

# 4 Wire Data E&M Fiber Link Card System

## SYSTEM INSTALLATION INFORMATION

### Description

The 4 Wire Data E&M Fiber Link Card system provides simultaneous transmission of 4 wire data E&M over two optical fibers. The 4 wire data is full duplex and supports constant transmission up to 9600bps (9.6Kbps) in voice frequency range (300Hz-3.4KHz).

The card also interfaces with an E&M input and provides a output on the far end. The system includes convenient E&M input and output status LED indicators.

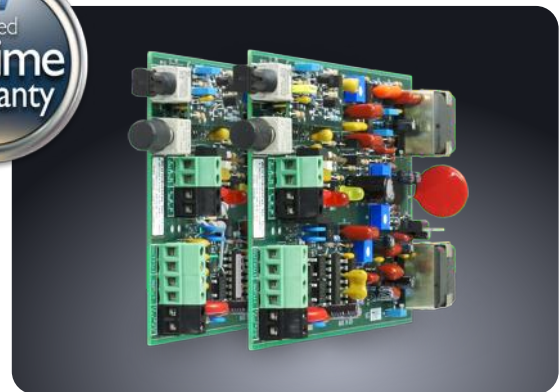
The **CO** (Central Office) Side Card provides the electrical-optical interface between a Central Office or PBX 4 wire copper line and two fiber strands, and the **Sub** (Subscriber) Side Card provides the optical-electrical interface between the fiber and a 4 wire copper line to a RTU, PBX, modem or other customer supplied equipment.

This industrial hardened Fiber Link Card system may be installed into any RLH card housings, and is covered by our **Limited Lifetime Warranty**.

### Powering

The 4 Wire Data E&M Fiber Link CO and Sub Cards may be powered by local or line power. Cards can accept local power from 22-56VDC@18 mA maximum, or line power supplied from the serving office @15mA.

**Note:** To maintain high voltage isolation, Fiber Link CO and Sub Cards must be powered from separate power sources.



4 Wire Data E&M Fiber Link Card

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### Compliance Information

The 4 Wire E&M Fiber Link System is compliant with the following industry standards:

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

## General Safety Practices

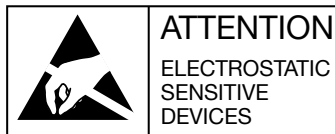
The equipment discussed in this document may require tools designed for the purpose being described. RLH recommends that service personnel be familiar with the correct handling and use of any installation equipment used, and follow all safety precautions including the use of protective personal equipment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

### Caution - Severe Shock Hazard

- Never install during a lightning storm or where unsafe high voltages are present.
- Use caution when handling copper wiring and follow appropriate safety regulations.

## Special handling requirements

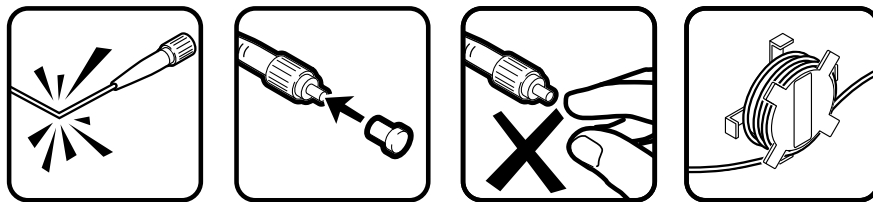
### Be careful when handling electronic components



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

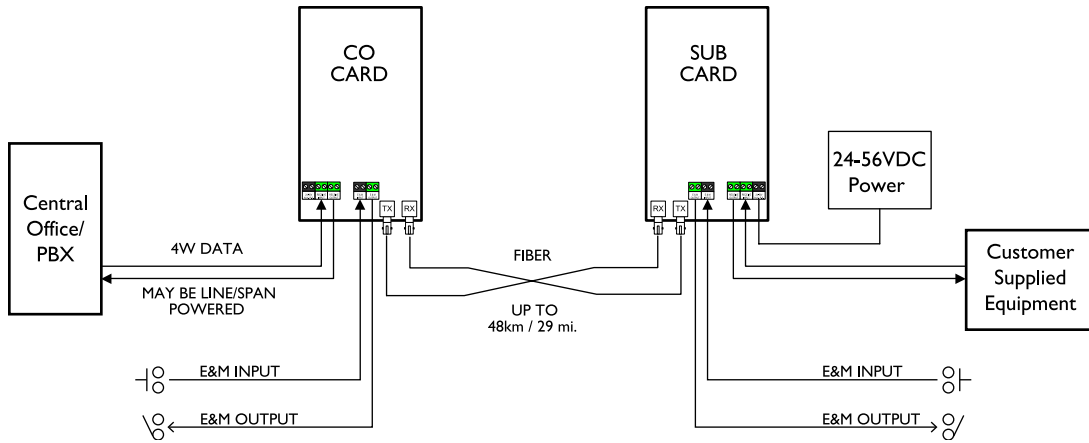
This card utilizes circuitry that can be damaged by static electricity. When transporting the card, carry it in an ESD safe container such as the antistatic bag provided with the card. Before handling cards, discharge yourself of static electricity by physical bodily contact with earth ground. When handling 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.

