AN6000-15
Optical Line Terminal Equipment Quick Installation Guide

Version: A Code：MN000004295

FiberHome Telecommunication Technologies Co., Ltd.

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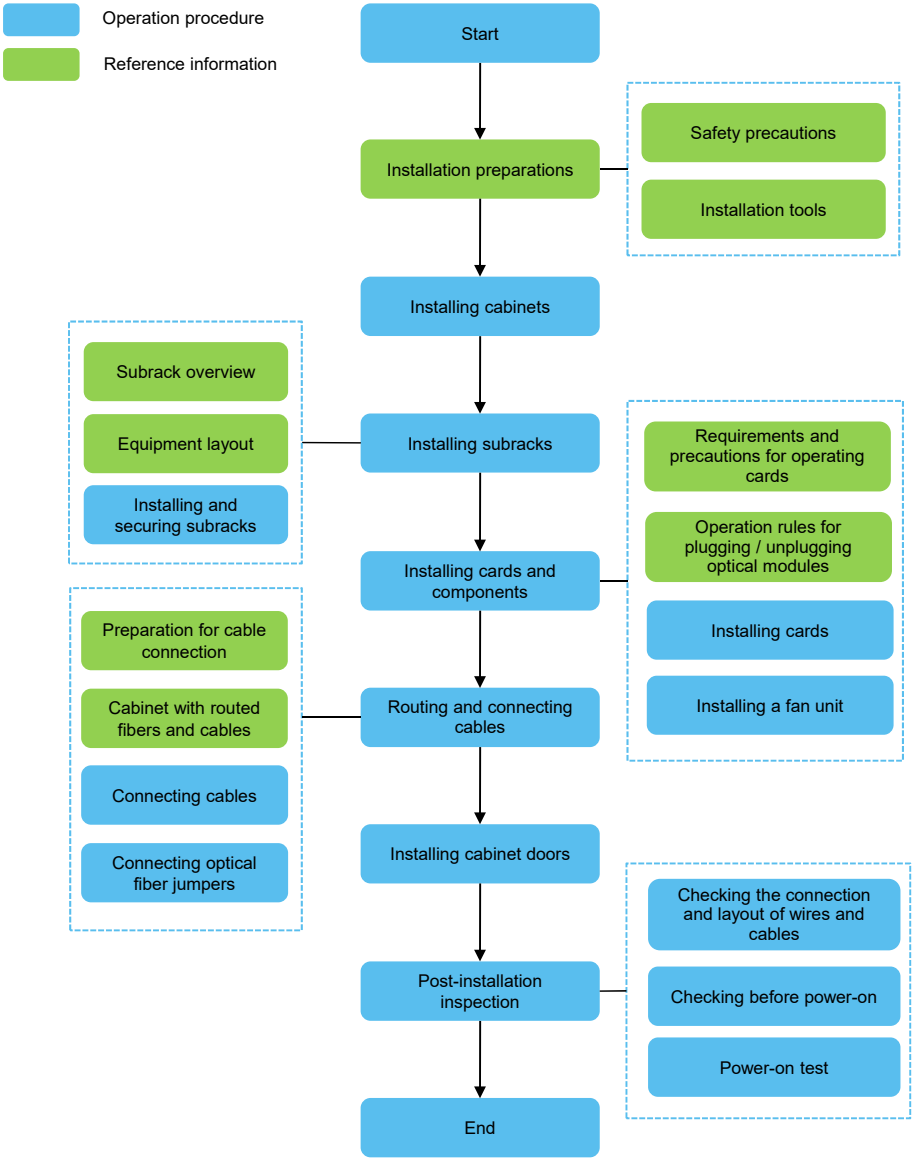
1 Installation Procedure



Warning

Laser Safety

To prevent laser radiation from injuring eyes, do not look into the end face of a fiber or fiber connector directly with naked eyes.

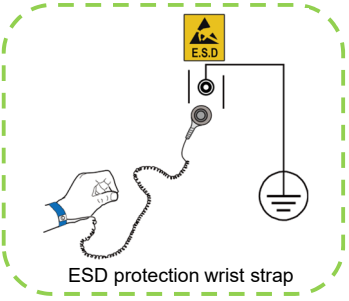
Laser class identifier

Caution

ESD Protection

- Carpets or other materials that easily generate static electricity should not be used on the floor of the equipment room.
- Do not touch any components or wires on cards, or metal conductors in sockets. ESD protection measures should be taken if it is necessary to touch the card during maintenance.


ESD protection gloves



ESD protection wrist strap

Caution

Grounding Requirements

Make sure the cabinet protection earth ground cable and subrack protection earth ground cable are well grounded before powering on the equipment. Check and ensure that the insulation resistance and ground resistance meet the specification.

Caution

Binding Cables

- Different types of cables on the installation site should be laid out independently and bound separately. Please note that optical fibers should be bound with dedicated fiber binding straps.
- Exercise care if you must bend fibers. If bends are necessary, the fiber bending radius should not be smaller than 10 D (“D” refers to the fiber diameter) and should not be smaller than 30 mm.
- Cables are bound with appropriate tightness and even distance between cable ties. The cable ties are arranged in good order, and the extra parts of ties are cut from the root without leaving sharp points.

Caution

Inspection Prior to Installation

Prior to equipment installation, inspect the equipment room, cabinets, power supplies, cables (especially earth ground cables), and supporting facilities. After confirming that the conditions for installation are satisfactory, start the work following project design documents.

