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[www.fiberopticlink.com](http://www.fiberopticlink.com)

UG-M079 2023-08-29

### **4 Channel 4~20mA Fiber Converter**

#### **Transmit four 4~20mA Analog Signals over Fiber with High Speed and Accuracy**

This Fiber Optic Media converter transmits 4 Analog signals over fiber cable. Offers high end specifications: 78,000 samples a second, 16 bit signal resolution, and less than 0.1% source signal variance.

Compatible with most PLC's, Sensors (2, 3, or 4 wire), and other types of equipment where a precise current or voltage measurement must be taken and transmitted over fiber. The system comprises of a transmitter (Analog Input) and a receiver (Analog Output), each device is enclosed in a compact DIN and wall mountable housing.

This compact and rugged system provides convenient and easy to read LEDs, supports both single-mode and multimode fiber applications, and includes an alarm on either side monitoring system power and fiber health. Designed to operate over an extreme temperature range, providing reliability in harsh environments. Designed and Made in the USA and covered by our Limited Lifetime Warranty.

### **Key Features**

- Rugged design – Extreme operating temperature rating
- Convenient LEDs for power, fiber, and analog signals
- Single and dual fiber models available
- Available with ST or SC connectors & single or multimode fiber
- Update rate: 78,000 samples a second
- 16 Bit Signal Resolution
- 99.9% Accuracy or Better
- Alarm contact for status monitoring
- Redundant Power Inputs
- Built-in surge, over current, and polarity reversal protection
- DIN rail or wall mount (Includes wall mount ears)
- Limited Lifetime Warranty
- Made in USA



4 Channel 4~20mA Fiber Converter (transmitter shown)



Complete System with Transmitter and Receiver

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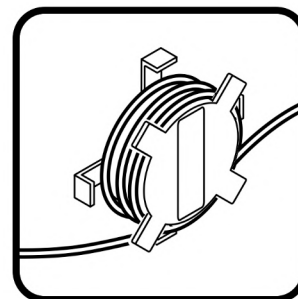
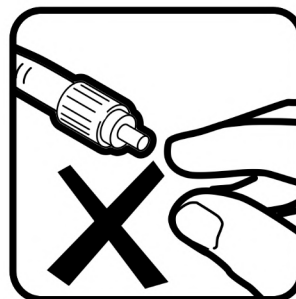
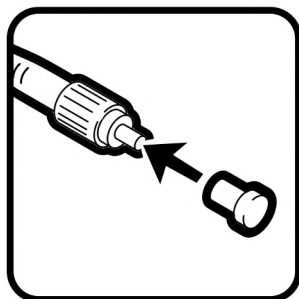
### **General Safety Practices**

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 HAZZARD**

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

### **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

### **Commonly Used Acronyms & Abbreviations**

| Name     | Description                                                                                                  |
|----------|--------------------------------------------------------------------------------------------------------------|
| TX       | Transmit                                                                                                     |
| RX       | Receive                                                                                                      |
| PWR      | Power                                                                                                        |
| NC       | Normally Closed                                                                                              |
| Com      | Common                                                                                                       |
| NO       | Normally Open                                                                                                |
| TRX      | 4~20mA Transmitter                                                                                           |
| RCV      | 4~20mA Input/Receiver                                                                                        |
| Sinking  | Does not provide signal voltage or current, expects the voltage and current to be present on the signal line |
| Sourcing | Provides signal voltage and current                                                                          |

