

## 4-Wire 9.6 kbps Fiber Optic Link System

4RU Plug-in card Installation Information

### Description

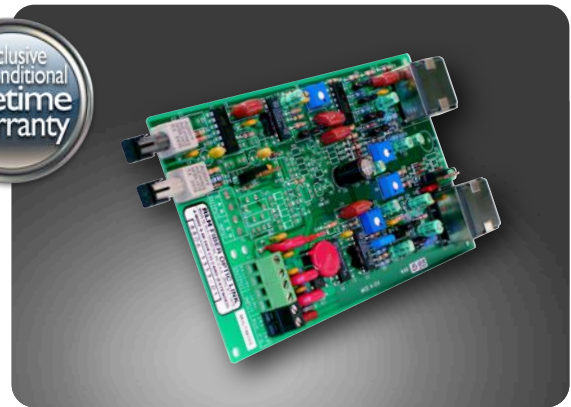
RLH Fiber Optic Link 9.6 kbps Cards are designed to process incoming bipolar signals (3.2V P-P Max) with a digital data signal rates from 2.4 to 9.6kbps. It also supports analog data with a bandwidth of 50 kHz to 500 Hz at a maximum of 9.6 kbps. An electrical copper signal is converted into an optical signal and transmitted over 2 strands of fiber optic cable. This hardened, rugged system is covered by our **Exclusive Unconditional Lifetime Warranty**.

#### 4-Wire 9.6 (Central Office) Side Card

The 9.6 kbps CO Card provides an interface between a Telco Central Office copper 4- wire and transmits these signals optically to a 9.6 kbps Sub Card. The CO Card also receives the optical signal transmitted by the Sub Card, and converts it back to the original electrical signal and transmits this signal to the Telco Central Office. CO powering. 9.6 kbps CO Card is typically line powered. The CO Card will operate from a 24-54VDC at a minimum of 18mA sealing current on the send and receive Telco pairs. The CO Card can also be local powered by an isolated power source (24-54VDC).

#### 4-Wire Data Sub (Subscriber) Side Card

9.6 kbps Sub Card receives the optical signal transmitted by the CO Card and converts it back into the original electrical signal and transmits this signal to the subscriber equipment. The 9.6 kbps Sub Card also provides the interface between an electrical 9.6 kbps signal coming from the subscriber equipment and optically transmit it to the CO Card. Sub powering. The 9.6 kbps Sub Card is typically powered by a 24-54V C, 18mA local source. It may also be powered by simplex current on the send and receive pairs from the subscriber equipment. The power input on the Sub Card is not polarity sensitive.



RLH 4 Wire 9.6 kbps 4RU Plug-In Card

### Contents

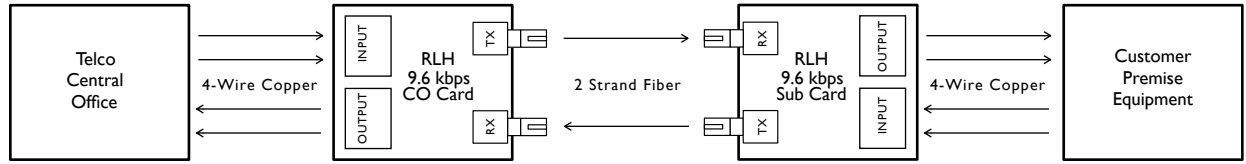
Description	1
General Safety Practices	2
Special Handling Requirements	2
Installation	3
Troubleshooting	4
Ordering Information	4
General Specifications	5
Warranty	7

### Compliance Information

The RLH 4-Wire 9.6 kbps Fiber Optic Link System is compliant with the following industry standards:

- **FCC PART-68B**
- **IEEE-80, IEEE-367**
- **IEEE-487**
- **IEEE-1590**
- **IEEE-1615**
- **Motorola R56**
- **BR 876-310-100 BT (Telcordia)**
- **Bellcore SR-3966**
- **GR-1089**
- **GR-63**

Specifications subject to change without notice.