3 Installation Tools


Ladder


Vacuum cleaner


Electric drill
(including the drill bits)


Marker pen


Long tape


Knife


Spirit level


Claw hammer (insulated)


Cross screwdriver
(insulated)


Flat screwdriver (insulated)


Crimping pliers


Hydraulic pliers


Wire clipper


Sharp nose pliers


Diagonal pliers


Wire stripper


Combination wrench
(insulated)


M6 to M12 socket wrench
(insulated)


Torque wrench
(insulated)


Insulating
gloves


Multimeter


Optical power meter

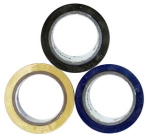

ESD protection
gloves


ESD
protection
wrist strap


Fiber puller


Open
corrugated
pipe

Flexible conduit


Insulating
tape


Cable tie

Fiber binding strap

4 Installing Cabinets

Instruction

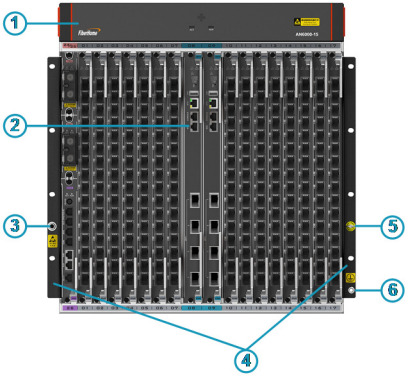
The AN6000-15 can be installed into the following cabinets. Please refer to related manuals for how to install the cabinets.

Cabinet Model	Manual
19-inch 600 mm-deep cabinets (4102596 to 4102599)	*Quick Installation Guide for the 19-inch Cabinet (600 mm-deep) (4102596 to 4102599)*
21-inch 300 mm-deep cabinets (404000068 to 404000071)	*Quick Installation Guide for the 21-inch Cabinet (300 mm-deep) (404000068 to 404000071)*
21-inch 340 mm-deep cabinets (404000596 to 404000599)	*Quick Installation Guide for the 21-inch Cabinet (340 mm-deep) (404000596 to 404000599)*
21-inch 600 mm-deep cabinets (4102581 to 4102584)	*Quick Installation Guide for the 21-inch Cabinet (600 mm-deep) (4102581 to 4102584)*

5 Installing Subracks

5.1 Subrack Overview

Subrack Structure



No.	Name	Function
①	Horizontal card slot	Houses the fan unit.
②	Vertical card slots	Accommodate cards to implement various functions of the equipment.
③	ESD protection earth ground fastener	Connects with the ESD protection unit.
④	Mounting ears	Secure the subrack in a cabinet.
⑤	Fiber puller hanger	Holds a fiber puller.
⑥	Subrack earth ground point	Connects with the subrack earth ground cable.

Subrack Dimensions

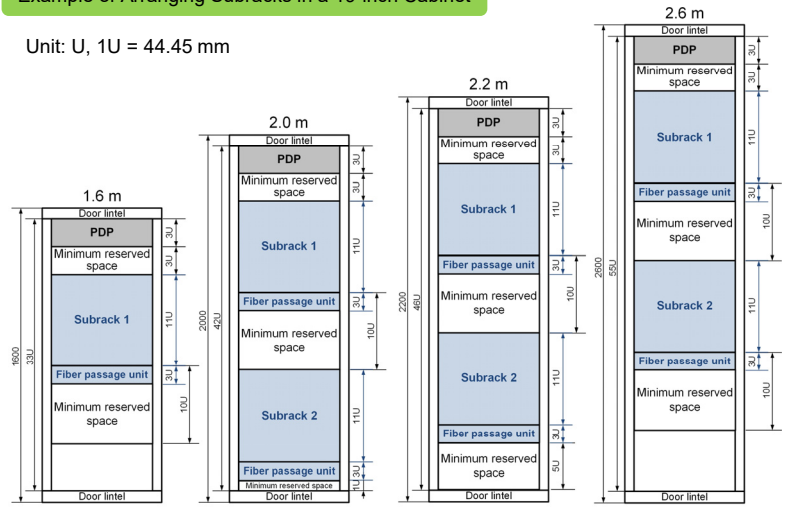
Description	Dimensions (H × W × D)
Subrack with mounting ears for a 19-inch cabinet[Note 1]	486 mm × 480 mm × 254.2 mm
Subrack with mounting ears for a 21-inch cabinet	486 mm × 530 mm × 254.2 mm
Note 1: The AN6000-15 subrack is equipped with mounting ears for a 19-inch cabinet by default.	

Rules for Arranging Subracks

- When multiple AN6000-15 subracks are to be installed in a cabinet, usually arrange the subracks from the top down.
- A cabinet can house two AN6000-15 subracks at most.
- Subracks are mounted on the front vertical mounting flanges of a 19-inch or 21-inch cabinet.
- The distance between every three mounting holes on the front vertical mounting flange in a 19-inch cabinet is 1 U (44.45 mm).
- The distance between every two mounting holes on the front vertical mounting flange in a 21-inch cabinet is 1 SU (25 mm).

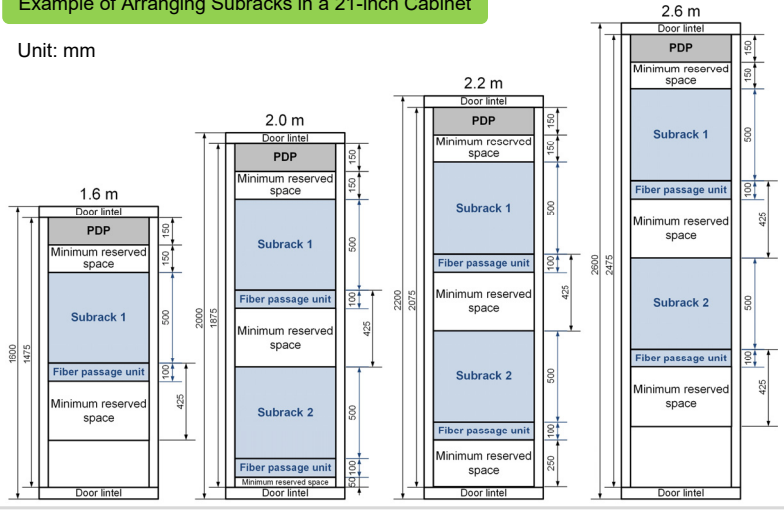
Example of Arranging Subracks in a 19-inch Cabinet

Unit: U, 1U = 44.45 mm



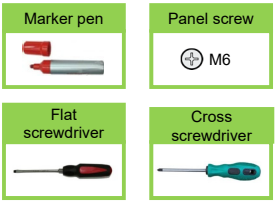
Example of Arranging Subracks in a 21-inch Cabinet

Unit: mm



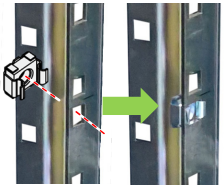
Installing Components

Fiber Passage Unit Integrated with Slide Rails for a 19-inch Cabinet



Procedure

1 Mark the positions for mounting the subrack and fiber passage unit on the vertical mounting flanges of the cabinet. Then install floating nuts.