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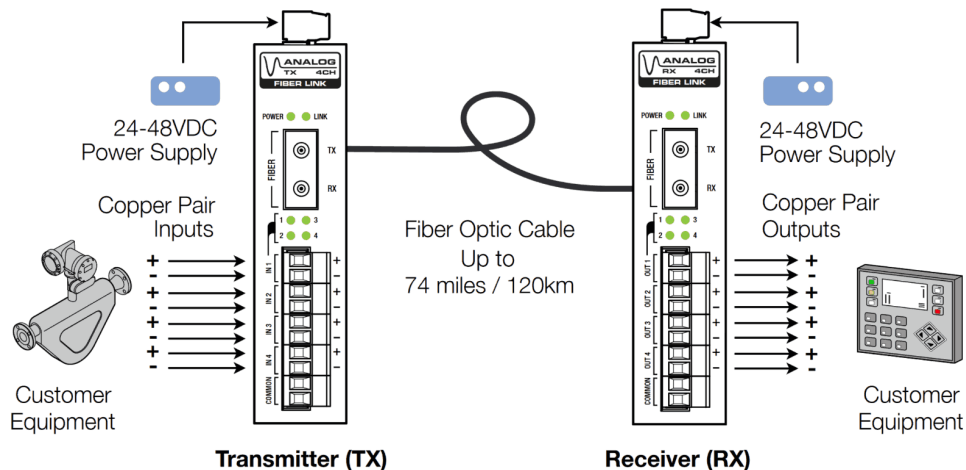
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### Applications

By utilizing fiber optic cable, the 4~20mA system provides absolute electrical isolation between both ends of the control system. It provides immunity to EMI/RF interference, ground loops, and high voltage surges from lightning or ground faults, and is ideal in electrically noisy environments such as near large power sources, electrical motors, and radio communications equipment. Fiber optic cable also allows for a signal transmission of up to 120km over fiber optic cable from the source signals location.

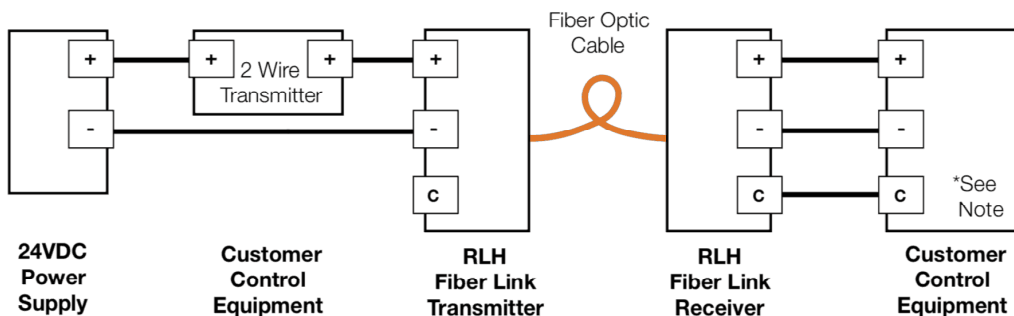
Control equipment in high voltage areas can be at risk due to Ground Potential Rise (GPR). A copper network cable referenced to a remote ground can become a path for high voltages during a ground fault. Placement of all-dielectric fiber optic cable (instead of copper) completely eliminates the presence of a remote ground, which dramatically increases signal accuracy, reliability of equipment, and safety of personnel.

### System Diagram



### 4~20mA System – 2-Wire Transmitter Wiring

Connecting a 2-wire Transmitter to a RLH Transmitter (ADH-420TX-XX-1). The RLH transmitter is always a sinking input, expecting the source current to be supplied by the remote device. In this example, the 2-Wire Transmitter has 24VDC loop voltage provided by a separate power supply.

