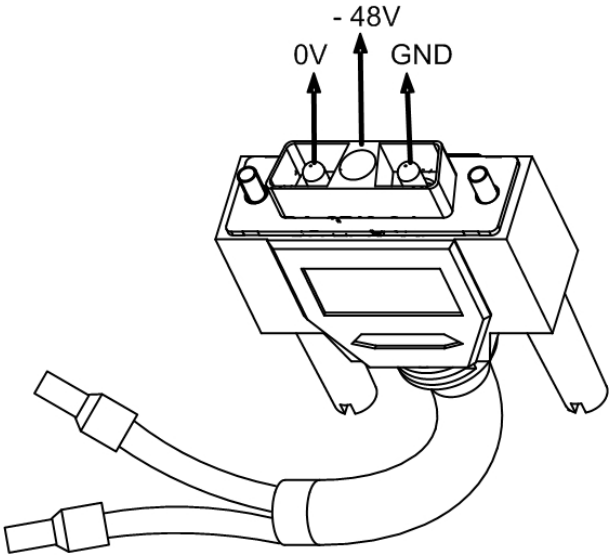


Figure 7-12 The subrack power cable

Procedure

1. Make sure that the power control switch of the corresponding subrack on the PDP is placed in the OFF position.
2. Insert the D-type connector of the subrack power cable into the PWR interface of the subrack backplane, as shown in ① of Figure 7-13.
3. Tighten the screws on the D-type connector.
4. Route the other end of the subrack power cable upward along the cabinet left wiring channel, as shown in ② of Figure 7-13.

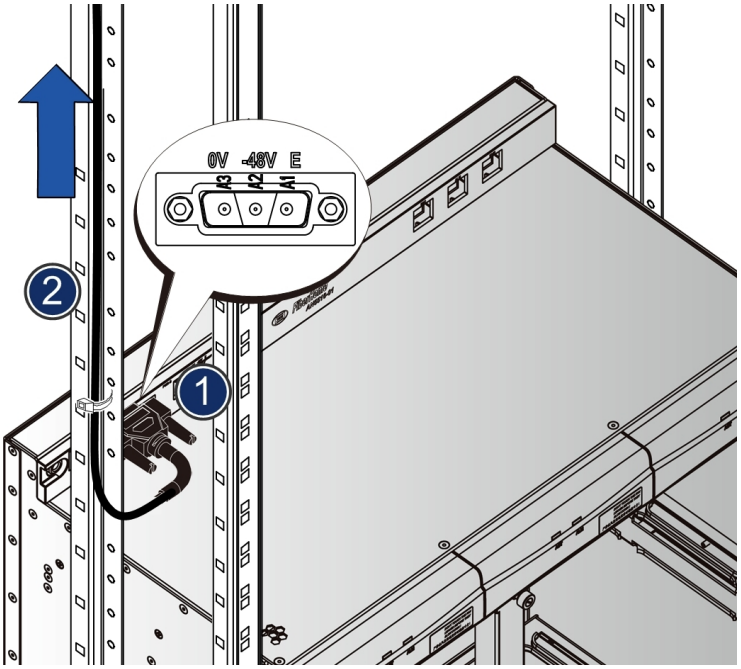


Figure 7-13 Arranging the subrack power cable

5. At the PDP side, loosen the screws on the corresponding connector, and route the cable to the PDP through the wiring hole on the left side of the PDP. Insert the tube terminal into the corresponding connector and tighten the screws, as shown in Figure 7-14.

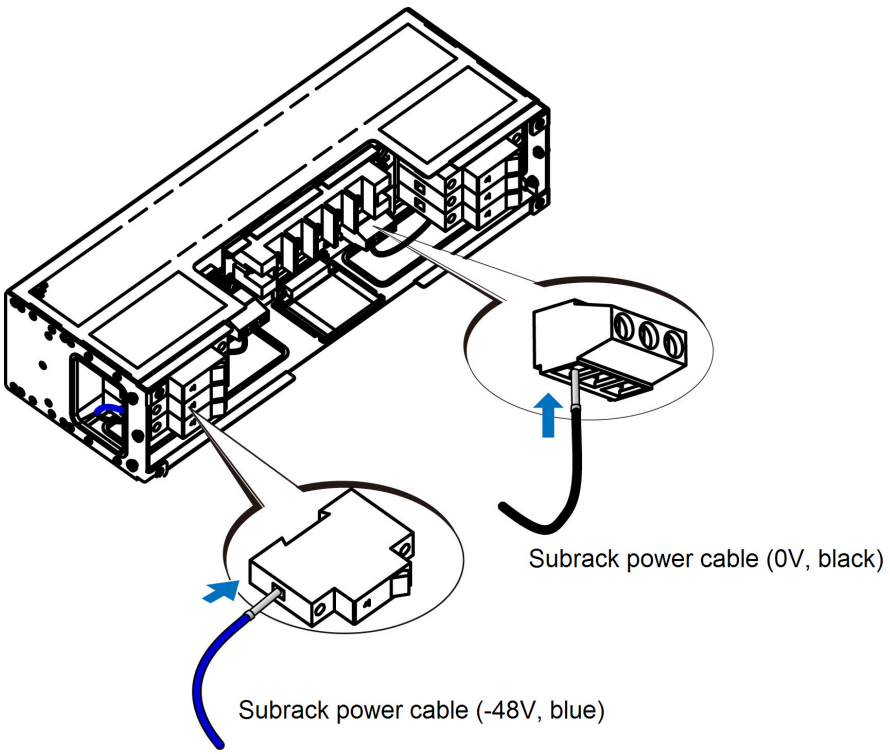


Figure 7-14 Connecting the subrack power cable at the PDP side

Note:

1. Generally, the -48V power wire of the subrack power cable (active) connects to one among terminals -48V_A_1 to -48V_A_3 on the PDP; and the -48V power wire of the subrack power cable (standby) connects to one among terminals -48V_B_1 to -48V_B_3 on the PDP.
2. Generally, the 0V power wire of the subrack power cable (active) connects to one among terminals 0V_A_1 to 0V_A_3 (XS1) on the PDP; and the 0V power wire of the subrack power cable (standby) connects to one among terminals 0V_B_1 to 0V_B_3 (XS2) on the PDP.

6. Arrange and bind the subrack power cable.
7. Bind the cables on the side of the cabinet onto the vertical mounting flange of the same side.

8. Bind and secure the cables inside PDP to the corresponding wire binder ring.

Note:

It is recommended that labels should be attached to the branch ACBs (Automatic Circuit Breakers) at the PDP side, to record the type of equipment powered by the PDP and the far-end interface.

7.3.4 Connection and Layout of the Subrack Alarm Cable

The subrack alarm cable connects the subrack and the PDP, and outputs the subrack alarm to the PDP.

Component

The subrack alarm cable is the general straight-through network cable. Both ends of the cable are installed with the RJ-45 connectors (also known as crystal head), as shown in Figure 7-15.

Figure 7-15 The network cable

1. Insert the RJ-45 connector of the subrack alarm cable into the ALM interface on the subrack backplane, as shown in ① of Figure 7-16.
2. Route the other end of the subrack alarm cable upward to the PDP along the rear vertical mounting flange on the right side of the cabinet , as shown in ② of Figure 7-16.

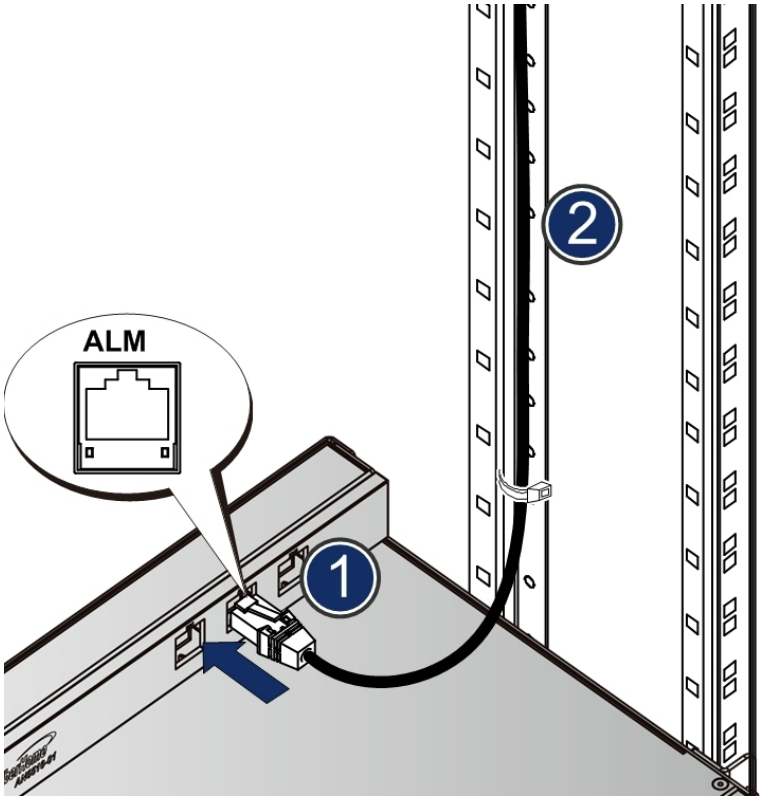


Figure 7-16 Arranging the alarm cable

3. Insert the RJ-45 connector of the subrack alarm cable into one of the three sockets AlmIn1 to AlmIn3 on the PDP, as shown in Figure 7-17.

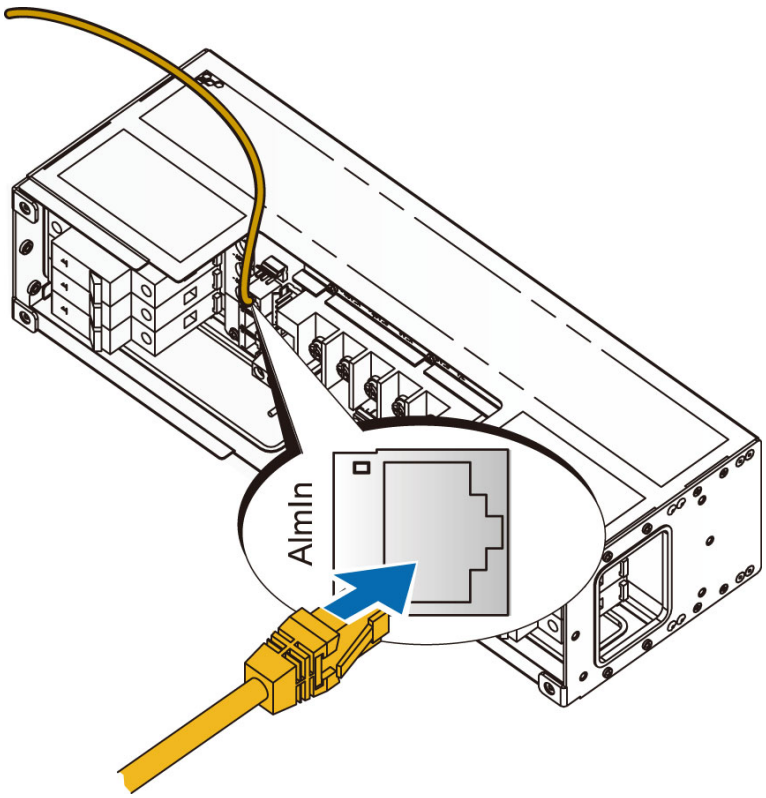


Figure 7-17 Connecting the subrack alarm cable at the PDP side

7.4 Connection and Layout of the External Wires and Cables

The external cables are wires and cables that connect the equipment and other devices outside the cabinet; these are usually connected on site.

