FIBERROAD

INDUSTRIAL ETHERNET SWITCH

DIN RAIL MOUNT

SCAN ME

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Quick Start Guide

The images in this guide are for demonstration only and may differ from your actual product.

Introduction

Thank you for choosing Fiberroad DIN Rail Mount Industrial Ethernet Switch. This guide is designed to familiarize you with the layout of the Industrial Ethernet Switch and describes how to deploy them in your network. The Quick Start Guide contains Fiberroad Unmanaged Industrial Ethernet Switch and Managed Industrial Ethernet Switch. **In order to understand the network management instructions of Managed Industrial Ethernet Switch, please visit our website: www.fiberroad.com.**

If you have any questions while reading this guide, please email: support@fiberroad.com

Product Overview

Fiberroad Industrial Ethernet Switch series are rugged switches aimed at operational technology users with limited IT network knowledge. The Switches provide an solution which turns the traditional factory into a digital integrated manufacturing system. Machine builders and machine-to-machine (M2M) solutions are attractive entry level products as a GUI-based, light-managed switch. The switch is a good fit for locations with harsh temperatures and small spaces and is Power over Ethernet (PoE) capable of zero IT management. The Switch is ideal for industrial Ethernet applications where small and easy-to-be managed hardened products are required, including factory automation, intelligent transportation systems, city-surveillance programs, building automation etc. The Industrial Ethernet Series Switches complement the current industrial Ethernet portfolio of related Fiberroad industrial switches, such as the FR-7M, FR-7N, FR-7S and FR-7A Series Switches. The Industrial Ethernet Switch can be easily installed on your network. I.e., FR-7M, FR-7S through a user-friendly web device manager, the industrial ethernet switches allow easy installation without a lot of effort and are more manageable than ever, enabling advanced and secure multi-services over industrial networks.

Reliable Industrial Grade Design

- Industrial Grade Design, -40 – 75℃ Operating Temperature.
- All Aluminum Alloy Enclosure, No Fan, No Air Hole Design
- IP40 Protection Grade
- 6kV Surge Protection
- DIN Rail and

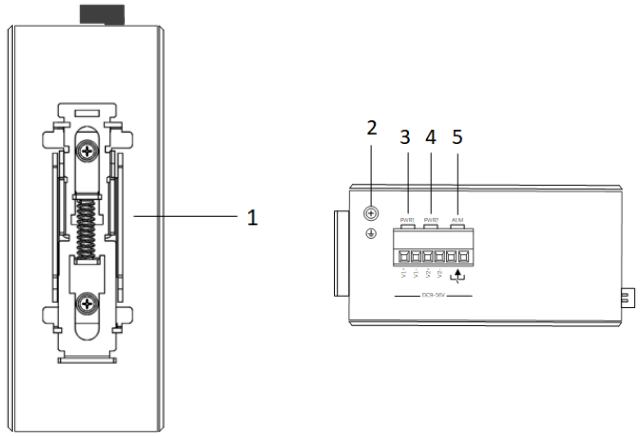
Model Support

This instruction contains Fiberroad "7" Series Industrial Ethernet Switches, including but not limited to Unmanaged Industrial Ethernet, Layer 2 Managed Lite Industrial Ethernet Switch, Layer 2+ Managed Industrial Ethernet Switch, Layer 2+ Managed MAX Industrial Ethernet Switch…

NOTE: In the figure above, we show DIN Rail Industrial Ethernet Switches with five enclosure sizes. The above four sizes are central to our DIN Rail Industrial Ethernet Switches. To learn more our products, please visit our website: www.fiberroad.com.

General Instruction

Panel Layout



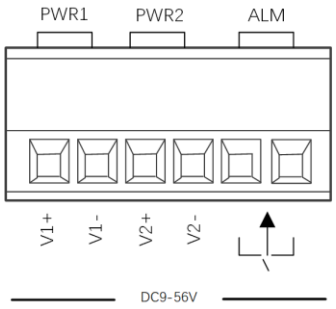
Item	Description
1	Wall Mount Kits
2	Ground Screw
3	PWR1 Power Input Terminal Block
4	PWR2 Power Input Terminal Block
5	Relay Output Terminal Block

NOTE: NOTE: FR-7M, FR-7N, FR-7S, FR-7A Series have the same panel layout. An example is given in the figure above.

Power Supply

Connects the DC power to the switch through the top panel connectors. The switch has a dual-feed DC power supply; two connectors provide primary and secondary DC power (PWR1 and PWR2). The switch power connectors are attached to the switch chassis. Each power connector has screw terminals for terminating the DC power. All connectors are connected to the switch top panel with the captive screws. The power connector labeling is on the panel. The positive DC power connection is labeled “+”, and the return connection is labeled “-“. The switch can operate with a single power source or with dual power sources. When both power sources are operational, the switch draws power from the DC source with the higher voltage. If one of the two power sources fails, the other control the switch.

Additionally, it has Built-in Overcorrect Protection and Reverse Connection Protection. The voltage input range is 9 ~ 56VDC（terminal block defined as V1-、V1+、V2-、V2+）.



NOTE: 1. Power ON operation: Insert the power cable’s terminal block into the device’s power port, then insert the power supply plug into the power source.
2. Power OFF operation: Unpin the power plug, then strike the terminal block. Please be aware of the sequence of operation.
3. FR-7A Series supports dual-feed DC 9 ~ 72V power supply.

Relay Connection

The relay access terminal is on the top panel of the device. For a two-terminal relay, open circuit state ia s normal non-alarm state; closed state is on when there is any alarm information.

The two-terminal block connector is used to detect both power failure and port failure. The two wires attached to the Fault contacts form an open circuit when the device has lost power supply from one of the DC power inputs, or failure occurs in one of the ports.

Reset Button (Managed Series Model)

The reset button provides user with a quick and easy way to set the configuration back to default value:

Press the button at least 10 seconds and release. The switch will set all configuration back to default setting.

PoE & Power Supply (Based on the model)

Standard Model

PoE Ports	Port 1-8 IEEE802.3af/at
Power Supply Pin	Default: 1/2(+), 3/6(-)
Max PWR Per Port	30W
Total PWR/ Input Voltage	DC48-56V

IEEE802.3bt Model

PoE Ports	Port 1-8 IEEE802.3af/at/bt
Power Supply Pin	Default: 1/2(+), 3/6(-), 4/5(+), 7/8(-)
Max PWR Per Port	90W
Input Voltage	DC52-56V

PoE Power Specification (Based on the model)

Spec	**802.3af PoE**	**802.3at PoE+**
Device Power	12.95W	25.5W
Supplied Power	15.4W	30W
Device Voltage	44-57V	50-57V
Supplied Voltage	37-57V	42.5-57V
Current(MAX)	350mA	600mA
Resistance(Ω)	20	12.5
Cable Type	Cat3, Cat5	Cat5
Spec	**802.3bt 4PoE**	**802.3bt Type4**
Device Power	51W	71W
Supplied Power	60W	100W
Device Voltage	50-57V	52-57V
Supplied Voltage	42.5-57V	41.1-57V
Current(MAX)	600mA	960mA
Resistance(Ω)	12.5	12.5
Cable Type	Cat5	Cat5

DIP Switch (Managed Series Model)

DIP	**State**	**Description**
#1	ON	RSTP Disabled
	OFF	RSTP Enable
#2	ON	Port VLAN Enable
	OFF	Port VLAN Disable
#3	ON	SFP Port is 100M
	OFF	SFP Port 100/1000M
#4		Function Reserve

NOTE: As Managed Industrial Model, before enabling the DIP Switch, please log in Web management interface to enable the DIP Switch.

