



RLH Industries, Inc.

## USER GUIDE

The leader in  
rugged fiber optic  
technology.

U-153 2018A-1001

# 4 Channel 4-20mA/0-10V Industrial Media Converter

## SYSTEM INSTALLATION INFORMATION

### Description

This Fiber Optic Media converter transmits 4-20mA or 0-10VDC 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. It was designed and is made in the U.S.A and is covered by our Limited Lifetime Warranty.

#### 4~20mA System

Extends up to 4 separate analog 4-20mA current signals. 4-20mA signals are less susceptible to noise interference, can easily detect an open circuit, and current measurement remains the same in any point of the signal path.

#### 0~10VDC System

Extends up to 4 separate analog 0-10 Volt signals. Transport analog voltage signals over long distances without compromising accuracy and reliability.



4 Ch. Analog Signal DIN Fiber Link System

### Standard Features

- Convenient LED status indicators
- Single and dual fiber models available
- Available with ST or SC connectors, single or multi-mode fiber
- Transmit 0-10VDC or 4-20mA signals over Fiber
- 78,000 Samples a Second, 12.8µs Update Rate
- 16 Bit Signal Resolution
- 99.9% Accuracy or Better
- Pluggable terminal blocks
- Alarm contact for status monitoring
- Environmentally rugged with wide operating temp. -40°F to +158°F (-40°C to +70°C)
- Standard T35 DIN rail or wall mount applications
- Limited Lifetime Warranty

**Designed and Made in the U.S.A.**

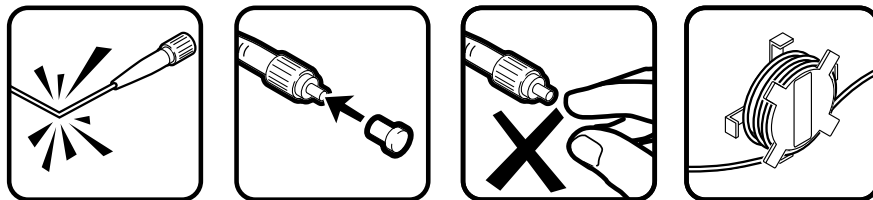
## General Safety Practices

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.

### 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

## Acronyms

Commonly used acronyms, terminology, and abbreviations.

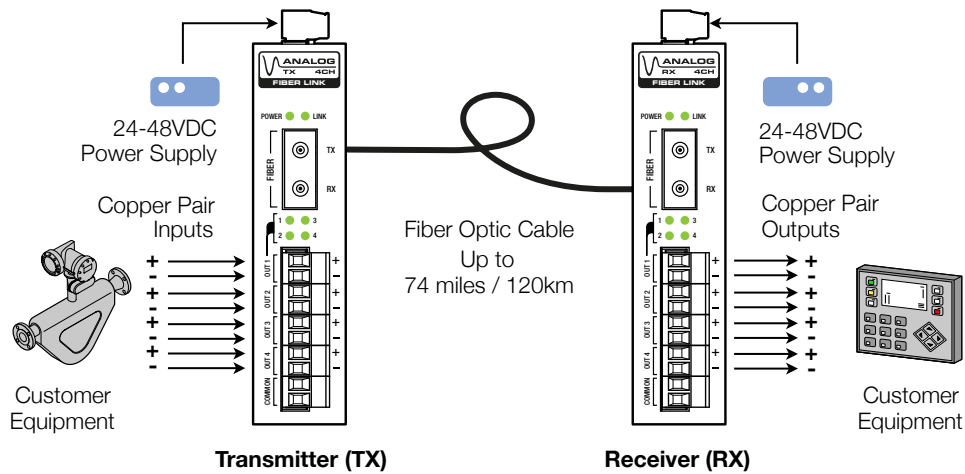
Acronym/Abbreviation	Description
<b>TX</b>	Transmit
<b>RX</b>	Receive
<b>PWR</b>	Power
<b>NC</b>	Normally Closed
<b>COM</b>	Common
<b>NO</b>	Normally Open
<b>Sinking</b>	Does not provide voltage or current
<b>Sourcing</b>	Providing Voltage or Current

# Applications

By utilizing fiber optic cable, the 4~20mA / 0~10VDC 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.