2 Install the fiber passage unit.

3 Push the subrack into the cabinet along the slide rails.

4 Install the panel screws to secure the subrack.

Correct Way to Install a Screw

1 Pre-tighten the screw: Tighten the screw with moderate force, making sure that the screwdriver is on the same line with the screw.

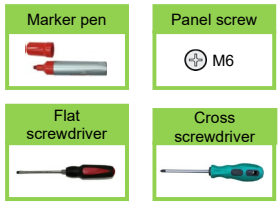
2 Make sure that the screw is engaged well with the screw thread (the resistance encountered is small), and tighten the screw carefully.

5.4 Installing Subracks in a 21-inch Cabinet

Installing Components

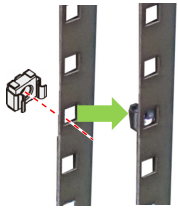
Fiber Passage Unit Integrated with Slide Rails for a 21-inch Cabinet

Adapter Mounting Ears



Procedure

1 Mark the positions for mounting the subrack and the fiber passage unit on the vertical mounting flanges of the cabinet. Then install floating nuts.



2 Install the fiber passage unit.

3 Install the adapter mounting ears.

4 Push the subrack into the cabinet along the slide rails.

5 Install the panel screws to secure the subrack.

Tips

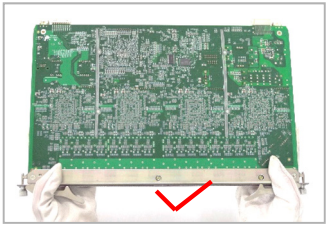
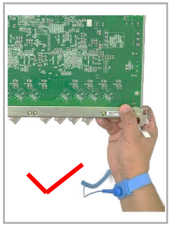
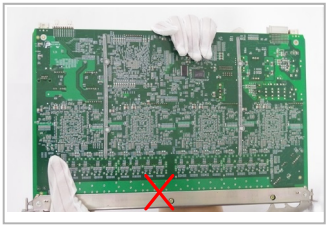
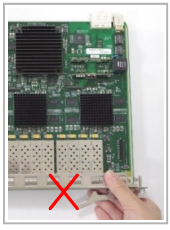
When installing the adapter mounting ears, install the panel screws but do not tighten them. After the subrack is pushed into the cabinet, fasten the screws to secure the subrack.

Correct Way to Install a Screw

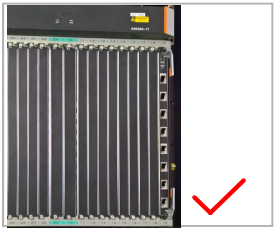
Refer to *Installing Subracks in a 19-inch Cabinet*.

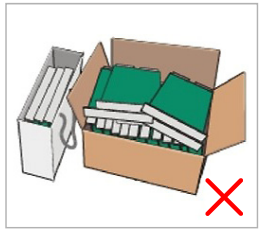
Caution

- Do not contact cards with bare hands. Always wear ESD protection gloves or an ESD protection wrist strap when operating cards.
- When holding a card, put your hands on its panel, and do not touch any components or wires on the card, or metal conductors in the socket.

- All vacant slots in a subrack should be installed with dummy panels. When you unplug a dummy panel, make sure that you plug it back in five minutes.
- Use care when plugging a card. The card cannot be inserted if not properly oriented.
- Cards are valuable and fragile. Please treat them with great care.
- Prevent the circuit surfaces of cards from contacting each other to avoid shorting or scratching.
- If the unpacked card is a spare one, it will not be installed immediately. Pack the card with its original ESD protection bag and put it in a dry and cool place, keeping it away from sunlight and strong electromagnetic radiation sources.

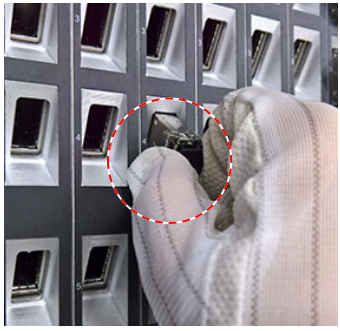




7 Operation Rules for Plugging / Unplugging Optical Modules

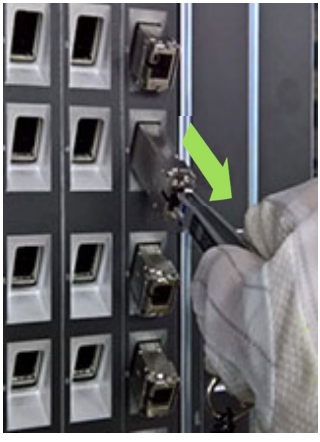
7.1 Plugging an Optical Module

1 Hold an optical module, and plug it into a card along the desired EMI cage.

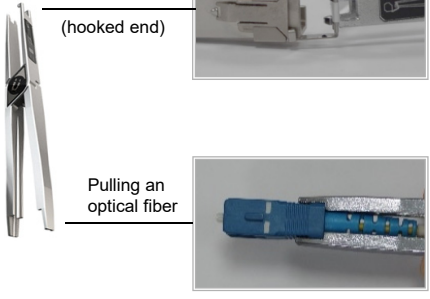


7.2 Unplugging an Optical Module

1 Grab the handle of an optical module with the hooked end of a fiber puller, and draw it out to detach the optical module from the EMI cage.



Fiber puller



Caution

- While pulling an optical module, hold the fiber puller tightly so that the module will not fall down.
- If no fiber puller is available on site, draw out an optical module by pulling its handle.

8 Installing Cards and Components

8.1 Installing Cards

Caution

- Before installing a card, check the pins and card connector on the backplane.
- Follow the rules for installing cards.
- If you feel a resistance when inserting a card, pull it out and make sure that you are inserting a card of the correct type to a correct slot in a correct direction. Do not force in the card.
- The core switch card, power card and CIOA card have color marks on both ends. Apply the cards to the slots with the same color marks to prevent mismatch.
- Insert dummy panels to the slots not holding cards. The procedures for installing dummy panels are the same as those for installing common cards.