DIP Switch (Unmanaged Series Model, Based on the model)

DIP	Name	State	Description
#1	AI VLAN	ON	Enable
		OFF	Disable
#2	AI EXTEND	ON	Enable
		OFF	Disable
#3	AI QoS	ON	Enable
		OFF	Disable
#4	AI PoE	ON	Enable
		OFF	Disable

Notes: 1. AI VLAN: AI VLAN is essentially port isolation on each of the ports. All ports are only able to communicate with the uplinks when this option is enabled. This can be useful when the setup requires multiple clients to connect to a common network resource but should not be able to connect to each other. Using this also improves network security.

2. AI Extend: AI extend is a common switch feature designed to extend RJ45 Port distance up to 250m. The downside is that port speeds will be limited to only 10Mbps. This limitation does not apply to the uplink ports. The AI Extend feature is suitable for situations where your power source is too far away. There is, however, that bandwidth limitation to be aware of.

3. When AI QoS is enabled on the 8 port models, Port 1 - 4 will prioritize Video and VoIP traffic flows over others. For example, an IP camera streaming in real-time takes preference over a user transferring a backup file to a server.

4. AI PoE (Base on model): The AI PoE feature allows the switch to check the ports for activity periodically. If a port is not passing traffic for a certain amount of time, the switch will reset the power on that specific port. The device on the other end will reboot with the idea that it returns to a working state. This is a great feature to automate this process. It can save lots of time on support and driving out to the site to troubleshoot or manually power cycle equipment.

DIP Switch (FR-7A Series)

DIP	Name	State	Description
#1	Broadcast Storm Protection	ON	Enable
		OFF	Disable
#2	Function Reserved	\	\
		\	\

Ports and Slots

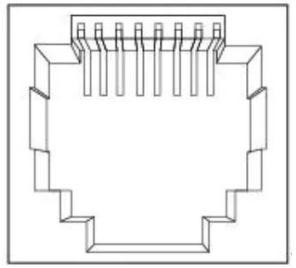
NOTE: Different configuration are available. Not all ports and slots are present in all configures.

Maximum Transmission Distance of Different RJ45 Port

Cable Type	Different Rates			
	100/1000M	2.5G	5G	10GE
CAT5e UTP	100m	100m	55m	Not Supported
CAT5e STP	100m	100m	100m	Not Supported
CA 6 UTP	100m	100m	100m (Not Recommend due to high risk)	Not Supported
CAT6 STP	100m	100m	100m	Not Supported
CAT6A (U/UTP)	100m	100m	100m (Not Recommend due to high risk)	Not Supported
CAT6A (F/UTP)	100m	100m	100m	100m
CAT6A STP	100m	100m	100m	100m
CAT7	100m	100m	100m	100m

100M/1G/2.5G/5G/10G LAN Ports Pinouts

Pin	Label
1	TP0+
2	TP0-
3	TP1+
4	TP2+
5	TP2-
6	TP1-
7	TP3+
8	TP3-



RJ45 Ethernet Cable Pinout for PoE

	10/100BASE-TX(802.3af/at, Mode A)		10/100BASE-TX (802.3af/at, Mode B)		1000BASE-TX (802.3af/at, Mode A)		1000BASE-TX (802.3af/at, Mode B)		1000BASE-TX (802.3bt)	
Pin	Data	Power	Data	Power	Data	Power	Data	Power	Data	Power
1	Rx +	DC +	Rx +		TxRx A +	DC +	TxRx A +		TxRx A +	DC +
2	Rx -	DC +	Rx -		TxRx A -	DC +	TxRx A -		TxRx A -	DC +
3	Tx +	DC -	Tx +		TxRx B +	DC -	TxRx B +		TxRx B +	DC -
4	Unused			DC +	TxRx C +		TxRx C +	DC +	TxRx C +	DC +
5	Unused			DC +	TxRx C -		TxRx C -	DC +	TxRx C -	DC +
6	Tx -	DC -	Tx -		TxRx B -	DC -	TxRx B -		TxRx B -	DC -
7	Unused			DC -	TxRx D +		TxRx D +	DC -	TxRx D +	DC -
8	Unused			DC -	TxRx D -		TxRx D -	DC -	TxRx D -	DC -

NOTE: 1. Power must only be applied in one mode at a time, and this decision is made by the PSE. The PSE can support mode A or B, or both. Typically, the method selected is not a concern for an end-user because it is a requirement of the IEEE 802.3af/at standards that all PDs must support both modes.

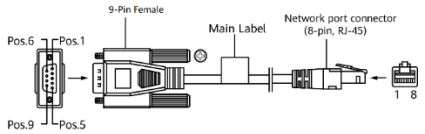
2. With Mode B, the phantom power technique allows the powered pairs also to carry data in 10/100 Mbit/s Ethernet.

3.Both Modes A and B are supported in Gigabit Ethernet. The phantom power technique is utilized for both modes, as in Gigabit Ethernet, all four pairs are used for data transmission.

4. IEEE 802.3bt "4PPoE" uses all for pairs to provide power in Gigabit Ethernet, hence the name of the standard - 4PPoE ("4-pair Power over Ethernet").

Console Port (Based on the model)

This series product provided a 1pcs procedure test port based on a serial port. It adopts the RJ45 interface. Also, located in the front panel, it can figure related commands through RJ45 to DB9 female cable.



Switch Console Port (DTE)	RJ45 To DB9 Terminal Adapter	Console Device
Signal	DB9 Pin	Signal
RTS	8	CTS
DTR	6	DSR
TxD	2	RxD
GND	5	GND
GND	5	GND
RxD	3	TxD
DSR	4	DTR
CTS	7	RTS

Table: Console Port Signaling Using a DB-9 Adapter

Serial Port Specification (Based on the model)

Series Port	Parameters
Ports	2 x RS485/422/232
Signals	RS-232: a:TXD, b:RXD, c:Na, d:Na, e: GND RS-422: a:T+, b:T-, c:R+, d:R-, e:GND RS:485: a: Na, b:Na, c:D+, d:D-, e:GND
Baud rate	2400-115200bps
Terminal	5-Pin Terminal
Load Capacity	RS-485/422 supports 128 points polling environment
Movement	RS-485 adopts automatic data flow control technology
Interface Protection	RS-232 15KV static protection Isolation voltage 2KV Electrostatic protection 15KV
Management Features	
Serial Protocol	TCP Server/Client , UDP, Modbus ASCII TCP Server Client, Modbus RTU Server Client
Interconnection	Data Bits, Parity, Stop Bits Configuration
Serial Statistics	Bytes and Packets Statistics

Optical Fiber Bypass Specifications (Based on the model)