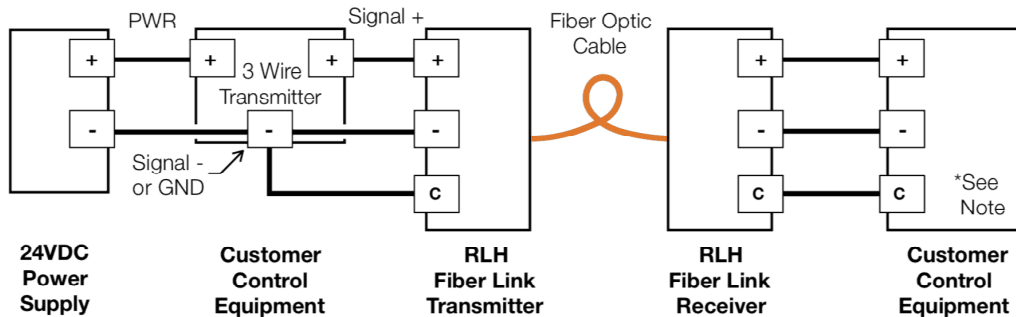


**Note:** Use common terminal when connecting RLH receiver to differential inputs

### **Applications (cont'd)**

#### **4~20mA System – 3-Wire Transmitter Wiring**

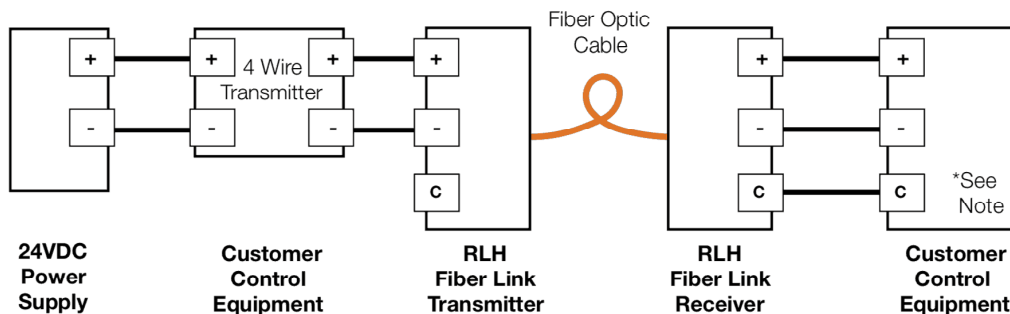
Connecting a 3-Wire Transmitter to a RLH Transmitter (ADH-420TX-XX-1). The RLH transmitter is always a sinking input, expecting the source current to be supplied by the remote device. The common terminal should be used when multiple 3-Wire transmitters are connected to the RLH Fiber Link Transmitter. Below is a typical configuration for 3-wire transmitters.



**Note:** Use common terminal when connecting RLH receiver to differential inputs

#### **4~20mA System – 4-Wire Transmitter Wiring**

Connecting a 4-Wire Transmitter to a RLH Transmitter (ADH-420TX-XX-1). The RLH transmitter is always a sinking input, expecting the source current to be supplied by the remote device. Below is a typical configuration for a 4-Wire transmitter.



**Note:** Use common terminal when connecting RLH receiver to differential inputs

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### Installation

Prior to installation:

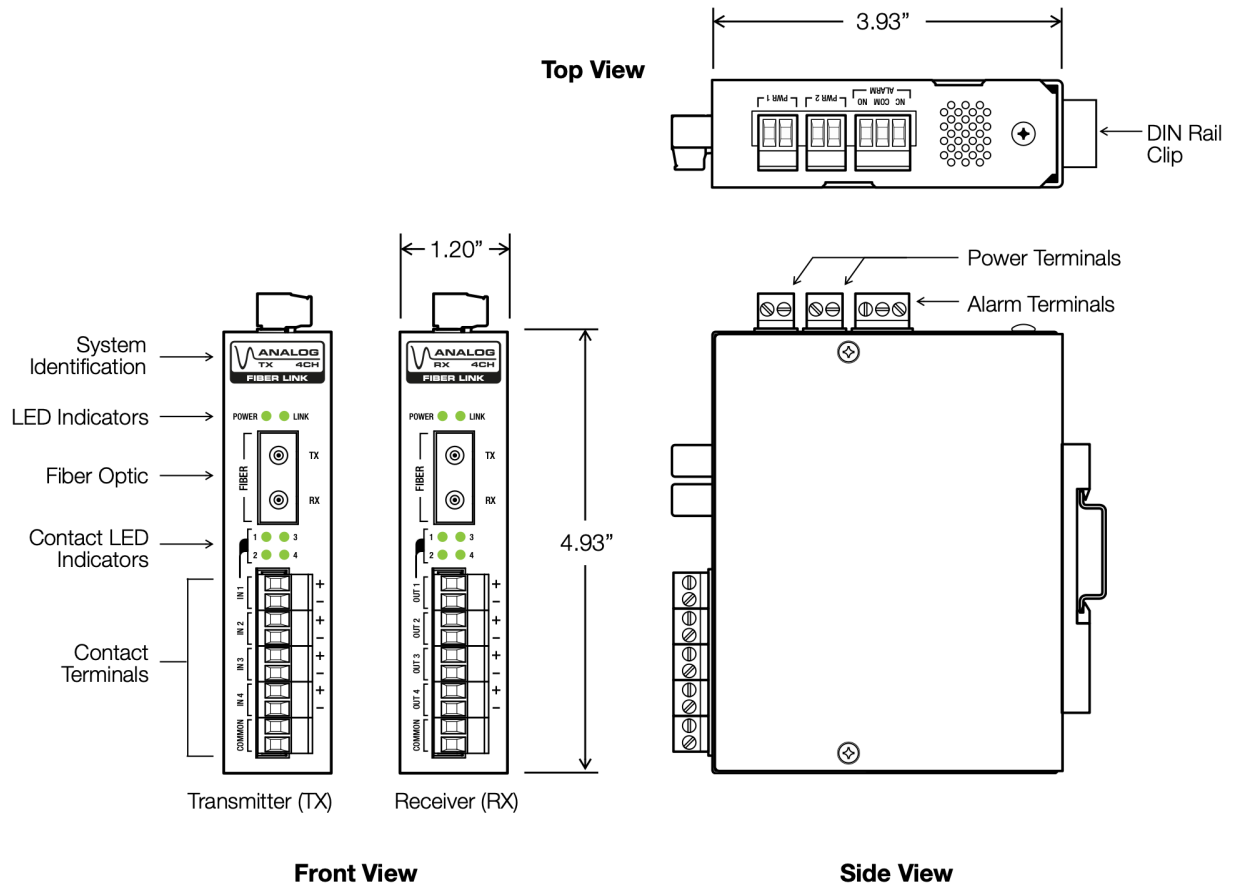
- Check for shipping damage
- Check the contents to ensure correct model and fiber type
- Have a clean, dry installation environment ready
- Ensure that the fiber type at the site matches the system type

