FIBERROAD

FR8000
Optical Line System
Installation Guide

Release 1.0.0

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Units of Measurement
Units of measurement in this publication conform to SI standards and practices.

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Preface

Thank you for purchasing the FR8000-OLS series products.
Be sure to carefully read this manual before using the product. This manual will be useful later on, so after reading it, be sure to store it in a safe place. This manual gives an explanation of the necessary functions and operating methods for properly using the FR8000-OLS.

⚠️Warning!

This device has no items that require the user to open the cover to operate them. Absolutely do NOT open the cover as it could result in electric shock.

⚠️Warning!

When the power is turned ON, do not look directly into the optic port or the end of the optic fiber that is connected to it. Doing so could result in eye damage.

Contents

Revision History

Version	Date	Author	Reasons of Change	Section(s) Affected
1.0	2021/11/01		Initial Release	All

⚠️ Warning!

- **Please don't open the cover**

  Opening the cover of this equipment is absolutely forbidden.

  This has an electric shock hazard. Besides, this is a factor that may cause faults.

- **Please don't use when the equipment is abnormal**

  In case of abnormal conditions like fume, peculiar smell, strange sounds, etc., please stop using the equipment lest that fire or electric shock occurs. Please switch it off immediately, and then ask the sale shop or sale site from which you purchased it for repair after the smoke surely disappears. Never repair it by yourself, lest that hazard occurs.

  - ❖ When using AC power: please pull out the power plug from socket.
  - ❖ When using DC power: please remove the power cable from junction board.

- **Please don't damage the power wires**

  Please don't scratch, damage or stretch the power wires, otherwise the power wires may break and cause hazards of fire or electric shock.

- **Plug in the plug properly**

  When using AC power, the power plug should be fully inserted. Besides, please don't use loose socket to avoid bad contact. Otherwise fire or electric shock may occur.

- **The power wires should be firmly connected with junction board**

  When using DC power, the power wires should be firmly connected with junction board. As long as the [0V], [-48V] and [FG] junctions are contacted, not only the internal power of the equipment will fail, but also fire or electric shock may occur.

- **Hold the plug when plugging it in/out**

  When plugging in or pulling out the power wires, please make sure to hold the plug with your hand. Stretching the wires parts may damage them and cause electric shock or fire.

- **Please don't touch the plug/junction board with wet hand**

  Please don't touch the power plug or connect the junctions with wet hand. Otherwise electric shock may occur.

- **Plug/junction board cleaning**

  Please make sure that the plug and junction board are not covered with dust before you connect

them. If they are covered with dust, fire or electric shock may occur.

- **Please don't touch the equipment in thunder**

When thundering please don't perform connection tasks of communication cables and don't touch the equipment. Touching the equipment in thunder may cause electric shock.

- **Don't interfere with ventilation**

The vents are designed lest that the internal temperature increases. Please don't place the equipment at unventilated positions or place objects on or near the vents, otherwise its internal temperature may increase and cause fire or faults.

Please don't place objects on the soft power wires

Please don't place objects on the power wires. The breakage of it may cause fire or electric shock.

- **Pull out the soft power wires from socket in case of damage**

When the soft power wires are damaged, please switch the power off immediately and ask the sale shop or sale site from which you purchased it for repair. Letting it alone may cause fire or electric shock.

- **Pull it out from the socket in case of damage**

In case the host is dropped or damaged, please switch the power off immediately and ask the sale shop or sale site from which you purchased it for repair. Letting it alone may cause fire or electric shock.

- **Please don't place it at unstable sites**

Please don't place the equipment at rocky, declining or unstable sites. Otherwise it may be damaged by dropping or overturn.

- **Please don't place it at the sites with abominable environment**

Placing the equipment at the following sites will shorten the life of it and thereby cause faults. Please conserve it properly. Don't place it at the following sites.

Very damp or dusty sites

Sites that generate lampblack or corrosive gases

Continuously vibrated sites

Sites under direct sunlight

High-temperature sites near ovens or other hot apparatus

- **Please don't impose pressure at will**

Please don't impose pressure on the connector or touch is with metal at will. Otherwise a fault may occur

About This Guide

Introduction

This installation guide provides an overview of FR8000-OLS, and describes its engineering,

installation procedures and cabling methods.