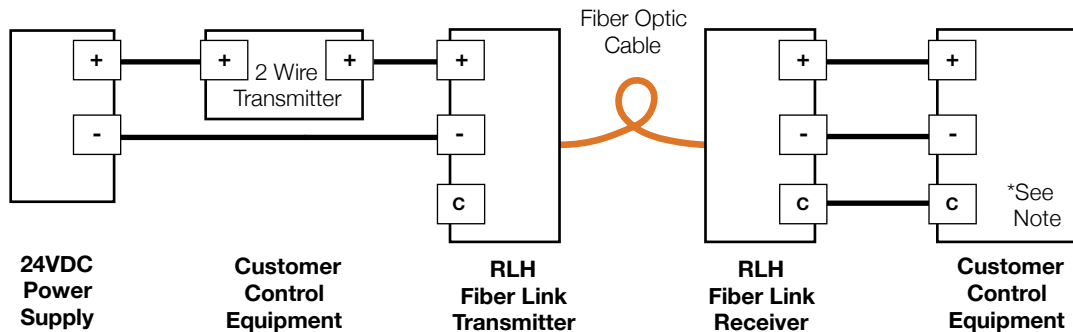
## System Diagram



Typical System Diagram

## 4-20mA System - 2-Wire Transmitter

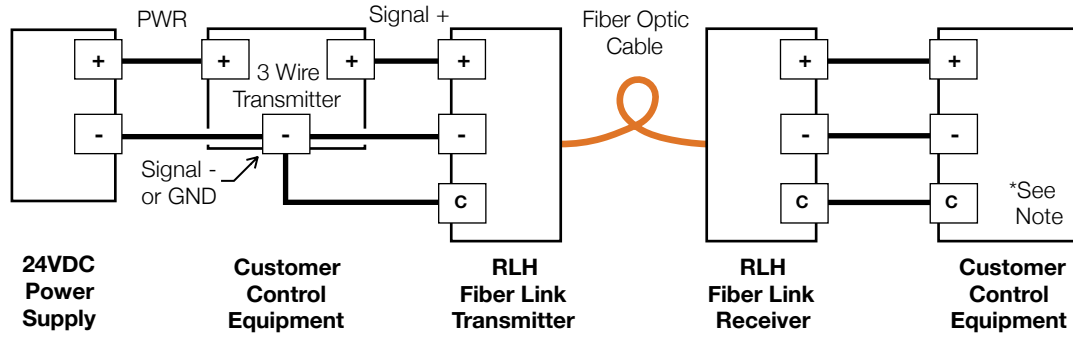
Connecting a 2-wire Transmitter to a RLH Transmitter (ADH-420TX-XX-1 or ADH-010TX-XX-1). The RLH transmitter is always a sinking input, expecting the source voltage or current to be supplied by the remote device. In this example, the 2-Wire Transmitter has 24VDC loop voltage provided by a separate power supply. Below is a typical configuration for loop powered sensors (Flow, Temperature, Pressure, etc...).



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

### 4-20mA System - 3-Wire Transmitter

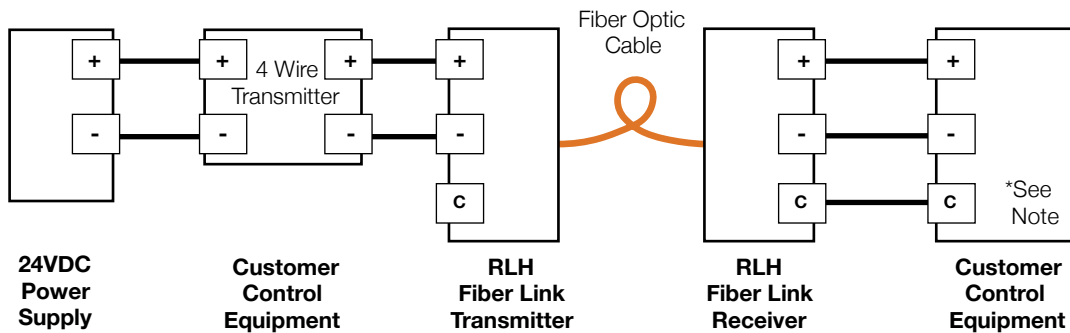
Connecting a 3-Wire Transmitter to a RLH Transmitter (ADH-420TX-XX-1 or ADH-010TX-XX-1). The RLH transmitter is always a sinking input, expecting the source voltage or current to be supplied by the remote device. The common terminal should be used when multiple 3-Wire transmitters are connected to the 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

Connecting a 4-Wire Transmitter to a RLH Transmitter (ADH-420TX-XX-1 or ADH-010TX-XX-1). The RLH transmitter is always a sinking input, expecting the source voltage or 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