7.4.1 Connection and Layout of the Cabinet Power Cable

The cabinet power cable is used to induct two channels of -48V power feeds (active and standby, act as hot backup for each other) from the external and provide dual power supplies for the PDP.

Component

The cabinet power cable includes 5 wires, as shown in Table 7-2.

Table 7-2 The cabinet power cable

Color	Quantity	Remark
Blue	2	The two are respectively active and standby -48V power wires
Black	2	The two are respectively active and standby power ground wires
Yellow- / green	1	The protection earth ground cable

One end of the cabinet power cable is an uninsulated ring terminal and the other end is composed of bare wires, as shown in Figure 7-18.

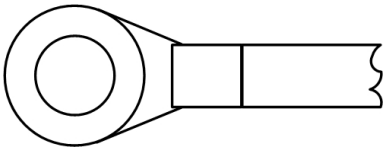


Figure 7-18 The cabinet power cable

Procedure

Caution:

1. Make sure the switch of the external power supply is shut off before connecting or removing the power cable. Do not connect or remove the power cable while it is powered.
2. The power ground (GND) and protection earth ground (PE) should be connected with the GND and PE in the equipment room respectively.

1. Make and attach temporary marks on both sides of the cabinet power cable.
2. Lay the cabinet power cable.
   - When the top access wiring mode is used, lead the cabinet power cable through the wiring hole on the cabinet top, routing it to the PDP along the wiring channel at the side of the cabinet downward, passing through the wiring hole on the top of the PDP.

- When the floor access wiring mode is used, lead the cabinet power cable through the wiring hole at the cabinet bottom, routing it to the PDP along the wiring channel at the side of the cabinet upward, passing through the wiring hole on the top of the PDP.

3. Connect the uninsulated ring terminal of the cable to the corresponding connector on the PDP, as shown in Figure 7-19.

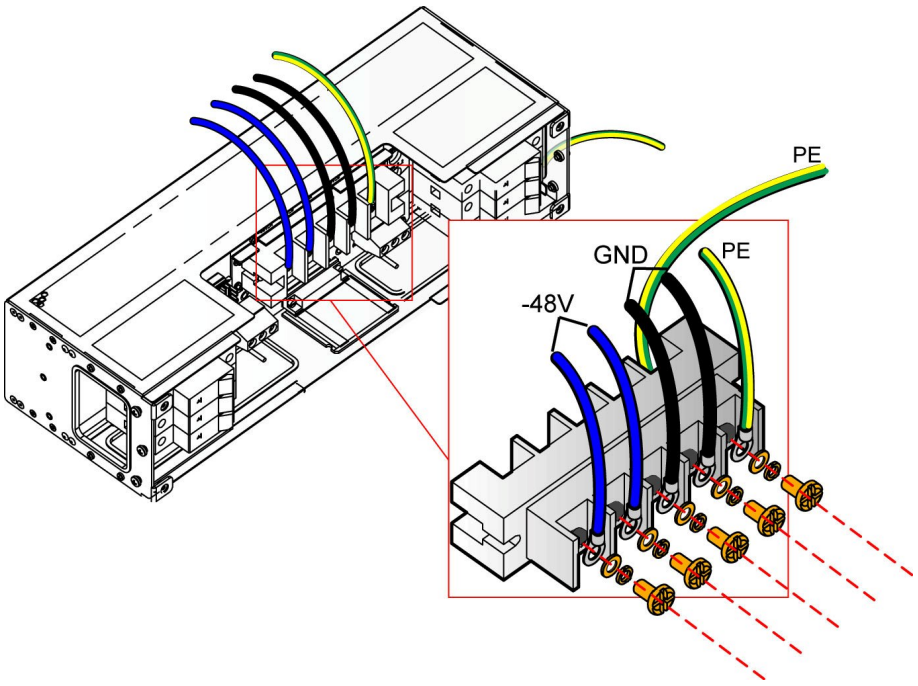


Figure 7-19 Connecting the cabinet power cable

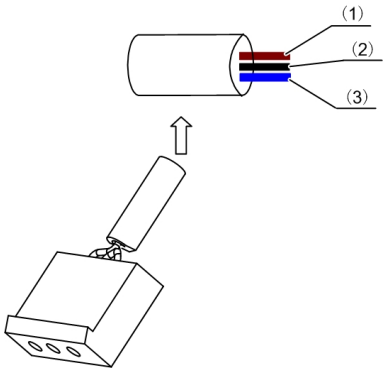
4. Arrange the cabinet power cable and bind the cables on the side of the cabinet onto the vertical mounting flange of the same side.
5. At the external power supply side, connect the wires of the cabinet power cable according to the terminals of the external power supply.
6. Remove the temporary marks, then make and attach project labels on both ends of the cabinet power cable.

7.4.2 Connection and Layout of the Alarm Cable for the Head of Row Cabinet

The alarm cable for the head of row cabinet is used to connect the PDP with the head of row cabinet, for outputting the equipment alarm signals to the head of row cabinet from the cabinet.

Component

For the alarm cable for the head of row cabinet, one end is the three-conductor D-type connector and the other end is the three-conductor cable led by the connector, as shown in Figure 7-20. Installers need make plugs for the head of row cabinet by themselves according to the situation of the head of row cabinet in the equipment room.



(1) Call, brown (2) Nua, black (3) Ua, blue

Figure 7-20 The alarm cable for the head of row cabinet

Procedure

1. Lay the alarm cable for the head of row cabinet
   - When the top access wiring mode is used, lead the alarm cable for the head of row cabinet through the wiring hole on the cabinet top,routing it to the PDP along the wiring channel at the side of the cabinet downward, passing through the wiring hole of the PDP.
   - When the floor access wiring mode is used, lead the alarm cable for the head of row cabinet through the wiring hole at the cabinet bottom, routing it to the PDP along the wiring channel at the side of the cabinet upward, passing through the wiring hole of the PDP.

2. Insert the three-conductor D-type connector of the alarm cable for the head of row cabinet into the XP1 socket on the PDP, as shown in Figure 7-21.

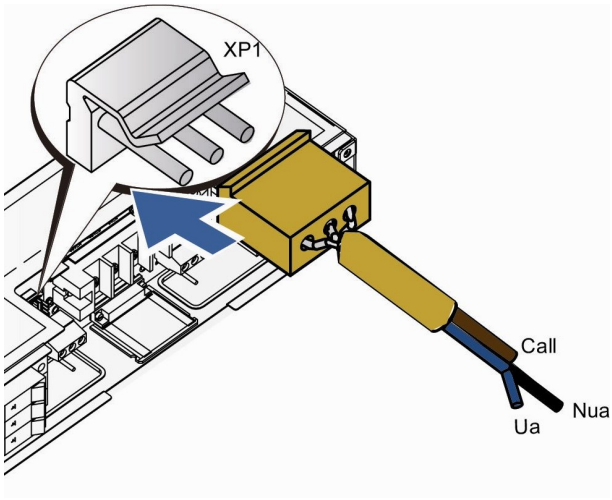


Figure 7-21 Connecting the alarm cable for the head of row cabinet

3. Arrange the alarm cable for the head of row cabinet and bind the cables on the side of the cabinet onto the vertical mounting flange of the same side.
4. Complete the connection and layout of the cable for the head of row cabinet according to the situation of the head of row cabinet.
5. Make and attach project labels on both sides of the alarm cable.

7.4.3 Connection and Layout of the E1 Cable

Component

One end of the E1 cable is the DB-44P connector and the other end is composed of bare wires. The DB-44P connector is shown in Figure 7-22.

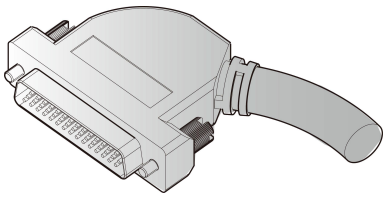


Figure 7-22 The DB-44P connector

Figure 7-23 shows the pins of the DB-44P connector; Table 7-3 lists the wiring scheme of the connector.

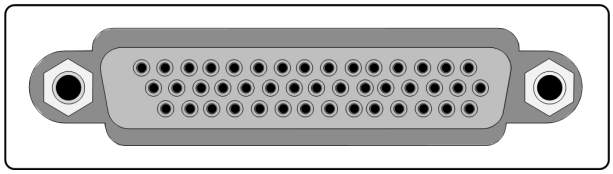


Figure 7-23 The pins of the DB-44P connector

Table 7-3 The wiring scheme of the DB-44P connector

E1 Signal	Pin No.	Cable	Attribute	E1 Signal	Pin No.	Cable	Attribute
R1	15	1	Internal conductor (core)	R5	7	9	Internal conductor (core)
	30		Shielded (ground)		22		Shielded (ground)
T1	14	2	Internal conductor (core)	T5	6	10	Internal conductor (core)
	29		Shielded (ground)		21		Shielded (ground)
R2	13	3	Internal conductor (core)	R6	5	11	Internal conductor (core)
	28		Shielded (ground)		20		Shielded (ground)
T2	12	4	Internal conductor (core)	T6	4	12	Internal conductor (core)
	27		Shielded (ground)		19		Shielded (ground)
R3	11	5	Internal conductor (core)	R7	3	13	Internal conductor (core)
	26		Shielded (ground)		18		Shielded (ground)
T3	10	6	Internal conductor (core)	T7	2	14	Internal conductor (core)
	25		Shielded (ground)		17		Shielded (ground)
R4	9	7	Internal conductor (core)	R8	1	15	Internal conductor (core)
	24		Shielded (ground)		16		Shielded (ground)
T4	8	8	Internal conductor (core)	T8	31	16	Internal conductor (core)
	23		Shielded (ground)		32		Shielded (ground)

Note 1: The copper foil inside the plastic casing is connected to the metal shell of the plug.

Note 2: Ri indicates the i-th input and Ti indicates the i-th output. The pins not listed in this table are not used.

Procedure

1. Measure the distance from the DDF to the E1 interface on the CE1B card, so as to ensure an adequate length for the E1 cable.
2. Mark and attach temporary labels to both ends of the E1 cable.
3. Arrange the E1 cable.
   - In the top access wiring mode: Lead the E1 cable through the wiring hole at the cabinet top, and route it downward along the wiring channel on the side of the cabinet to the CE1B card. Insert the DB-44P connector into the CE1B card, as shown in ① and ② of Figure 7-24.