**Circuit Diagram**

## General Safety Practices

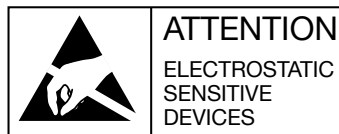
The equipment discussed in this document may require tools designed for the purpose being described. RLH recommends that service personnel be familiar with the correct handling and use of any installation equipment used, and follow all safety precautions including the use of protective personal equipment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

## Special handling requirements

### Be careful when handling electronic components



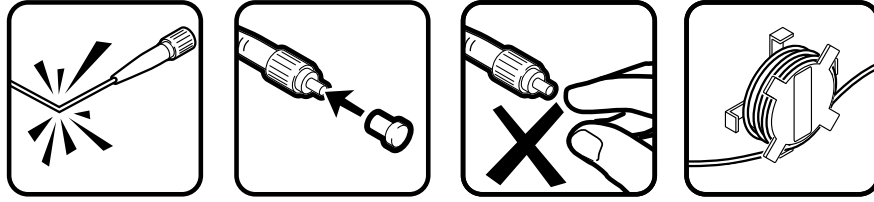
- This product contains static sensitive components.
- Handle the cards at their edges only.
- Follow proper electrostatic discharge procedures.

This 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 serious damage to the card and prevent proper operation.

## Warning

The intra-building port(s) of the equipment or subassembly is suitable for connection to intrabuilding 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.
- 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

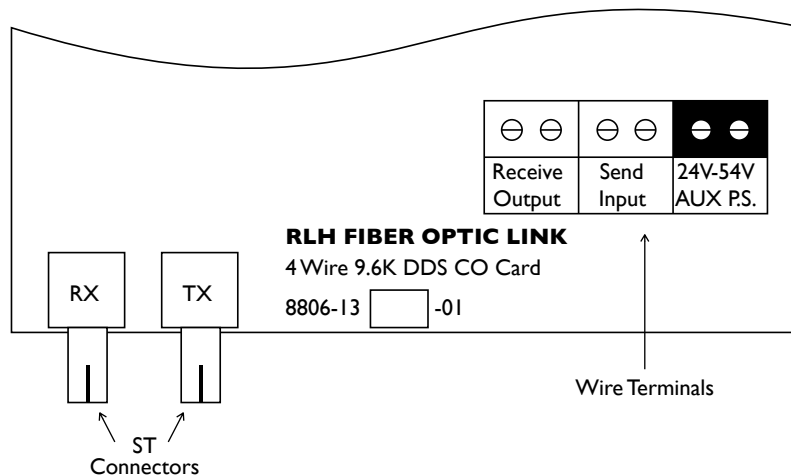
## Installation

After unpacking the card, immediately inspect it for shipping damage. If damage is discovered file a claim immediately with the carrier, then contact RLH customer service. The Fiber Optic Link 4-wire data card can be installed into any RLH card housing. All electrical and fiber optic connection are made directly onto the card.

### Connect fiber optic cable

Fiber optic cable. Each Fiber Optic Link Card has a transmit (TX) and receive (RX) optical connector. The connectors on multimode or single mode Fiber Optic Link Cards are ST Female. Be sure the TX optical is connected to the RX optical on the opposite end of the fiber, i.e., if the #1 fiber is connected to the TX optical on the CO Card then the #1 fiber must be connected to the RX optical on the Sub Card

Short Haul systems have color-coded optical connectors. The transmit terminal is gray, the receive terminal is blue. The connectors on the plastic duplex jumper are also color-coded (blue/gray). Connect the gray (male) to the gray (female) connector, and the blue (male) to the blue (female) connector on the card.