Required for installation:

- 24VDC power source at both installation sites
- DIN rail for mounting or wall space for wall mounting
- Multimeter
- Measure the DC voltage of the source power to ensure that it is 24VDC

### Front Panel

The front panel contains the input or output contact terminals, LED's, and the TX or RX fiber port.



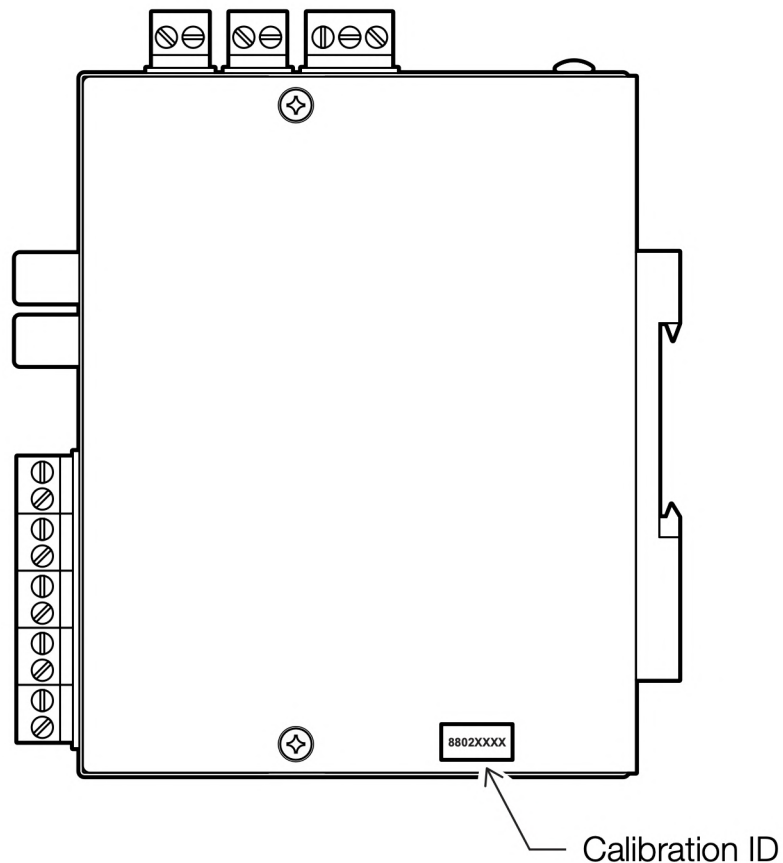
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### **Installation (cont'd)**

#### **Calibration**

The system is calibrated in pairs. With a calibrated pair the transmitter device and receiver device will both share the same Calibration ID. To ensure best performance ensure a calibrated pair is being used together. See the below graphic for how to identify the calibration ID on the unit.