Conventions

This guide may contain notices, figures, screen captures, and certain text conventions.

Figures and Screen Captures

This guide provides figures and screen captures as example. These examples contain sample data. This data may vary from the actual data on an installed system.

Chapter 1 Pre-Installation

This chapter describes the requirements before installing FR8000-OLS. It contains the following topics:.

- Installation Workflow
- Document Preparation
- Technical Personnel Qualification
- Equipment Room Requirement
- Production Specifications
- Environment Specification

Document Preparation

Before installation, the following documents must be obtained from official sources:

- Project Recommendation
- Project Schedule
- Field Survey & Design Reports
- Related Technical Documents
- Related Installation Guides

Installation Workflow

FR8000-OLS hardware installation process is illustrated in Figure 1
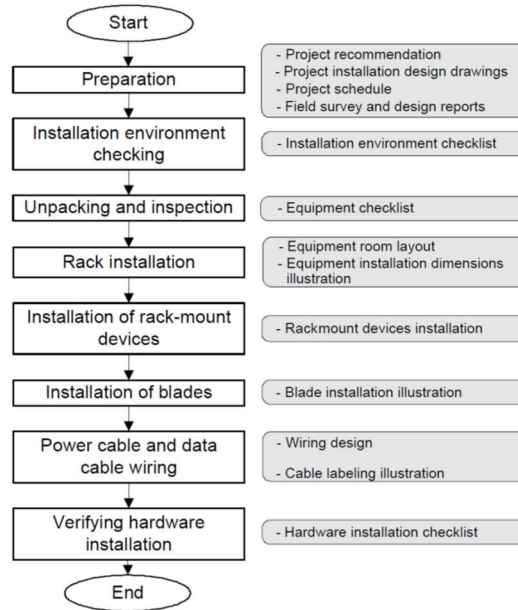
Technical Personnel Qualification

If third-party engineers are employed for installation, you must ascertain and verify their qualification and knowledge through professional qualification certificates. For example a welder must have welder certificate, and an electrician must have electrician certificate.

Equipment Room Requirements

Area of the Equipment Room

The equipment room should be able to accommodate all racks, with enough space reserved for operation and service access, as well as for ventilation and heat radiation. In addition, space for those devices not mounted on racks (such as test equipment) should also be allocated.

Product Specifications

The Production Specifications are shown in Table 1.

Name	Conditions
FR8000-OLS Full Load Weight	5.3KG
FR8000-OLS Chassis Frame Weight	2KG
EDFA Module Weight	0.8KG
OLP Module Weight	0.2KG
Power Consumption	≤30W

Environment Specification

The optical transmission products required environmental conditions are as follows:

Operating Conditions

The environmental conditions are shown in the Table 2.

Conditions	Limits
Operating Temperature Range	0 to 40℃
Operating Humidity Range	20 to 90%(Non-condensing)
Operation Voltage	AC100 ~ 120/220 V +/- 10% at 50 Hz DC-40- -55V(50/60Hz)
Mechanical size	435mm（L）× 295mm（W）×43mm（H）

Chapter 2 Product Installation

This chapter describes the installation procedures. It contains the following topics:

- Installation the main unit
- Installation conditions
- Unpacking the Sub rack

Installing the main unit

Please install and connect the FR8000-OLS in accordance with the following instructions.

- Installing conditions
- Unpacking the Sub rack
- Rack mounts conditions
- Installation and Start-up

Installing conditions

In order to ensure that the FR8000-OLS functions properly over a long service life time, it must be operated correctly and in a suitable environment. Furthermore, installation of the device in the following types of environments should be avoided as its lifespan may be reduced or malfunctions may occur as a result.

1. Locations exposed to direct sunlight
2. Locations that undergo large changes in temperature or humidity.
3. Locations in the vicinity of devices that emit electronic noise.
4. Locations in the vicinity of devices that generate strong electric fields.
5. Locations where large amounts of waste material or dust are present.
6. Locations that are regularly subjected to vibration.