### Connect 4-wire copper pair

The 4-wire 9.6 kbps line from the Telco CO connects to the green screw- down terminals provided on the 9.6 kbps CO Card. The Telco Receive pair connects to the RECEIVE / OUTPUT terminal (signal comes out of card). The Telco SEND connects to the SEND / INPUT terminal (signal goes into card).

The 9.6 kbps 4-wire line from the Subscriber equipment connects to the green screw- down terminals provided on the 9.6 kbps Sub Card. The Subscriber RECEIVE pair connects to the RECEIVE / OUTPUT terminal (signal comes out of card). The Subscriber SEND pair connects to the SEND / INPUT terminal (signal goes into card).

### Connect Power

The 9.6 kbps CO Card is typically powered from Telco sealing current (24-54V DC, 18mA). The Sub Card is local powered with a 24-54V DC, 18mA source connected to the AUX. P.S. terminal on the 9.6 kbps Card (this terminal is not polarity sensitive). The 9.6 kbps Sub Card will supply 18mA sealing current to Subscriber equipment

**Note:** Fiber Optic Link 9.6 kbps system can be line powered through the Adtran Total Reach system, by using the Remote NIU Part# 1292023L5. The List 5 NIU will pass through sealing current to the Fiber Optic Link 9.6 kbps CO Card.

## Troubleshooting

If trouble is encountered, verify all installer connections, signal and voltage levels. If trouble persists, replace the unit and retest. If technical assistance is required, contact RLH Industries, Inc. Technical support department.

## Ordering Information

RLH Fiber Optic Link products are available directly through RLH Industries, Inc. or its distributors nationwide. Please call RLH customer service for ordering assistance.

Each 4W Data card is identified with the part number.

Fiber Type	Part Number	
	4W Data CO Card	4W Data Sub Card
Multimode ST *	8806-1313-01	8806-1323-01
Multimode SC *	8805-1313-01	8805-1323-01
Single-mode ST	8806-1343-01	8806-1353-01
Single-mode SC	8805-1343-01	8805-1353-01
Short Haul	8806-1311-01	8805-1321-01

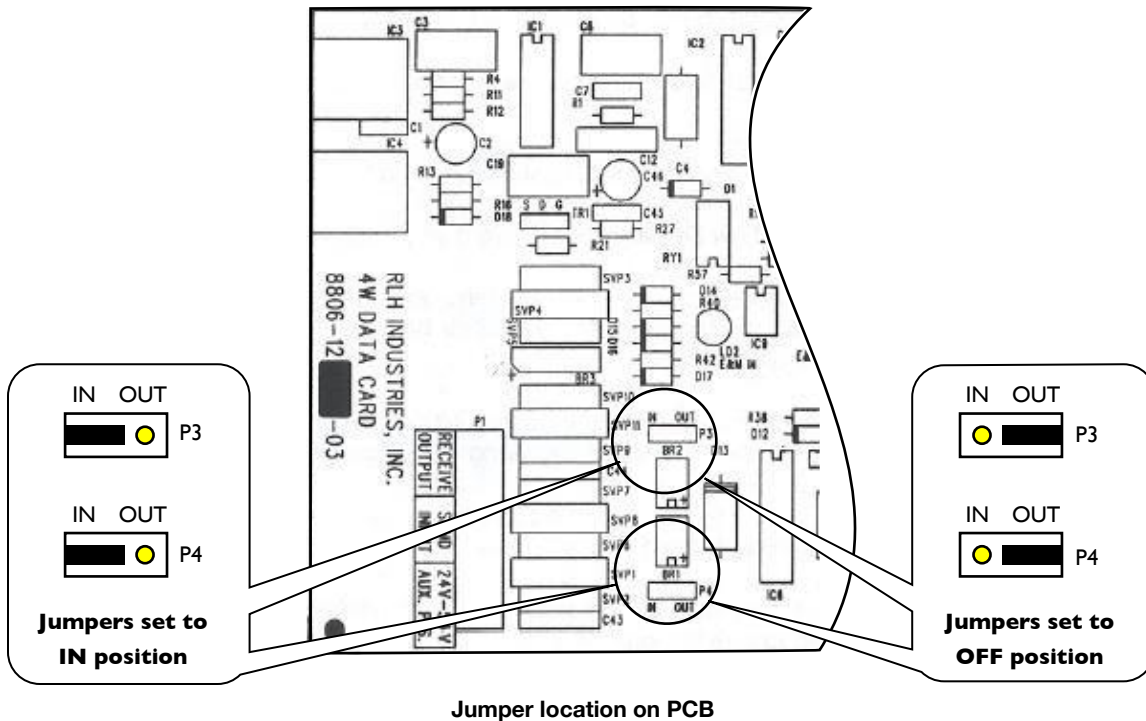
- ▶ \* 62.5µm multimode fiber compatibility is standard, add **-50** to part number for 50µm fiber compatibility
- ▶ Add **RJ** to part number for installed RJ48S adapter
- ▶ Add **S** to part number for simplex current output option on Sub card only.

