RLH Industries, Inc.

USER GUIDE

The leader in rugged fiber optic technology.

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2 Channel POTS Mux DIN Fiber Link System

SYSTEM INSTALLATION INFORMATION

2 Channel POTS Mux DIN Fiber Link System

Introduction

The 2 Channel POTS Mux DIN Fiber Link system provides a comprehensive method of multiplexing POTS channels over a single pair of multimode or single mode fibers. Additional POTS lines may now be added when available fiber is limited, helping to reduce equipment space, and lower overall equipment costs.

The system includes two 10/100 Ethernet ports for LAN interconnection. All ports operate simultaneously over the fiber optic cable, and may be used with leased lines to build up private networks and private telephone networks. It is available in either single mode or multimode with the ability to operate up to 120km/74 mi. over single mode fiber.

The system requires 24~48VDC power. A typical complete system comprises one FXO/CO and one FXS/Sub module, or use FXS/Sub unit at each end for ringdown operation where direct connection to phones on both ends of the system is desired. RLH DIN Fiber Link systems are covered by our **Limited Lifetime Warranty**.

Key Features

- Single or Dual Fiber Connector
- 2 channels of analog telephone
- Convenient LED status indicators
- 2 shared RJ45 UTP ports with 10/100 automatic Half or Full-Duplex auto-negotiation
- Alarm indication function
- Compatibility with IEEE 802.3 10Base-T UTP, 100Base-TX, and 100Base-FX Devices
- Extends network span up to 74 miles miles (120km)
- Uses 24~48VDC local power
- T35 DIN rail
- **Limited Lifetime Warranty**

Contents

General Safety Practices

Intended Audience

This guide is intended for use by knowledgeable telco/network installation, operation and repair personnel. Every effort has been made to ensure the accuracy of the information in this guide is accurate. However, due to constant product improvement, specifications and information contained in this document are subject to change without notice.

Conventions

Symbols for notes, attention, and caution are used throughout this manual to provide readers with additional information, advice when special attention is needed, and caution to prevent injury or equipment damage.

The equipment discussed in this document may require tools designed for the purpose being described. RLH recommends that service personnel be familiar with the correct handling and use of any installation equipment used, and follow all safety precautions including the use of protective personal equipment as required.

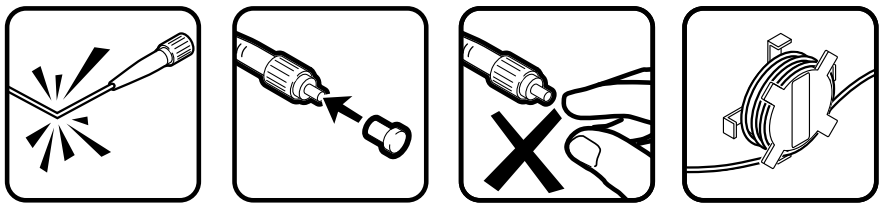
Caution - Severe Shock Hazard

- Never install during a lightning storm or where unsafe high voltages are present.
- Active phone lines may carry high DC voltages. Use caution when handling copper wiring.
- The DIN chassis must be grounded using the ground screw to reduce the risk of damage from lightning.

HVP information

The intra-building port(s) of the equipment or subassembly is suitable for connection to intra-building or unexposed wiring or cabling only. The intra-building port(s) of the equipment MUST NOT be metallically connected to interfaces that connect to the OSP or its wiring. These interfaces are designed for use as intra-building interfaces only (Type 4 ports as described in GR-1089-CORE, Issue 4) and require isolation from the exposed OSP cabling. The addition of Primary Protectors is not sufficient protection in order to connect these interfaces metallically to OSP wiring.

Guidelines for handling terminated fiber cable



- Do not bend fiber cable sharply. Use gradual and smooth bends to avoid damaging glass fiber.
- Keep dust caps on fiber optic connectors at all times when disconnected.
- Do not remove dust caps from unused fiber connectors.
- Keep fiber ends and fiber connectors clean and free from dust, dirt and debris. Contamination will cause signal loss.
- Do not touch fiber ends.
- Store excess fiber on housing spools or fiber spools at site