ESD protection gloves / wrist strap

Cross screwdriver

Captive screw

1 Open the latches, align the upper and lower edges of the card with the slide rails in the slot (with the component side of the card facing left), and push the card in along the slide rails slowly.

2 Push the card to its position, and close and secure the card's latches, as shown in the figure below.

3 Tighten the captive screws on the card panel to lock the card.

8.2 Installing a Fan Unit

Caution

- Do not operate forcefully; especially do not exert excessive force when installing a fan unit.
- Do not touch the fan blades when the fan unit is running.

1 Hold the fan unit and align the slide rails on both sides of the fan unit with the slide rail grooves for the fan unit on the subrack respectively. Push the fan unit slowly into the subrack until you hear a click.

ESD protection gloves / wrist strap

9 Preparations for Cable Connection

Instruction

- Internal cables are connected inside a cabinet. Usually they have been connected before delivery. Installers should check the connection of internal cables on site. The items to check include whether the cable distribution is reasonable, whether the wires and cables are properly and neatly arranged, whether the plugs are connected firmly, whether incorrect or poor insertion exists, and whether any part is missing.
- Installers can choose the top access wiring mode or the floor access wiring mode according to the equipment room and the installation site conditions (This guide uses the top access wiring mode as an example).
- The AN6000-15 uses the PDP850A (3000064).

Note

- Before laying out wires and cables, you need to remove the front panel of the PDP. If space is limited for operations, remove the baffle at the bottom of the PDP as well.
- After you have completed layout of wires and cables, restore the front panel and baffle to their original places.

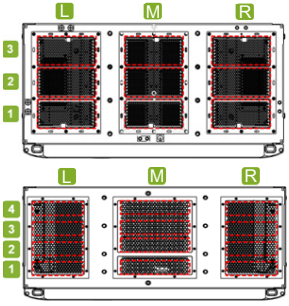
Preparing Wiring Holes on the Cabinet

Instruction

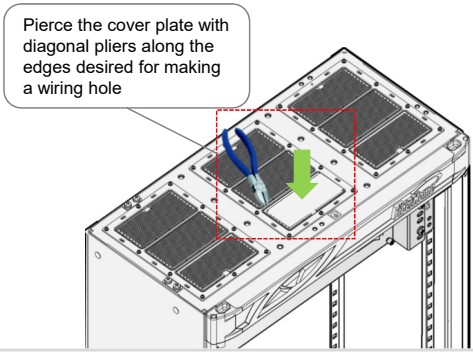
- For a cabinet equipped with mouseproof hop-pockets on the top, fasten the mouseproof hop-pockets after external wires and cables are led into the cabinet and well arranged.
- For a cabinet equipped with a cover plate on the top or bottom, determine the position, size and number of wiring holes according to the wiring plan. Pierce the cover plate with diagonal pliers at desired positions to make wiring holes. The following introduces how to make wiring holes on the top of the cabinet.
  - Prepare the holes from near to far in sequence.
  - Polish the raw edges of the holes so that they will not cut hands or cables.

Fastening the mouseproof hop-pockets on the top of the cabinet

Recommended Areas and Sequence for Making Wiring Holes

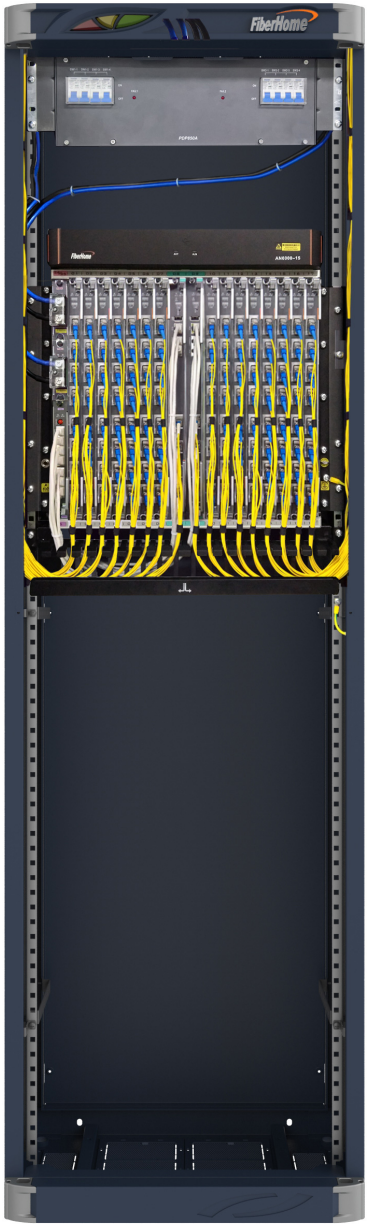


Making a Wiring Hole



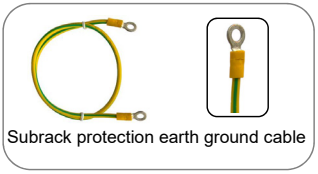
10 Cabinet with Routed Fibers and Cables

A Subrack for PON Services



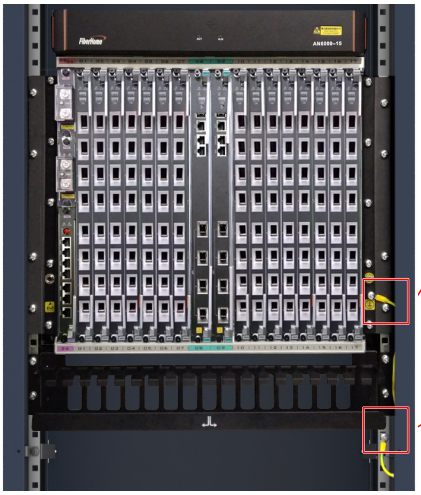
11 Connecting Power Cables and Protection Earth Ground Cables

