



RLH Industries, Inc.

USER GUIDE

The leader in
rugged fiber optic
technology.

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Serial Data Fiber Link Card System

SYSTEM INSTALLATION INFORMATION

**SERIAL DATA
OVER FIBER**

Introduction

The Serial Data Fiber Link Card system transports two active channels of copper serial data over fiber optic cable, allowing for both RS-232 and RS-485/422 to be used at the same time. Fiber optics not only provide long distance communication up to 74 mi. (120km), but also provide immunity to EMI/RFI and transient surges. This is ideal for extending serial data communications over long distances, or near large electrical equipment where resistance to EMI is desired.

The system supports serial data rates from 50 bps to 921.6kbps, and has an auto-sensing feature that eliminates the need to manually set serial data rates. The included Pull High / Pull Low rotary dials allows for fast and easy biasing adjustment.

Each Fiber Link Card requires 24-48VDC and has a comprehensive set of LEDs on the front panel that indicate power status, fiber status, and activity for RS-232 and RS-485/422 channels. This rugged system is manufactured in the U.S.A, and covered by our **Limited Lifetime Warranty**.



Serial Data Fiber Link Card

Standard Features

- Simultaneously transmits both RS-232 and RS485/422
- Convenient LEDs for power, fiber, and serial signals
- Supports baud rates of 50 bps to 921.6 kbps baud
- ST and SC single mode and multimode fiber units available
- Extends communication up to 74 mi. (120km)
- Transparent RS-232 & RS-485/422 extension over fiber
- Supports 2 & 4 Wire RS-485 operation
- Rotary dials for easy impedance matching
- Selectable On/Off RS-485/422 Termination
- Rugged design for wide operating temperature is standard
- 24-48VDC powering requirements
- Limited Lifetime warranty

Made in U.S.A.

General Safety Practices

Intended Audience

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

Conventions

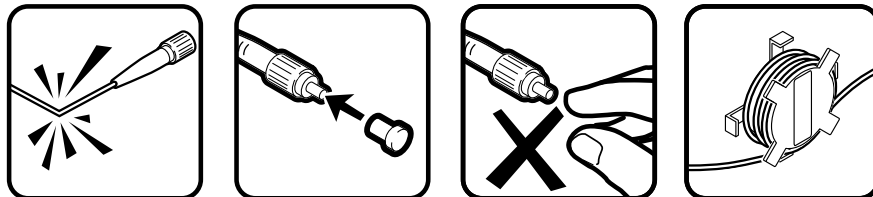
Symbols for notes, attention, and caution are used throughout this manual to provide readers with additional information, advice when special attention is needed, and caution to prevent injury or equipment damage.

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

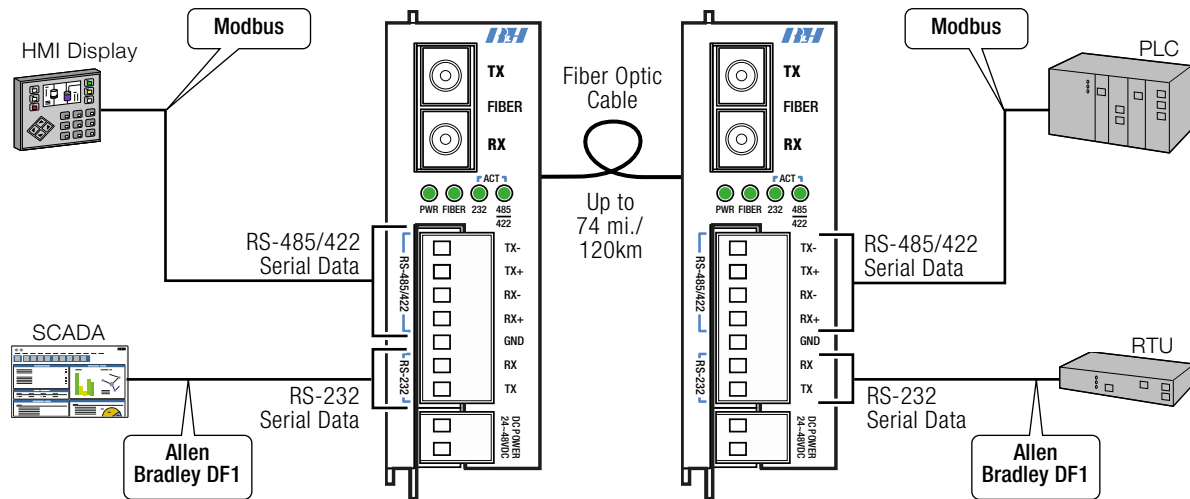
- Never install during a lightning storm or where unsafe high voltages are present.
- Copper wires may carry high voltages. Use caution when handling.
- Do not open the enclosure, there are no user serviceable parts.