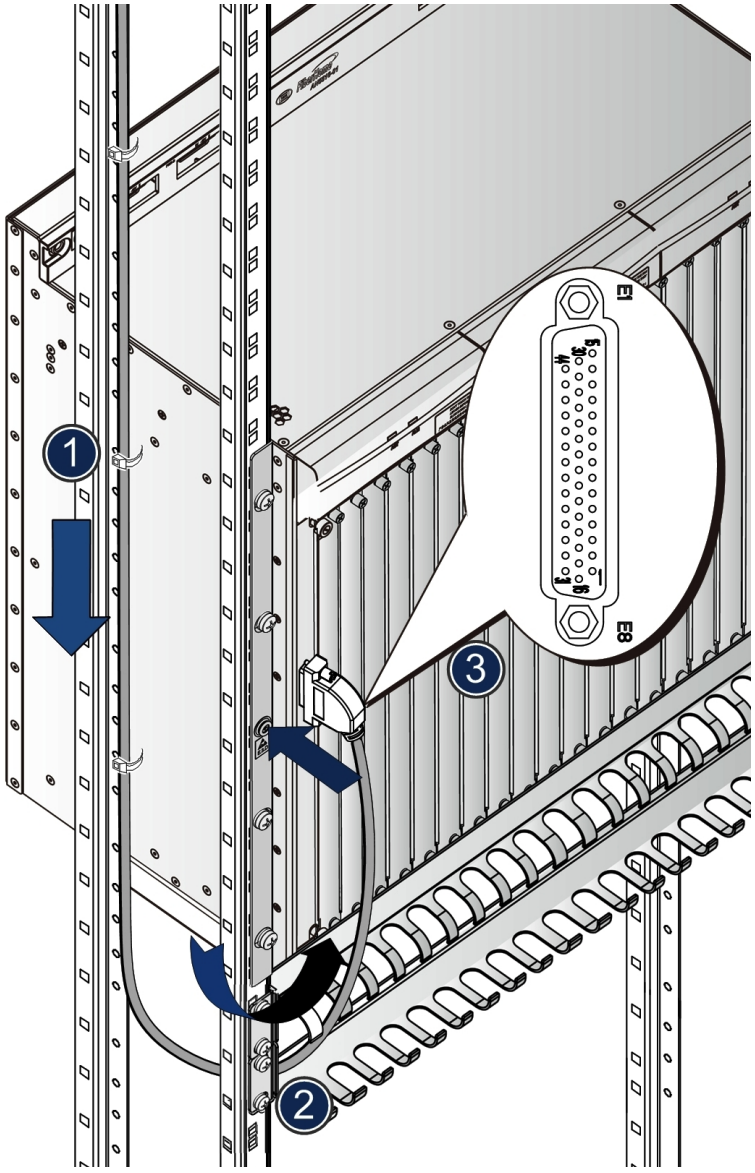


Figure 7-24 Arranging the E1 cable in the top access wiring mode

- In the floor access wiring mode: Lead the E1 cable through the wiring hole at the cabinet bottom, and route it upward along the wiring channel on the side of the cabinet to the CE1B card. Insert the DB-44P connector into the CE1B card, as shown in ① and ② of Figure 7-25.

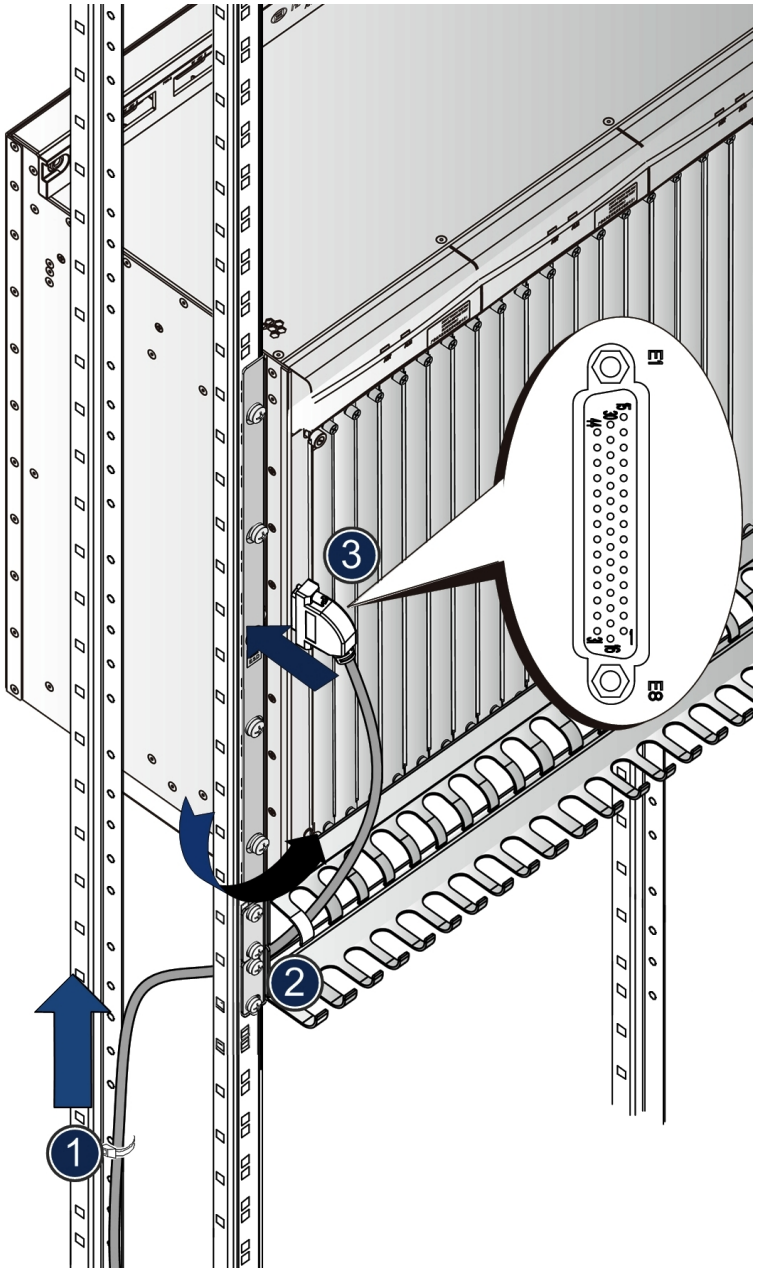


Figure 7-25 Arranging the E1 cable in the floor access wiring mode

4. Insert the DB-44P connector into the E1 interface of the CE1B card, as shown in ③ of Figure 7-24 and Figure 7-25.
5. Tighten the captive screws on the DB-44P connector.
6. Arrange the E1 cable, binding the cables on the side of the cabinet onto the vertical mounting flange of the same side.

7. Make the connector of the other end of the cable according to the situation on the DDF side, then connect the E1 cable to the DDF.
8. Remove the temporary marks, then make and attach project labels on both ends of the E1 cable.

Note:

Make sure that the pins are aligned with the interface while plugging and unplugging the connector to avoid damaging the connector.

7.4.4 Connection and Layout of the Clock Cable

The clock cable is used to connect the clock source / lower level clock device with the clock interface of the equipment. The STM-1 service card C155A provides two channels of clock input and one channel of clock output.

Component

One end of the 75Ω coaxial clock cable is the SAA L-type connector and the other end is composed of bare wires. The appearance of the SAA L-type connector is shown in Figure 7-26.

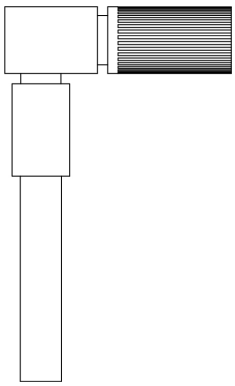


Figure 7-26 The coaxial clock cable

Procedure

1. Measure the distance from the interface on the opposite end equipment to the interfaces on the CE1B card and the C155A card, so as to ensure an adequate length for the clock cable.
2. Make and attach temporary labels to both ends of the cable.
3. Lay the clock cable:
   - In the top access wiring mode: Lead the clock cable through the cabinet top wiring hole and route it downward along the wiring channel on the side of the cabinet to the CE1B and C155A cards' slots in the corresponding subrack fiber passage area, as shown in ① and ② of Figure 7-27.

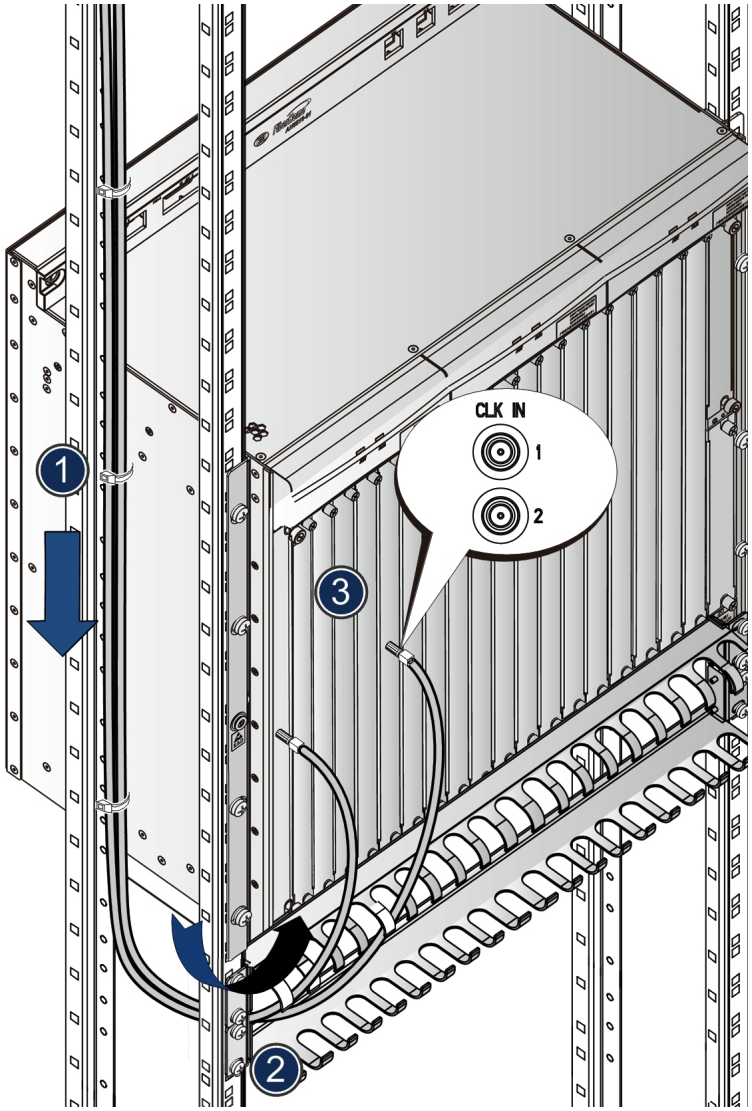


Figure 7-27 Arranging the clock cable in the top access wiring mode

- In the floor access wiring mode: Lead the clock cable through the cabinet bottom wiring hole and route it upward along the wiring channel on the side of the cabinet to the CE1B and C155A cards' slots in the corresponding subrack fiber passage area, as shown in ① and ② of Figure 7-28.