Other company and product names mentioned herein are trademarks of their respective companies. Mention of third-party products is for informational purposes only and constitutes neither an endorsement nor a recommendation. RLH assumes no responsibility with regard to the performance or use of these products.

## General Specifications

<b>Transmission method</b> <i>Frequency modulated light via two optical fiber</i>	Multimode:	820nm
	Single-mode:	1310nm
	Short Haul:	650nm
<b>Maximum Fiber Loss / Distance*</b>	Multimode:	8dB / 1.2 miles (2km)
	Single-mode:	8dB / 9 miles (15km)
	SM Long Haul:	26dB / 31 miles (50km); minimum 8dB
*Note: Distances equated using industry standard fiber and connector attenuation of 3dB/Km. Fiber condition, splices and connectors may affect actual range.		
<b>Fiber Type</b>	Multimode: 62.5/125µm, 50/125µm ; Single-mode: 9/125µm	
<b>Fiber Type Connectors</b>	ST or SC	
<b>PCB Dimensions</b>	CO and Sub Cards: 7.0"x4.0" (180x100 mm)	
<b>Insertion Loss</b>	0dB +/- 1dB in each direction	
<b>Bandwidth</b>	500 Hz to 50 kHz	
<b>Signal to Noise</b>	>45 dB for line attenuation up to 30 dB at 4.8 kHz	
<b>Digital Data Type</b>	Bipolar digital data stream with no DC reference	
<b>Maximum Data Rate</b>	9600 bps (9.6Kbps) (analog)	
<b>BER</b>	<10 <sup>-9</sup>	
<b>Input Level</b>	3.2 V P-P Maximum	
<b>Transmit Level</b>	Equal to input level (3.2 V P-P Max.)	
<b>Surge Protection</b>	CO / Sub Cards: PTC thermistors, varistors, zener diodes, bridge rectifiers, metal oxide Resistors, gas tube	
<b>Power Requirements</b>	CO Card: 24-54 VDC, 18mA Sub Card: 24-54 VDC, 18mA (up to 45mA if card simplex power to Subscriber equipment)	
<b>Powering Method</b>	CO Card: 24-54 VDC, 18mA sealing current on Telco pairs, or local power source (24-54V DC)	
	Sub Card: 24-54 VDC, 18mA local DC power source	
<b>Simplex Current Output Option</b>	18mA@24VDC on XMIT pairs, Sub side only	
<b>Operating Temperature</b>	-40° to +160° F (-40° to +70° C)	
<b>Humidity</b>	95% non-condensing	
<b>Dimensions</b>	7"x4"x1"	

## 9.6K DDS Revision-02



### CO Card Line/Local power selector:

The 9.6K CO card has two (2) jumpers (P3, P4) to set Line or Local powering.