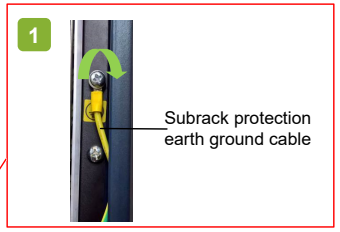
11.1 Connecting the Subrack Protection Earth Ground Cable

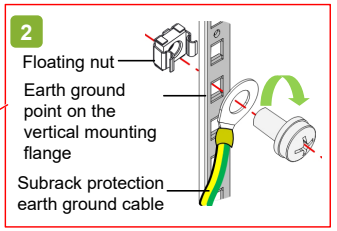


Subrack protection earth ground cable

Marker pen	Flat screwdriver	Cross screwdriver	Panel screw
			M6







11.2 Connecting External Power Cables

Warning

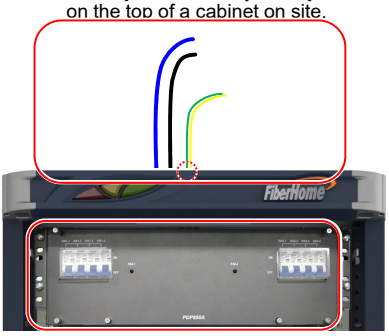
- Make sure the external power supply is shut off before connecting the power cables. Do not connect the cabinet power cables when the power supply is connected.
- Make sure the DC power input is cut off during cable connection, and attach labels to the switches to be used.
- Never expose the joining part of a power cable or a power connector unless necessary.
- If the bonding resistance between the equipment ground cable and the earth ground bar is higher than 0.1 ohm, the ground cable should be re-arranged.

Caution

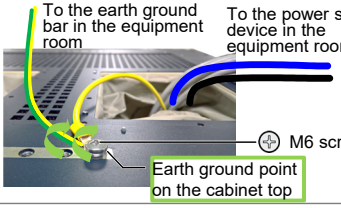
- With the premise that cables must be arranged in compliance with the route, the power cables should be processed on site according to the “shortest” route principle.
- The power cables should be made of a continuous segment of copper core with no intermediate connections.

Instruction

The protection earth ground cable for a PDP has been connected with the PE terminal before delivery of the PDP; you only need to connect the other end of the cable to the earth ground point on the top of a cabinet on site.

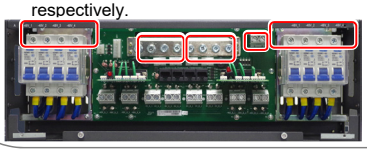


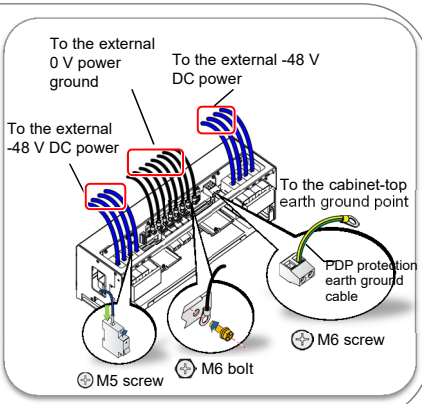
1. Connect the cabinet earth ground cable to the earth ground bar in the equipment room.
2. Lead the -48 V and 0 V power cables into the cabinet.



3. Remove the front panel of the PDP. M3

4. Connect the cabinet power cables to the PDP and the external power supply respectively. The terminals on the PDP from left to right are -48V_A, 0V_A, 0V_B, PE and -48V_B respectively.





-48 V power cable

0 V power cable

Protection earth ground cable

PDP protection earth ground cable

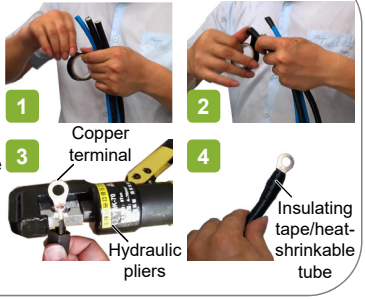
Screw/bolt	Captive screw
M5/M6	M3

Socket wrench	Cross screwdriver
	

Processing External Power Cables

"Cut-Wrap-Crimp-Insulate"

1. Measure a power cable and cut an appropriate length of it as needed with a wire clipper on site.
2. Wrap the bare end of the cable with an insulating tape to prevent short circuit during cable layout.
3. After leading the cable to the desired position, remove the insulating tape, strip the cable end with stripping pliers, install a copper terminal onto the cable end, and crimp it with hydraulic pliers.
4. Insulate the terminal with an insulating tape or a heat-shrinkable tube.

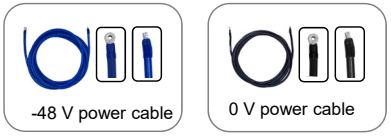


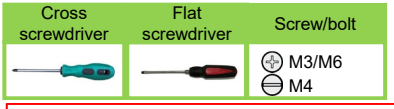
Caution

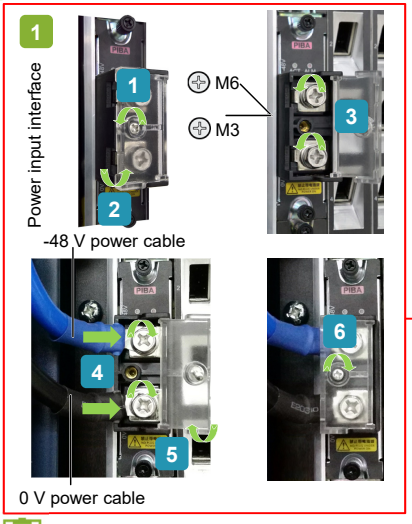
- Make sure that the power control switch for the corresponding subrack on the PDP is placed in the OFF position before laying the power cables.
- Completely insert the cord end terminals into the terminal blocks on the PDP. To ensure good connection, the metal part exposed should not exceed one sixth of the overall metal length. The length of the exposed insulation covering or metal part of terminals in the same row or batch should be equal whenever possible.
- Do not press the insulation covering of cord end terminals, which may cause poor electrical connection.
- Make sure the side with a larger area of a cord end terminal contacts the terminal block.
- After connecting power cables, attach a label indicating the cable information to both ends of each cable, 1 cm to 2 cm away from the connector on each end.