### 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



**4-Wire Data E&M System Diagram**

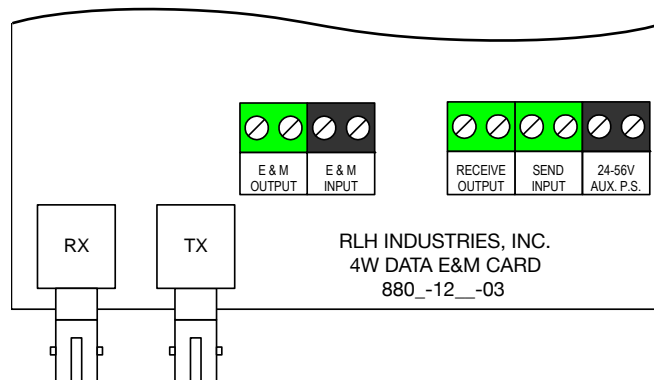
## Before installing

- Check for shipping damage. In case of damage, file a claim immediately with the carrier, then contact RLH customer service.
- Check the contents to ensure correct model, mode and fiber connector type.
- Have a clean, dry installation environment ready.

## Required for installation

- RLH card housing for Fiber Link Cards.
- 24-56VDC@18mA local power sources as needed.

The 4-Wire Data E&M Fiber Link Card is designed to be installed into any RLH card housing. The housing should be properly installed before installing the card. All electrical and fiber optic connection are made directly onto the card.



**4-Wire Data E&M Card Connectors**

## Connect fiber optic cable

Fiber Link Cards are equipped with two optical connectors. Connect fibers to the transmitter and receiver marked TX and RX. Connect the transmitter (TX) fiber on one card to the receiver (RX) fiber on the other card and vice versa. Always route fiber cable loosely, avoiding tight bends.

### Connect 4 wire data pairs

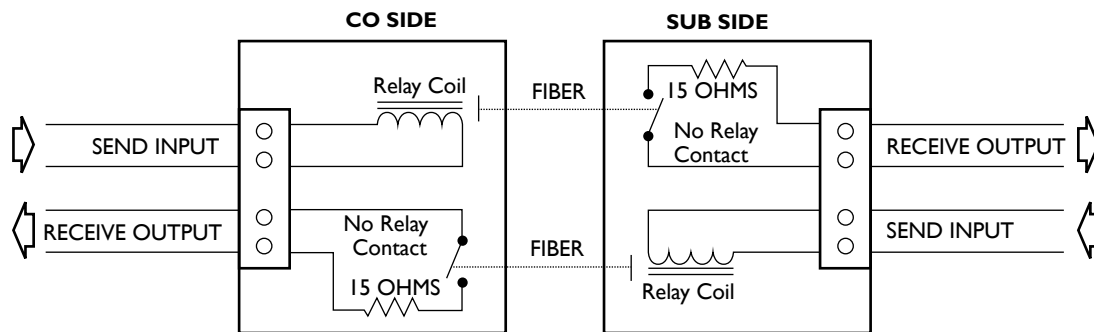
The analog voice-frequency data transmission supports constant send and receive up to 9600 bps. The module has a receive output that corresponds to the send input on the opposite end module.

The copper pairs from the CO or PBX connect to the green SEND/INPUT and RECEIVE/OUTPUT screw-down terminals on the CO Card.

The copper pairs from the remote terminal connect to the green SEND/INPUT and RECEIVE/OUTPUT screw-down terminals on the Sub Card.

### Connect E&M Leads

Connect the E&M leads to the black E&M INPUT and green E&M OUTPUT screw terminals. The RECEIVE of one side corresponds to the SEND at the other end. The standard (wet contact) model E&M input is activated by 6VDC@5mA, and can accept up to 48VDC.



**E&M Connection Diagram**

E&M operation status may be determined from the 2 status LED's. The red LED is ON when the input is active, and OFF when no input is present. The yellow LED is ON when the E&M output is closed, and OFF when the output is open.

### Connect Power

Connect a 24-56VDC (15mA minimum) local power source to the black AUX. P.S. screw-down terminals on the Card. The power input is not polarity sensitive. The CO card can operate off of simplex line power on the SEND/INPUT and RECEIVE/OUTPUT pairs where available.

## Troubleshooting

If trouble is encountered, verify all 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. Refer to the contact information at the end of this document.