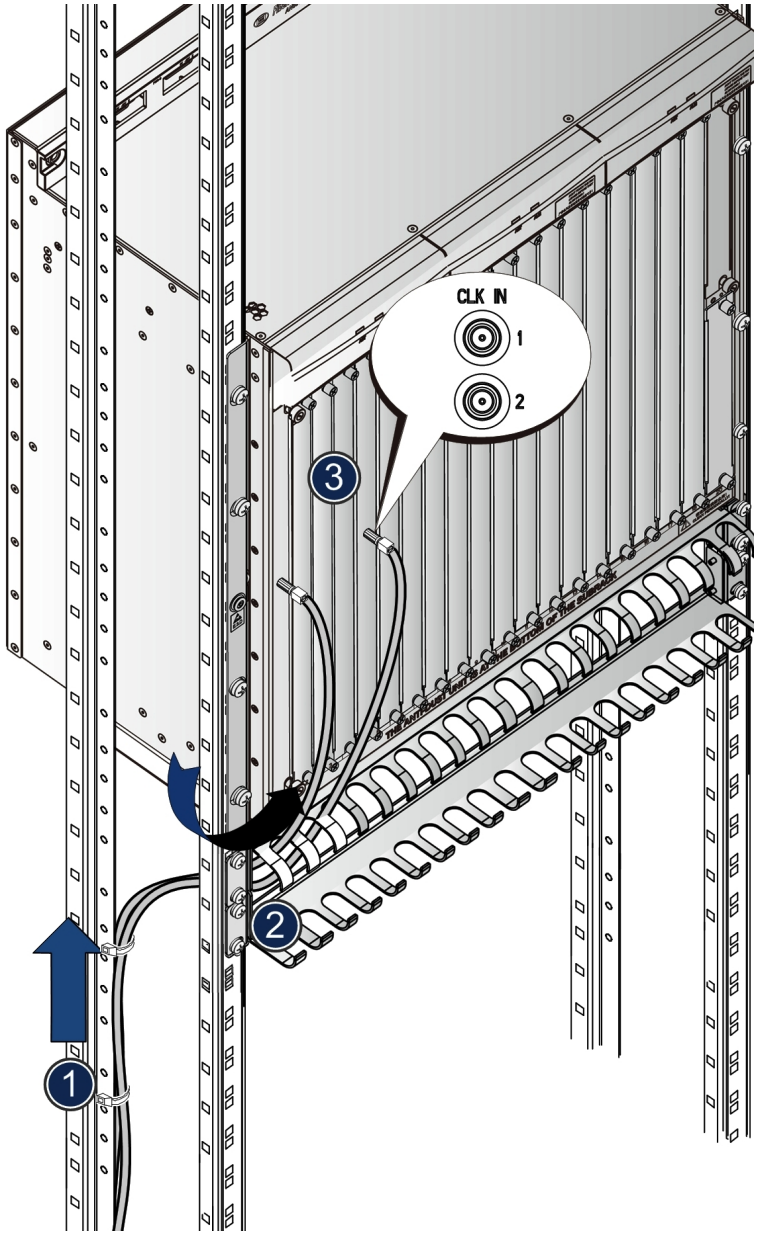


Figure 7-28 Arranging the clock cable in the floor access wiring mode

4. Insert the SAA L-type connectors into the corresponding interfaces on the CE1B card and the C155A card, as shown in ③ of Figure 7-27 and Figure 7-28.
5. Arrange the clock cable, binding the cables on the side of the cabinet onto the vertical mounting flange of the same side.
6. Connect the other end of the clock cable to the opposite end equipment.
7. Make and attach project labels on both ends of the clock cable.

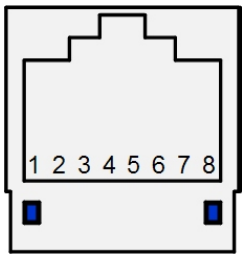
7.4.5 Connection and Layout of the Dry Contact Cable

The AN5116-06B achieves monitoring of a series of ON / OFF event environmental parameters, such as infrared detection, smoke density, AC power supply, humidity, temperature, fan, vibration, and access control system via connecting the DC 1 to 7 and DC 8 to 14 interfaces on the PUBA card to dry contact equipment.

Component

The dry contact cable is equipped with the RJ-45 connector on the equipment side, and bared wires on the other end. Make the corresponding connector onsite according to the interface on the opposite equipment. The definition of the RJ-45 connector' pins is shown in Table 7-4.

Table 7-4 The definition of the RJ-45 connector' pins

Pins of RJ-45 Connector	Pin No.	Color	Opposite End
	1	Orange	Earth grounding
	2	White- / orange	not connected
	3	Green	Dry contact equipment 1 level output end
	4	White- / green	Dry contact equipment 2 level output end
	5	Blue	Dry contact equipment 3 level output end
	6	White- / blue	Dry contact equipment 4 level output end
	7	Brown	Dry contact equipment 5 level output end
	8	White- / brown	not connected

Procedure

1. Measure the distance between the interface on the corresponding equipment and the PUBA card, so as to ensure an adequate length of the cable.
2. Make and attach temporary labels on both ends of the cable.
3. Arrange the dry contact cable.

- In the top access wiring mode: Lead the dry contact cable through the cabinet top wiring hole and route it downward along the wiring channel on the side of the cabinet to the PUBA card slot in the corresponding subrack fiber passage area. Insert the RJ-45 connector into the Interfaces DC1 to 7 and DC8 to 14 on the PUBA card, as shown in Figure 7-29.

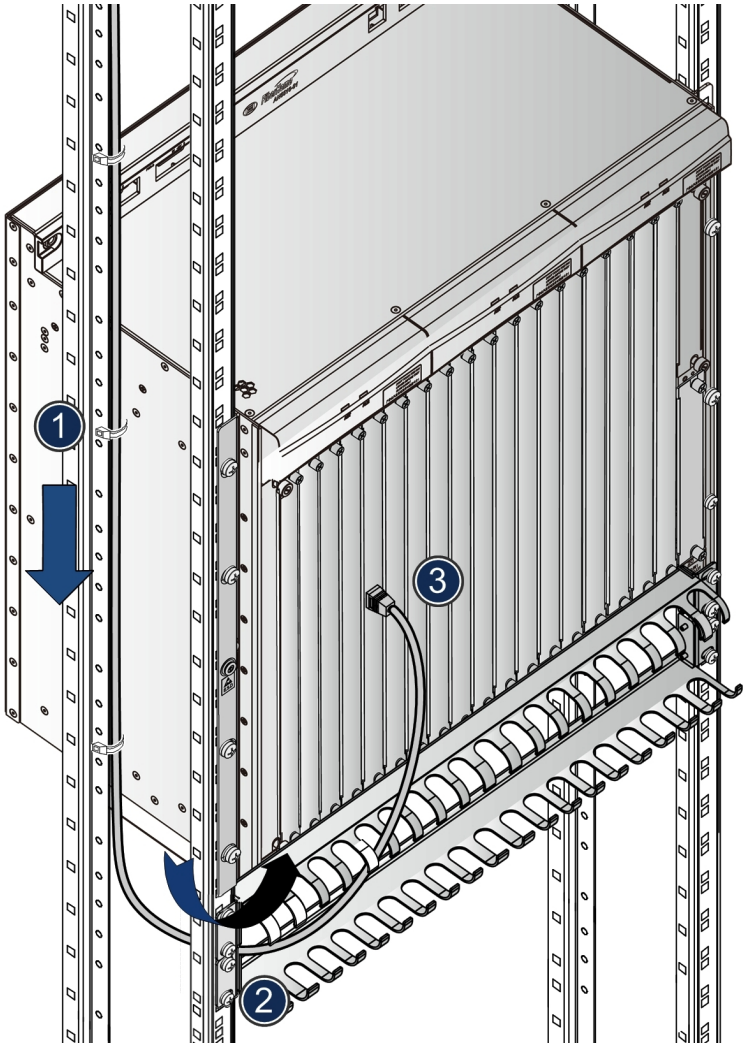


Figure 7-29 Arranging the dry contact cable in the top access wiring mode

- In the floor access wiring mode: Lead the dry contact cable through the cabinet bottom wiring hole and route it upward along the wiring channel on the side of the cabinet to the PUBA card slot in the corresponding subrack fiber passage area. Insert the RJ-45 connector into the Interfaces DC1 to 7 and DC8 to 14 on the PUBA card, as shown in Figure 7-30.

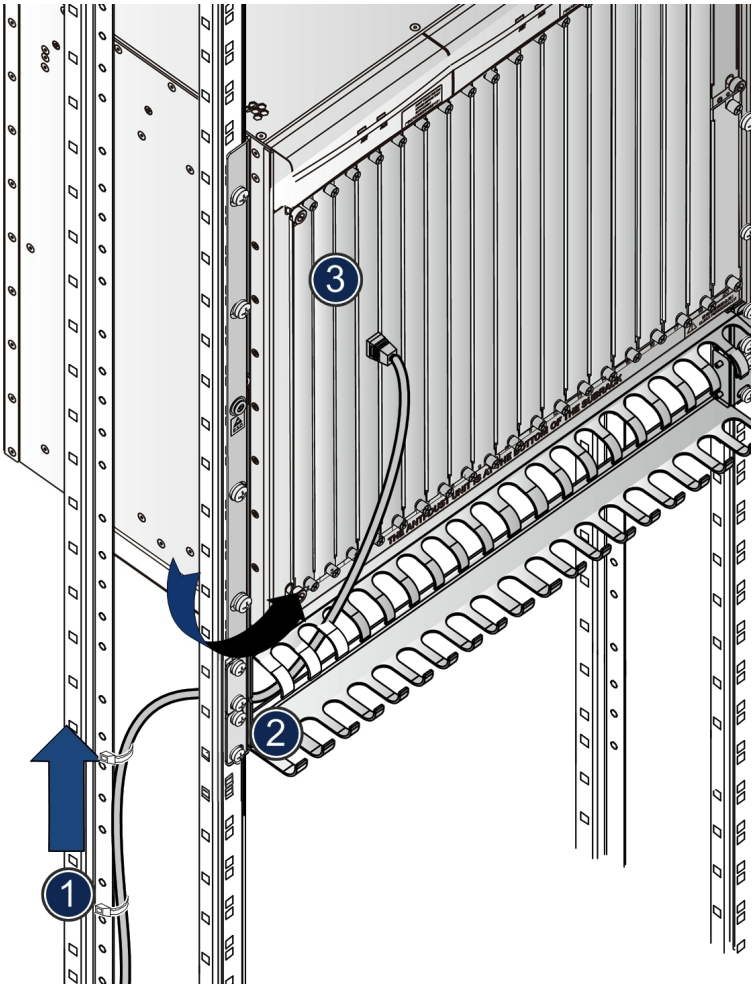


Figure 7-30 Arranging the dry contact cable in the floor access wiring mode

4. Arrange the dry contact cable, and bind the cable to the vertical mounting flange on the cabinet side with wire binders.
5. Arrange the dry contact cable of the opposite end.
6. Make and attach project labels on both sides of the cable.

Note:

Installer can first make the RJ-45 connector on the equipment side of the dry contact cable, then cut out an appropriate length of the cable and make the corresponding connector of the opposite end after completing the layout of the cable following the procedure above.

7.4.6 Connection and Layout of the Ethernet Cable

The AN5116-06B's Ethernet cable is used to connect the Ethernet electrical interface of the uplink card with the uplink equipment.

Component

The AN5116-06B can recognize and adapt to the straight-through and crossover network cables. Installers can use either one of them.

Procedure

1. Lay the Ethernet cable:
   - In the top access wiring mode: Lead the Ethernet cable through the wiring hole at the cabinet top, and route it downward along the wiring channel on the side of the cabinet to the EMSA / HSWD card, as shown in ① and ② of Figure 7-31.