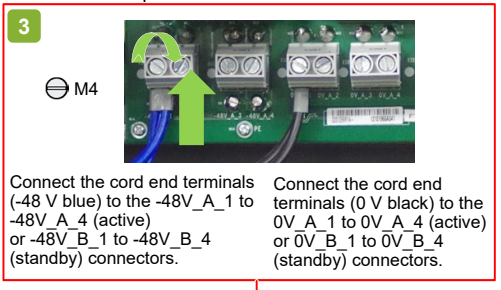
Instruction

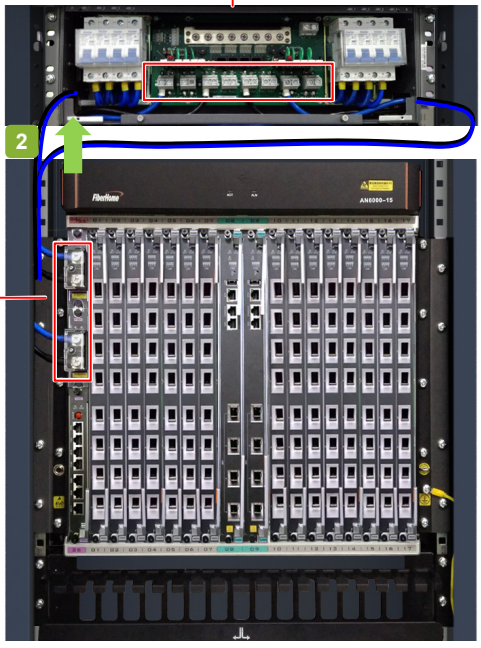
The figures below illustrate how to connect the subrack power cables to the subrack and the PDP850A (3000064).





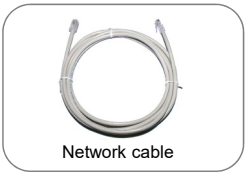


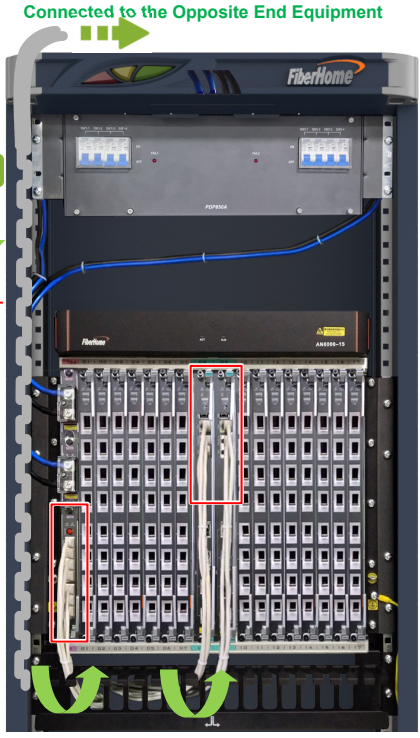




Instruction

- You need to properly bend the power cables before connecting them to power input interfaces.
- Route the power cables along the wiring channel on the left side of the cabinet, and then horizontally lead them into the PDP from wiring holes on both sides of the PDP.





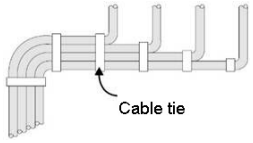
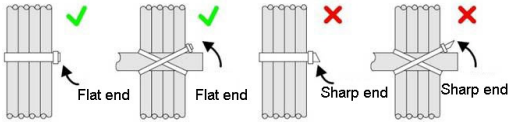
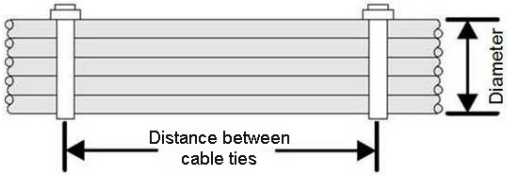
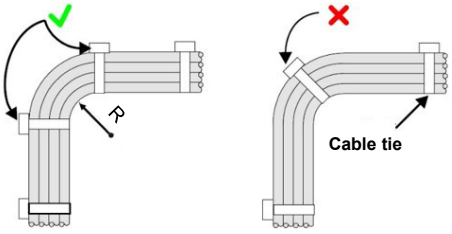
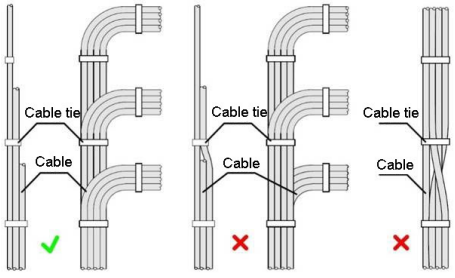
Instruction

Route the network cables behind the left vertical mounting flange, in the space between the subrack side panel and the cabinet side panel. Lead them to the bottom of the subrack, thread them through the wiring holes of the fiber passage unit, and then connect them to the desired cards.

Connection

Subrack Side (RJ-45)	Opposite Side (RJ-45 / Bare Wire)
SFP+ ports 1 to 4 of the HSCA card	Connected to an IP network for uplinking.
Ports 1 to 8 of the HU8A card	
ETH interface of the HSCA card	Connected to an out-of-band network management computer to implement network management monitoring.
EMS interface of the CIOA card	
ESC interface of the HSCA card	Connected to an environment monitoring device to report the external environment status to the network management system.
ALM interface of the CIOA card	Connected to one of the terminals XS1 to XS4 on the PDP850A (3000064) to output the subrack alarms to the PDP.
1PPS/TOD interface of the CIOA card	Connected to an external clock device. Note 1
DC1-7 interface of the CIOA card	Connected to a dry contact device. Note 1
Note 1: The cable is connected by bare wires on this side.	