- Line Power – “OUT”  
The 9.6 CO Card will be pre-set to the Line Power or “OUT” position. This allows for the Card to be operated from simplex power of 22-56V DC and a minimum of 15mA.
- Local Power – “IN”  
When the CO Card is powered via the AUX. P.S Terminal, both jumpers should be set to the “IN” position.

### Sub Card Sealing Current ON/OFF selector:

The RLH 9.6K Sub card has two (2) jumpers (P3, P4) to select sealing current on the 4- wire transmit and receive pairs.

- Sealing Current – “IN”  
The 9.6K Sub Card will be pre-set to the Sealing Current or “IN” position. This setting will simplex the power supply voltage (1.5VDC less) onto 4-wire transmit and receive pairs. Polarity is determined by the input to the AUX. P.S terminal. Current is limited by a 1.3K Ohm resistor.
- No Sealing Current – “OUT”  
The Sub Card will not simplex power onto 4-wire transmit and receive pairs.

## Warranty

RLH is recognized throughout the U.S. and offers the only **UNCONDITIONAL LIFETIME WARRANTY** in the telecommunications industry. We are very proud of our warranty which simply states that our Fiber Optic Link Assemblies are warranted to be free of defects in material and workmanship for the **LIFE OF THE PRODUCT**.

### We can offer this warranty because:

- We believe our customers shouldn't have to incur additional costs due to failure or damage
- We engineer and manufacture our Fiber Optic Links in the USA, with total confidence in our quality
- We understand how safety and reliability impact the total cost of ownership
- We know that customer support extends beyond the initial sale, so **we stand behind our products**

RLH will replace any product, or part thereof, that fails **FOR ANY REASON**, provided the defective part is returned to RLH Freight prepaid. This warranty is **UNCONDITIONAL** and valid even when RLH Fiber Optic Link Assemblies have been abused or mishandled, where unauthorized repairs have been attempted or performed, or product has been damaged as a result of a natural disaster. Compare this warranty to our competitors and see how our warranty will reduce your costs and simplify your maintenance activities.

**To make a warranty claim, or schedule repair or replacement of your RLH product, please contact us for an RMA number.** You will be promptly assisted by one of our warranty specialists. All returns must have an RMA number before we can receive any items.

## Technical Support

<b>Normal technical support:</b> (Mon - Fri 6am - 6pm PST)	Local (714) 532-1672 Toll Free (800) 877-1672 Toll Free (866) DO-FIBER
<b>24/7 Technical support:</b>	(714) 396-8982 (714) 457-5740

## Contact Information

<b>Corporate Headquarters:</b>	RLH Industries, Inc. 936 N. Main Street Orange, CA 92867 USA
<b>Phone:</b>	Local (714) 532-1672 Toll Free (800) 877-1672 Toll Free (866) DO-FIBER
<b>Fax:</b>	(714) 532-1885
<b>Email:</b>	info@fiberopticlink.com
<b>Web site:</b>	www.fiberopticlink.com

# RLH FIBER OPTIC LINK

RLH Industries, Inc., The Leader in Fiber Optic Telecom Isolation Technology

LIFETIME

## UNCONDITIONAL WARRANTY

RLH INDUSTRIES, INC. FIBER OPTIC LINK assemblies are warranted to be free of defects in materials and workmanship for the life of the product. This lifetime warranty is effective for RLH products sold from February 2, 1988, to the present, with the exception of fiber optic cable assemblies which are warranted only to be free of defects in manufacturing and batteries, which carry a 5-year unconditional replacement warranty.

RLH Industries, Inc. will repair or replace any product, or part thereof, that fails for any reason, provided the defective part is returned to RLH, freight prepaid.

This warranty is UNCONDITIONAL and is valid even when RLH Fiber Optic Link assemblies have been abused or mishandled, where unauthorized repairs have been attempted or performed, or product has been damaged as a result of a natural disaster.

Authorized by:



J. RANDALL MEARS, Vice President, Engineering



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Please contact your RLH sales representative for pricing and delivery information.

Specifications subject to change without notice.