Spec	Characteristic
Bypass Interface	Single Fiber Bi-directional SC/FC/ST
Bypass Optic Mode, Wavelength, Distance	Port 10: T1310/R1550nm 20km Port 12: T1550/R1310nm 20km
Bypass Return Loss	Multimode > 50dB Singlemode > 35dB
Bypass Insertion Loss	Typical:1.0dB; Max:1.5dB
Bypass Switching Time	<8ms

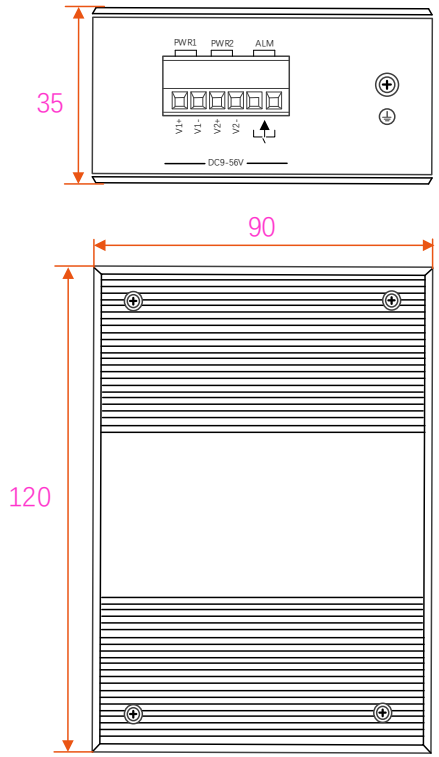
LEDs

LED Name	State	Description
PWR (P1&P2)	ON	Power is being supplied
	OFF	Power is not being Supplied.
RUN	Blinking	The system is running well
	OFF	The system is running unwell
FAIL (Only For PoE)	ON	PoE Status is abnormal
	OFF	PoE Status is normal
MAX (Only For PoE)	ON	Total PoE Power out of maximum power budget
	OFF	Total PoE Power under maximum power budget
R.O.	ON	Ring Owner
	OFF	Not Ring Owner
RING	ON	Ring is enabled
	OFF	Ring is disabled
Link/ACT	ON	Port connection is active
	Blinking	Data transmitted
	OFF	Port connection is not active.
RJ45 Port Speed	Green Light ON	1000M is running
	Yellow Light ON	10/100M is running
ALM	ON	Has alarm information
	OFF	No alarm information

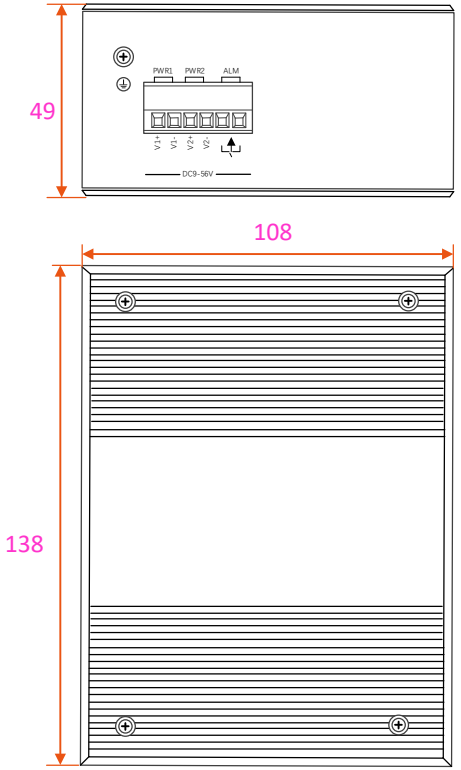
NOTE: The LED indicator bases on model. The LED name and description are

Dimension (Unit: mm)

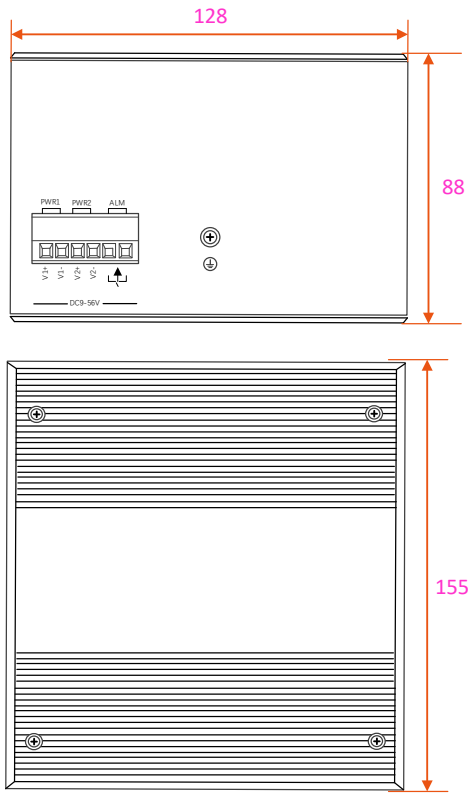
1. Support FR-7N, FR-7S Series Unmanaged Industrial Switch and Managed Lite Industrial Switch



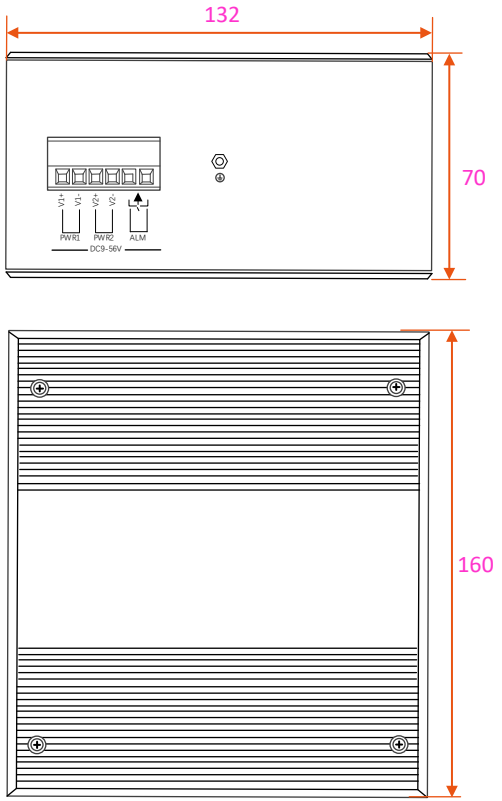
2. Support FR-7N, FR-7M, FR-7A Series Unmanaged Industrial Switch and Managed and Manage Lite Industrial Switch



3. Support FR-7N, FR-7M Series, Unmanaged MAX Industrial Switch and Managed MAX Industrial Switch



4. Support FR-7N, FR-7M Series, Unmanaged Industrial Switch, and Managed Industrial Switch



Installation Guidelines

Before determining where to place the switch, please read these guidelines

Environment and Enclosure Guidelines

- This equipment is intended for use in a Pollution Degree 2 industrial environment, in overvoltage Category II applications (as defined in IEC publication 60664-1), at altitudes up to 9842 ft (3 km) without derating.
- This equipment is considered Group 1, Class A industrial equipment, according to IEC/CISPR Publication 11. Without appropriate precautions, there may be potential difficulties ensuring electromagnetic compatibility in other environments due to conducted as well as a radiated disturbance.
- This equipment is supplied as open-type equipment. It must be mounted within an enclosure that is suitably designed for those specific environmental conditions that will be present and appropriately designed to prevent personal injury resulting from accessibility to live parts. The section must have suitable flame-retardant properties to prevent or minimize flame spread, complying with a flame-spread rating of 5VA, V2, V1, V0 (or equivalent) if nonmetallic. The interior of the enclosure must be accessible only by using a tool. Subsequent sections of this publication might contain additional information regarding specific enclosure type ratings required to comply with certain product safety certifications.