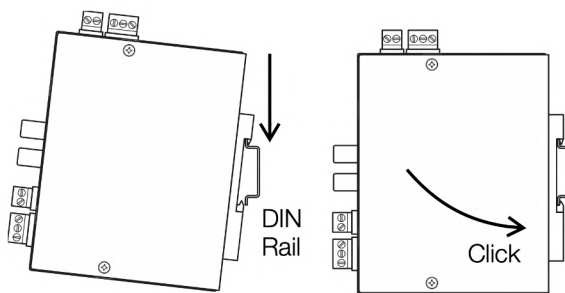
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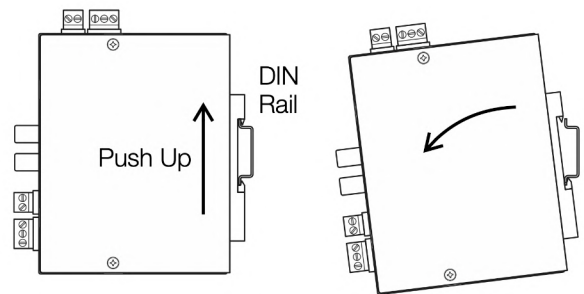
### **Installation (cont'd)**

#### **DIN Rail Mounting**

The DIN clip for mounting the system is mounted onto the rear panel. Hook the DIN clip on the top flange of the DIN rail and rotate to the locked position to install. To remove, push up to depress the spring latch and rotate off of the DIN rail.



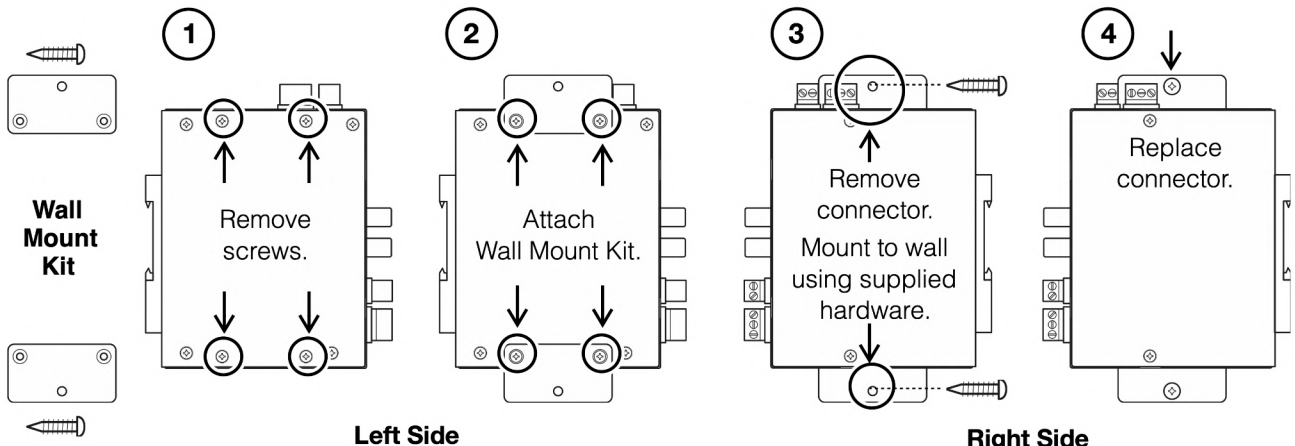
**Installation**



**Removal**

#### **Wall Mounting**

The system can be easily wall mounted by attaching the provided wall mount ears and hardware. Attach the wall mount ears by following the instructions below.



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### **Installation (cont'd)**

#### **Connect Fiber Optic Cable**

Connect fiber to the transmit and receive optical connectors on the front of the units. Fiber cable should always be routed loosely avoiding tight bends.

