RLH Industries, Inc.

USER GUIDE

The leader in rugged fiber optic technology.

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4 Channel POTS Fiber Link Card System

SYSTEM INSTALLATION INFORMATION

4 Channel POTS Fiber Link Card

Introduction

The 4 Channel POTS (Plain Old Telephone Service) Fiber Link Cards are fully featured and hardened for substation and critical applications. These cards operate over a wide temperature range and have been designed to provide reliability in harsh environments.

Common applications include extending analog lines over fiber for the benefit of electrical isolation, to achieve long distances, or through noisy environments to reduce EMI. These cards are compatible with all traditional POTS services, dial-up modems, meters, and fax machines. Fiber Link Cards are designed and Made in the USA, and are covered by our limited lifetime warranty.

Key Features

- Wide operating temperature range -40°F to +158°F (-40°C to +70°C)
- Extends telephone up to 74 miles miles (120km)
- Multimode or single-mode fiber, SC or ST connectors
- Single or dual fiber connector
- Uses 24-48VDC local power
- Supports Caller ID
- Supports Call-Forward Disonnect
- Ringdown Function (FXS to FXS Hotline Phone)
- Convenient LED status indicators
- Compatible with standard 2 wire analog phone lines, dial-up modems, and fax machines
- Fiber Link Card is compatible with RLH card housings
- **Made in the USA** covered by our 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.

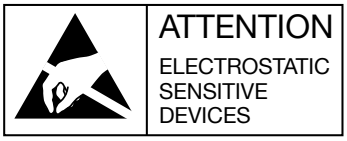
The equipment discussed in this document may require tools designed for the purpose being described. RLH recommends that service personnel be familiar with the correct handling and use of any installation equipment used, and follow all safety precautions including the use of protective personal equipment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

Special Handling Requirements

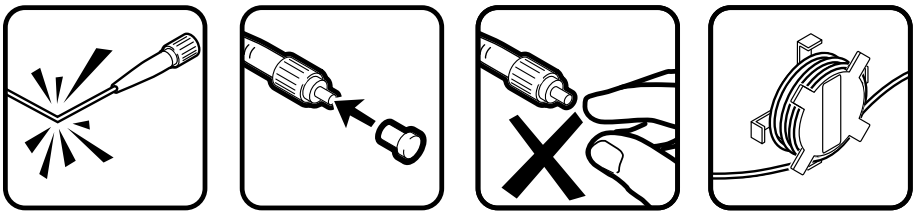
Be careful when handling electronic components



- This product contains static sensitive components.
- Handle Fiber Link Cards at their edges only.
- Follow proper electrostatic discharge procedures.

The Fiber Link Card utilizes circuitry that can be damaged by static electricity. When transporting the card, carry it in an ESD safe container such as the antistatic bag provided with the card. Before handling cards, discharge yourself of static electricity by physical bodily contact with earth ground. When handling cards, hold by outer edges and avoid touching circuitry. Failure to follow ESD precautions may cause damage to the card and prevent proper operation.

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	Foreign Exchange Office or Central Office location
FXS	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
MUX	Multiplexer
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. 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 4 Channel POTS system provides absolute electrical isolation.

FXO Card

The FXO card provides the electrical to optical interface between any inbound telephone lines, for example a PSTN phone line delivered from a service provider or a analog PBX phone line.

FXS Card

The FXS card provides the optical to electrical interface in the system. The cards are meant to be plugged into end devices such as telephones, modems, or fax machines.

Caller-ID (CLID)

RLH FXO & FXS Cards are designed to fully support Caller ID Pass-through. The RLH system supports both Single Data Message Format (SDMF) & Multiple Data Message Format (MDMF). If present both the Calling Party Name and Calling Party Number will be transmitted via Fiber to the remote party.

Call Forward-Disconnect

Also known as disconnect supervision our cards will transmit battery drops to the FXO interface letting the remote party know that the phone has been hung up. Also by having this feature we're able to support Hook Flash (Flashing) on traditional telephones.