Rules for Binding Cables

Rules	Illustration
• Keep the bound cables neat. The horizontal cables should be bound with even distance between cable ties.	
• Do not join several cable ties to make a longer one and bind cables with it; otherwise, the tensity may be reduced. • The cable ties are arranged in good order. The extra parts of the ties are cut from the root without leaving sharp points.	
When binding cables, abide by the following rules for the distance between cable ties: • When the diameter of the cable bunch is less than 10 mm, the distance between cable ties should be 150 mm; • When the diameter of the cable bunch is between 10 mm and 30 mm, the distance between cable ties should be 200 mm; • When the diameter of the cable bunch is equal to or larger than 30 mm, the distance between cable ties should be 300 mm.	
• When binding bent cables, do not bind them midway through the bend; otherwise, the cable cores may be broken. • The bending radius of cables (R) shall meet the following requirements (“D” refers to the cable diameter): ▸ Cables for general use: R ≥ 2 D; ▸ RF cables: R ≥ 15 D in common conditions; R ≥ 10 D in extreme conditions.	
• The cables inside the cabinet should be arranged from far to near. That is, lay the cables to the farthermost end first, putting them at the bottom layer in the wiring area. • Avoid crossing or twisting cables whenever possible.	

13 Connecting Optical Fiber Jumpers

Instruction

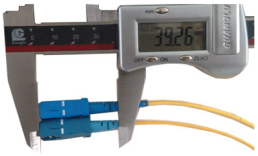
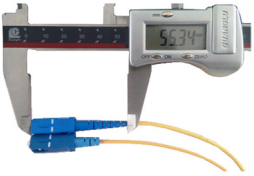
Select the right types of optical fiber jumpers according to the types of optical interfaces on the local and opposite end equipment. The optical interfaces on the AN6000-15 match two types of optical fiber connectors: LC/PC and SC/PC.

LC/PC Optical Fiber Connector

SC/PC Optical Fiber Connector

Caution

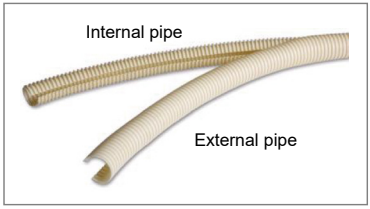
See the table below for the major specifications and appearances of the commonly used LC/PC and SC/PC optical fiber connectors. When the equipment is mounted in a 300 mm-deep cabinet, it is advisable to use short optical fiber connectors.

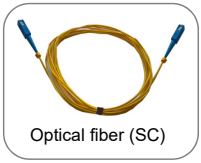
Type	Short Optical Fiber Connector	Long Optical Fiber Connector
LC/PC	31 mm 	48 mm 
SC/PC	39 mm 	55 mm 

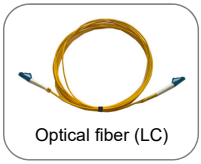
13.1 Connecting External Optical Fibers

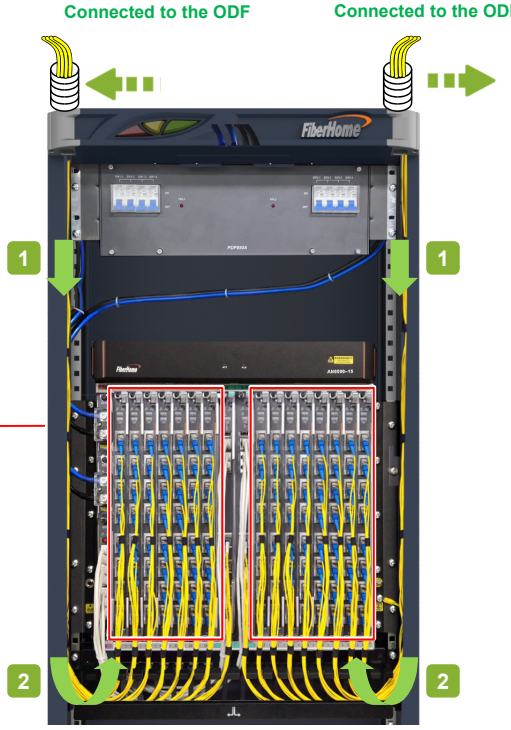
Caution

- Open corrugated pipes should not be overloaded with optical fibers. An open corrugated pipe with a diameter of 32 mm should carry no more than 60 optical fibers with a diameter of 2 mm.
- It is recommended that the part of a corrugated pipe inside a cabinet should be about 10 cm long.
- Arrange the corrugated pipes outside a cabinet according to the conditions of the equipment room.




Optical fiber (SC)


Optical fiber (LC)



Instruction

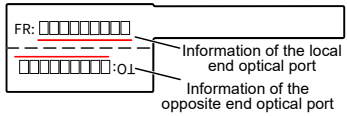
Route the fiber jumpers in slots 1 to 7 along the front vertical mounting flange on the left side of the cabinet and those in slots 10 to 17 along the front vertical mounting flange on the right side of the cabinet.

Connection

Connector	Subrack Side	Opposite Side
SC/PC connector	Ports 1 to 8 of the EX8A / GX8A / GM8A card	Connected to an ODF to provide GPON / 10G EPON / XG-PON / GPON & XG-PON Combo / GPON & XGS-PON Combo downlink channels.
	Ports 1 to 16 of the GPOA / EXOA / GMOA / GNOA card	
LC/PC connector	SFP+ ports 1 to 4 of the HSCA card	Connected to an IP network to provide GE and 10GE optical channels.
	Ports 1 to 8 of the HU8A card	

13.3 Arrangement After Layout

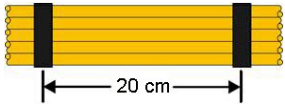
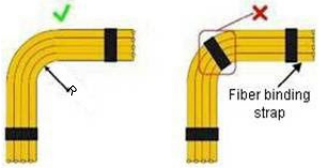
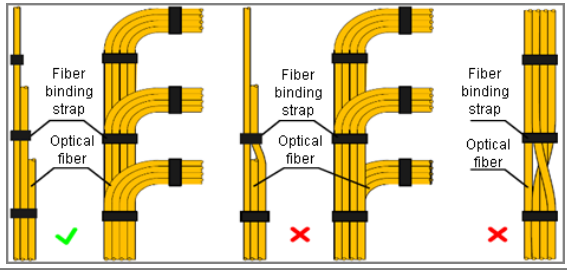
1. After the connection of optical fibers is completed, installers should bind the optical fibers between the cabinet entrance and the fiber passage area with dedicated fiber binding straps to secure them.
2. Connect the optical fibers on the ODF side.
3. Remove the temporary labels; make project labels and attach them to both ends of the optical fiber.
4. Insert an anti-dust cap into each unconnected optical port and cap the unused connector on each fiber pigtail.