- For dual fiber systems connect the TX fiber port to the RX fiber port at the remote side
- For single fiber systems ensure Side A is connected to Side B. Two side A devices will not pair together, the same applies to side B; single fiber systems will always have a Side A & B
- Once the system is properly connected the Link LED, on the receiver unit, should turn ON

#### **Connect Copper Wire Pairs**

The wire pairs from the sensor or controller equipment connect to the green screw-down terminals on the transmitter and receiver modules labeled Input and Output.

- Observe polarity on the input and output connectors
- The contact terminals may be removed and accept wire sizes 16~26 AWG
- Fully seat the terminal block back into the connector before operating the system
- When using 3-Wire devices ensure common terminals are connected

#### **Receiver Alarm Contact Wiring**

The contact will alarm when the fiber link is down or a power failure.

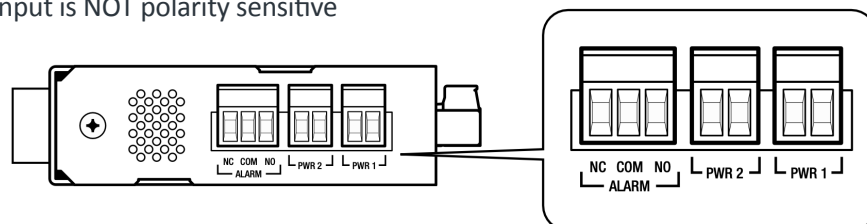
- Use the NO or NC contact positions as required
- The alarm terminal block may be removed and accept wire sizes 16~26 AWG
- Fully seat the terminal block back into the connector before operating the system
- An alarm terminal is present on both the Transmitter and Receiver

#### **Connect Power**

Ensure power supply is OFF prior to wiring the system. Each device has redundant power input terminals. Connect a 24VDC power supply to the screw-down terminals labeled PWR1 or PWR2 located on the top of the unit. Either pair of terminals or both may be used to power the device.

- Requires one (1) 24VDC power supply on each side of the system
- Fully seat the terminal block back into the connector before operating the system

**Note:** Power input is NOT polarity sensitive



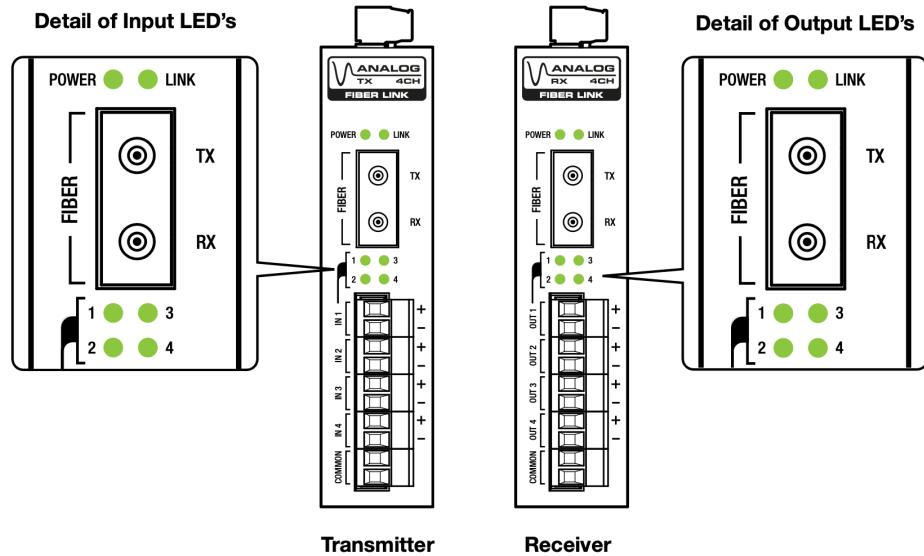
**Top View of Power & RX Alarm Terminals**

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### Installation (cont'd)

#### LED Identification



**Analog Signal Fiber Link System**

| LED    | Name          | Status                | Condition                                                |
|--------|---------------|-----------------------|----------------------------------------------------------|
| Power  | Power Failure | ON<br>OFF             | DC input power OK<br>DC input power failed               |
| Link   | System Link   | ON<br>OFF             | Fiber link OK<br>Fiber link failed                       |
| Input  | 4~20mA Input  | ON<br>OFF<br>Blinking | Signal present<br>No signal present<br>Signal over range |
| Output | 4~20mA Output | ON<br>OFF<br>Blinking | Signal present<br>No signal present<br>Signal over range |

### Troubleshooting

If trouble is encountered, verify all copper and fiber connections, signal and voltage levels. If the alarm is on, check the fiber cable and connections, or the other units power source and connections. If trouble persists, contact RLH Industries, Inc. technical support department\*.