Unpacking the Sub rack

Follow the instructions regarding proper unpacking. Be aware of any specific instructions for handling the shelf, proper packaging orientation.
Procedure:

- Inspect the crate for visible damage.
- Prepare materials specified by the manufacturer.
- Follow the manufacturer's instructions to handle the shelf.
- Make sure that all necessary materials for mounting the shelf are included with the sub rack.
- Inspect the sub rack for any visible damage. If damage does exist, report the extent of any damage to the transport company or the management personnel.

Configuration conditions

When installing the FR8000-OLS unit, the easiness of operation and safety should be fully considered. Especially remember not to hinder the venting of the cooling fans in the equipment.

(1)   When installing the FR8000-OLS unit, keep at least 100mm space in front of it.
(2)   When fixing the FR8000-OLS unit on a bracket, please place it on a shelf of at least 20mm (internal dimension) in depth.
(3) Please don't place anything at the side of the FR8000-OLS unit, lest the cooling venting is hindered and a fault occurs.
(4) Please don't place vases, beverage, etc. on the top of the FR8000-OLS unit.

Rack mount conditions
The FR8000-OLS front panel is shown in Figure 2
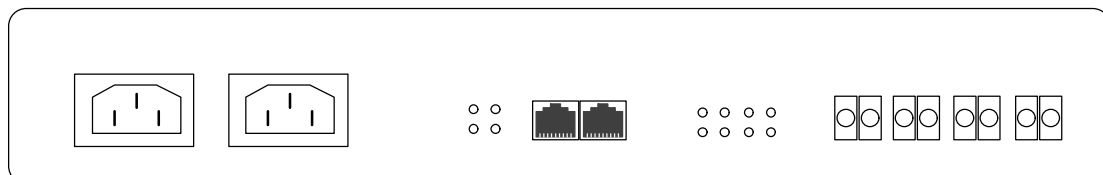
The FR8000-OLS is designed to be rack mounted as follows:

The FR8000-OLS Unit is designed to be mounted on two vertical rack mounting rails of 19"

RACK. 2 front mounting rail is used as four mounting point using the flanges provided at the

front of each FR8000-OLS. The FR8000-OLS is positioned onto the 19" RACK using four M5x15

screws with flat washer and lock washer.

The allowable positions for rails and how to install the FR8000-OLS are shown in Figure 15

Figure 3 Mounting Rail Positions

M5 SCREWS   M5 SCREWS
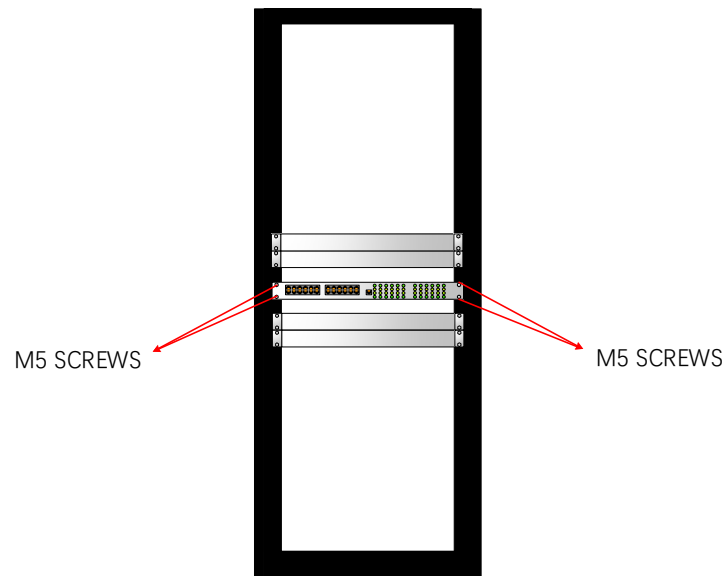
- Ensure that the height of the rack is such that the surrounding temperature remains at 40°C or less.

- Ensure that there is sufficient airflow in the rack and that the temperature around the rack is maintained at 40°C or less. Also confirm that the FR8000-OLS's ventilation holes are not blocked.

- Make sure that the FR8000-OLS's left and right mounting arms fit properly into the rack's mounting holes. At this time, use all of the included screws, tightening them with equal force.

- The FR8000-OLS must be grounded. Please use a power plug featuring a grounding wire with the FR8000-OLS. The backup power circuit must also be grounded.