## General Specifications

|                                       |                                                                                                                                                                              |                                                                                               |
|---------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| <b>Transmission method</b>            | Frequency modulated light via two optical fibers                                                                                                                             |                                                                                               |
|                                       | Multimode:                                                                                                                                                                   | 850nm                                                                                         |
|                                       | Single-mode:                                                                                                                                                                 | 1310nm                                                                                        |
| <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.<br>(Multimode: 3.5dB/km, Single-mode: 0.4db/km, + 0.5dB per connector, + 0.3dB per splice) |                                                                                               |
| <b>Fiber Type</b>                     | Multimode: 62.5/125µm, 50/125µm ; Single-mode: 9/125µm                                                                                                                       |                                                                                               |
| <b>Fiber Connector Types</b>          | ST or SC                                                                                                                                                                     |                                                                                               |
| <b>Analog Bandwidth</b>               | 300 Hz to 3.4 KHz                                                                                                                                                            |                                                                                               |
| <b>Maximum Analog Data Rate</b>       | 9600 bps (9.6Kbps)                                                                                                                                                           |                                                                                               |
| <b>DDS Data Rate</b>                  | 2.4Kbps and 4.8Kbps                                                                                                                                                          |                                                                                               |
| <b>E&amp;M Input</b>                  | 5mA-200mA @ 6VDC, 48V Max.                                                                                                                                                   |                                                                                               |
| <b>E&amp;M Output</b>                 | 2500VRMS isolation by solid state relay: Closed resistance 15 Ohms (220VAC or 330VDC @ 150mA max.) Open resistance >1M Ohms                                                  |                                                                                               |
| <b>Response Time</b>                  | On: 1.4µs / Off: 1.9 msec (Dry Contact Only)                                                                                                                                 |                                                                                               |
| <b>LED Indicators</b>                 | Yellow Contact Output Status (LD1)                                                                                                                                           | ON: Closed, OFF: Open                                                                         |
|                                       | Red Contact Input Status (LD2)                                                                                                                                               | ON: Closed, OFF: Open                                                                         |
| <b>Channel Noise</b>                  | < 20dBmC (15dBmC typical)                                                                                                                                                    |                                                                                               |
| <b>DC Resistance Limits</b>           | 2000 Ohms typical for 50V DC CO battery                                                                                                                                      |                                                                                               |
| <b>Nominal Impedance</b>              | 600 Ohm input and output                                                                                                                                                     |                                                                                               |
| <b>Insertion Loss</b>                 | 0dB +/- 0.5dB each direction                                                                                                                                                 |                                                                                               |
| <b>Overload Level</b>                 | 8dBm into 600 Ohms                                                                                                                                                           |                                                                                               |
| <b>Surge Protection</b>               | PTC thermistors, zener diodes and varistors                                                                                                                                  |                                                                                               |
| <b>Power Requirements</b>             | Line: 15mA ; Local: 24-56VDC, card current limits at 18mA                                                                                                                    |                                                                                               |
| <b>Power Connector</b>                | Screw type connector terminal, 12-26 AWG                                                                                                                                     |                                                                                               |
| <b>Powering Method</b>                | Simplexed line power or local DC power supply connected to AUX. P.S.                                                                                                         |                                                                                               |
| <b>Operating Temperature</b>          | -40° to +158° F (-40° to +70° C), 95% non-condensing                                                                                                                         |                                                                                               |
| <b>Dimensions</b>                     | 7 "x 4" x 1" Standard RLH Fiber Link Card form factor                                                                                                                        |                                                                                               |
| <b>Warranty</b>                       | Limited Lifetime                                                                                                                                                             | Visit <a href="http://www.fiberopticlink.com">www.fiberopticlink.com</a> for warranty details |

## Ordering Information

Each 4 Wire Data E&M Fiber Link Card is identified with the part number.

| Optics                      | Distance       | Fiber        | Description | Part Number            |
|-----------------------------|----------------|--------------|-------------|------------------------|
| Multimode ST                | 2km / 1.25 mi. | 62.5 $\mu$ m | CO Card     | <b>8806-1238-02</b>    |
|                             |                |              | Sub Card    | <b>8806-1248-02</b>    |
| Single-mode ST              | 15km / 9 mi.   | 8~9 $\mu$ m  | CO Card     | <b>8806-1277-01</b>    |
|                             |                |              | Sub Card    | <b>8806-1287-01</b>    |
| Single-mode SC              | 15km / 9 mi.   | 8~9 $\mu$ m  | CO Card     | <b>8805-1277-01</b>    |
|                             |                |              | Sub Card    | <b>8805-1287-01</b>    |
| Long Haul<br>Single-mode ST | 50km / 31 mi.  | 8~9 $\mu$ m  | CO Card     | <b>8806-1277-01-LH</b> |
|                             |                |              | Sub Card    | <b>8806-1287-01-LH</b> |
| Long Haul<br>Single-mode SC | 50km / 31 mi.  | 8~9 $\mu$ m  | CO Card     | <b>8805-1277-01-LH</b> |
|                             |                |              | Sub Card    | <b>8805-1287-01-LH</b> |

- ▶ 62.5 $\mu$ m multimode fiber compatibility is standard, add **-50** to part number for 50 $\mu$ m
- ▶ A complete system requires one CO card and one Sub card

## Technical Support

|                                                                   |                                                                        |
|-------------------------------------------------------------------|------------------------------------------------------------------------|
| <b>Normal technical support:</b><br>(Mon - Fri 6am - 6pm PST)     | (714) 532-1672<br>Toll Free 1-800-877-1672<br>Toll Free 1-866-DO-FIBER |
| <b>Email:</b>                                                     | support@fiberopticlink.com                                             |
| <b>24/7 technical support:</b><br>(Outside normal business hours) | Toll Free 1-855-RLH-24X7<br>Toll Free 1-855-754-2497                   |

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

Specifications subject to change without notice.