Acronyms

Commonly used acronyms and abbreviations

Acronym/Abbreviation	Description
POTS	Plain Old Telephone Service (analog phone)
FXO/CO	Foreign Exchange Office or Central Office location
FXS/Sub	Foreign Exchange Station or Subscriber side location
PBX	Private Branch Exchange
TX	Transmit
RX	Receive
MM	Multimode
SM	Single Mode
2W	Refers to 2 wire copper analog phone line
VOIP	Voice Over IP
LAN	Local Area Network
MUX	Multiplex
LED	Light Emitting Diode

Applications

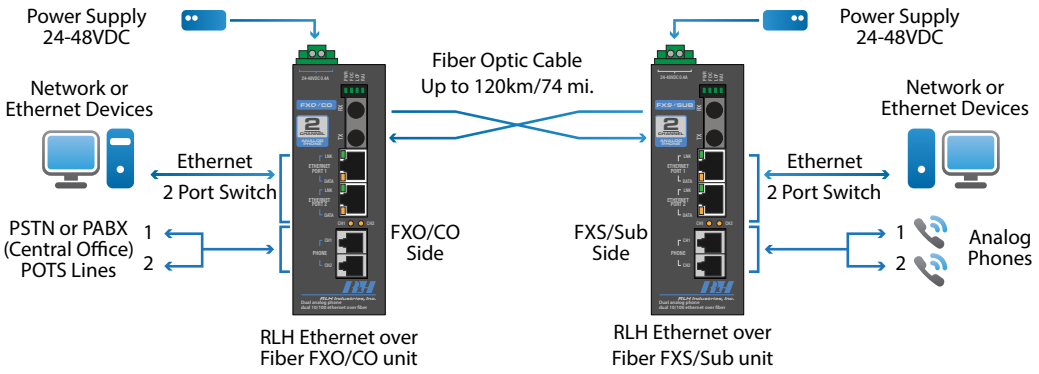
Optical fiber is immune to EMI/RF interference, ground loops, and high voltage surges from lightning or ground faults, and is ideal for electrically noisy environments such as near large power sources, electrical motors, and radio communications equipment. Additionally, copper twisted pair Ethernet is limited to 100m/328ft without extenders. Using fiber optic cable provides long distance service (up to 120km/74mi.) without any additional equipment.

Safety benefits of fiber optics

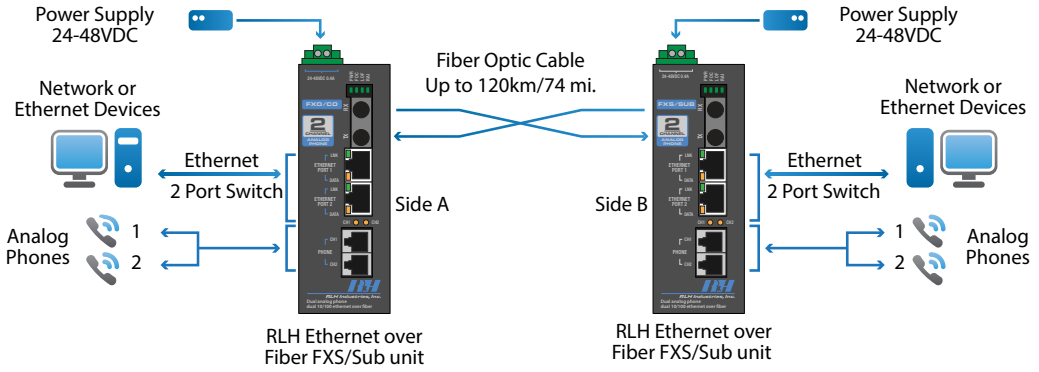
Placement of all-dielectric fiber optic cable (instead of copper) completely eliminates the presence of a remote ground, which dramatically increases safety of personnel and reliability of equipment. By using fiber optic cable, the 2 Channel POTS Mux provides absolute electrical isolation between fiber network devices.

Connection Diagrams

The diagrams below show the two different models of the analog phone mux. Refer to the Ordering Information and Specifications sections for additional information.



Analog phone mux system connection diagram



Analog phone mux system ringdown circuit connection diagram

Installation

Prior to installation:

- Check for shipping damage
- Check the contents to ensure correct model and powering options
- Make sure you have the correct fiber type and power available
- Have a clean, dry installation environment ready
- Observe anti-static precautions

Required for installation:

- Suitable T35 DIN rail
- 24~48VDC power supply

FXO/CO (Central Office) Side Unit

The FXO/CO side unit provides the electrical-optical interface between PSTN or PABX 2-wire copper analog phone lines, Ethernet devices or LAN, and the optical fiber cable.