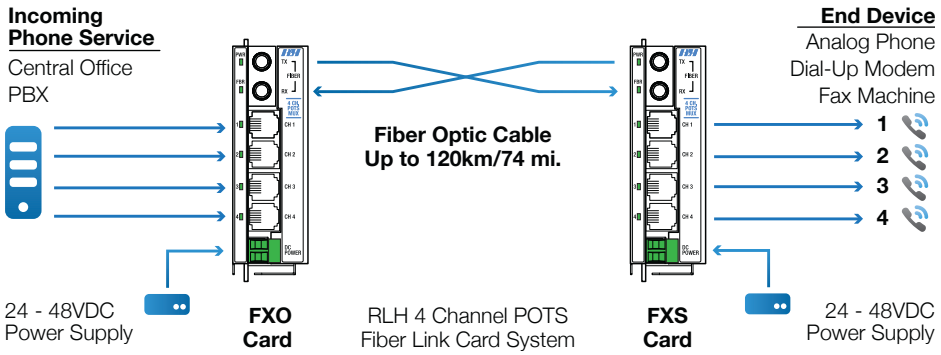
This Call-Forward disconnect feature is one that is not common to all fiber extension devices and we're glad to offer this as a standard feature in our product. It is especially important to have when integrating our fiber card system with a PBX or Modem as without it those devices may not properly go on-hook after the call has been completed.

Diagrams

The diagrams below show the two different configurations of the POTS system. Refer to the **Ordering Information** and **Specifications** sections for additional information.

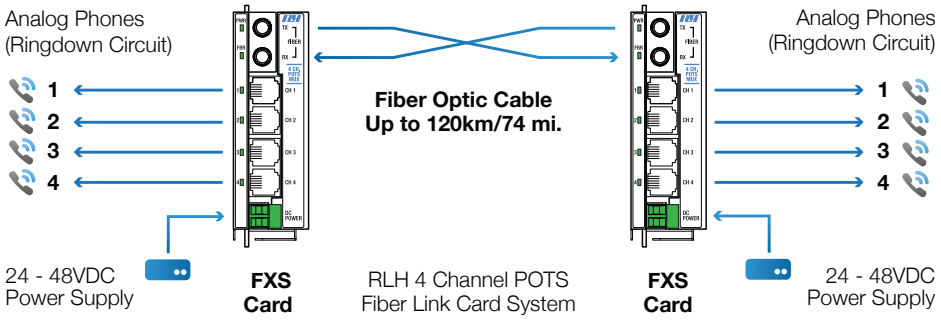
FXO to FXS - Phone Line Extension Application Diagram

When a link is created between an FXO & FXS card the system will act as a phone extender. The inbound phone line will be connected to the FXO card and transmitted over Fiber to the FXS card, where the signal will be regenerated back into copper transparently as shown in the diagram below.



FXS to FXS - Ringdown (Hotline Phone) Application Diagram

When a link is created between two (2) FXS cards a standard telephone can be connected to each side and when either of the phones are taken off-hook the other end will ring until answered. Once answered an audio session will be created until either end hangs up. This type of configuration creates a closed circuit point to point telephone system.



Installation

Prior to installation

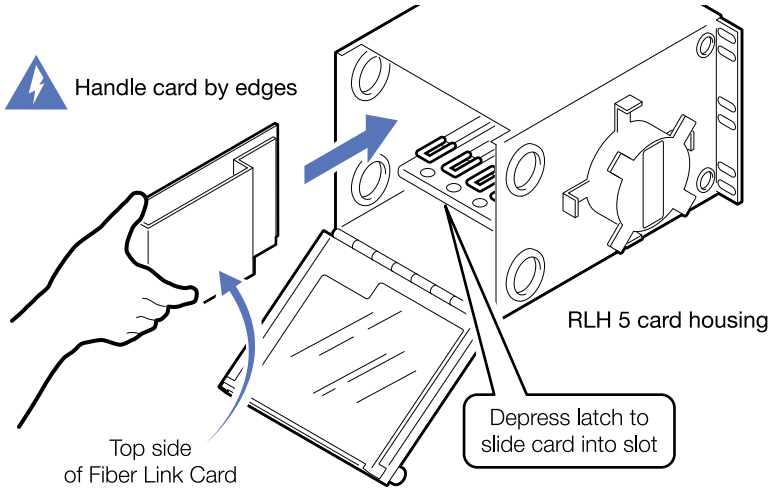
- Check for shipping damage
- Check the contents to ensure correct model and powering options
- Make sure you have the correct fiber type and power available
- Have a clean, dry installation environment ready
- Observe anti-static precautions

Required for installation:

- Suitable RLH card housing for the Fiber Link Card
- 24-48VDC power supply
- Flat head screw driver

Install into Card Housing

Install the Fiber Link Card into the desired RLH card housing by depressing the card retainer slightly while sliding the card into the guide rails. Contact your RLH representative about card housing options.



Installation into RLH Fiber Link Card Housing

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 output signal and RX is the input signal. Single fiber models combine input and output signal over one (1) fiber strand.