Guidelines for handling terminated fiber cable

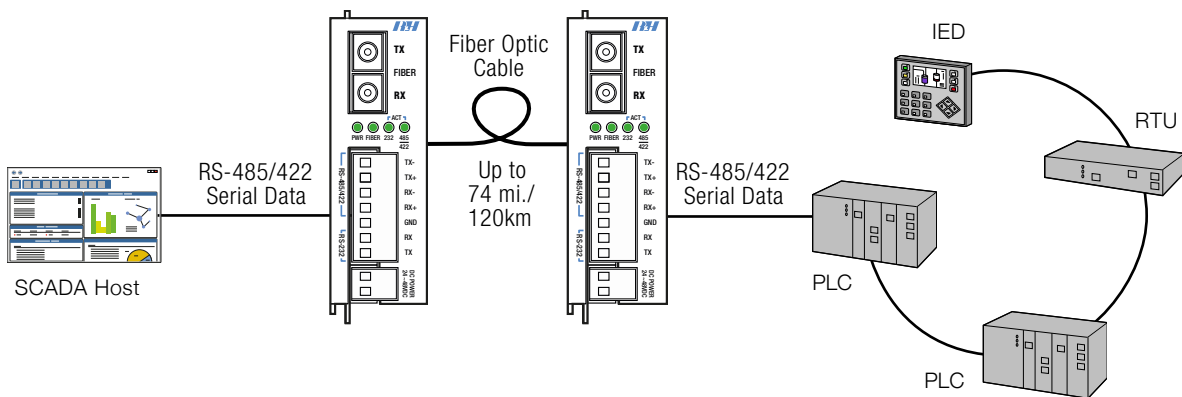


- Do not bend fiber cable sharply. Use gradual and smooth bends to avoid damaging glass fiber.
- Keep dust caps on fiber optic connectors at all times when disconnected.
- Do not remove dust caps from unused fiber.
- Keep fiber ends and fiber connectors clean and free from dust, dirt and debris. Contamination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

Application Diagrams



2 Channel Point to Point Application Diagram



Point to Point Application Diagram

Installation

Prior to installation:

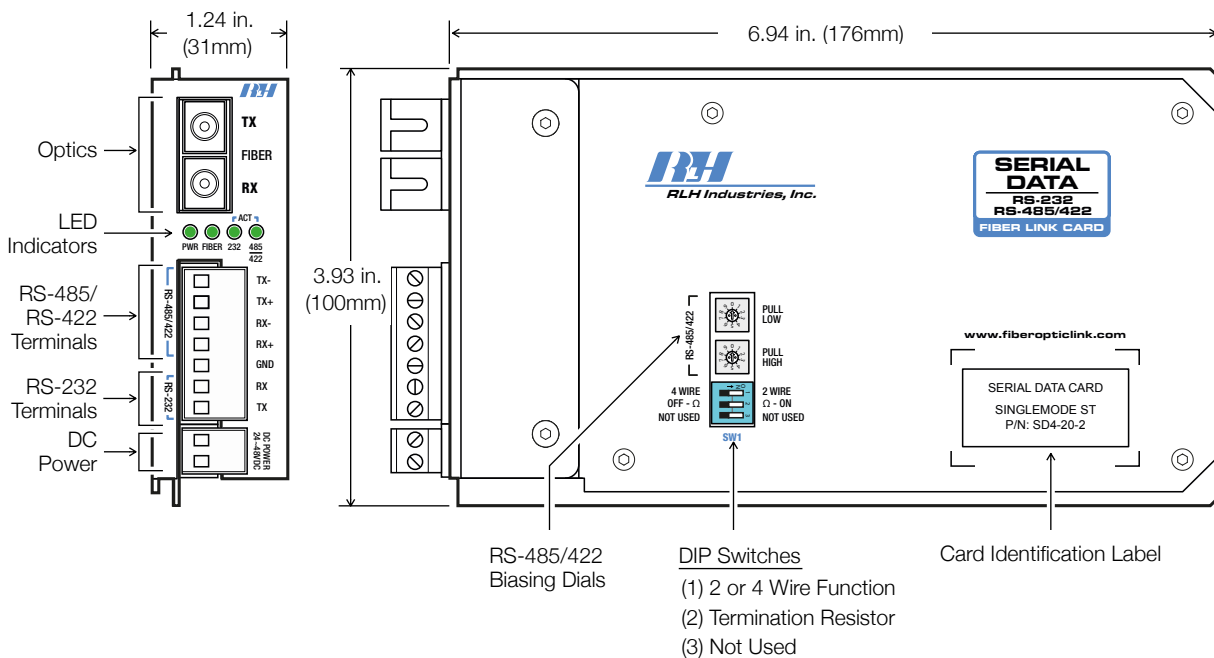
- Check for shipping damage. (If so, file claim immediately with the carrier, then contact RLH customer service.)
- Check the contents to ensure correct model.
- Make sure you have the correct fiber type and power available.
- Have a clean, dry installation environment ready.

