



RLH Industries, Inc.

## USER GUIDE

The leader in  
rugged fiber optic  
technology.

U-025 2017A-0420

# 4 Wire Data E&M DIN Fiber Link System

## SYSTEM INSTALLATION INFORMATION

### Description

The 4 Wire Data E&M DIN Fiber Link system provides simultaneous transmission of 4 wire data and single or bidirectional E&M over two optical fibers. The 4-wire data supports full duplex constant transmission up to 9600 bps in voice frequency range (300Hz-3.4KHz). The E&M module interfaces with an E&M input and provides an output on the far end.

The system includes convenient E&M input and output status LED indicators. RLH Fiber Link Systems are made in the U.S.A. and covered by our **Limited Lifetime Warranty**.

### 4 Wire Data E&M Fiber Link

The 4 Wire Data E&M system provides the electrical-optical interface between a Central Office or PBX 4-wire copper line and two fiber strands to a RTU, PBX, modem or other customer equipment.

### Powering

The 4 Wire Data E&M Fiber Link has the ability to operate from local or line power. The system can accept local power from 24-56VDC @ 18 mA maximum and can operate from power supplied from the serving office @ 15mA.

**Note:** To maintain high voltage isolation, the DIN Fiber Link system must be powered separately on each side.



4 Wire Data E&M DIN Fiber Link

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### Compliance Information

The RLH 4 Wire Data E&M DIN 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.
- Active phone lines may carry high DC voltages. Use caution when handling copper wiring.
- Observe the power requirements of this device and use appropriate power sources.
- De-energize the power input wiring before making connections to this device.

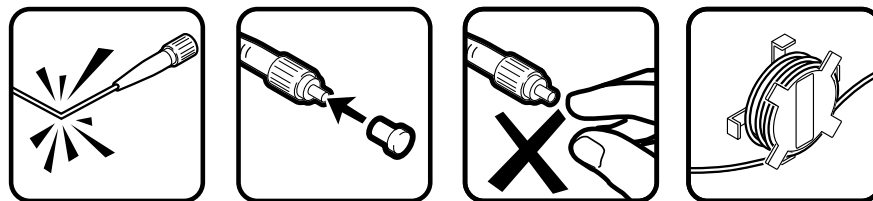
## Special handling requirements

This device utilizes circuitry that can be damaged by static electricity. Do not open the housing, there are no user serviceable parts inside. When transporting the unit, cap the optical connectors and protect from damage by carrying the unit in a suitable container, such as the original packaging provided with the unit.

### Warning

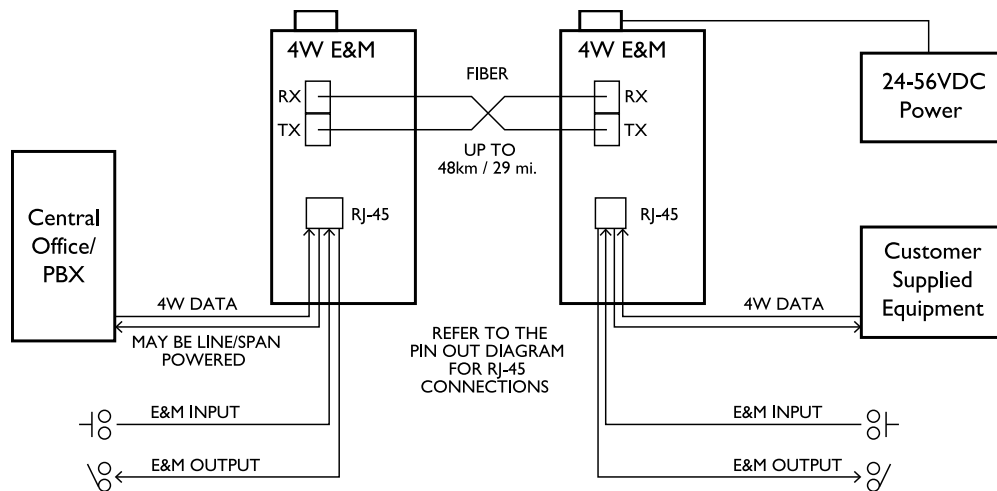
The intra-building port(s) of the equipment or subassembly is suitable for connection to intrabuilding or unexposed wiring or cabling only. The intra-building port(s) of the equipment **MUST NOT** be metalically connected to interfaces that connect to the OSP or its wiring. These interfaces are designed 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 metalically to OSP wiring.

#### Guidelines for handling terminated fiber cable

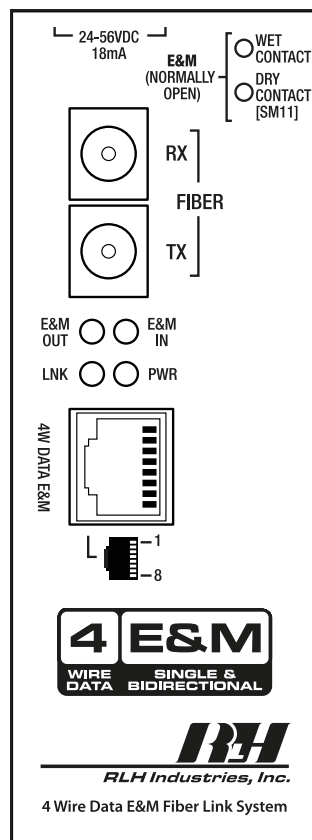


- Do not bend fiber cable sharply. Use gradual and smooth bends to avoid damaging glass fiber.
- Keep dust caps on fiber optic connectors at all times when disconnected.
- Do not remove dust caps from unused fiber.
- Keep fiber ends and fiber connectors clean and free from dust, dirt and debris. Contamination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

## System Diagram



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



**4 Wire Data E&M Front Panel**

# Installation

## 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

- DIN rail for mounting the module.
- 24-56VDC@18mA local power sources as needed. The CO side may be Line/Span Powered.