\*Tech support contact info is at the end of this document

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### Ordering Information

| Transmitter/Receiver | Mode       | Connector | Fibers                | Distance        | Part Number    |
|----------------------|------------|-----------|-----------------------|-----------------|----------------|
| Transmitter          | Multimode  | SC        | Dual Fiber            | 2km/1.2 miles   | ADH-420TX-03-1 |
| Receiver             | Multimode  | SC        | Dual Fiber            | 2km/1.2 miles   | ADH-420RX-03-1 |
| Transmitter          | Multimode  | ST        | Dual Fiber            | 2km/1.2 miles   | ADH-420TX-04-1 |
| Receiver             | Multimode  | ST        | Dual Fiber            | 2km/1.2 miles   | ADH-420RX-04-1 |
| Transmitter          | Singlemode | SC        | Dual Fiber            | 20km/12.4 miles | ADH-420TX-40-1 |
| Receiver             | Singlemode | SC        | Dual Fiber            | 20km/12.4 miles | ADH-420RX-40-1 |
| Transmitter          | Singlemode | SC        | Dual Fiber            | 60km/37 miles   | ADH-420TX-41-1 |
| Receiver             | Singlemode | SC        | Dual Fiber            | 60km/37 miles   | ADH-420RX-41-1 |
| Transmitter          | Singlemode | SC        | Dual Fiber            | 120km/74 miles  | ADH-420TX-45-1 |
| Receiver             | Singlemode | SC        | Dual Fiber            | 120km/74 miles  | ADH-420RX-45-1 |
| Transmitter          | Singlemode | ST        | Dual Fiber            | 20km/12.4 miles | ADH-420TX-50-1 |
| Receiver             | Singlemode | ST        | Dual Fiber            | 20km/12.4 miles | ADH-420RX-50-1 |
| Transmitter          | Singlemode | ST        | Dual Fiber            | 60km/37 miles   | ADH-420TX-51-1 |
| Receiver             | Singlemode | ST        | Dual Fiber            | 60km/37 miles   | ADH-420RX-51-1 |
| Transmitter          | Singlemode | ST        | Dual Fiber            | 120km/74 miles  | ADH-420TX-55-1 |
| Receiver             | Singlemode | ST        | Dual Fiber            | 120km/74 miles  | ADH-420RX-55-1 |
| Transmitter          | Singlemode | SC        | Single Fiber - Side A | 20km/12.4 miles | ADH-420TX-10-1 |
| Receiver             | Singlemode | SC        | Single Fiber - Side B | 20km/12.4 miles | ADH-420RX-11-1 |
| Transmitter          | Singlemode | SC        | Single Fiber - Side A | 60km/37 miles   | ADH-420TX-14-1 |
| Receiver             | Singlemode | SC        | Single Fiber - Side B | 60km/37 miles   | ADH-420RX-15-1 |

