

**4-Wire E&M Fiber Optic Link  
System Description and Installation**

Fiber Type	4 Wire E&M CO Card	4 Wire E&M Sub Card
Multimode ST	8806-1238-02	8806-1248-02
Multimode SC	8805-1238-02	8805-1248-02
Single-mode ST	8806-1277-01	8806-1287-01
Single-mode ST (Long Haul)	8806-1277-01LH	8806-1287-01LH
Single-mode SC	8805-1277-01	8805-1287-01



\*Add "SM11" to card p/n for dry contact closure E&M input.

**Description**

The Fiber Optic Link 4-wire E&M system provides a simultaneous transmission of 4-wire data and one-way or bi-directional E&M over two optical fibers. The 4-wire data supports full duplex constant transmission up to 9600bps in voice frequency range (300Hz-3.4KHz). The E&M interfaces an E&M input and provides a contact closure on the distant end. Cards have E&M input and output status LED indicators. E&M cards can be ordered with SM11 for dry contact closure input (see page 4).

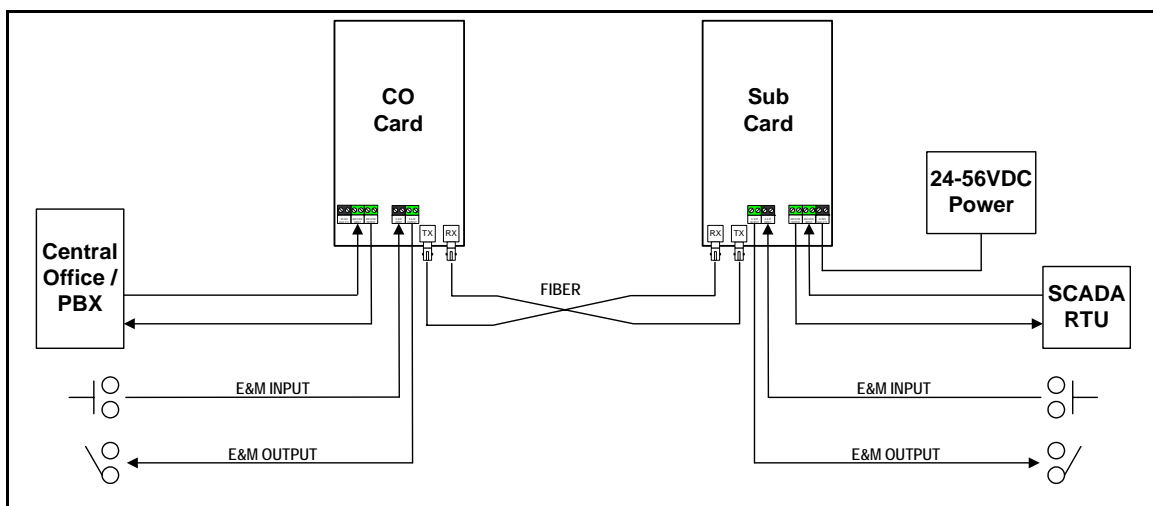
**4-Wire E&M CO Side Card.** The 4-Wire E&M CO Card provides the electrical-optical interface between a Central Office or PBX 4-wire copper line and two fiber strands.

**4-Wire E&M Sub Side Card.** The 4-Wire E&M Sub Card provides the optical-electrical interface between the two fiber strands and a 4-wire copper line to a RTU, PBX, or modem.

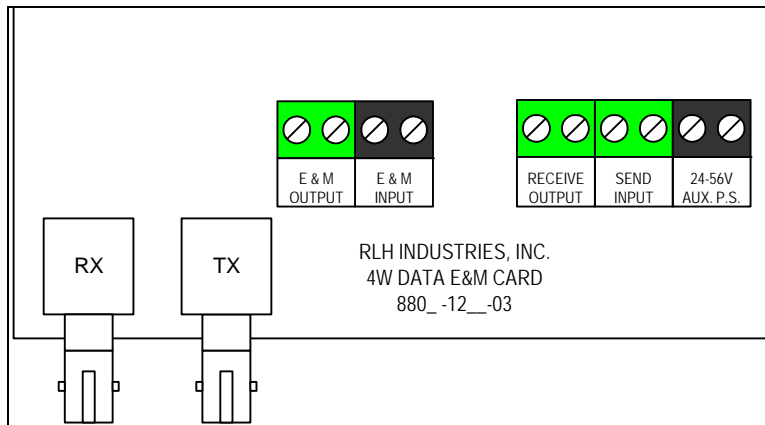
**Note:** CO and Sub 4-wire E&M Cards are electronically the same and can be interchanged.