Installation and Start-up

Safety Recommendations

You must install the FR8000-OLS in compliance with national and local electrical codes.

The FR8000-OLS operates safely when it is used in accordance with its marked electrical ratings and product usage instructions.

The following guidelines will help to ensure your safety and protect the equipment. The list of guidelines may not address all potentially hazardous situations in your working environment so be alert and exercise good judgment at all times.

The safety guidelines are:

- Keep the chassis area clear and dust-free before, during and after installation.

- Keep tools away from walk areas where you and others could fall over them.

- Do not wear loose clothing or jewelry (for example, ear rings, bracelets, chains) that could get caught in the equipment.

- Wear safety glasses if you are working under any conditions that might be hazardous to your eyes.

- Never attempt to lift alone an object that might be too heavy.

- Always power OFF all power supplies and unplug all power cord before opening, installing, or removing a chassis.

Maintaining Safety with Electricity

⚠️**Warning**：Before working on a unit or near power supplies, unplug the power cord(s) on AC units; disconnect the power at the circuit breaker on DC units.

Follow these basic guidelines when working with the electrical equipment:

Maintaining Safety with Electricity

Locate the emergency power-OFF switch for the room you are working before beginning any procedures requiring access to the interior of the FR8000-OLS.

Disconnect all power and external cables before installing or removing FR8000-OLS.

Examine your work area for possible hazards (for example, moist floors, ungrounded power extension cables, frayed power cords and missing safety grounds).

Never work alone when potential hazardous conditions exist.

Never assume the power has been disconnected from a circuit; always check.

Never assume the power has been disconnected from a circuit; always check.

Never install equipment that appears damaged.

⚠️**Warning**：For protection against shock hazard, verify that all power cords are disconnected before servicing the unit. The maximum voltage that may be present in the unit is 240VAC in AC systems and 48VDC in DC systems.

Grounding

The two 48VDC power feeds must be properly grounded on the positive 48V and safety ground pins.

For AC systems, an insulated grounding conductor that is identical in size to the grounded and

ungrounded branch circuit supply conductors, but is green with yellow stripes, is installed as part of the branch circuit that supplies the unit.

Site Preparation

Site preparation involves space, power, and cooling considerations.

Rack and Space

The FR8000-OLS is designed for mounting in a standard 19- inch rack. The FR8000-OLS site requires a 19- inch rack with sufficient available mounting unit for the equipment to be installed (1U for FR8000-OLS). The rack should have a set of mounting rails at the front and a second set at the rear or in a designated intermediate position. There must be sufficient clearance around the rack to allow removal and replacement of front and back cards and for the attachment and routing of cables to the line modules.

Power

The FR8000-OLS can be configured for either AC or DC power.

An easily accessible AC or DC power source must be available within six feet of the FR8000-OLS system.

Before powering up the node, verify that the FR8000-OLS is powered from a dedicated branch circuit. An easily accessible disconnect device should be included in the facility wiring.

DC Version

For the DC version, a 48VDC power feed is required. For power supply redundancy, two such power feeds (preferably from independent power sources) are required. Each power feed must be capable of supplying 125 watts.

AC Version

For the AC version, an AC power source is required. For power supply redundancy, two such AC sources, (preferably independent) are required. Each source should be capable of supplying 125 watts per FR8000-OLS. The AC power cord from the AC source attach to the AC power module that is mounted at the rear of FR8000-OLS.

An AC circuit breaker is recommended for the AC power source which supplies AC power to each FR8000-OLS. This circuit breaker should protect against excess currents, short circuits, and earth faults in accordance with national and local electrical codes.

The dedicated circuit breaker should be sized so the rated current and the trip delay are higher and longer than the FR8000-OLS circuit breaker. When the supply voltage is 110V/60Hz, the

permission maximum electricity is 4A; When the supply voltage is 220V/50Hz, the permission maximum electricity is 2A.

Unpacking

The FR8000-OLS is shipped in its own separate shipping containers.

To unpack and install the FR8000-OLS, the following tools should be available:

- Utility knife

- Flat blade and Phillips screwdriver sets

- Grounding wrist strap

Warning：If any of the shipping containers are damaged, of if any of the various shipping indicators show improper handling of the containers, contact your local shipping representative.