Caution

Do not leave labels between two cards, which may affect the electrical conductivity between cards.

Rules for Binding Optical Fibers

Rules	Illustration
● When bundling optical fibers, make sure the distance between two adjacent fiber binding straps is 20 cm.	
● Do not twist, bend, stretch or squeeze optical fibers when connecting them. ● The fiber bending radius should not be smaller than 10 D (“D” refers to the optical fiber diameter) and should not be smaller than 30 mm.	
● Optical fibers should contact the loop side instead of the hook side of fiber binding straps. ● Tidy up optical fibers before binding them. ● Bind optical fibers with fiber binding straps with appropriate tightness. ● Avoid crossing or twisting optical fibers whenever possible.	

14 Installing Cabinet Doors

Instruction

Refer to the corresponding manuals listed in the section “Installing Cabinets” for procedures of installing cabinet doors.

Caution

Exercise care when closing or opening doors to avoid damage to cables.

15 Post Installation Inspection

15.1 Checking the Connection and Layout of Wires and Cables

Caution

When the connection and layout of cables and wires are completed, installers should conduct the connectivity test and ensure that signals are transmitted normally.

No.	Items to Check	Means
1	The specifications, routes, cross-sectional areas, and positions of the cables arranged are compliant with the construction plan drawing. The cables are arranged in good order, without damage to their sheath.	Visual inspection
2	The cable plugs are clean and intact, and the plugs made onsite are up to standard. The connectors are correctly and firmly connected.	Visual inspection
3	When cables must be arranged along the upper part of the cabinet, the distance between them and the ventilation hole on the cabinet top should be no less than 10 cm. If the distance between the cabling rack and the cabinet is larger than 0.8 m, installers should set up a cabling ladder.	Visual inspection
4	Layout of fiber pigtails: ● 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 fiber pigtails. ● Fiber pigtails can move forward or backward freely in fiber fasteners but cannot bend in right angle. ● After fiber pigtails are arranged, do not put any cables or other objects on them.	Visual inspection

15.2 Checking Before Power-on

Caution

The AN6000-15 uses -48 V DC power supply with an acceptable voltage range from -40 V to -57 V. Before powering on the equipment, installers should:

1. Confirm that the cabinet power cables are correctly connected with the external power supply equipment.
2. Confirm that all the wires and cables are connected correctly.
3. Place all the power switches on the PDP in the OFF position.
4. Disconnect all the cards inside the subrack but leave them on their slots.
5. Disconnect the fan unit inside the subrack but leave it on its slot.

15.3 Power-on Test

1. Measure the voltage between the -48 V and the 0 V connectors in the external power input area of the PDP. The normal value should be between -40 V and -57 V.
2. Place all the output branch switches on the PDP in the ON position.
3. Confirm that the subrack has no abnormal sound or smell.
4. Insert the fan unit, making sure it starts running normally and air movement begins around it.
5. Insert cards into the subrack in sequence and the cards will be electrified normally in two or three minutes. Make sure the indicator LEDs of all these cards indicate normal working status.
   ① Check whether the ACT indicator LED on the card is illuminated, which indicates normal power-on.
   ② Check whether the ALM indicator LED on the card is OFF, which indicates no alarm.

Card Indicator Status

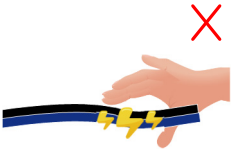
6. Check whether the active-standby power supply protection works.

Step	Operations on PDP's Output Branch Power Rail Switches	Checking Status of Power Card's ACT Indicator	Power Supply Status Indicated
①	1) active OFF, 2) standby ON	Active: OFF, standby: ON	The standby power supply is working.
②	1) active ON, 2) standby OFF	Active: ON, standby: OFF	The active power supply is working.
③	1) standby ON, 2) active ON	Active: ON, standby: ON	The active-standby power supply protection is working.

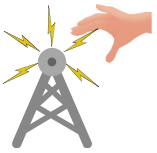
Instruction

The power-off procedures for the AN6000-15 are reverse to those of power-on.

Do not install / operate the equipment or lay cables during a lightning storm.



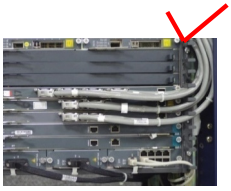
Do not connect or remove power cables while they are powered.



Direct or indirect contact (through damp objects) with high voltage power supply can cause bodily harm and should be avoided.

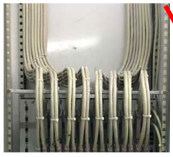
Promptly report any conditions that may lead to security problems.

Vacant slots should be covered with dummy panels to prevent foreign objects from entering the equipment and ensure normal air circulation.



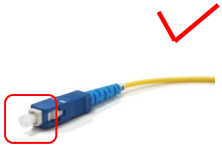
Power cables should be separated from signal cables.

Do not bind optical fibers with cable ties. Use the black fiber binding strap instead.

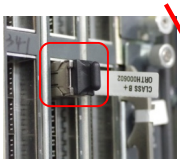


Tidy up big bundles of cables, and avoid crossing or twisting them whenever possible.

When plugging / unplugging a card, exercise care and align the card with slide rails.



Put an anti-dust cap on an unused optical fiber.



Put an anti-dust cap on an unused optical module.

Do not twist, bend, stretch or squeeze optical fibers during installation. The bending radius of optical fibers should be no smaller than 10 D.

Install rat guards at the top and bottom of a cabinet or fasten mouseproof hop-pockets after connection of cables is completed.

Keep cabinet doors closed in daily operations.

Do not place labels between two cards, which may affect the electrical conductivity between the cards.

Reserve proper margins between cable connectors and the first binding points, so that cables can be easily plugged or unplugged and that stress will not be produced at the connecting points.