FXS/Sub (Subscriber Side) Side Unit

The FXS/Sub side provides the electrical-optical interface between the copper 2-wire analog phone line devices (phones, fax, modem), Ethernet devices or LAN, and the optical fiber cable.

Note: FXS/Sub units are electrically different from FXO/CO units and cannot be interchanged.

When using the ringdown circuit, the FXS/Sub module is used at each end of the network.

Connect optical fiber cable

The optical ports may be equipped with ST or SC fiber connectors. A fiber pair is required for operation with dual fiber models, TX is the signal output side and RX is the signal input side. Bi-directional single fiber models combine input and output, and require only a single fiber, however their TX and RX wavelengths will be different.

Connect fiber cables to correct TX and RX ports. On dual fiber models, the TX port of one side must be connected to the RX port of the unit at the other side. Make sure the connections for dual fiber optics are flipped accordingly.

Do not remove fiber cable caps until you connect fiber to the unit, watch for contamination.

Connect Ethernet ports

The two Ethernet ports use standard RJ-45 connectors. The Ethernet ports are 10/100, full/duplex, auto negotiating. The ports have status indicators when operating. Refer to the LED indicators table for additional information.

Connect analog phones

The 2 Channel POTS Mux DIN Fiber Link system uses RJ-11 connectors for POTS lines. Simply connect each RJ-11 connector to the desired port on the faceplate.

Connect Power

The POTS Mux accepts 24-48VDC local power source.

Note: The power terminals are not polarity sensitive, and power wires may be inserted into either side.

Attach the power wires to the screw down terminal on the top of the unit. For ease of installation, the terminal block may be removed by loosening the screws on both sides of the connector and pulling straight out.

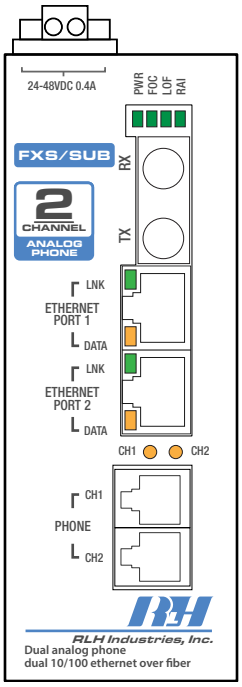
If removed, seat the terminal block firmly into the connector and tighten the screws before applying power. Once power is applied, thePOTS Mux will begin operating automatically.

Operation

Note: On the Fiber Link unit, the yellow PHONE CH LEDs on the front panel indicate which analog phone (POTS) lines are being actively used.

The LED indicators on each Ethernet port indicates the port connection and operation. The LNK LED is ON when the port is connected to a LAN or other active link, and the DATA LED blinks when the port is sending or receiving Ethernet data.

Status and Activity LED display



LED activity and status indicators

Label	Name	Status	Description
RAI	Remote Alarm Indicator	ON	Loss of fiber or copper signal
LOF	Loss of Frame	ON	Fiber or copper frame loss
FOC	Fiber Optic Connection	ON	Fiber connector disconnected
		OFF	Fiber connector installed
PWR	Power	ON	Power is ON
CH1	Channel 1 Phone Port	OFF	Channel 1 phone is not active
		ON	Channel 1 phone is off hook
		Blinking	Channel 1 phone is dialing
CH2	Channel 2 Phone Port	OFF	Channel 1 phone is not active
		ON	Channel 1 phone is off hook
		Blinking	Channel 1 phone is dialing
LNK (TP ports)	Ethernet Link	ON	Ethernet connected
		OFF	Ethernet disconnected
DATA (TP ports)	Ethernet Data	Blinking	Ethernet data is transmitting or receiving
		OFF	No Ethernet data activity

Ordering Information

Each 2 Channel POTS Mux system is identified with a part number.