**Powering.** The Fiber Optic Link 4-wire E&M CO and Sub cards have the ability to operate from local or line power. Cards accept local power from 22- 56 VDC @ 18mA maximum. Line powered, cards can operate from power supplied from serving office @ 15mA.

**Note:** In order to maintain high voltage isolation, Fiber Optic Link CO and Sub cards must be powered from separate power sources.



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



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

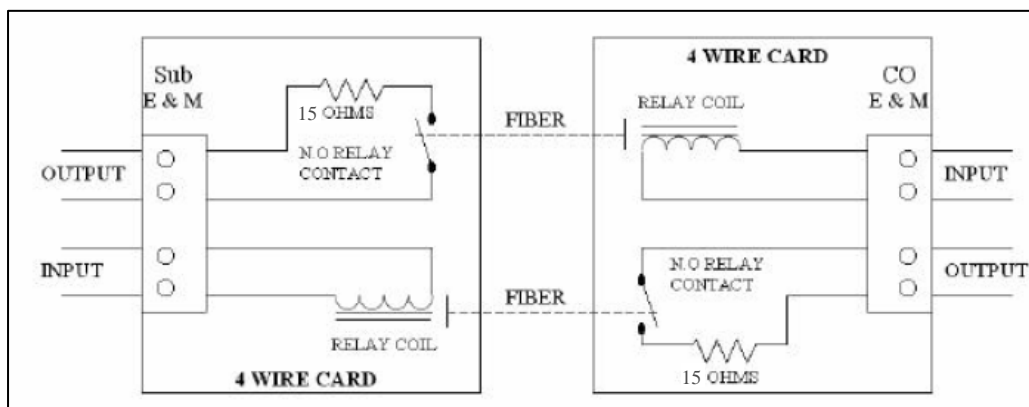
### Installation

**Connect fiber optic cable.** Fiber Optic Link Cards are equipped with two optical connectors. Connect fibers to the transmitter and receiver marked “TX” and “RX”. For example, if fiber #1 is connected to “TX” on the CO Card, fiber #1 must be connected to “RX” on the Sub Card. Fiber cable should always be routed loosely avoiding tight bends.

**Connect 4-wire copper pairs.** The copper pairs from the CO or PBX connects 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 pairs.** The E&M leads connect to the black “E&M INPUT” and green “E&M OUTPUT” screw terminals. The E&M input is activated by 6VDC @ 5mA. E&M operation can be monitored by 2 LED’s: The E&M input corresponds with red LED (LD2), when the red LED is on the input is active. The red LED will be off when no input is present. The E&M output is monitored by the Yellow LED (LD1), with the yellow LED is on the E&M output is closed, the E&M output is open with the yellow LED off.

**Note:** SM11 cards are available to accept a dry contact closure for the E&M input (see page 4).



**E&M Diagram**

**Connect Power.** Connect a 24-56VDC (15mA minimum) power source to the black “AUX. P.S.” screw-down terminal on the Card. The power input is not polarity sensitive.

**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: (714) 532-1672 (6 am to 6 pm- PST), or for after hours, weekends and holidays call (714) 366-2503 or (714) 457-5740.

**Warranty Repair**

RLH Industries, Inc. Fiber Optic Link products have an unconditional lifetime warranty. If a unit needs repair, call the RLH Customer Service department for a Return Material Authorization (RMA) number and return the defective unit with the RMA number, freight prepaid, along with a brief description of the problem. As specified in our warranty RLH will repair and return the unit at no charge to the customer. If an out-of-service condition exists, a replacement unit can be obtained; however, a purchase order number will be required to ensure return of the replacement unit.