Required for installation:

- Suitable RLH Fiber Link Card Housing with available mounting slot.
- Local power source for each card (24~48VDC).
- Multimeter
- Flat head screwdriver for connecting wiring.

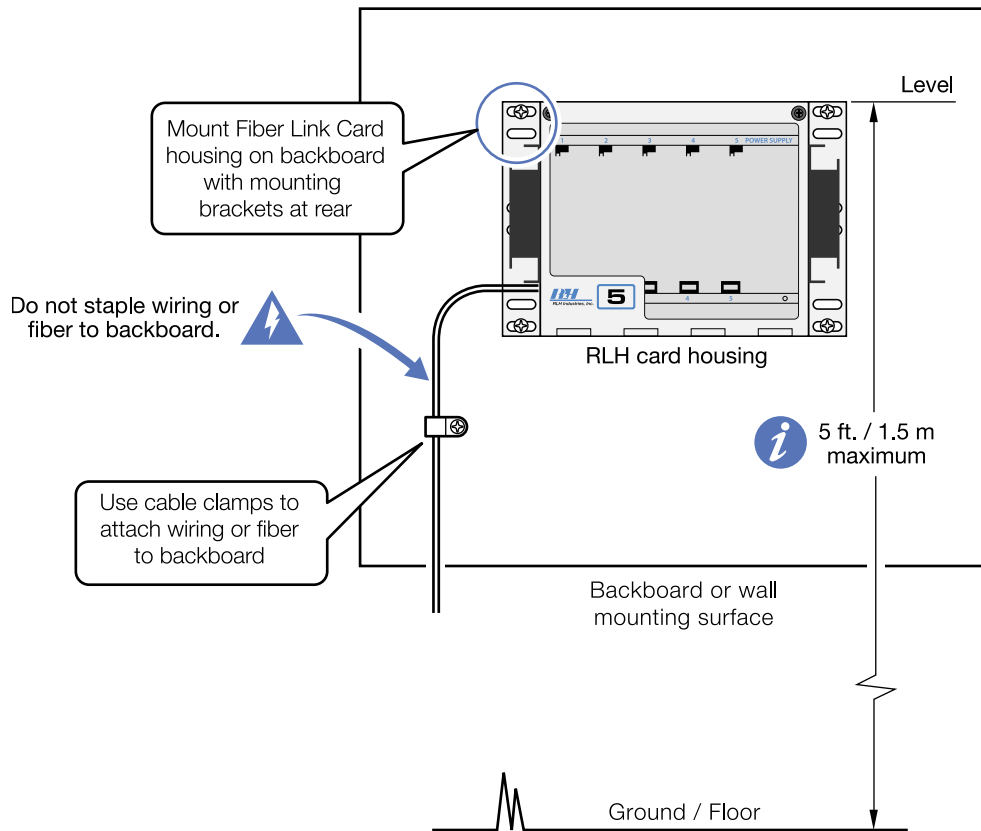
Measure the DC voltage of the power source to ensure that it is 24-48VDC. All electrical and fiber optic connections are made directly onto the card.