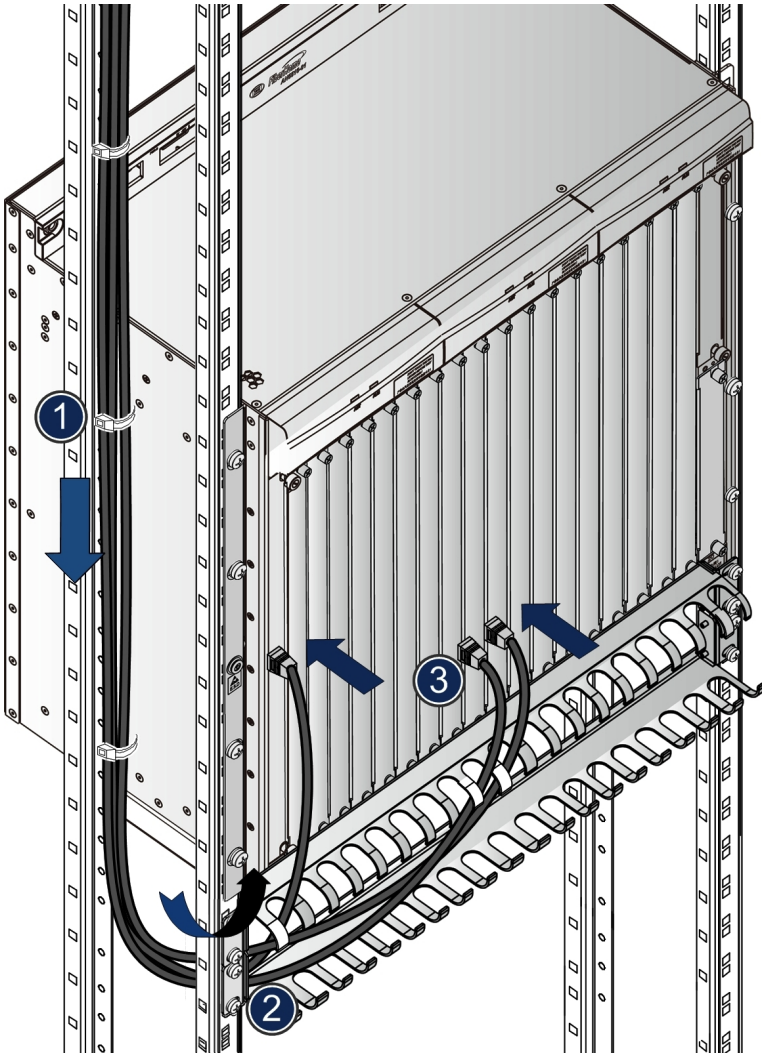


Figure 7-31 Arranging the network cable in the top access wiring mode

- In the floor access wiring mode: Lead the Ethernet cable through the wiring hole at the cabinet bottom, and route it upward along the wiring channel on the side of the cabinet to the EMSA / HSWD card, as shown in ① and ② of Figure 7-32.

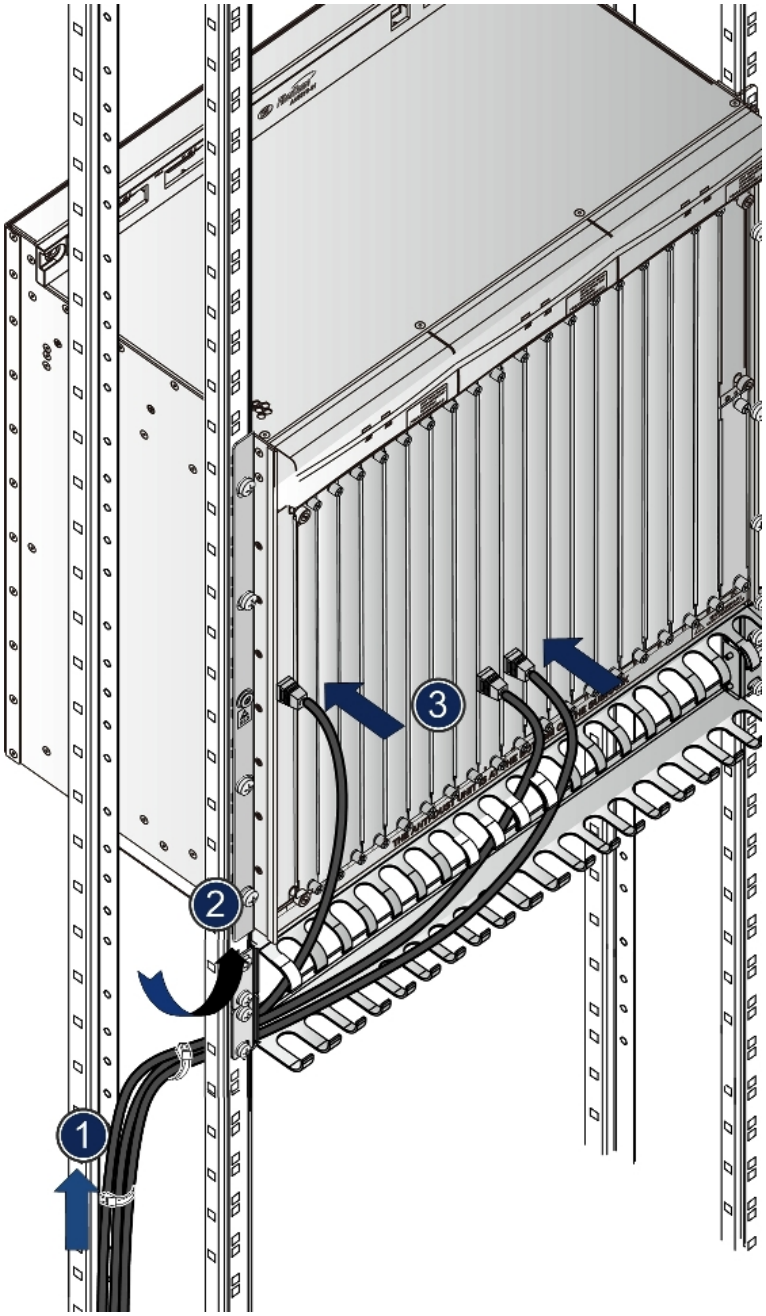


Figure 7-32 Arranging the network cable in the floor access wiring mode

2. Insert the RJ-45 connector into the corresponding interface, as shown in ③ of Figure 7-31 and Figure 7-32.
3. Arrange the Ethernet cable and bind the cables on the side of the cabinet onto the vertical mounting flange of the same side.

4. Connect the other end of the network cable to the opposite end equipment
5. Make and attach project labels on both ends of the network cable.

7.4.7 Connection and Layout of the Optical Fiber Jumper

The optical fiber jumper is used to connect the optical interface of the card with the ODF.

Component

The user should select optical fiber jumpers depending on the types of optical interfaces on the local and remote end equipment. There are two types of optical fiber connectors, namely LC / PC and SC / PC, on the optical interfaces of the equipment. The corresponding optical fiber connectors of the cards are shown in Table 7-5.

Table 7-5 The optical fiber connectors

Card	Optical Module	Optical Connector Type
C155D	SFP 1 to 2	LC / PC
HU1A	SFP+ 1 to 5	LC / PC
HU2A	SFP+ 1 to 4	LC / PC
EC4B	SFP 1 to 4	SC / PC

The LC / PC type and SC / PC type connectors are shown in Figure 7-33 and Figure 7-34.

Figure 7-33 The LC / PC-type fiber connector

Figure 7-34 The SC / PC-type fiber connector

Procedure

The optical fiber jumper should be wrapped by the protection casing first, and then be routed based on the top (or floor) access wiring mode. Specific steps are as follows:

1. Make and attach temporary labels on both sides of the optical fiber jumper, put them in order and lay them straight. Please note that the fibers should be arranged in pairs for transmitting and receiving.
2. Cut out an appropriate length of the protection casing according to the length of the optical fiber, (the fiber between the cabinet on the local end and the cabinet / ODF on the opposite end should be wrapped by the protection casing).
3. Put the fibers into the protection casing. Adjust the length of the optical fiber outside the protection casing, so as to ensure that the fibers are arranged in the equipment without redundancy.
4. Lay the optical fiber jumper
   - In the top access wiring mode:
     a) Route the fiber with the protection casing to the cabinet through the cabinet top wiring hole.
     b) Route it upward along the wiring channel to the corresponding subrack fiber passage unit, as shown in ① and ② of Figure 7-35.

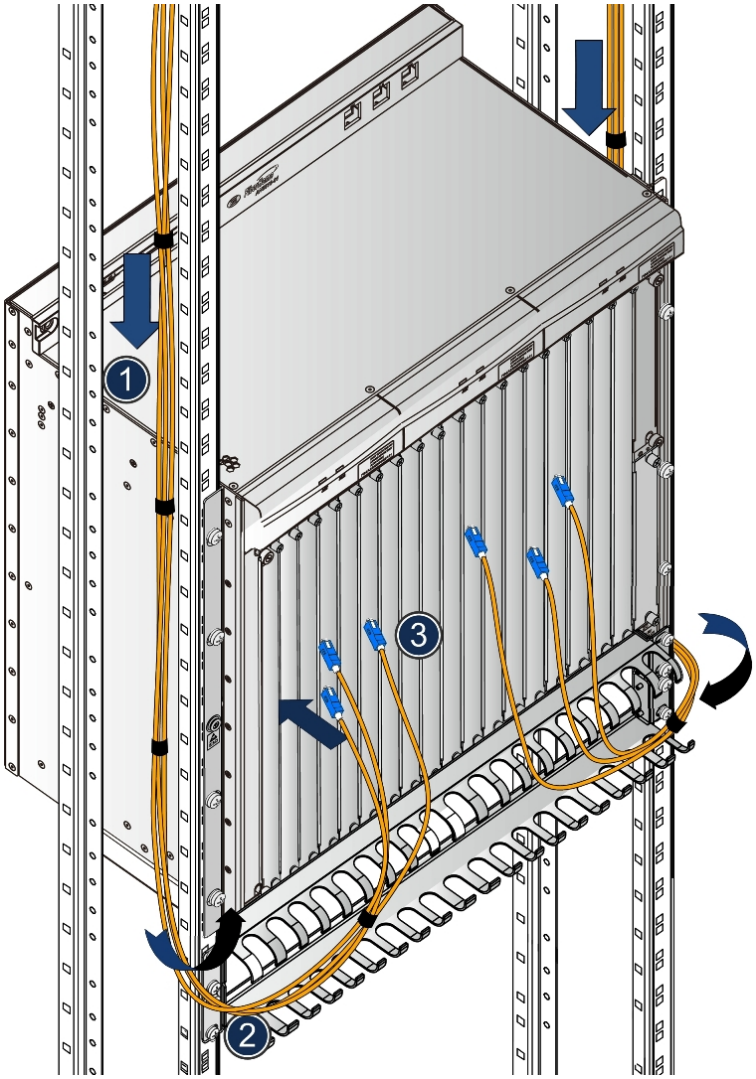


Figure 7-35 Arranging the optical fibers in the top access wiring mode

c) Lead the fiber through the fiber passage unit, and connect it with the optical interface on the corresponding card, as shown in ③ of Figure 7-35.

- In the floor access wiring mode:

a) Route the fiber with the protection casing to the cabinet through the ESD protection raised floor cut and the wiring hole at the cabinet bottom.

b) Route it upward along the wiring channel to the corresponding subrack fiber passage unit, as shown in ① and ② of Figure 7-36.

c) Lead the fiber through the fiber passage unit to the left, and connect it with the optical interface on the corresponding card, as shown in ③ of Figure 7-36.