**Specifications**

Transmission method:	Amplitude modulated light via two optical fibers Multimode: 850nm ; Single-mode: 1310nm
Maximum Fiber Loss / Distance*:	Multimode: 14dB / 1.8 mi.(3km) Single-mode: 8dB / 7.5 mi.(12km) ; Long Haul: 14dB / 16 mi.(26km)  *Distance is 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)
Fiber Type:	Multimode: 62.5/125µm, 50/125µm ; Single-mode: 9/125µm
Connector Types:	Fiber: ST or SC ; Wire: screw clamps
LED Indicators:	LD1 (Yellow): E&M Output, ON-closed contact, OFF- open contact LD2 (Red): E&M Input, ON- active, OFF- non-active
Bandwidth:	300 Hz to 3.4 KHz
Channel Noise	< 20dBmC (15dBmC typical)
DC Resistance Limits:	2000 Ohms typical for 50V DC CO battery
Maximum Data Rate:	9600 bps (analog)
Nominal Impedance:	600 Ohm input and output
Insertion Loss	0dB +/- 0.5dB each direction
Overload Level	8dBm into 600 Ohms
Surge Protection:	PTC thermistors, zener diodes and varistors
E&M Input:	5mA-200mA @ VDC SM11: 1200 Ohms maximum (external closed contact)
E&M Output:	2500VRMS isolation by solid state relay: Closed resistance 15 Ohms (220VAC or 330VDC @ 150mA max.) Open resistance >1M Ohms
Power Requirements:	Line: 15mA ; Local: 24-56VDC, card current limits at 18mA
Powering Method:	Simplex line power or locally connected to "AUX. P.S."
Temperature Limits:	-40°F to +158°F (-40°C to +70°C)
Humidity:	95% non-condensing
Dimensions (LxWxH)	7" x 4"x 1"

**RLH Industries, Inc.  
4 Wire Data with Contact Closure (SM11)**

The Fiber Optic Link 4 Wire E&M may be ordered with special modification “SM11” for contact closure relay. The SM11 cards will provide simultaneous transmission of 4-wire analog data and one-way or bi-directional contact closure over two optical fibers. The analog voice-frequency data transmission supports full duplex constant transmission up to 9600bps. The card has a contact output that corresponds to the contact input on the opposite end card. LED’s indicate contact status.

**Specifications:**

**Contact Interface**

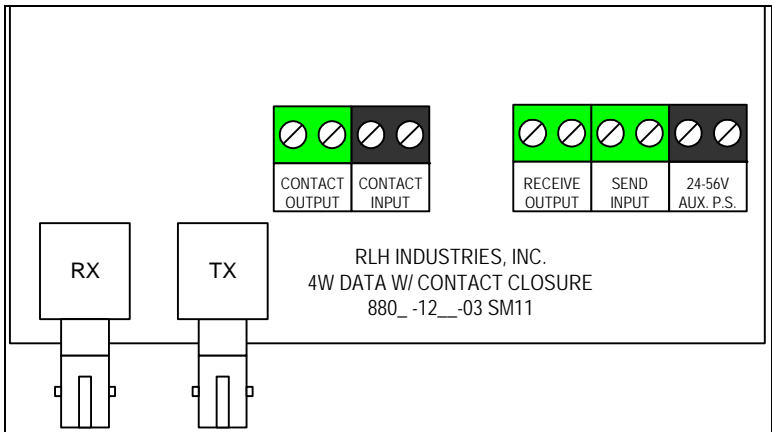
Input: Dry Contact Closure of 2000 Ohms maximum  
 Output: Normally Open, Solid State Relay, 150mA 220VAC 330VDC  
 Response Time: 1.4µs -On, 1.9 msec -Off  
 LED Indicators: Output LD1: Yellow, Contact Output status, On-Closed, Off-Open  
 Input LD2: Red, Contact Input status, On-Closed, Off-Open

**Electrical & Mechanical**

Dimensions: 7”x4”x1”  
 Connectors: Data, Contacts, Power: screw clamps  
 Fiber: Multimode or Single-mode, ST or SC  
 Power: 24-56VDC @ 18mA  
 Surge Protection: Varistors, zener diodes, PTC thermistors, diodes

**Environmental**

Operating Temperature: -40°F to +158°F (-40°C to +70°C)  
 Humidity: 95% non-condensing



**4-Wire with Contact Closure Card (SM11) Connectors**



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