Physical Layout



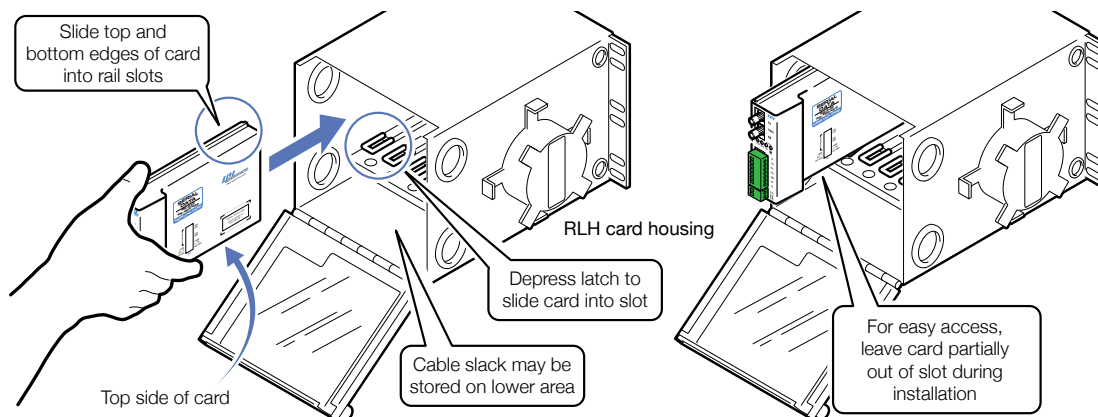
Mount housing in equipment rack or attach to backboard.

When installing an RLH card housing, leave room for the door to open and provide enough slack in wiring and fiber to allow for card access.



Note card orientation in housing during installation

Handle card by edges. Install in slot 1 or next available card slot. Install card into housing before connecting fiber or copper wiring.



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. Single fiber models (bi-directional) combine input and output, by using different wavelengths over the fiber to both transmit and receive.

Connect fiber cables to correct TX and RX ports. On dual fiber models, Verify that the TX fiber at one module is connected to the RX port on the opposite end. On single fiber systems there will be an **A** and **B** side. The **A** side must connect to the **B** side.

Do not remove dust cap(s) on the fiber ports and fiber cable until you are ready connect fiber to the unit, watch for dust and contamination. Loosely route the fiber cable avoiding tight bends to prevent excessive optical loss.

RS-485/422 Biasing - Pull High and Pull Low

The rotary dials allow you to match the impedance of multi-drop & daisy chained RS-485 networks. Most RS-485 networks impedance values will vary and the more complex the system the more likely it will be necessary to tune your fiber media converter to match the impedance of the rest of the network. Each position that's indicated on the rotary dial represents a resistance value in Ohms. See the below table for the specific values for each position.



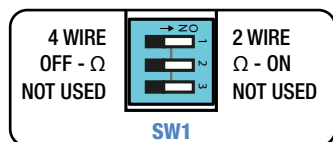
Biasing Dial

Dial	Settings										
Pull High	0	1	2	3	4*	5	6	7	8	9	
	Ω Open	10K	5K	3.3K	1K	909	833	769	500	476	
Pull Low	0	1	2	3	4*	5	6	7	8	9	
	Ω Open	10K	5K	3.3K	1K	909	833	769	500	476	

***Note:** Default position is 4.

Dip Switch (SW1) - RS-485 2/4 Wire

This Dip Switch is used for the RS-485 communication bus. Set the device for 2 or 4 wire communication.

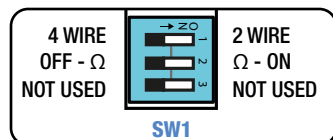


DIP Switch on Top Cover

RS-485 Dip Switch	
Setting	Switch Position
2 Wire RS-485	→
4 Wire RS-485/422	←

Dip Switch (SW1) - RS-485/422 Termination Resistor

Termination resistors are sometimes needed on long copper runs or when many devices are on a RS-485/422 chain. The provided Dip Switch allows for users to easily add a 120 Ω termination resistor if determined necessary.