# 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.

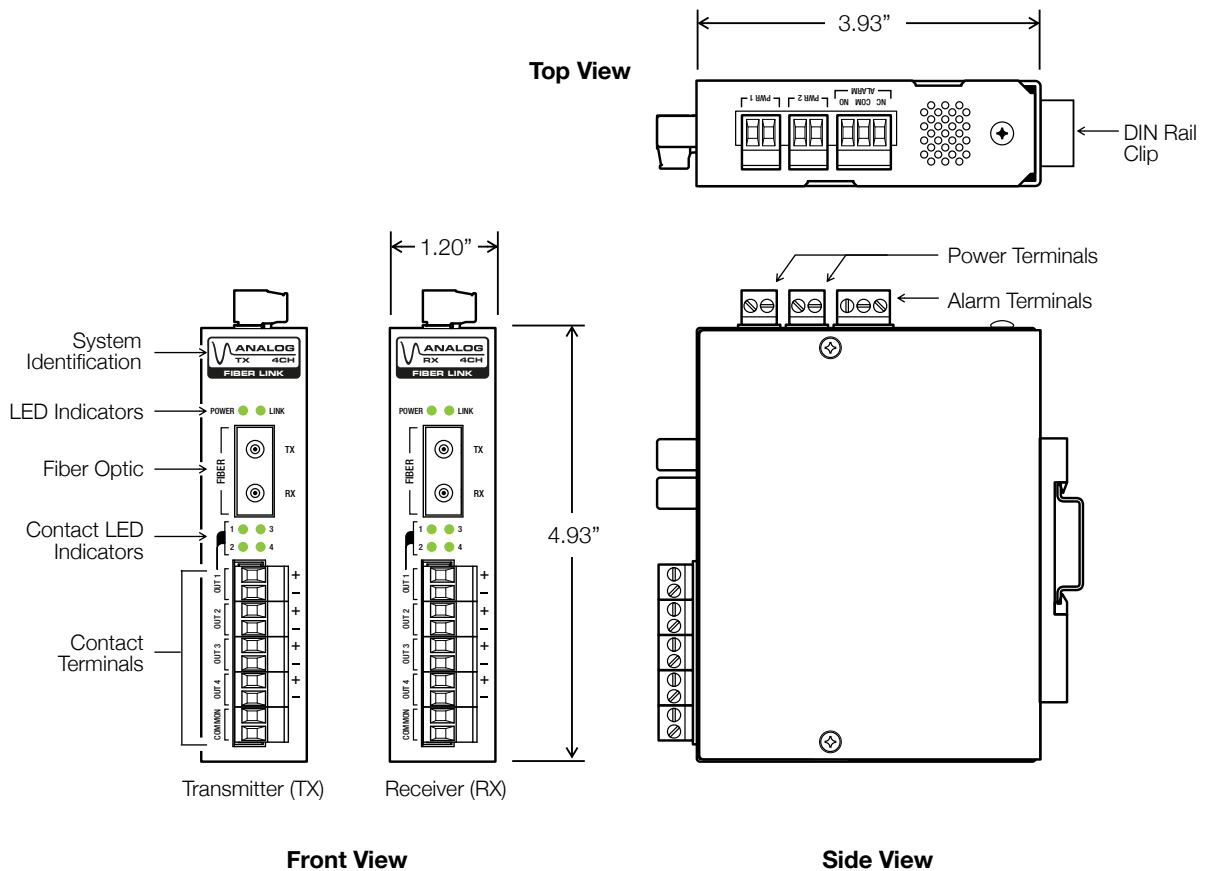
Required for installation:

- 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. All electrical and fiber optic connections are made directly onto the unit.