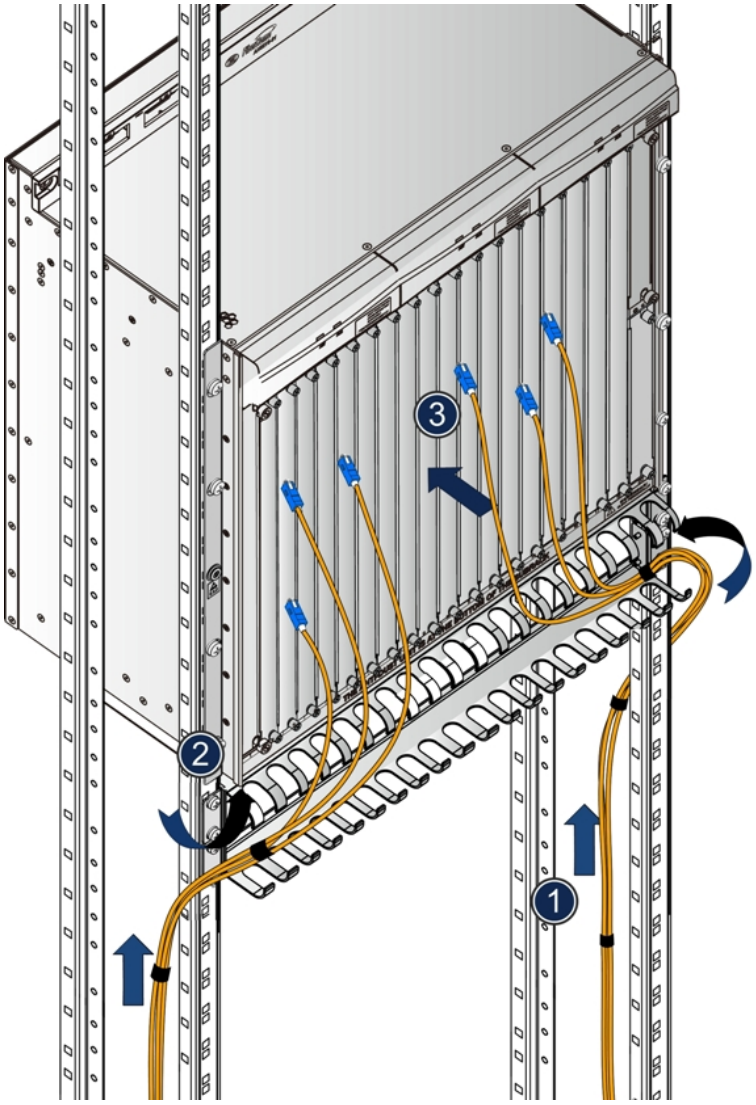


Figure 7-36 Arranging the optical fibers in the floor access wiring mode

5. After the connection of the fibers is completed, installers should bind the optical fibers at the entrance of the cabinet and at the point near to the fiber passage area with soft plastic binders to secure them. The interval between the binders should be equally spaced.
6. Connect the optical fibers on the ODF side.
7. Remove the temporary marks, then make and attach project labels on both ends of the fiber.

Note:

If the corrugated conduit is used, seal it with insulating tap to avoid damage to the optical fiber caused by shaking or to prevent any foreign material from entering the conduit into the cabinet.

7.4.8 Connection of the Serial Port Line

The serial port line is used to connect the CONSOLE interface of the HSWA card or the D interface of each card with the serial port of the local computer. It is used only in project start-up and commissioning.

Component

The serial port line is shown in Figure 7-37. One end of the cable is the RJ-45 connector and the other end is the DE-9 connector.

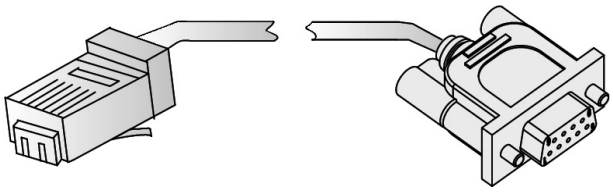


Figure 7-37 The serial port line

Procedure

1. Insert the RJ-45 connector of the serial port line into the CONSOLE interface of the HSWA card.

Caution:

The DE-9 connector should be connected to the serial port of the local computer after the computer is powered off.

2. Insert the DE-9 connector into the serial port of the local computer, and tighten the screws, as shown in Figure 7-38.

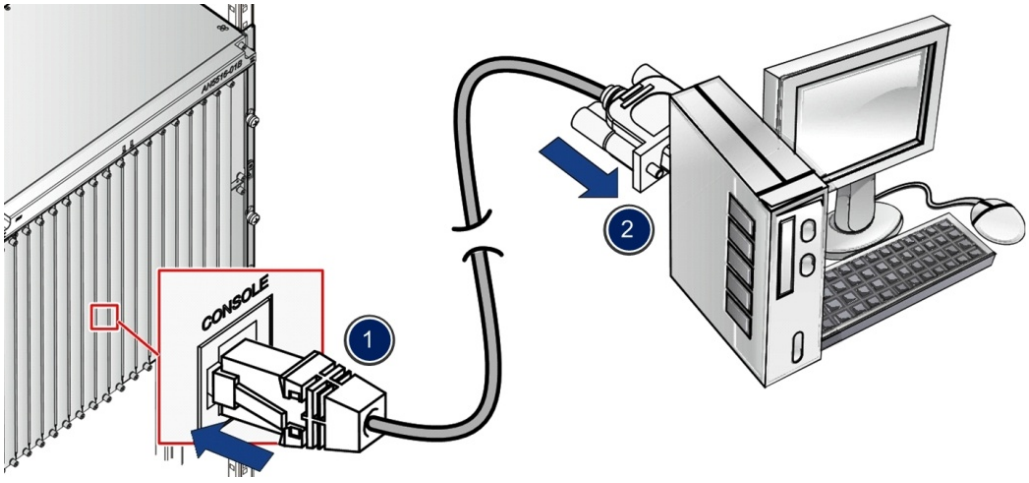


Figure 7-38 Connecting the serial port line

8 Installing the Cabinet Doors

After completing the connection and layout of the wires and cables, installers should install the doors that are removed to their original positions.

Refer to *Quick Installation Guide for the 19-inch Cabinet (600mm-deep) (596-599)* and *Quick Installation Guide for the 21-inch Cabinet (300mm-deep) (068-071)* for detailed installation method.

9 Checking the Installation

When the hardware installation is completed, installers should check the installation, getting ready for the system commissioning.

- ☑ Checking the Cabinet Installation
- ☑ Checking Connection and Layout of Wires and Cables
- ☑ Checking the Power and Grounding
- ☑ Checking the Environment and Security of the Equipment Room
- ☑ Checking the Connectivity of Wires and Cables

9.1 Checking the Cabinet Installation

After completing the cabinet installation, installers should check the quality of the installation. Table 9-1 lists the items to be checked and method of checking.

Table 9-1 The checklist of the cabinet installation

No.	Items to be Checked	Checking Method
1	The cabinet is installed in the correct position and in compliance with the installation requirements listed in project design documents.	Visual inspection
2	The vertical deviation of the cabinet installation position is no more than 3mm.	Measuring
3	The cabinet is secured firmly and in compliance with the requirements for seismic resistance capability specified in project design documents.	Visual inspection
4	The row of cabinets at the side of the main walkway is aligned in a line with the deviation no more than 5mm. The neighboring cabinets are in neat and compact arrangement. The surfaces of the row of cabinets are in the same plane, having no visible concave or convex areas.	Visual inspection
5	The hex machine screws that are used to secure the cabinet on the ground are installed correctly and fastened. The enlarged flat washer, locking spring washer and hex machine screws are installed in the correct order.	Visual inspection
6	All bolts are fastened tightly. Bolts of the same type should stand out above the screw cap at the same height.	Visual inspection
7	The appearance of the cabinet is not affected by paint peeling, scratches or stains; otherwise installers should touch up the painting and clean the cabinet.	Visual inspection
8	The structural accessories of the cabinet are installed correctly and firmly. The doors have no problem in opening and closing; their locks have no problem in locking and unlocking.	Visual inspection
9	The cards have no problem in mounting and removal. Dummy panels are installed correctly as long as they are needed.	Referring to this manual
10	All wiring holes on the cabinet are protected as required.	Referring to this manual
11	There is no litter, such as cable remnants and screws, inside the cabinet, on the cabinet top or at the cabinet bottom.	Visual inspection

Table 9-1 The checklist of the cabinet installation (Continued)

No.	Items to be Checked	Checking Method
12	Gaps between the floor boards around the cabinet are all filled. There is no sundry such as cable remnants or screws on the floor.	Visual inspection
13	Label all cabinets with identical tags, on which the information about the cabinet and all of its components are correct, clear and complete.	Visual inspection
14	The ESD protection wrist strap is connected to the ESD protection earth ground fastener on the cabinet.	Visual inspection
15	The cables, the key to the cabinet door and other accessories bound inside the cabinet on delivery are taken out.	Visual inspection

9.2 Checking Connection and Layout of Wires and Cables

After the cables and wires are arranged, installers should check whether the wiring, binding, turning of the cables and the attachment of labels are in compliance with the standards. Table 9-2 lists the items to be checked and method of checking the wires and cables.

Table 9-2 The checklist of the wires and cables

No.	Items to be Checked	Checking Method
1	The specifications, routes, cross-sectional area and position of the cables arranged are compliant with the construction drawing. The cables are arranged in good order, without damage to their sheath.	Visual inspection
2	The plugs of the cables are clean and intact; and the plugs made onsite are up to standard. The plugs are all connected correctly and firmly.	Visual inspection
3	There is no missing, mistake or loosening of the connection for all cables and wires.	Visual inspection and referring to this manual
4	The cables are bound with proper and equal spacing between them. The wire binders are arranged in good order. The extra parts of the binders are cut from the root without leaving sharp points.	Visual inspection
5	Cables arranged outside the cabinet should be free of crossing beyond a distance of 1m from the cabinet.	Visual inspection

Table 9-2 The checklist of the wires and cables (Continued)

No.	Items to be Checked	Checking Method
6	Layout of the cables outside the cabinet: The cables should be arranged in good order without crossing or bending. When the cables are arranged along the wiring channels, bindings are not necessary, but the cables should not overfill the channels. Bind the cables with wire binders carefully at equal intervals with appropriate tightness; and the bound cables are arranged close to each other in good order, without crossing or twisting.	Visual inspection
7	When the top access wiring mode is used, the cables should be directly arranged on the cabling rack and should not cover the ventilation opening in the top cover. When cables are required to be arranged along the upper part of the cabinet, the distance between the cables and the ventilation hole on the cabinet top should be no less than 10cm. If the distance between the cabling rack and the cabinet is bigger than 0.8m, installers should set up a cabling ladder.	Visual inspection
8	When the cables are arranged under the floor, the height of the cable bundles should be no more than 3/4 of the net height from the ground to the ESD protection raised floor or the ventilation and air cooling may be hindered.	Visual inspection
9	Protection measures should be taken when the fiber pigtails are arranged outside the cabinet, using protection casing or tray.	Visual inspection
10	The end of the fiber pigtail protection casing that is led to the cabinet or tray should extend into the cabinet or the tray and should be secured there. Do not press the protection casing with weights.	Visual inspection
11	The cut at the end of the fiber pigtail protection casing should be neat and free of burr. The connecting part of the protection casing or the end should be wrapped with insulating tape and treated to be cut resistant, so as to prevent the pigtail from being cut or damaged.	Visual inspection
12	The connection points on the fiber pigtails should be clean and dustless. The fiber connectors or the optical interfaces that are not in use should be protected by the anti-dust caps. Strictly follow the specifications and rules issued by FiberHome when cleaning the connection points.	Visual inspection

Table 9-2 The checklist of the wires and cables (Continued)

No.	Items to be Checked	Checking Method
13	Layout of the fiber pigtails: The fiber pigtails are not arranged too closely to each other or intertwined at the turning points. The paired fiber pigtails are bound after being arranged in order. Do not bind with too much force and leave pressure marks on the fiber pigtails. The fiber pigtails can rotate freely in the binding ring, but all not allowed to turn at a right angle. After the fiber pigtails are arranged, do not put any cable or other objects on them.	Visual inspection
14	The information filled in the cable label is correct and the label is affixed firmly and neatly in the same direction. It is recommended that the label should be attached and positioned 2cm away from the cable's plug. The labels can be customized.	Installer confirming and visual inspection

9.3 Checking the Power and Grounding

The correct connection of the power cables and protection earth ground cables helps avoid damages from an excessive current surge due to lightning. Table 9-3 lists the items to be inspected.