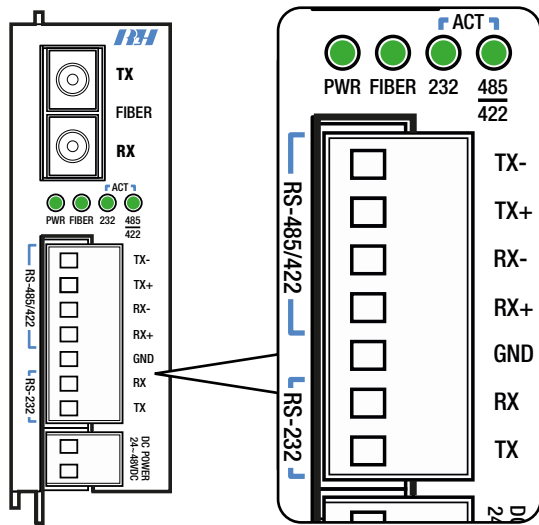


DIP Switch on Top Cover

120 Ω Termination Resistor Switch	
Setting	Switch Position
ON - Ω	→
Ω - OFF	←

Connect Serial Ports

The RLH Serial Data Fiber Link transports two active channels of copper serial data over fiber optic cable, allowing for both RS-232 and RS-485/422 to be used at the same time. Serial connections are made to the 7 position screw down pluggable terminal. Refer to the terminal position diagram below for copper connections.



Detail of Serial Data Pluggable Terminals

RS-485 (2 Wire)	
Terminal	Function
TX- (DATA -)	RS-485/422 Transmit -
TX+ (DATA +)	RS-485/422 Transmit +
GND	Signal Ground

RS-485/422 (4 Wire)	
Terminal	Function
TX- (DATA -)	RS-485/422 Transmit -
TX+ (DATA +)	RS-485/422 Transmit +
RX-	RS-485/422 Receive -
RX+	RS-485/422 Receive +
GND	Signal Ground

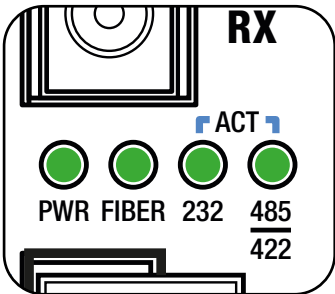
RS-232	
Terminal	Function
GND	Signal Ground
RX	RS-232 Receive
TX	RS-232 Transmit

Connect Power

The system has a 2 position power terminal that accommodates 24-48VDC powering. Follow these steps when connecting wires to power terminals located on the top of the module.

- Check that DC power source voltage matches the accepted voltage range of the device to avoid damaging the unit.
- Disconnect power from the DC power source prior to connecting to the Fiber Link.
- Connect the DC power cables to the terminal pairs. The system is not polarity sensitive.
- Connect the power source. The PWR LED will then turn ON indicating that the system has power.

Front Panel LED Indicators



Detail of LED Indicators

Indicator	Color	LED	Description
PWR	Green	On	System has power
		Off	System has NO power
FIBER	Green	On	Fiber Link Detected
		Off	No Fiber Link Detected
RS-232 ACT	Green	On/Off	No activity
		Blinking	Copper signal received
RS-485/422 ACT	Green	On/Off	No activity
		Blinking	Copper signal received

Troubleshooting

The RLH Serial Data Fiber Link system is fully tested prior to shipping. If problems do occur, please follow the troubleshooting steps below prior to contacting support.

PWR LED Indicator OFF

- Check power supply voltage and rated device voltage.
- Check connections of the power terminals.

RS-232 and RS-485/422 ACT LED Indicators Off

- Verify serial data pin-outs of each end device.
- Verify 2 wire / 4 wire dip switch is in the correct position.

FIBER LED Indicator Off

- Verify optic port connection is correct.
- Make sure fiber cable from the TX optic is connected to the RX optic on the other end.
- Make sure single-mode equipment is using single-mode fiber and multimode equipment is using multimode fiber.

If all connections and indicators has been verified please contact the RLH support team for further assistance.

Ordering Information

Serial Data Cards are each identified with a part number.