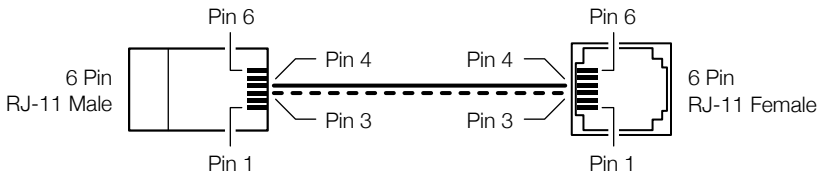
Connect fiber cables to the correct TX and RX ports. On dual fiber models, the TX port of one side must be connected to the RX port of the unit at the other side. Make sure the connections are made accordingly at both ends of the Fiber Link.

Do not remove fiber cable caps until you connect the fiber to the unit, exposing the mating optical interface to the surrounding environments should be limited to installation & maintenance only.

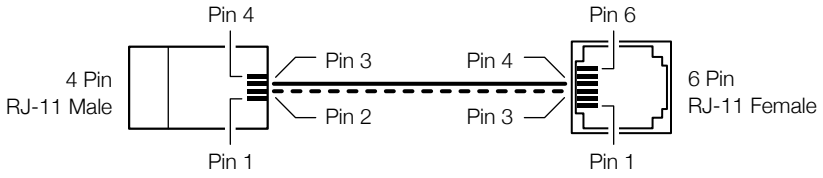
Connect analog phones

The Fiber Link Card has four (4) RJ-11 female connectors, one (1) for each of the POTS channels. The POTS ports use the center two (2) pins of the RJ-11 connector. The RJ-11 male connector pinouts are indicated in the diagrams and table below.

6 Pin RJ-11 male to 6 Pin RJ-11 Female



4 Pin RJ-11 male to 6 Pin RJ-11 Female



RJ-11 Pinout Table

POTS Channel	RJ-11 Female (On Card)	6 Pin RJ-11 Male	4 Pin RJ-11 Male
1 ~ 4	3	3	2
	4	4	3

Connect Power

The POTS system accepts a 24-48VDC local power source. The power input is identified on the top of the card, near the power connector.

Note: The power terminals are not polarity sensitive. Positive or negative lead of the power source may be connected to either terminal of the power connector.

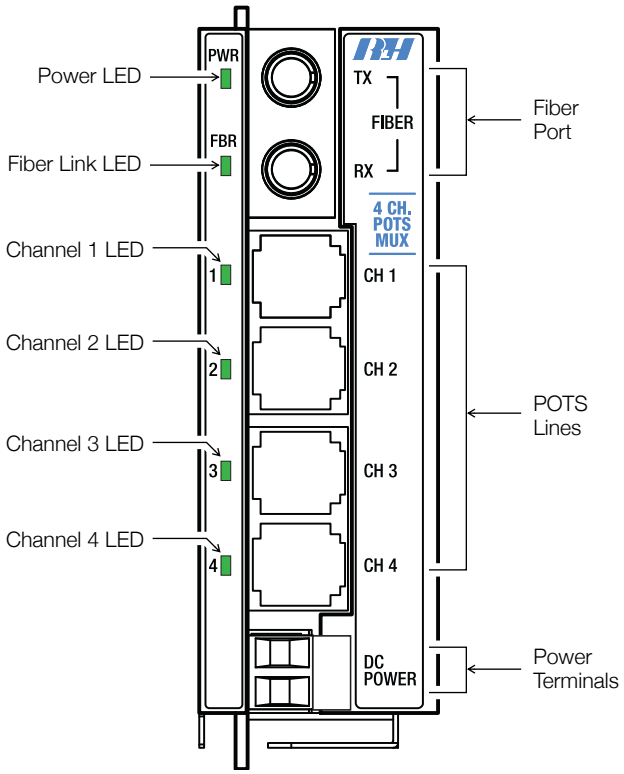
Attach the power wires to the screw down terminal on the front panel of the card. For ease of installation, the terminal block may be removed by pulling straight out.

If removed, seat the terminal block firmly into the connector before applying power. Once power is applied, the system will begin operating automatically.

Operation

The 4 Channel POTS Card has six (6) green LED status indicators on the front panel of the card. When ON, the power LED indicates the system DC power is OK and the fiber LED indicates a good fiber link. Similarly, the POTS LED when ON indicates the respective channel being active. Below is a table for a description of the LED indicators.