General Guidelines

Before installation, please carefully read these general guidelines:

CAUTION: Proper ESD protection is required whenever you handle Fiberroad equipment. Installation and maintenance personnel should be adequately grounded by using ground straps to eliminate the risk of ESD damage to the switch. **Do not touch connectors or pins on component boards. Do not touch circuit components inside the switch. When not in use, store the equipment in appropriate static-safe packaging.**

- If you are responsible for applying a safety-related programmable electronic system (PES), you need to be aware of the safety equipment in appropriate static-safe packaging.

CAUTION: The device is designed to mount on a DIN rail that conforms to Standard EN50022. or mount on a wall that serves standard EN60715

When determining where to place the switch, observe these guidelines:

- Before installing the switch, verify that it is operational by powering it on and observing LEDs.
- For RJ45 LAN ports, the cable length from a switch to an attached device cannot exceed 328 feet (100 meters).
- For fiber-optic ports, the cable length from a switch to a connected device cannot exceed the SFP specific length.
- Clearance to front and rear panels meets these conditions:

• Front-panel LEDs can be easily read.
• Access to ports is sufficient for available cabling.
• Front-panel direct current (DC) power connectors and the alarm connector are within reach of the connection to the DC power source.

- Airflow around the switch must be unrestricted. To prevent the switch from overheating, you must have the following minimum clearances:

• Top and bottom: 2.0 in. (50.8 mm)
• Sides: 1.0 in. (25.4 mm)
• Front: 2.0 in. (50.8 mm)

CAUTION: 1. When the switch is installed in an industrial enclosure, the temperature within the enclosure is more significant than the average room temperature outside the enclosure.

2. Ensure temperatures inside the enclosure conform to devise specifications

- Cabling is away from sources of electrical noise, such as radios, power lines, and fluorescent lighting fixtures.

Guide for Power Connecting

Tools and Equipment

Obtain these necessary tools and equipment:

- Ratcheting torque flathead screwdriver.
- For the protective ground connector, obtain a single or pair of stud size six ring terminals.
- Crimping tool
- 10-gauge copper ground wire
- For DC power connections, use twisted-pair copper appliance wiring material (AWM) wire.
- Wire-stripping tools for stripping 10- and 18- gauge wires.
- A screwdriver.
- A flat-blade screwdriver.

Installing the Power Supply on a DIN Rail, Wall, or Rack Adapter

Installing the power converter on a DIN rail, wall, or rack as you would a switch module

Warning: This equipment is supplied as “open structure” equipment. It must be mounted within an enclosure that is suitably designed for those specific environmental conditions that will be present and appropriately designed to prevent personal injury resulting from accessibility to live parts. The interior of the enclosure must be accessible only by using a tool.

The enclosure must meet at least IP54 or NEMA type 4 minimum enclosure rating standards.

CAUTION: To prevent the switch assembly from overheating, there must be sufficient spacings, as explained under installation guidelines, between any other switch assembly.

Grounding the Switch

Make sure to follow any grounding requirements at your site.

Warning: This equipment must be grounded. Never defeat the ground conductor or operate the equipment without a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available.

Warning: This equipment is intended to be grounded to comply with emission and immunity requirements. Ensure that the switch functional ground lug is connected to earth ground during everyday use.

Warning: This equipment is intended to be grounded to comply with emission and immunity requirements. Ensure that the switch functional ground lug is connected to earth ground during everyday use.

CAUTION: Use at least a four mm2 (0.006 in2) conductor to connect to the external grounding screw.

The ground lug is not supplied with the switch. You can use one of these options:

- Single ring terminal
- Two single ring terminals

To ground the switch to earth ground by using the ground screw, follow these steps:

1. Use a standard Phillips screwdriver or a ratcheting torque screwdriver with Phillip’s head to remove the ground screw from the switch’s front panel. Store the ground screw for later use.

2. Use the manufacturer’s guidelines to determine the wire length to be stripped.

3. Insert the ground wire into the ring terminal lug, and using a crimping tool, crimp the terminal to the wire. If two ring terminals are used, repeat this action for a second ring terminal.

Figure: Crimping the Ring Terminal

4. Slide the ground screw through the terminal.
5. Insert the ground screw into the available ground screw opening on the front panel.

Use a ratcheting torque screwdriver to tighten the ground screws and ring terminal to the switch top panel. The torque should not exceed 4.5 in-lb (0.51 N-m).

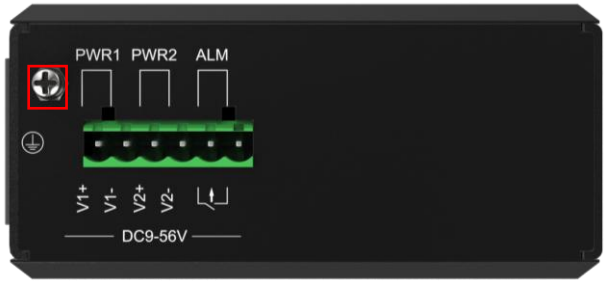


Figure: Ground-Lug Screw

6. Attach the other end of the ground wire to a grounded bare metal surface, such as a ground bus, a grounded DIN rail, or a grounded basic rack.

Connecting the Power Supply to a DC Power Source

NOTE: Use copper conductors only, rated at a minimum temperature of 167°F (75°C).

Warning: Use twisted-pair supply wires suitable for 86°F (30°C) above surrounding ambient temperature outside the enclosure.

1. Measure a single length of stranded copper wire long enough to connect the power converter to the earth ground. The wire color might differ depending on the country that you are using it in. For connections from the power converter to earth ground, use shielded 14-AWG stranded copper wire.

2. Measure the length of twisted-pair copper wire long enough to connect the power converter to the DC power source. For DC connections from the power converter to the DC source, use 10-AWG twisted-pair copper wire. **3.** Using a 14-gauge wire-stripping tool, strip the ground wire and both ends of the twisted pair wires to 0.25 inches (6.3mm) ± 0.02 inches (0.5 mm). Do not strip more than 0.27 inches (6.8 mm) of insulation from the wires. Stripping more than the recommended amount of wire can leave exposed wire from the power and relay connector after installation.

3. Connect one end of the stranded copper wire to a grounded bare metal surface, such as a ground bus, a grounded DIN rail, or a grounded basic rack.

4. Insert the other end of the exposed ground wire lead into the earth-ground wire connection on the power converter terminal block. Note that the position of the power converter may vary on different switch models.

5. Tighten the earth-ground wire connection terminal block screw.

NOTE: Torque to 8 in.-lb, not to exceed ten in-lb.

Warning: An exposed wire lead from a DC-input power source can conduct harmful levels of electricity. Be sure that no exposed portion of the DC-input power source wire extends from the power and relay connector.