Optics	Side	Distance	Wavelength	Fiber	Part Number
Dual Fiber Multimode ST	-	2 km/1.2 mi	1310nm	50/62.5 µm	SD4-04-2
Single Fiber Single-mode SC	A	20km/12.4mi.	Tx 1310nm Rx 1550nm	8~9 µm	SD4-10-2
	B	20km/12.4mi.	Tx 1550nm Rx 1310nm	8~9 µm	SD4-11-2
	A	60km / 37mi.	Tx 1310nm Rx 1550nm	8~9 µm	SD4-14-2
	B	60km / 37mi.	Tx 1550nm Rx 1310nm	8~9 µm	SD4-15-2
Dual Fiber Single-mode SC	-	20km/12.4mi.	1310nm	8~9 µm	SD4-40-2
	-	60km / 37mi.	1310nm	8~9 µm	SD4-41-2
	-	120km / 74 mi.	1550nm	8~9 µm	SD4-45-2
Dual Fiber Single-mode ST	-	20km/12.4mi.	1310nm	8~9 µm	SD4-50-2
	-	60km / 37mi.	1310nm	8~9 µm	SD4-51-2
	-	120km / 74 mi.	1550nm	8~9 µm	SD4-55-2

- ▶ Bidirectional single fiber models require an **A** Side and **B** Side card for a complete system.
- ▶ RLH SD4-XX-2 models are fully backwards compatible with all SD4-XX-1 models.
- ▶ Please contact your RLH sales representative for pricing and delivery information.

General Specifications

Wavelength	Multimode	1310nm	
	Single-mode	1310nm/1550nm	
Maximum Fiber Attenuation / Distance*	Single Fiber	Single-mode (8~9/125µm):	Up to 37 mi./60km range
	Dual Fiber	Multimode (50/62.5/125µm):	1.25mi./2 km range
		Single-mode (9/125µm):	Up to 74 mi./120km range
		*Note: Distances equated using industry standard fiber and connector attenuation. Fiber condition, splices and connectors may affect actual range.	
Connector Type	ST or SC Multimode or Single-mode		
Power Margin	8dB (2Km, M/M), 12dB ~ 35dB (20 ~ 120Km, S/M)		
Protocols	RS-232 and RS-485/422		
Serial Signaling	RS-232	TX, RX, Ground	
	RS-485/422 (4 Wire)	TX-, TX+, RX-, RX+, Ground	[DIP Switch - 4 Wire Function]
	RS-485 (2 Wire)	TX+ (Data +), TX- (Data -), Ground [DIP Switch - 2 Wire Function]	
RS-485 Line Biasing	Use rotary dials for impedance adjustment. See <i>RS-485/422 Biasing</i> section for more information.		
Serial Connectors	Pluggable Terminal Blocks		
Signal Isolation	Optical Isolation 3.75 KV		
Baud Rates	50bps- 921.6kbps Automatic Detection		
DIP Switch	RS-485 (2/4 Wire)	Specifies 2 Wire RS-485 or 4 Wire RS-485/422 operation	
	Termination Resistor	ON position provides 120 ohm terminal resistance	
Supports	DNP / DF1 / Modbus / Profibus		
LED	PWR	DC Power OK	See <i>Front Panel LED Indicators</i> section in User Guide for more detailed information.
	FIBER	Fiber Connection OK	
	RS-232 ACT	RS-232 Copper Receive	
	RS-485/422 ACT	RS-485/422 Copper Receive	
Power Input	24~48VDC nominal		
Power Consumption	150mA @ 24VDC or 3.6 Watt		
DC Input Isolation (In/Out)	1.5KV		
Voltage Reversal Protection	Will operate with V+ or V- in either power terminal		
Over Current Protection	1.0A (Automatic Recovery)		
Temperature	Storage	-40°C to +85°C (-40°F to +185°F)	
	Operating	-25°C to +70°C (-13°F to +158°F)	
Dimensions/Mounting	H 3.93” x W 1.24” x D 6.94”		
	Standard Fiber Link Card Form Factor		
Warranty	Limited Lifetime	Visit www.fiberopticlink.com for warranty details	

Technical Support

Email:	support@fiberopticlink.com
24/7 technical support:	Toll Free 1-855-RLH-24X7 Toll Free 1-855-754-2497

Contact Information

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