Status and Activity LED display



LED activity and status indicators

Label	Name	LED Status	Description
PWR	Power	ON	System Power OK
FBR	Fiber Optic Link	ON	Fiber Link is Good
		OFF	Fiber Link is Disconnected
1 ~ 4	Channel 1 ~ 4 Phone Ports	ON	OFF Hook
		Blinking	Ringing
		OFF	ON Hook

Ordering Information

Each 4 Channel POTS Card is identified with the part number.

Fiber / Connector	Description	Side	Distance	Fiber	Part Number
Multimode ST	FXO Card	-	2.4km / 1.5 mi.	62.5/50µm	**4PC-FXO-04-2**
	FXS Card	-	2.4km / 1.5 mi.	62.5/50µm	**4PC-FXS-04-2**
Bi-Directional Single-mode SC	FXO Card	A	20km / 12.4 mi.	8~9µm	**4PC-FXO-10-2**
	FXS Card	B	20km / 12.4 mi.	8~9µm	**4PC-FXS-11-2**
	FXO Card	A	60km / 37 mi.	8~9µm	**4PC-FXO-14-2**
	FXS Card	B	60km / 37 mi.	8~9µm	**4PC-FXS-15-2**
Single-mode SC	FXO Card	-	20km / 12.4 mi.	8~9µm	**4PC-FXO-40-2**
	FXS Card	-	20km / 12.4 mi.	8~9µm	**4PC-FXS-40-2**
	FXO Card	-	60km / 37 mi.	8~9µm	**4PC-FXO-41-2**
	FXS Card	-	60km / 37 mi.	8~9µm	**4PC-FXS-41-2**
	FXO Card	-	120km / 74 mi.	8~9µm	**4PC-FXO-42-2**
	FXS Card	-	120 km / 74 mi.	8~9µm	**4PC-FXS-42-2**
Single-mode ST	FXO Card	-	20km / 12.4 mi.	8~9µm	**4PC-FXO-50-2**
	FXS Card	-	20km / 12.4 mi.	8~9µm	**4PC-FXS-50-2**
	FXO Card	-	60km / 37 mi.	8~9µm	**4PC-FXO-51-2**
	FXS Card	-	60km / 37 mi.	8~9µm	**4PC-FXS-51-2**
	FXO Card	-	120km / 74 mi.	8~9µm	**4PC-FXO-52-2**
	FXS Card	-	120 km / 74 mi.	8~9µm	**4PC-FXS-52-2**

- A complete system requires 2 cards.
  - One (1) **FXO** paired with one (1) **FXS** card for a typical phone line extension, or
  - Two (2) **FXS** cards paired for a ringdown hotline.
- Bi-directional single fiber models require an **A** Side and **B** Side unit for a complete system.
- Please contact your RLH sales representative for pricing and delivery information.

General Specifications

Transmission method	Frequency modulated light via optical fiber		
	Multimode	1310nm	
	Single-mode	1310nm/1550nm	
Maximum Fiber Attenuation / Distance*	**Dual Fiber**	Multimode (50/125µm, 62.5/125µm):	1.25mi./2 km range
		Single-mode (9/125µm):	12.4 mi./20km range
			37 mi./60km range
			74 mi./120km range
	Single Fiber, Bi-directional	Single-mode (9/125µm):	12.4 mi./20km range
			37 mi./60km range
	***Note**: Distances equated using industry standard fiber and connector attenuation. 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		
Phone Connectors	(4) RJ-11 Female		
Audio Bandwidth	300Hz to 3400Hz		
Analog Phone (POTS) Interface	**FXO Card**	Impedance	600 ohms
		Ring Frequency	Acceptable 20 ~50Hz
	FXS Card	Impedance	600 ohms
		Dial	DTMF and Pulse
		Battery Source	48VDC ± 4V
		Ring Voltage	80Vrms at 20Hz (Depending on the ringing load)
		REN	REN 3.0 (Ring Equivalence Number) *REN value is per channel.
Ringing Waveform	Sine wave		
Ring Cadence	FXS to FXS	On ⟶ 2 sec, Off ⟶ 4 sec	
	FXO to FXS	Reproduces the cadence detected by FXO	
Return Loss	40dB		
Supports	Caller ID & Call Forward Disconnect		
Power Requirements	24~48VDC Nominal		
Max Power Consumption	≤10W		
Dimensions/Mounting	L 7in. x H 4in. x W 1in. (177.8mm x 101.6mm x 25.4mm)		
	Compatible with RLH Fiber Link card housings		
Operating Temperature	-40°F to +158°F (-40°C to +70°C)		
Humidity	95% non-condensing		
Warranty	Limited Lifetime	*Visit* www.fiberopticlink.com *for warranty details*	

Technical Support

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