6. Insert the twisted-pair wire leads into the terminal block line and neutral connections.

Lead into the line wire connection. Ensure that only wire with insulation extends from the connectors.

7. Tighten the line and neutral terminal block screws.
NOTE: Torque to 8 in.-lb, not to exceed ten in-lb.

8. Connect the red wire to the positive pole of the DC power source, then connect the black wire to the return pole. Ensure that each bar has a current-limiting-type fuse rated to 30 Amp.

Wiring the DC Power Source

Read these cautions and warnings before wiring the switch to the DC power source.

Warning: A readily accessible two-poled disconnect device must be incorporated in the fixed wiring.

Warning: A readily accessible two-poled disconnect device must be incorporated in the fixed wiring.

Warning: Installation of the equipment must comply with local and national electrical codes.

Warning: Before performing any following procedures, ensure that power is removed from the DC circuit.

Warning: Only trained and qualified personnel should be allowed to install, replace, or service this equipment.
To wire the switch to a DC power source, follow these steps:
1. Locate the two power connectors on the switch front panel labelled PWR1 and PWR2.

2. Identify the connector positive and return DC power connections. The power connectors DC-A and DC-B labels are on the switch panel, as displayed below.
3. Measure two strands of twisted-pair copper wire (16-to-18 AWG) long enough to connect to the DC power source.

Label	Connection
V+ Positive	DC power connection
V- Return	DC power connection

4. Using an 18-gauge wire-stripping tool, strip each of the two twisted-pair wires coming from each DC-input power source to 0.25 inches (6.3 mm) ± 0.02 inches (0.5 mm). Do not strip more than 0.27 inches (6.8 mm) of insulation from the wire. Stripping more than the recommended amount of wire can leave exposed wire from the power connector after installation.

Figure: Stripping the Power Connection Wire

1	0.25 in. (6.3mm) ± 0.02 in. (0.5mm)

5. Remove the two captive screws that attach the power connector to the switch and remove the power connector. Remove both connectors if you are connecting to two power sources.

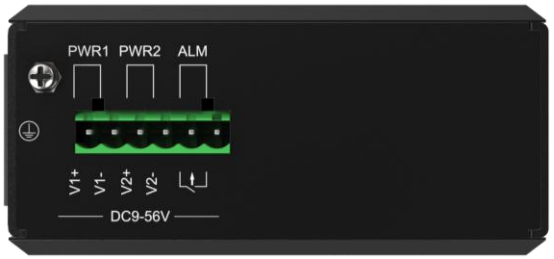


Figure: DC power connector receptacle

6. On the power connector, insert the exposed part of the positive wire into the connection labelled “+” and the exposed portion of the return wire into the link marked “–”. Make sure that you cannot see any wire lead. Only wire with insulation should extend from the connector.

Warning: An exposed wire lead from a DC-input power source can conduct harmful levels of electricity. Be sure that no exposed portion of the DC-input power source wire extends from the connector(s) or terminal block(s).

7. Use a ratcheting torque flathead screwdriver to torque the power connector captive screws (above the installed wire leads) to 2in-lb (0.226 Nm).

CAUTION: Do not over-torque the power connector's captive screws. The torque should not exceed 2in-lb (0.226Nm).

8. Connect the other end of the positive wire to the positive terminal on the DC power source, and connect the other end of the return wire to the return terminal on the DC power source.
When you are testing the switch, one power connection is sufficient. If you are installing the controller and are using a second power source, repeat Step 4 through Step 8 using the second power connector.

Applying Power to the Power Converter

Move the circuit breaker for the AC outlet or the DC control circuit to the on position.

The LED on the power converter front panel is green when operating normally. The LED is off when the unit is not powered or is not operating normally. After the power is connected, the switch automatically begins the power-on. A self-test is a series of tests verifying that the switch functions properly.

Installing the Switch

This section describes how to install the switch

- Installing the Switch on DIN Rail
- Installing the Switch from on Wall

Warning: This equipment is supplied as "open type" equipment. It must be mounted within an enclosure that is suitably designed for those specific environmental conditions that will be present and appropriately designed to

prevent personal injury resulting from accessibility to live parts. The interior of the enclosure must be accessible only by using a tool.
The enclosure must meet IP 54 or NEMA type 4 minimum enclosure rating standards.

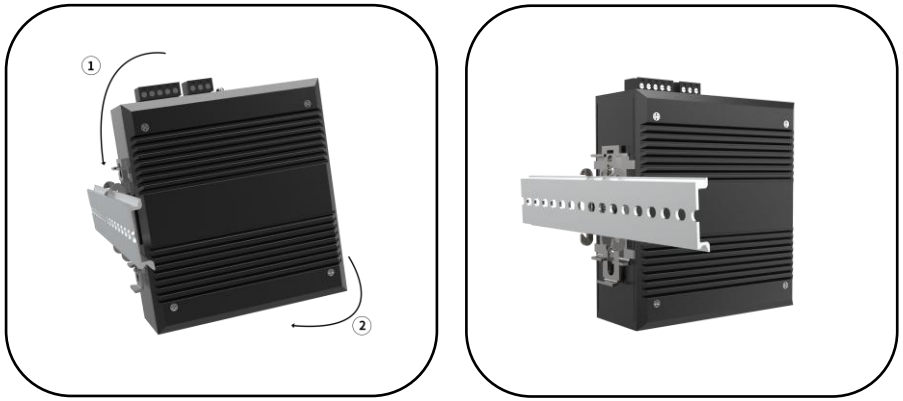
Warning: When used in Class I, Division 2, hazardous location, this equipment must be mounted in a suitable enclosure with proper wiring method for all power, input and output wiring that complies with the governing electrical codes and by the authority having jurisdiction over Class I, Division 2 installations.

CAUTION: To prevent the switch from overheating, ensure these minimum clearances:
– Top and bottom: 2.0 in. (50.8 mm)
– Exposed side: 1.0 in. (25.4 mm)
– Front: 2.0 in. (50.8 mm)

Installing the Switch on a DIN Rail

The switch ships with a spring-loaded latch on the rear panel to mount a DIN rail. To attach the switch to a DIN rail, follow these steps:

1. Position the rear panel of the switch directly in front of the DIN rail, making sure that the DIN rail fits in the space between the two hooks near the top of the switch and the spring-loaded latch near the bottom.



2. Holding the bottom of the switch away from the DIN rail, place the two hooks on the back of the switch over the top of the DIN rail.
CAUTION: Do not stack any equipment on the switch.
3. Push the switch toward the DIN rail to cause the spring-loaded latch at the bottom rear of the switch to move down and snap into place.
When unpacking, the metal plate of the aluminum rail attachment has been fixed on the backside of the switch. Remove the wall-mounted metal plate from the switches and re-install it.

NOTE: Before screwing the screws onto the wall, make sure that the screw size matches the wall-mounted metal panel
CAUTION: Do not stack any equipment on the switch.

Connecting Alarm Circuits

The switch has one alarm output relay circuit for external alarms. The alarm output relay circuit has a normally open and normally closed contact. Alarm signals are connected to the switch through the 2-pin alarm connector. The two connections are for the alarm output circuit: an ordinarily open output, a normally closed output. An alarm output wiring connection is required to complete a single alarm output circuit.