Unpacking Each Container

Use the following steps to unpack each container.

Step 1   Move the container to the area it is to be installed.

Step 2   Use a knife to open the cardboard container.

Step 3   Remove any foam packaging.

Step 4   Lift the module out of the container.

Step 5   Remove the anti-static bag surrounding the module.

Step6   Remove any accessory hardware and set aside for future reference.

Step 7   Save the packing materials until the installation is complete.

Parts Checklist

Before proceeding with the installation, use the parts checklist to verify that all the parts you ordered are present and in good condition.

Plug-in optical module or card may be shipped already installed in the FR8000-OLS or under separate cover. Depend on the selected configuration. The unit must not be operated with any unused uncovered.

Power connection

Please connect the power wires with the FR8000-OLS unit. After this connection and powering on, the FR8000-OLS unit starts to run.

Power Supply

The power supply must be provided by customer. Power capacity and cable cross-sections should conform to the equipment room's power consumption requirements.

The incoming power supply must be stable. It must be free of noise and distortion, with a voltage range is as follows:

DC Power range: -48V~-55 VDC 5.2A; 7A (The DC power itself has fuse.)

AC Power range: 100/200V, 50/60Hz. 2.5 /1.25A; (The AC power itself has no fuse)

AC power in the United States is using the 110 V/50 Hz of the AC, while in China using the 220 V/60Hz the AC, they are compatible;

DC-48V power corresponding type

The customer please prepares power wires corresponding to the power distribution equipment. The recommended power wires are wires above AWG18 in thickness. Following that, please make sure that the voltage output of the DC supplier is in stop status. Connect the equipment terminal of the power wire with the terminal panel on the back of the FR8000-OLS series, and connect the power terminal of the power wire with a DC power. Connect the terminal indicated [0V] with DC 0V, the terminal indicated [-48V] with DC -48V, and the terminal indicated [FG] with the ground of the setting site. It shows the power connection method of the FR8000-OLS series (DC-48V power corresponding types).

DC power connection

The DC power connection -48VDC is made to the -48V terminal lug for both of the power feeds.

⚠️Warning!

Connection of power cable must be performed when the voltage output from the DC power is stopped.

Special note: If, however, the output doesn't stop, please don't directly touch the metal parts of the FR8000-OLS series DC power terminal or the power cable terminal to prevent personal injury. Besides, necessary processing is necessary to protect the insulation parts between power cables and that between the power cable and other devices to prevent the cables from confusion, or the operator may get and electric shock or the FR8000-OLS series or the customer's distribution equipment may fail.

AC power corresponding type

The FR8000-OLS Series uses an AC power source as its power source.

The FR8000-OLS Series uses AC power as its power source.

For the AC version, an AC power source is required. For power supply redundancy, two such AC sources, (preferably independent) are required. Each source should be capable of supplying 100 watts per FR8000-OLS equipment. The AC power cables from the AC source attach to the AC power module that is mounted at the rear of FR8000-OLS equipment.

An AC circuit breaker is recommended for the AC power source which supplies AC power to each FR8000-OLS equipment. This circuit breaker should protect against excess currents, short circuits, and earth faults in accordance with national and local electrical codes.

Insert the device-side of the power cord into the FR8000-OLS Series AC inlet and insert the power source-side of the power cord into the power source outlet.

Connecting the power cord

- Insert the power cord plug firmly into the appropriate outlet.
- Always use a grounded outlet for the outlet.
- Always connect both power cords.

Check the Power Connection

Connect the power cord to the FR8000-OLS. When you connect the power cord and supply power to the FR8000-OLS, it will immediately begin operation.

After connecting the power cord to the FR8000-OLS, confirm that the PWR LED has lit up. Under normal conditions, LED will be lit in the following manner.

PWR1 and PWR2 LED: ON

PWR FAULT LED: OFF

When the PWR LED is OFF or when the PWR FAULT LED is ON, please pull out the soft power wires with the power supply switched off, then confirm the connection status of the soft power wires and that the supplying voltage is normal. If connection is OK and the LED is still abnormally ON, a host fault of the FR8000-OLS unit should be considered. Please shut it down immediately and contact the sale shop or site.