The 4 Wire Data E&M module is designed to be clipped onto any DIN rail. Hook the lower spring onto the rail, then rotate to clip into place. All electrical and fiber optic connection are made directly onto the module.

## Connect fiber optic cable

The DIN Fiber Link system is equipped with two optical connectors. Connect fibers to the transmitter and receiver marked TX and RX. Connect the transmitter (TX) fiber on one unit to the receiver (RX) fiber on the other unit and vice versa. Always route fiber cable loosely, avoiding tight bends. The green LINK LED will be ON when the signal is detected on each end.

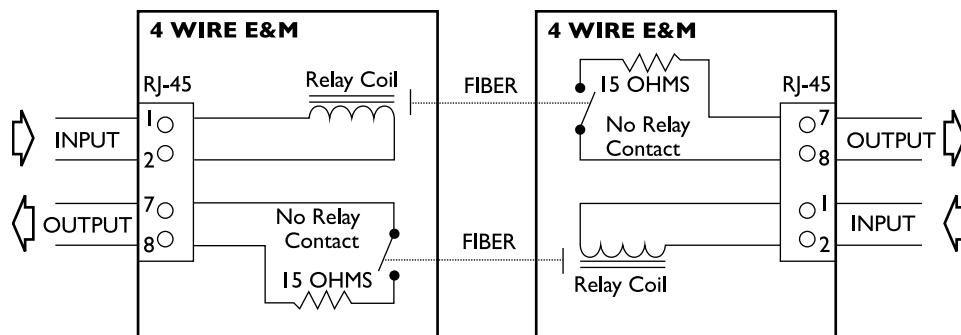
## Connect 4 Wire Data pairs

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

Connect the 4 Wire TX wires to pins (3 & 6), and the 4 Wire RX wires to pins(4 & 5). The TX pair on each unit corresponds to the RX pair at the other end.

## Connect E&M pairs

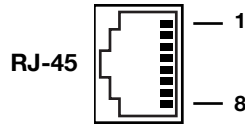
The 4 Wire Data E&M system may be ordered as a standard wet contact model.



**E&M connection diagram**

Connect E&M INPUT wiring to pins (1 & 2), and E&M OUTPUT wiring to pins (7 & 8). The input of one side corresponds to the output at the other end. The E&M input is activated by 6VDC@5mA, and can accept up to 48VDC. E&M operation is monitored by 2 green status LED's. The E&M input LED is on when the input is active, and off when no input is present. The output LED is on when the E&M output is closed and off when the output is open.

## RJ-45 Pin List



RJ-45 Pin Chart		
E&M INPUT	1	-48 Signaling Battery, SB
	2	Signaling Input, M-Lead
4 WIRE RX (Ring)	3	Ring, Audio Input, R
4 WIRE TX (Ring)	4	Ring, Audio Output, R1
4 WIRE TX (Tip)	5	Tip, Audio Output, T1
4 WIRE RX (Tip)	6	Tip, Audio Input, T
E&M OUTPUT	7	Signaling Output, E-Lead
	8	Signal Ground, SG

## Connect Power

Connect a 24-56VDC (15mA minimum) power source to the green screw-down terminals on the top of the module. The power input is not polarity sensitive. The CO side may be Line/Span powered. The green PWR LED will be on when power is detected.

## 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.

## Ordering Information

Each 4 Wire Data E&M DIN Fiber Link system is identified with a part number.

Optics	Description	Distance	μm	Part Number
Multimode SC	CO/SUB DIN Fiber Link	2km / 1.2 mi	62.5/50 μm	<b>4ED-01-1</b>
Multimode ST	CO/SUB DIN Fiber Link	2km / 1.2 mi	62.5/50 μm	<b>4ED-03-1</b>
Single-mode SC	CO/SUB DIN Fiber Link	15km / 9 mi.	8-9 μm	<b>4ED-10-1</b>
	CO/SUB DIN Fiber Link	50km / 31 mi.	8-9 μm	<b>4ED-11-1</b>
Single-mode ST	CO/SUB DIN Fiber Link	15km / 9 mi.	8-9 μm	<b>4ED-20-1</b>
	CO/SUB DIN Fiber Link	50km / 31 mi.	8-9 μm	<b>4ED-21-1</b>

- ▶ A complete system requires 2 units.
- ▶ Add **-SM11** to part number for dry contact. Example: 4ED-01-1-SM11.
- ▶ Please contact your RLH sales representative for pricing and delivery information.

## 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
	<i>*Note: Distances equated using industry standard fiber and connector attenuation. (Multimode: 3.5dB/km, Single-mode: 0.4db/km, + 0.5dB per connector, + 0.3dB per splice)</i>
<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>Channel Noise</b>	< 20dBrnC (15dBrnC 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>	Simplex line power or local DC power supply
<b>Simplex Current Output Option</b>	18mA@24VDC on XMIT pairs, Sub side only
<b>Operating Temperature</b>	-40° to +158° F (-40° to +70° C), 95% non-condensing
<b>Dimensions</b>	H5" x W1.9" x D3.9" (127mm x 48mm x 100mm) Not including connectors or DIN clip
<b>Warranty</b>	Limited Lifetime <i>Visit <a href="http://www.fiberopticlink.com">www.fiberopticlink.com</a> for warranty details</i>



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

Specifications subject to change without notice.