Warning: Explosion Hazard—Do not connect or disconnect wiring while the field side power is on; an electrical arc can occur. This could cause an explosion in hazardous location installations. Be sure that power is removed or that the area is nonhazardous before proceeding.

CAUTION: The input voltage source of the alarm output relay circuit must be an isolated source and limited to less than or equal to 24 VDC, 1.0 A or 48 VDC, 0.5 A.

To wire the switch to an external alarm device, follow these steps:
1. Remove the connector from the switch chassis.
2. Measure two strands of twisted-pair wire (16-to-18 AWG) long enough to connect to the external alarm device. Choose between setting up an external alarm input or output circuit.
3. Use a wire stripper to remove the casing from both ends of each wire to 0.25 inch (6.3 mm) ± 0.02 inch (0.5 mm). Do not strip more than 0.27 inches (6.8 mm) of insulation from the wires. Stripping more than the recommended amount of wire can leave exposed wire from the alarm connector after installation.
4. Insert the exposed wires for the external alarm device into the connections based on an alarm input or output circuit setup.
5. Use a ratcheting torque flathead screwdriver to tighten the alarm connector captive screw (above the installed wire leads) to 2 in-lb (0.226 Nm).)

CAUTION: Do not over-torque the power and alarm connectors' captive screws. The torque should not exceed two in-lb (0.226 Nm).

6. Repeat Steps 2 through Step 5 to insert the input and output wires of one additional external alarm device into the alarm connector.

Connecting Destination Ports

These sections provide more information about connecting to the destination ports:

- ❖ Linking to 10/100/1000 Lan Ports
- ❖ Installing and Removing SFP Modules
- ❖ Connecting to SFP Modules

Connecting to LAN Ports

The switch copper LAN ports automatically configure themselves to operate at the speed of attached devices. If the attached ports do not support auto-negotiation, you can explicitly set the speed and duplex parameters. Connecting devices that do not auto-negotiate or have their speed and duplex parameters manually set can reduce performance or result in no linkage.

To maximize performance, choose one of these methods for configuring the Ethernet ports:

- ❖ Let the ports auto-negotiate both speed and duplex.
- ❖ Set the port speed and duplex parameters on both ends of the connection.

To connect to 10BASE-T, 100BASE-T, 1000BASE-T or the above devices, follow these steps:

1. When connecting to workstations, servers, routers, and IP phones, connect a straight-through cable to an RJ-45 connector on the front panel.

2. Connect the other end of the cable to an RJ-45 connector on the other device. The port LED turns on when the switch and the connected device have established a link. The port LED is amber while Spanning Tree Protocol (STP) discovers the topology and searches for loops. This can take up to 30 seconds, and the port LED turns green. If the port LED does not turn on:
   - ❖ The device at the other end might not be turned on.
   - ❖ There might be a cable problem or a problem with the adapter installed in the attached device.

3. Reconfigure and reboot the connected device if necessary.

4. Repeat Steps 1 through 3 to connect each device.

Installing and Removing SFP Modules

These sections describe how to install and remove SFP modules. SFP modules are inserted into SFP module slots on the front of the switch. These field-replaceable modules provide the uplink optical interfaces, send (TX) and receive (RX).

You can use any combination of rugged SFP modules. Each SFP module must be of the same type as the SFP module on the other end of the cable, and the line must not exceed the stipulated cable length for reliable communications.

For detailed instructions on installing, removing, and cabling the SFP module, see your SFP module documentation.

Warning: Do not insert and remove SFP modules while power is on; an electrical arc can occur. This could cause an explosion in hazardous location installations. Be sure that power is removed or the area is nonhazardous before proceeding.

Installing SFP Modules into SFP Module Slots

CAUTION: We strongly recommend that you do not install or remove the SFP module with fiber-optic cables attached to it because of the potential damage to the wires, the cable connector, or the optical interfaces in the SFP module. Disconnect all cables before removing or installing an SFP module.

Removing and installing an SFP module can shorten its useful life. Do not remove and insert SFP modules more often than is necessary.

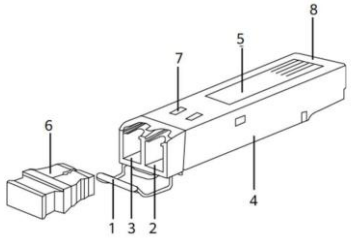


Figure: SFP Module Drawing

1	Handle	2	Receiver
3	Transmitter	4	Shell
5	Label	6	Dust Plug
7	Spring	7	Connect

To insert an SFP module into the SFP module slot:

1. Attach an ESD-preventive wrist strap to your wrist and a grounded bare metal surface.

2. Find the send (TX) and receive (RX) markings that identify the right side of the SFP module. On some SFP modules, the send and receive (TX and RX) markings might be replaced by arrows that show the direction of the connection, either send or receive (TX or RX).

3. Align the SFP module sideways in front of the slot opening.

4. Insert the SFP module into the slot until you feel the connector on the module snap into place in the rear of the space.

5. Remove the dust plugs from the SFP module optical ports and store them for later use.

CAUTION: Do not remove the dust plugs from the SFP module port or the rubber caps from the fiber-optic cable until you are ready to connect the cable. The pins and caps protect the SFP module ports and cables from contamination and ambient light.

6. Insert the LC cable connector into the SFP module.

Removing SFP Modules from SFP Module Slots

To remove an SFP module from a module receptacle:

1. Attach an ESD-preventive wrist strap to your wrist and a grounded bare metal

2. Disconnect the LC from the SFP module.

3. Insert a dust plug into the optical ports of the SFP module to keep the optical interfaces clean.
4. Unlock and remove the SFP module. If the module has a bale-clasp latch, pull the bale out and down to eject the module. If the bale-clasp latch is obstructed and you cannot use your index finger to open it, use a small, flat-blade screwdriver or other long, narrow instrument to open the bale-clasp latch.
5. Grasp the SFP module between your thumb and index finger, and carefully remove it from the module slot.
6. Place the removed SFP module in an antistatic bag or another protective environment.

Connecting to SFP Modules

This section describes how to connect to a fiber-optic SFP port. For instructions on how to install or remove an SFP module.

Warning: Class 1 laser product.
Warning: Do not connect or disconnect cables to the ports while power is applied to the switch or any device on the network because an electrical arc can occur. This could cause an explosion in hazardous location installations.

Be sure that power is removed from the switch and cannot be accidentally turned on, or verify that the area is nonhazardous before proceeding.

CAUTION: Do not remove the rubber plugs from the SFP module port or the rubber caps from the fiber-optic cable until you are ready to connect the cable. The plugs and caps protect the SFP module ports and cables from contamination and ambient light. Before connecting to the SFP module, be sure to understand the port and cabling guidelines in the Preparing for Installation. To connect a fiber-optic cable to an SFP module, follow these steps:

1. Remove the dust plugs from the module port and fiber-optic cable, then store them for future use.
2. Insert one end of the fiber-optic cable into the SFP module port.
3. Insert the other cable end into a fiber-optic receptacle on a target device.