Chapter 3 Network Connection

This chapter describes how to lay cables and bundle the cables and fibers in FR8000-OLS. It contains the following topics:

● Cables Required for Network Connection

Cables Required for Network Connection

Connection Location	Cable Type	Required Quantity
LC Port	Single Mode Fiber(SMF)	1
Management Port	CAT5/5E unshielded twisted pair cable	1

The device to which the FR8000-OLS is connected is a hub, use a straight-through cable; if it is a PC or some other type of data terminal, be sure to use a cross-wired cable.

LC Port Connection

Module IN/OUT port connection is done by RX/TX ports. According to different applications, connecting MUX/DEMUX input/output ports by SMF .

1) Cleaning the connector ends

Please clean the ends of the fiber optic connectors. Use an over-the-counter cleaner intended for optical fiber, and take care to avoid damaging the ends of the connectors when cleaning them. If the ends of the connectors are dirty or damaged, optical receive levels may drop below the specification range, leading to transmission errors or other communication problems.

2) Measuring optical receive levels

Confirm that the optical receive level at the Long Haul port's RX side is between the maximum and minimum optical receive levels as listed under the abbreviated specifications. If this level is higher than the maximum specification level, insert an attenuator to bring the level down to within the specification range.

3) Connecting optical fibers

Connect the specified fiber optic cables to the input/output port in the FR8000-OLS.

4) Checking connections

After connecting the fiber optic cables, use the status LED on the front panel to confirm the status of the connection. Under normal circumstances, the SD LED will be lit up. If the other FR8000-OLS's power is not on, or if a fiber optic cable is not connected, the LED will not light up. Even if the SD LED is lit, the device may not function reliably if poor connection has been made at the Long Haul port or if the optical levels are above the specification maximum.

5) Disconnecting

To disconnect the FR8000-OLS from the network in order to exchange or remove devices, disconnect the fiber optic cables connected to the input/output port in the MUX/DEMUX. When these cables are disconnected, transmission via the Long Haul port in the line card will cease and the SD LED will turn off.

⚠️Warning!

Never let dust into the LC port when performing the installation in site.

Make sure to clean the connector end face before connecting the fiber to LC port.

The LC port end has been cleaned at factory and needs not be cleaned by the customer. If however it needs cleaning due to shipment or other cases, please makes sure there is no dust at the end face of LH port.

The connection of a fiber at the LC port must be such that the TX terminal is connected with the RX terminal. If the TX terminal is connected with the TX terminal or the RX terminal is connected with the RX terminal, the equipments can't communicate with each other.

Besides, SD LED turns on only if the connection both of TX and RX terminals of the LH port is correct.

The maximum optical reception power of LH port is -9dBm. When optical reception power is beyond the maximum reception power, please insert an attenuator to reduce it below the maximum value.

To measure the input optical power using a power meter, the input optical power of both ends must be checked.

The distance the LH port can transmit over is dependent on the cable loss of the optical fiber used. To determine the length of the optical fiber, the characteristics, layout status, connector loss/reflection/dispersion and other factors should be considered, so that the maximum span loss is within 28dB.

Management Port Installation

Connect the FR8000-OLS's Management port when conducting MIB management via a network management station, or when using a TELNET terminal to change parameter settings.

1 Connecting the cable

Connect a twisted-pair cable to the FR8000-OLS's Management port. Note that a straight-through cable should be used if connecting to a hub. Furthermore, if connecting to a PC or another similar terminal, use a cross-over cable.

2 Checking the connection

After connecting the twisted-pair cable, use the Manage Port Status LED on the front panel to check its connection status. If the cable has been properly connected to a terminal or other network device, the LINK LED will be lit up.

3 Disconnecting

To disconnect the FR8000-OLS from the network in order to exchange or remove devices, disconnect the twisted-pair cable from its Management port. If the twisted-pair cable features a tab designed to prevent accidental pull-out, be sure to depress this tab while disconnecting. When this cable is disconnected, transmission via the Management port will cease and the LINK LED will turn off.

⚠️Warning!

The FR8000-OLS's Manage port can automatically detect 100BASE-TX, 10BASE-T, full duplex, and half duplex; furthermore, a fixed transmission speed can also be set for this port. Although 100BASE-TX and half duplex are set by default, these settings can be changed if so required