Table 9-3 The checklist of the power and grounding

No.	Items to be Checked	Checking Method
1	The wiring routing, number and layout position of the cables such as the power cables and the protection earth ground cables are in compliance with the project design documents. The specifications of the power cables and the capacity of the fuses should comply with the design requirements.	Visual inspection
2	The power cables and the protection earth ground cables of the equipment are evenly arranged, bound neatly and connected correctly and firmly.	Visual inspection
3	The power cables and the protection earth ground cables should be made of a continuous segment of copper core with no intermediate connections. The insulation layer is complete and in good condition. Cut off the extra part, do not wind them into coils or bend them repeatedly.	Visual inspection

Table 9-3 The checklist of the power and grounding (Continued)

No.	Items to be Checked	Checking Method
4	When the power cables and the protection earth ground cables are crimped into the wire noses, the joints should be welded or pressed firmly. Use the copper nose whose size is in compliance with the diameter of the cable and the connection screw.	Visual inspection
5	The feed cable of the AC / DC power supplies should be arranged separately. The power cable, signal cable, subscriber cable and trunk cable should be arranged separately. The recommended interval is more than 5 cm.	Visual inspection
6	When the protection earth ground cables and the power cables are connected to the power cabinet, the cable remainder has to be cut off and is not allowed to be coiled.	Referring to this manual
7	The diameters of the power cables and the protection earth ground cables of the equipment meet the requirements of the equipment configuration.	Visual inspection and calculating
8	The colors of the arranged power cables and protection earth ground cables are compliant with the packing list sent out on delivery or meet the installers' requirements. For power cables, their protection earth ground wires are yellow- / green; the 0V ground wire is black, and the -48V wire is blue.	Visual inspection
9	The wire nose ends and bare wires of the power and the protection earth ground cables are wrapped with casing tubes or insulating tapes. No copper wire is exposed at the wire noses or connectors. The flat washers and locking spring washers are installed correctly.	Visual inspection
10	The components and subracks inside the cabinet are correctly and firmly connected to the protection earth ground. The protection earth ground cables between cabinets should not be connected in series.	Measuring
11	The AC power cable must include a protection earth ground wire.	Visual inspection

Table 9-3 The checklist of the power and grounding (Continued)

No.	Items to be Checked	Checking Method
12	When the optical cable is led into the cabinet rack, its reinforced metal core must connect with the lightning-proof ground separately and should not share the protection earth ground cables with the equipment.	Visual inspection
13	When there is enough space on the power supply bus and protection earth ground cable bar, only one connector can be compression jointed on one screw bolt. But if there is not enough space, at most two connectors can be compression jointed on one bolt.	Visual inspection

9.4 Checking the Environment and Security of the Equipment Room

When the installation is completed, installers should check the environment and security of the equipment room. Table 9-4 lists the items that should be checked.

Table 9-4 The checklist of the environment and security inside the equipment room

No.	Items to be Checked	Checking Method
1	The equipment room should be clean and tidy. The abandoned packing boxes should all be removed from the room. The redundant spare components that are left after installation should be kept properly by relevant personnel from the operator.	Visual inspection
2	The equipment room should be equipped with effective fire-fighting devices. If the equipment is required to be configured with automatic fire alarm system or fixed gas fire-extinguishing system, users must keep the systems in good condition.	Visual inspection
3	The reserved holes on floor slab should be covered by the safety cover plate made of anti-flaming material.	Visual inspection
4	Do not keep or store inflammable, explosive or any other kinds of dangerous goods in the equipment room.	Visual inspection

9.5 Checking the Connectivity of Wires and Cables

When the connection and layout of the cables and wires is completed, installers should conduct the connectivity test and ensure that the signals are transmitted effectively. Table 9-5 lists the items to be checked.

Table 9-5 The checklist of the wires and cables' connectivity

No.	Items to be Checked	Checking Method
1	Optical fiber	Check the connectivity of the optical fiber with the light emitter.
2	Network cable	Check the connectivity of the network cable with the network cable tester.
3	Junction cable	Check the connectivity of the junction cable with the multimeter.

10 Power-on Testing

After the installation of all hardware, installers should conduct a power-on test of the equipment.

☑ Testing Power-on

☑ Testing Power-off

10.1 Testing Power-on

This section introduces the method of testing power-on.

10.1.1 Testing Cabinet Power-on

Preparations for the power-on test

The AN5116-06B uses a -48V DC power supply with an acceptable voltage range from -40V to -57V.

Before powering on the equipment, installers should check the following item:

- Confirm that the cabinet power cable is correctly connected with the external power supply equipment.
- Confirm that the wires and cables at all levels are connected correctly.
- Make sure that all power control switches on the PDP are placed in the OFF position.
- Remove the power cable plugs of all subracks.
- Disconnect all cards inside the subrack but leave them on their slots.
- Disconnect the fan units inside the subrack but leave them on their slots.

Procedure

1. Measure the voltage between the **-48V1** (the external power supply) and the **0V1** connectors on the PDP, whose normal value should range from -40V to -57V.
2. Measure the voltage between the **-48V2** (the external power supply) and the **0V2** connectors on the PDP, whose normal value should range from -40V to -57V.
3. If the voltage values measured in Steps 1 and 2 are not within the required range, installers should troubleshoot the power supply equipment and the cables until the voltage values meet the requirement.
4. Place each branch ACB on the PDP in the ON position.

5. Measure the voltage between the **-48V** connector and the **0V** connector on each subrack power cable's plugs respectively; the measured value should range from -40V to -57V.
6. When all the results of the above examinations meet the requirements, the power-on of the cabinet is confirmed to be normal.

10.1.2 Testing Subrack Power-on

Preparations for the power-on test

- Confirm that the cabinet power cable is correctly connected with the external power supply equipment.
- Confirm that the wires and cables at all levels are connected correctly.
- Place each branch ACB on the PDP front panel in the OFF position.
- Remove the power cable plugs of all subracks.
- Disconnect all cards inside the subrack but leave them on their slots.
- Disconnect the fan units inside the subrack but leave them on their slots.

Caution:

Wear an ESD protection wrist strap (with its plug inserted in the ESD protection earth ground fastener properly) when plugging and unplugging cards.

Procedure

1. Insert the plugs of the active and standby subrack power cables into the power supply interfaces on the active and standby power supply cards of the subrack's backplane respectively.
2. Place the corresponding power switches on the front panel of the PDP in the ON position.
3. Insert the fan unit at first after confirming the subrack has no abnormal sound or smell. The green LED indicator ACT is on, and the red LED indicator ALM is off.

4. Plug the cards into the subrack one by one, and check whether the indicator LEDs on each card are in normal state.

Note:

Generally, cards are electrified normally in two or three minutes. Please refer to *AN5116–06B Optical Line Terminal Equipment Hardware Description* for descriptions of normal status of the indicators LEDs.

5. When the results of all above tests meet the requirements, the cabinet power-on is proved normal.

10.2 Testing Power-off

The AN5116-06B's power-off procedures are reverse to those of the power-on. Specific steps are as follows:

1. Place each ACB on the PDP in the OFF position.
2. Disconnect the external power supply.

Appendix A PDP

The AN5116-06B inducts two channels of DC -48V power (active and standby) from the external (e.g. the power cabinet) and provides three sets of redundant branch power rails (six branch power rails total) for the three subracks. The primary functions of the PDP include power supply distribution, lightning protection and alarm signal processing.

A.1 Front Panel

This section introduces the PDP's front panel.

Two groups of automatic circuit breakers (ACBs) for branch power rails are located on the front panel of the PDP, as shown in Figure A-1.

- The ACBs SW1-1 to SW1-3 respectively control the branch power rails -48V_A_1 to -48V_A_3.
- The ACBs SW2-1 to SW2-3 respectively control the branch power rails -48V_B_1 to -48V_B_3.

Figure A -1 The PDP 296B’s front panel

A.2 Connectors

Figure A-2 shows the connectors on PDP's panel.

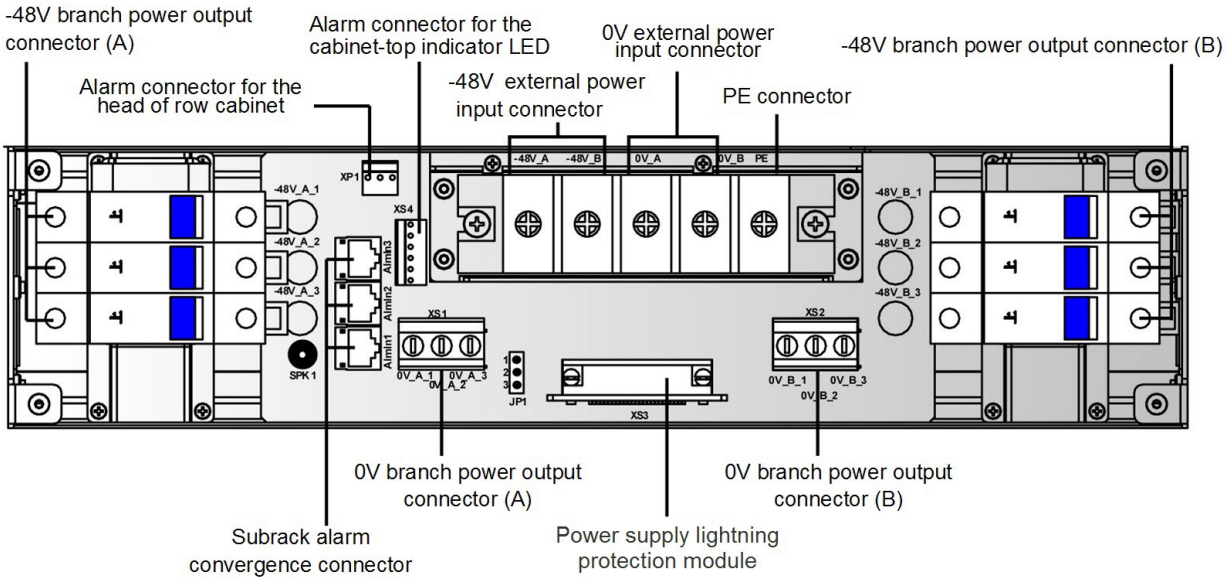


Figure A -2 The PDP's connectors

A.3 Power Connectors

- The description of the external power input connectors is listed in Table A-1.

Table A-1 The description of the external power input connectors

Connector	Description
-48V_A, -48V_B	The external power supply -48V input connectors. A and B back up each other.
0V_A, 0V_B	The external power supply 0V input connectors. A and B back up each other.
PE	Protective earth ground connector

- The description of the branch power rail output connectors is listed in Table A-2.

Table A-2 The description of the branch power rail output connectors

Connector	Description
-48V_A_1 to -48V_A_3	Automatic circuit breakers (ACBs), the outer connectors are -48V branch power rail output connectors corresponding to -48V_A.
-48V_B_1 to -48V_B_3	Automatic circuit breakers (ACBs), the outer connectors are -48V branch power rail output connectors corresponding to -48V_B.

Table A-2 The description of the branch power rail output connectors (Continued)

Connector	Description
0V_A_1 to 0V_A_3 (XS1)	0V branch power rail output connectors corresponding to 0V_A.
0V_B_1 to 0V_B_3 (XS2)	0V branch power rail output connectors corresponding to 0V_B.

A.4 Alarm Connectors

- The subrack alarm convergence connectors AlmIn1 to AlmIn3

  AlmIn1 to AlmIn3 are all RJ-45 sockets and can receive the alarm messages from the corresponding equipment in the cabinet.