4. Observe the port status LED:

- The LED turns green when the switch and the target device have an established link.
- The LED turns amber while the STP discovers the network topology and searches for loops. This process takes about 30 seconds, and then the port LED turns green.
- If the LED is off, the target device might not be turned on, there might be a cable problem, or there might be a problem with the adapter installed in the target device. See Troubleshooting.

5. If necessary, reconfigure and restart the switch or the target device.

Running Express Setup

If the default configuration is satisfactory, the switch does not need further configuration. You can use any of these management options to change the default configuration:

- Start Device Manager, which is in the switch memory, to manage individual and standalone switches. This is an easy-to-use web interface that offers quick configuration and monitoring. You can access Device Manager from anywhere in your network through a web browser. For more information, please read the Express Setup Section of the Device Manager online help.

NOTE: For the FR-7N series, due to no function of Web-GUI management, so the following express setup procedure is not available to this series.

When you first set up the switch, you should use Express Setup to enter the initial IP information. This process enables the switch to connect to local routers and the Internet. You can then access the switch through the IP address for additional configuration.

Required Equipment

You need this equipment to set up the switch:

- Computer with Windows 7/Windows 10/Mac

- Web browser (Microsoft Internet Explorer 11, Firefox 46.01 and 47.0, or Microsoft Edge 89.0) with JavaScript enabled. (Disable pop-up blockers and proxy settings and ensure that your browser uses the English EN-US language pack.)

NOTE: Firmware upgrade may fail or never complete when initiated using a browser language pack other than en-US.

- A straight-through or crossover Category 5 Ethernet cable connects your computer to the switch port.
- A small paper clip to reach the express setup button.

NOTE: Before running Express Setup, disable any wireless client running on your computer.

Express Setup Procedure

To run Express Setup:

1. Make sure that nothing is connected to the switch.
2. Connect power to the switch.
3. Power on or reset the switch:

- Use LEDs to monitor boot progress

RUN Blank: POST
RUN solid: exit post, initializing
RUN and alarm LED is green: initializing done
~25 seconds after power-on

4. Ensure the switch is in default factory mode.

Skip to the next step if freshly out of the box

a. If not freshly out of the package, use a paper clip to reset the switch by depressing the express setup button for 15 - 20 seconds

b. Switch will automatically reboot
5. Ensure no data port is connected to the switch.

NOTE: During Express Setup, the switch acts as a DHCP server.

- Ensure the computer connected to the switch is configured to receive an IP address from the DHCP server.

6. Insert a paper clip into the express setup button for 1-2 seconds.

- When released, EXP LED starts flashing green.

7. Connect the computer to port Fa 1/1; LED continues to blink
8. Ensure the computer has received the IP Address 192.168.1.1,
9. Point browser to http://192.168.1.254
10. Leave the username blank and enter the default password
a. Troubleshooting: If the Express Setup window does not appear, make sure that any pop-up blockers or proxy settings on your browser are disabled and that any wireless client is disabled on your computer.
11. Enter all entries in English letters and Arabic numbers.

In the Network Settings (Required for Static IP):

- New Admin User: Password must be eight characters long, contain upper and lower case characters, a number and a symbol (!@#$%^).
- IP Address: Enter a valid IP address for the switch. Later, you can use the IP address to access the switch through Device Manager.
- (Optional) Default Gateway: Enter the IP address of the router.

NOTE: The Device manager will not allow you to exit the express setup page if the static IP address of the switch and the Default Gateway is not in the same subnet.

12. Optional Settings
You can enter the optional information or enter it later by using Device Manager. For more details on the Express Setup fields, see the online help for the Express Setup window.
Click Submit to save your changes and to complete the initial setup.

13. After you click Submit, these events occur:

a. The switch is configured and exits Express Setup mode.

b. The browser displays a warning message, instructing the user to clear browser cookies.

c. Typically, connectivity between the computer and the switch is lost because the configured switch IP address is in a different subnet from the IP address on the computer.

d. If you changed the Management Interface VLAN ID, then after pressing submit, all Ethernet interfaces on the switch are now members of this new VLAN. This is to enable the connection to the network.

14. Remove the PC and connect the switch to the network as configured in step 12.

NOTE: After power cycling, the switch will not act as a DHCP server. DHCP Server behavior is unique to Express Setup. to reconnect to the Switch after the power cycle, you will need to A) configure a static IP Address on your PC that is in the same subnet as the IP Address you just assigned, or B) connect to the new IP Address of the Switch from the network.

15. You can now manage the switch by using the Device Manager for information about configuring and managing the switch. You can display Device Manager by following these steps:

a. Start a web browser on your computer.

b. Enter the switch IP address, username, and password in the web browser, and press Enter. The Device Manager page appears.

Troubleshooting and Maintenance

If the Device Manager page does not appear:

- Ping the device's IP address from the PC where the browser is launched. If not, check Computer's network connectivity.
- Confirm that the port LED for the switch port connected to your network is green.
- Confirm that the computer that you are using to access the switch has network connectivity by clicking it to a well-known web server in your network. If there is no network connection, troubleshoot the network settings on the computer.
- Make sure that the switch IP address in the browser is correct.
- If the switch IP address in the browser is valid, the switch port LED is green, and the computer has network connectivity, continue troubleshooting by reconnecting the laptop to the switch. Configure a static IP address on the computer in the same subnet as the switch IP address.
- When the LED on the switch port connected to the computer is green, reenter the switch IP address in a web browser to display the Device Manager. When Device Manager appears, you can continue with the switch configuration.

Troubleshooting

Diagnosing Problem

The switch LEDs provide troubleshooting information about the switch. They show fast boot failures, port-connectivity problems, and overall switch performance. You can also get statistics from Device Manager.

Switch LEDs

Look at the port LEDs information when troubleshooting the switch. See LEDs, page 11, for a description of the LED colors and their meanings.

Switch Connections

Bad or Damaged Cable

Please always examine the cable for marginal damage or failure. A cable might be just good enough to connect at the physical layer, but it could corrupt packets due to slight damage to the wiring or connectors. You can identify this problem because the port has many packet errors or constantly flaps (loses and regains link).

- Exchange the copper or fiber-optic cable with a known suitable cable.
- Look for broken or missing pins on cable connectors.
- Rule out any bad patch panel connections or media convertors between the source and the destination. If possible, bypass the patch panel, or eliminate media convertors (fiber-optic-to-copper).
- Try the cable in another port to see if the problem follows the line.

Ethernet and Fiber-Optic Cables

Make sure that you have the correct cable:

- For Ethernet, use Category 3 copper cable for 10 Mb/s UTP connections. Use either Category 5, Category 5e, or Category 6 UTP for 10/100 Mb/s, and PoE connections.
- Verify that you have the correct fiber-optic cable for the distance and port type. Make sure that the connected device ports match and use the same type of encoding, optical frequency, and fiber type.
- Determine if a copper crossover cable was used when a straight-through was required or the reverse.

Link Status

Verify that both sides have a link. A broken wire or a shutdown port can cause one side to show a link even though the other side does not have a connection.