- A complete system requires a transmitter unit and a receiver unit

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### Key Specifications

|                                             |                                                                                                                                                       |                                                                                                                                                     |  |
|---------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|--|
| Transmission Method:                        | Frequency modulated light via a single optical fiber                                                                                                  |                                                                                                                                                     |  |
|                                             | Multimode:                                                                                                                                            | 1310nm                                                                                                                                              |  |
|                                             | Singlemode:                                                                                                                                           | 1310nm/1550nm                                                                                                                                       |  |
| Maximum Fiber Attenuation/Distance:         | Dual Fiber:                                                                                                                                           | Multimode<br>(50µm & 62.5/125µm): 2km/1.2 miles range<br>Singlemode (9/125µm): 20km/12.4 miles range<br>60km/37 miles range<br>120km/74 miles range |  |
|                                             | Single Fiber, Bi-Directional:                                                                                                                         | Singlemode (9/125µm): 20km/12.4 miles range<br>60km/37 miles range                                                                                  |  |
|                                             | Note: Distances equated using industry standard fiber and connector attenuation.<br>Fiber condition, splices, and connectors may affect actual range. |                                                                                                                                                     |  |
|                                             |                                                                                                                                                       |                                                                                                                                                     |  |
| Connector Type:                             | ST or SC connectors                                                                                                                                   |                                                                                                                                                     |  |
| System Accuracy:                            | 99.9%                                                                                                                                                 |                                                                                                                                                     |  |
|                                             | Note: Accuracy for Fiber Link System, Both Transmitter & Receiver at 25°C and powered by 24VDC                                                        |                                                                                                                                                     |  |
|                                             | Ambient Temp Effect:                                                                                                                                  | Approximately 0.2% over range -40°F to +158°F                                                                                                       |  |
|                                             | Update Rate:                                                                                                                                          | 12.8µs (78,000 updates per second)                                                                                                                  |  |
|                                             | Signal Resolution:                                                                                                                                    | 16 Bits                                                                                                                                             |  |
|                                             | Sensitivity:                                                                                                                                          | 2^16 (65,536) Steps                                                                                                                                 |  |
| Analog Inputs 1~4: (differential inputs)    | Operating Range:                                                                                                                                      | 0~20mA (DC)                                                                                                                                         |  |
|                                             | Impedance:                                                                                                                                            | 250 Ohms                                                                                                                                            |  |
|                                             | Protection:                                                                                                                                           | 24mA                                                                                                                                                |  |
| Analog Output 1~4: (single-ended, unipolar) | Loop Voltage:                                                                                                                                         | 23.7VDC                                                                                                                                             |  |
|                                             | Maximum Loop Resistance:                                                                                                                              | 1000 Ohms                                                                                                                                           |  |
|                                             | Maximum Output Signal:                                                                                                                                | 24mA                                                                                                                                                |  |
| Power Requirements:                         | 24~48VDC, 8 Watts maximum transmitter, 10 Watts maximum receiver<br>Dual redundant power inputs                                                       |                                                                                                                                                     |  |
| Wire Connector:                             | Screw clamp terminal blocks, 16~26 AWG                                                                                                                |                                                                                                                                                     |  |
| DC Input Isolation:                         | 1.5KV                                                                                                                                                 |                                                                                                                                                     |  |
| Surge Protection:                           | PTC thermistors, zener diodes and varistors                                                                                                           |                                                                                                                                                     |  |
| Over Current Protection:                    | 0.5A (Automatic Recovery)                                                                                                                             |                                                                                                                                                     |  |
| Operating Temperature:                      | -40°C to +70°C (-40°F to +158°F), 95% non-condensing                                                                                                  |                                                                                                                                                     |  |
| Dimensions:                                 | 1.2” (W) x 3.91” (D) x 4.93” (H), (31mm x 100mm x 126mm)<br>*Not including connectors                                                                 |                                                                                                                                                     |  |
| Warranty:                                   | Limited Lifetime                                                                                                                                      |                                                                                                                                                     |  |

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### Contact

|                                                           |                                                                           |                              |
|-----------------------------------------------------------|---------------------------------------------------------------------------|------------------------------|
| By Mail:                                                  | Att: Sales<br>RLH Industries, Inc.<br>936 N. Main St.<br>Orange, CA 92867 |                              |
| By Phone:<br>Sales / Service<br>Mon - Fri, 6am - 6pm, PST | Local                                                                     | 714-532-1672                 |
|                                                           | Toll Free                                                                 | 800-877-1672<br>866-DO-FIBER |
|                                                           | By Email: info@fiberopticlink.com                                         |                              |
| By FAX:                                                   | 714-532-1885                                                              |                              |

### Tech Support

|           |                            |                              |
|-----------|----------------------------|------------------------------|
| By Email: | support@fiberopticlink.com |                              |
| By Phone: | Toll Free                  | 855-754-2497<br>855-RLH-24X7 |