- The alarm output connector XP1

  XP1 is a 3-conductor D-type socket and can output the alarm messages to the head of row cabinet.

- The alarm output connector XS4

  The XS4 is a 6-conductor D-type socket and can output the trigger signals of the alarm indicator LEDs to the cabinet top indicator LEDs.

A.5 Jumper Pin

JP1 is the jumper pin of the PDP's working status indicator LED. There are two methods for the shorting.

- Short pin1 and pin2 of JP1: Selects and transmits the PDP power-on status information to the cabinet-top indicator LED (green). When any branch (or multiple branches simultaneously) of the PDP is powered on, the cabinet-top indicator LED will be green.
- Short pin2 and pin3 of JP1: Selects and transmits CALL (order wire call) status information to the cabinet-top indicator LED (green).

Note:

The pin2 and pin3 of the JP1 are shorted by default in the PDP296B before delivery.

A.6 Lightning Protection Module

The lightning protection module of the power supply (Card No. / panel No. : 3.578.403 / 7.200.038) uses the standard DB-25 plug to connect with the sockets (XS3) of the lightning protection module on the PDP, which can effectively withstand a surge current of the common mode 2kV (1.2/50 us to 8/20us combination wave) or the differential mode 1kV (1.2/50 us to 8/20us combination wave), so as to guarantee the equipment's normal operation.

Appendix B Adjustable Cabinet Base

Introduces the structure and classification of the adjustable cabinet bases.

B.1 Classification of the Adjustable Cabinet Bases

In terms of height, the adjustable cabinet bases can be classified into 5 types, as described in Table B-1.

Table B-1 The types and application of the adjustable cabinet bases

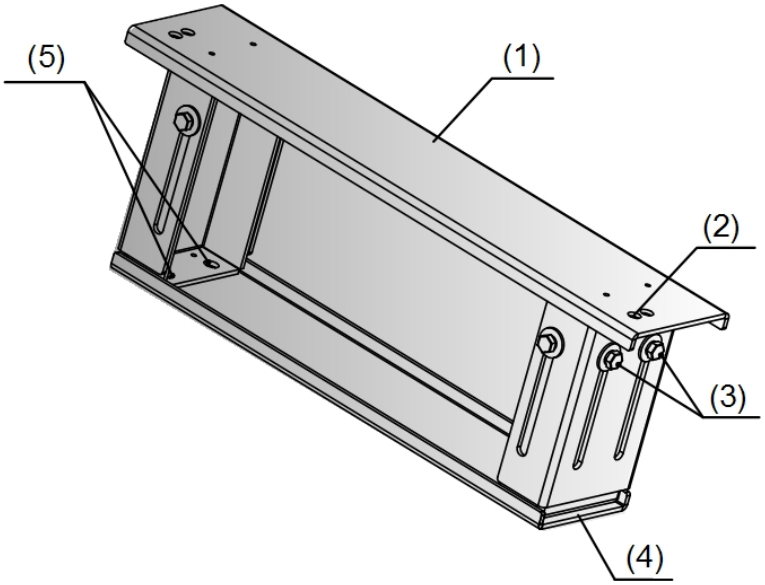
Type	Height Range for Suitable ESD Protection Raised Floor (mm)
I	85 to 125
II	125 to 195
III	195 to 290
IV	290 to 380
V	380 to 470

Note:

1. The height of ESD protection raised floor mentioned in Table B-1 refers to the distance between the upper surface of the ESD protection raised floor and the surface of the cement floor.
2. If the height of ESD protection raised floor is greater than applicable ranges shown in Table B-1, a customized adjustable cabinet base is required.

B.2 Adjustable Cabinet Base Structure (for the 19-inch Cabinet)

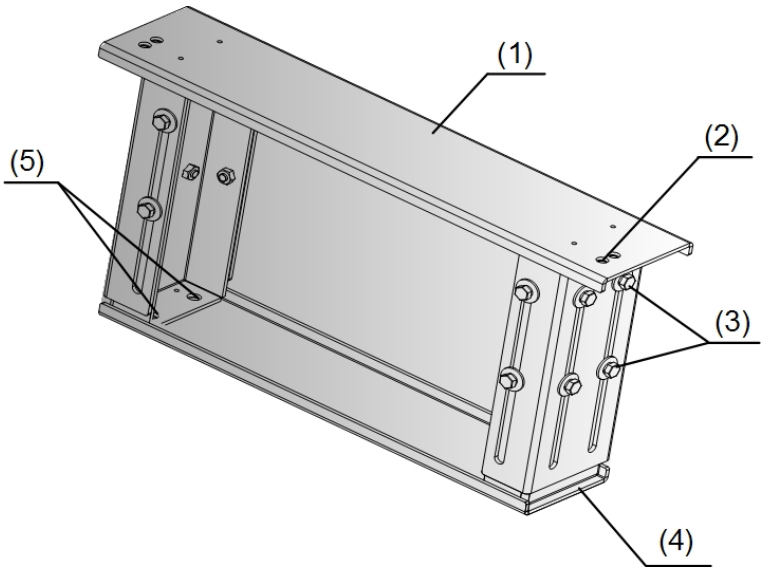
The structures of the adjustable cabinet bases for the 19-inch cabinet are shown in Figure B-1 and Figure B-2.



(1) Upper frame (2) Cabinet connection hole (3) Tightening screw

(4) Lower frame (5) Mounting hole

Figure B -1 The adjustable cabinet base (type I, II and III)



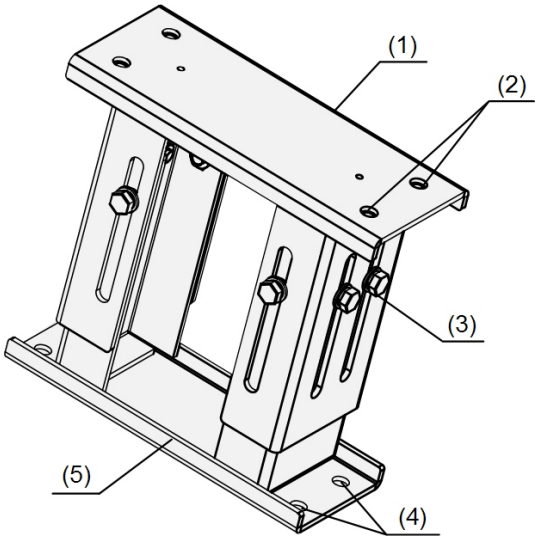
(1) Upper frame (2) Cabinet connection hole (3) Tightening screw

(4) Lower frame (5) Mounting hole

Figure B -2 The adjustable cabinet base (type IV and V)

B.3 Adjustable Cabinet Base Structure (for the 21-inch Cabinet)

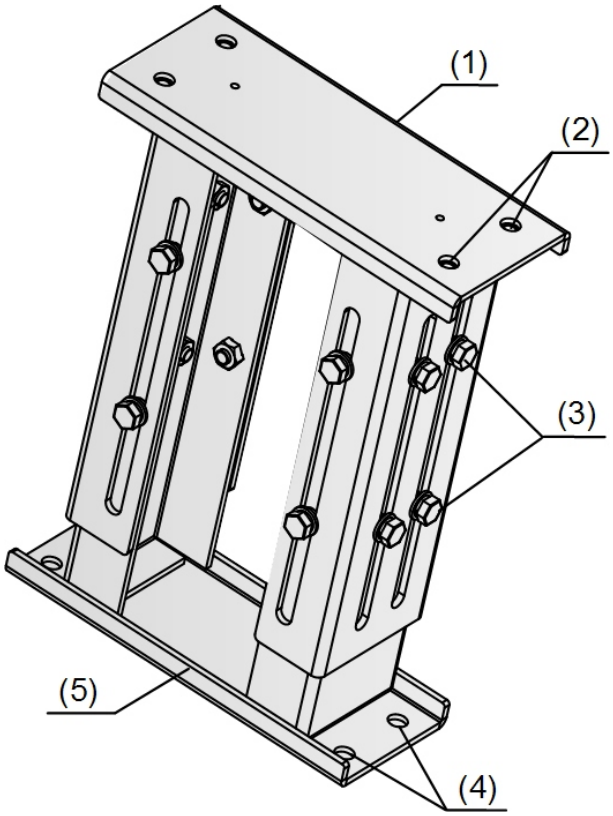
The structures of the adjustable cabinet bases for the 21-inch cabinet are shown in Figure B-3 and Figure B-4.



(1) Upper frame (2) Cabinet connection hole (3) Tightening screw

(4) Mounting hole (5) Lower frame

Figure B -3 The adjustable cabinet base (type I, II and III)



(1) Upper frame (2) Cabinet connection hole (3) Tightening screw

(4) Mounting hole (5) Lower frame

Figure B -4 The adjustable cabinet base (type IV and V)

Product Documentation Customer Satisfaction Survery

Thank you for reading and using the product documentation provided by FiberHome. Please take a moment to complete this survey. Your answers will help us to improve the documentation and better suit your needs. Your responses will be confidential and given serious consideration. The personal information requested is used for no other purposes than to respond to your feedback.

Name	
Phone Number	
Email Address	
Company	

To help us better understand your needs, please focus your answers on a single documentation or a complete documentation set.

Documentation Name	
Code and Version	

Usage of the product documentation:

1. How often do you use the documentation?

☐ Frequently ☐ Rarely ☐ Never ☐ Other (please specify) _____

2. When do you use the documentation?

☐ in starting up a project ☐ in installing the product ☐ in daily maintenance ☐ in trouble shooting ☐ Other (please specify) _____

3. What is the percentage of the operations on the product for which you can get instruction from the documentation?

☐ 100% ☐ 80% ☐ 50% ☐ 0% ☐ Other (please specify) _____

4. Are you satisfied with the promptness with which we update the documentation?

☐ Satisfied ☐ Unsatisfied (your advice) _____

5. Which documentation form do you prefer?

☐ Print edition ☐ Electronic edition ☐ Other (please specify) _____

Quality of the product documentation:

1. Is the information organized and presented clearly?

☐ Very ☐ Somewhat ☐ Not at all (your advice) _____

2. How do you like the language style of the documentation?

☐ Good ☐ Normal ☐ Poor (please specify) _____

3. Are any contents in the documentation inconsistent with the product?

_____

4. Is the information complete in the documentation?

☐ Yes

☐ No (Please specify) _____

5. Are the product working principles and the relevant technologies covered in the documentation sufficient for you to get known and use the product?

☐ Yes

☐ No (Please specify) _____

6. Can you successfully implement a task following the operation steps given in the documentation?

☐ Yes (Please give an example) _____

☐ No (Please specify the reason) _____

7. Which parts of the documentation are you satisfied with?

_____

8. Which parts of the documentation are you unsatisfied with?Why?

_____

9. What is your opinion on the Figures in the documentation?

☐ Beautiful ☐ Unbeautiful (your advice) _____

☐ Practical ☐ Unpractical (your advice) _____

10. What is your opinion on the layout of the documentation?

☐ Beautiful ☐ Unbeautiful (your advice) _____

11. Thinking of the documentations you have ever read offered by other companies, how would you compare our documentation to them?

Product documentations from other companies:_____

Satisfied (please specify) _____

Unsatisfied (please specify) _____

12. Additional comments about our documentation or suggestions on how we can improve:

_____

_____

Thank you for your assistance. Please fax or send the completed survey to us at the contact information included in the documentation. If you have any questions or concerns about this survey please email at edit@fiberhome.com.cn