- A port LED is on does not guarantee that the cable is functional. It might have encountered physical stress, causing it to function at a marginal level. If the port LED does not turn on:
- Connect the cable from the switch to a known suitable device.
- Ensure that both ends of the line are connected to the correct ports. ϖ Verify that both devices have power.
- Verify that you are using the correct cable type. See Cables and Adapters, page 38 for information.
- Look for loose connections. Sometimes a cable appears to be seated but is not. Disconnect the line, and then reconnect it.
-

LAN Port Connections

If a port appears to malfunction:

- Verify the status of all ports by checking the LEDs.
- Verify the cable type.

SFP Module

Use only Fiberroad SFP modules. Each Fiberroad module has an internal serial EEPROM encoded with security information.

This encoding verifies that the module meets the requirements for the switch.

- Inspect the SFP module. Exchange the suspect module with a known suitable module.
- Verify that the module is supported on this platform. (The switch release notes on Fiberroad list the SFP modules that the switch supports.)
- Make sure that all fiber-optic connections are clean and securely connected.

Interface Settings

Verify that the interface is not disabled or powered off. If an interface is manually shut down on either side of the link, it does not come up until you reenable the interface. If needed, reenable the interface.

Ping End Device

Ping from a laptop first, and then work your way backport by port, interface by interface, and trunk by trunk until you find the source of the connectivity issue. Make sure that each switch can identify the end device MAC address in its Content Addressable Memory (CAM) table.

Spanning Tree Loops

STP loops can cause serious performance issues like port or interface problems. A unidirectional link can cause loops. It occurs when the traffic sent by the switch is received by the adjacent switch, but the traffic from the adjacent switch is not received by the switch. A broken cable, other cabling problems, or a port issue can cause this one-way communication.

Switch Performance

Speed, Duplex, and Auto-negotiation

Port statistics that show many alignment errors, frame check sequence (FCS), or late collision errors might mean a speed or duplex mismatch.

A common issue occurs when duplex and speed settings are mismatched between two switches, between a button and a router, or between a workstation or server.

Mismatches can happen when manually setting the speed and duplex or from auto-negotiation issues between the two devices.

To maximize switch performance and ensure a link, follow one of these guidelines when changing the duplex or the speed settings.

- Let both ports auto-negotiate both speed and duplex.
- Manually set the speed and duplex parameters for the interfaces on both ends of the connection.
- If a remote device does not auto-negotiate, use the same duplex settings on the two ports. The speed parameter adjusts itself even if the connected port does not auto-negotiate.

Auto-negotiation and Network Interface Cards

Problems sometimes occur between the switch and third-party network interface cards (NICs). By default, the switch ports and interfaces auto-negotiate. Laptops or other devices are commonly set to auto-negotiate, yet sometimes issues occur.

To troubleshoot auto-negotiation problems, try manually setting both sides of the connection. If this does not solve the problem, there could be a problem with the firmware or software on the NIC. You can resolve this by upgrading the NIC driver to the latest version.

Cabling Distance

If the port statistics show excessive FCS, late collision, or alignment errors, verify that the cable distance from the switch to the connected device meets the recommended guidelines.

Resetting the Switch

These are reasons why you might want to reset the switch to the factory default settings:

- You installed the switch in your network and cannot connect because you assigned the wrong IP address.

- You want to reset the password on the switch. Notes: Resetting the switch deletes the configuration and reboots the switch.

To reset the switch:

1. Press and hold the Express Setup button (recessed behind a small hole in the faceplate) for about 15-20 seconds with a paper clip or similar object. The switch reboots. The system LED turns green after the switch completes rebooting.
2. Press the Express Setup button again for 3 seconds. Fa 1/1port blinks green. The switch now behaves like an unconfigured switch.

The Switch Serial Number

If you contact Fiberroad Technical Assistance or post-sales services, you need to know the serial number of your switch; The serial number is on the bottom.

Cable and Connectors

Connector Specifications

100M/1G/2.5G/5G/10G LAN Ports Pinouts

The Ethernet Copper LAN Port on the switches use RJ45 connectors

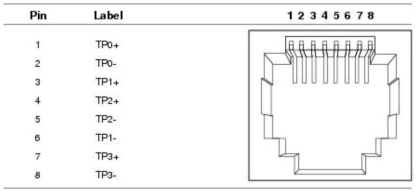


Figure: Ethernet Copper LAN Port Pinouts

NOTE: For the models of the switch that support PoE, connector pins 4 and 5 supply +48VDC and pins 7 and 8 are the DC voltage return lines.
CAUTION: PoE faults are caused when non-compliant cabling or powered devices connect pre-standard IP phones, IP cameras, or wireless access points or IEEE 802.3af/at/by compliant devices to PoE ports. A cable or device that causes a PoE fault must be removed from the network.

NOTE: You can use the MDIX auto interface configuration command via CLI or Web GUI to enable the automatic medium-dependent interface crossover (Auto-MDIX) feature. When the Auto-MDIX feature is enabled, the switch detects the required cable type for copper Ethernet and configures the interfaces accordingly. Therefore, you can use either a crossover or straight-through actions to a copper SFP module port on the switch, regardless of the type of device on the other end of the connection.

Fiber- Optic Module Connectors

Figure 17 Fiber-Optic Module Connectors show LC, SC, FC, ST type connectors used with Fiber-Optic Module. It's a fiber-optic cable connector.

Warning: Invisible laser radiation may be emitted from disconnected fibers or connectors. Do not stare into beams or view directly with optical instruments.

Fiber-Optic Module Cables

Each port must match the wave-length specifications on each end of the cable, and for reliable communications, the cable must not exceed the allowable length.

NOTE:

- The maximum operating temperature of the switch varies depending on the type of SFP module you use.
- Modal bandwidth applies only to multimode fiber.
- A mode-field diameter/cladding diameter = 9 micrometers/125 micrometers.
- A mode-conditioning patch cord is required when using 1000BASE-LX/LH SFP modules, MMF, and a short link distance. An ordinary patch cord can cause *transceiver saturation, resulting in an elevated bit error rate (BER). When* using the LX/LH SFP module with a 62.5-micron diameter MMF, you must install a mode-conditioning patch cord between the SFP module and the MMF cable on both the sending and receiving ends of the link. The mode-conditioning patch cord is required for connection distances greater than 984 feet (300 m).
- 1000BASE-ZX SFP modules can send data up to 62 miles (100 km) using dispersion-shifted SMF or low-attenuation SMF. The distance depends on the fiber quality, the number of splices, and the connectors.
- When the fiber-optic cable span is less than 15.43 miles (25 km), insert a 5-decibel (dB) or 10-dB inline optical attenuator between the fiber-optic cable plant and the receiving port on the 1000BASE-ZX SFP module.

Compliance Information

FCC

NOTE: This equipment had been tested and found to comply with the limits for a class digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communication. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help

The device complies with part 15 of the FCC Rules. Operation is subject to the This device may not cause harmful interference, and

(1) This device must be accepted any interference received, including interference that may cause undesired operation.

CAUTION:

Any changes or modifications not expressly approved by the grantee of this device could void the user's authority to operate the equipment.

CE

Fiberroad Technology Co., Limited hereby declares that this device is compliance with Directive 2-14/30/EU. A copy of the EU Declaration of conformity is available at https://fiberroad.com/en/resources/certificates/

Company Information

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