Optics	Distance	µm	Side	Description	Part Number
Multimode SC	2km / 1.25 mi	62.5/50µm	-	CO/FXO Card	**RLH-PM2D-03-CE-3**
				SUB/FXS Card	**RLH-PM2D-03-SE-3**
Multimode ST	2km / 1.25 mi	62.5/50µm	-	CO/FXO Card	**RLH-PM2D-04-CE-3**
				SUB/FXS Card	**RLH-PM2D-04-SE-3**
Bi-Directional Multimode SC	2km / 1.25 mi	62.5/50µm	A	CO/FXO Card	**RLH-PM2D-01-CE-3**
			B	SUB/FXS Card	**RLH-PM2D-02-SE-3**
Single-mode SC	20km/12.4mi.	8~9µm	-	CO/FXO Card	**RLH-PM2D-40-CE-3**
				SUB/FXS Card	**RLH-PM2D-40-SE-3**
Bi-Directional Single-mode SC	20km/12.4mi.	8~9µm	A	CO/FXO Card	**RLH-PM2D-10-CE-3**
			B	SUB/FXS Card	**RLH-PM2D-11-SE-3**
Single-mode SC	60km/ 37mi.	8~9µm	-	CO/FXO Card	**RLH-PM2D-41-CE-3**
				SUB/FXS Card	**RLH-PM2D-41-SE-3**
Bi-Directional Single-mode SC	60km/ 37mi.	8~9µm	A	CO/FXO Card	**RLH-PM2D-14-CE-3**
			B	SUB/FXS Card	**RLH-PM2D-15-SE-3**
Single-mode SC	120km / 74mi.	8~9µm	-	CO/FXO Card	**RLH-PM2D-42-CE-3**
				SUB/FXS Card	**RLH-PM2D-42-SE-3**
Single-mode ST	20km/12.4mi.	8~9µm	-	CO/FXO Card	**RLH-PM2D-50-CE-3**
				SUB/FXS Card	**RLH-PM2D-50-SE-3**
Single-mode ST	60km/ 37mi.	8~9µm	-	CO/FXO Card	**RLH-PM2D-51-CE-3**
				SUB/FXS Card	**RLH-PM2D-51-SE-3**
Single-mode ST	120km / 74mi.	8~9µm	-	CO/FXO Card	**RLH-PM2D-52-CE-3**
				SUB/FXS Card	**RLH-PM2D-52-SE-3**

- A complete system requires a **FXO/CO** and a **FXS/Sub** unit, or **two FXS/Sub** units for ringdown.
- Bidirectional single fiber models require an **A** Side and **B** Side unit for a complete system.
- Bidirectional optic wavelength may be special ordered. Contact factory for availability.
- Please contact your RLH sales representative for pricing and delivery information.

Specifications

Transmission method	Frequency modulated light via two optical fibers		
	Multimode	850nm/1310nm/1550nm	
	Single-mode	1310nm/1550nm	
Maximum Fiber Attenuation / Distance*	**Single Fiber, Bi-directional**	Multimode (50/125µm, 62.5/125µm):	1.2mi./2 km range
		Single-mode (9/125µm):	12.4 mi./20km range
			37 mi./60km range
	Dual Fiber	Multimode (50/125µm, 62.5/125µm):	1.2mi./2 km range
		Single-mode (9/125µm):	12.4 mi./20km range
			37 mi./60km range
			74 mi./120km range
	***Note**: Distances equated using industry standard fiber and connector attenuation of 3dB/Km. Fiber condition, splices and connectors may affect actual range.*		
Fiber Type	(ST or SC connectors) Multimode: 50/125µm, 62.5/125µm, Single-mode: 8-9/125µm		
Consumption	+2 to -11dBm		
Sensitivity	Better Than -36dBm		
BER	$<10^{-9}$		
Phone Connector	RJ-11		
Audio Frequency	300Hz-3400Hz		
Impedance	200Ω 560Ω//0.1µF		
Baud Rate	9600 maximum		
Compression Ratio	Class A in ITU G.711		
Loop Current	25mA		
Ethernet	10/100, full/duplex, auto negotiation		
Protocol	IEEE 802.3		
WAN Rate	100% Wire-Speed 100M		
Ethernet Connector	RJ-45		
Power Requirements	24VDC, 400mA ~ 48VDC, 200mA		
Consumption	≤5W		
Dimensions/Mounting	H 5in. x W 1.8in. x D 3.9in. (127mm x 46mm x 99mm)		
	T-35 DIN rail (35mm/1-3/8") (DIN rail section included)		
Operating Temperature	-4°F to +158°F (-20°C to +70°C)		
Humidity	95% non-condensing		
Warranty	Limited Lifetime	*Visit* www.fiberopticlink.com *for warranty details*	

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