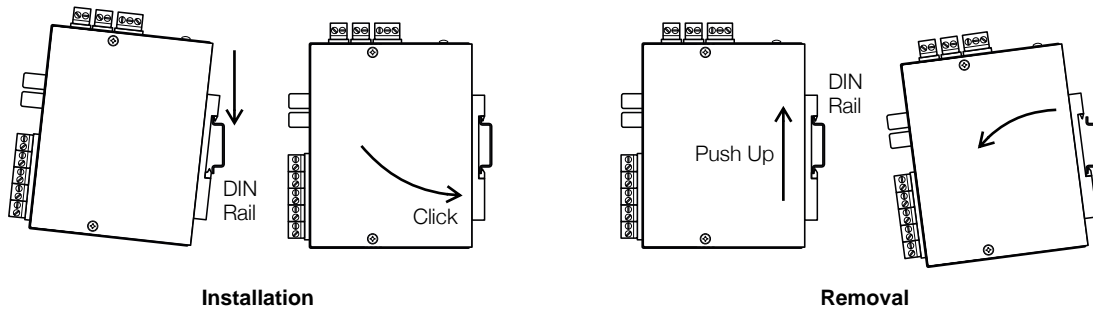
## Front Panel

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



## DIN rail mounting

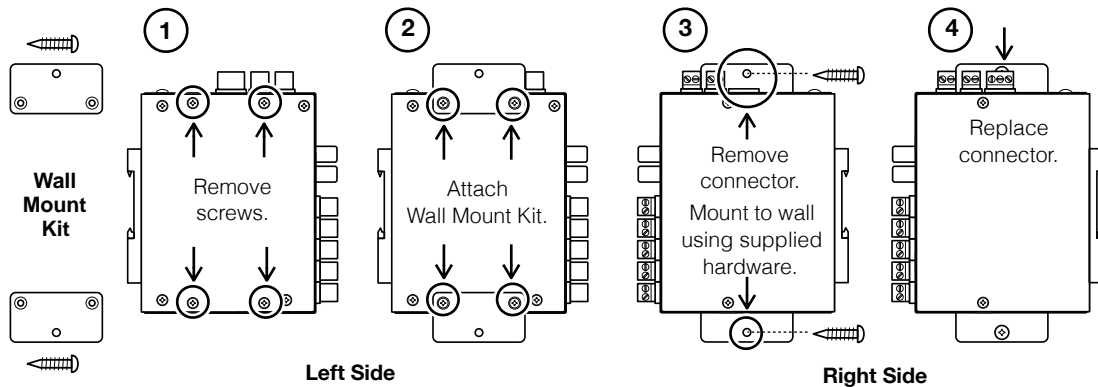
The DIN clip for mounting the system is mounted onto the rear panel. Hook the DIN clip on the top flange of the DIN rail and rotate to the locked position to install. To remove, push up to depress the spring latch and rotate off the DIN rail.



**DIN Rail Mounting**

## 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.



**Wall Mounting**

## 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.

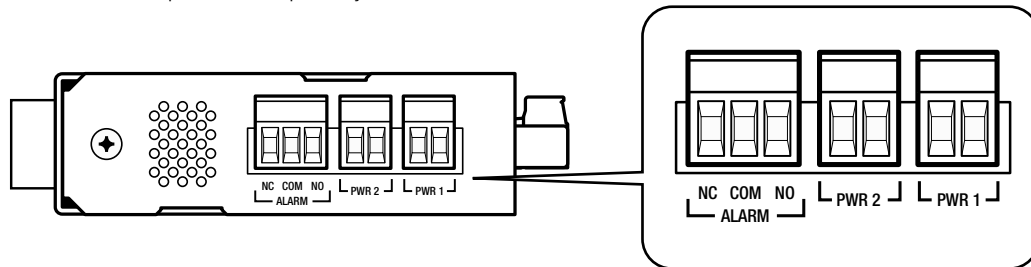
- Use the NO or NC contact positions as required.
- The alarm terminal block may be removed and accept wire sizes 16~26 AWG.
- Fully seat the terminal block back into the connector before operating the system.
- An alarm terminal is present on both the Transmitter and Receiver.

## 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.

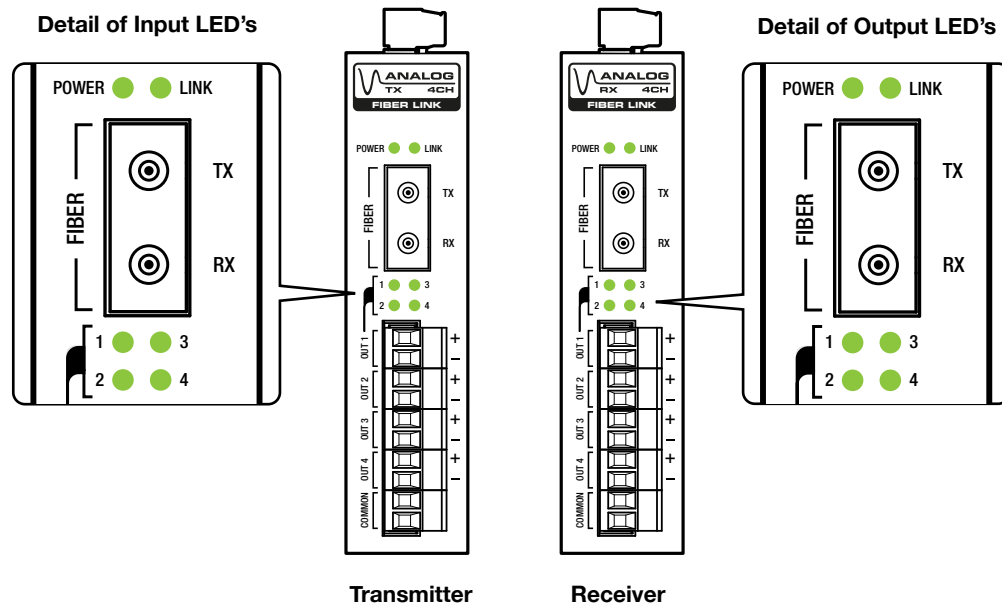
- Requires one (1) 24VDC power supply on each side of the system.
- Fully seat the terminal block back into the connector before operating the system.

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



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

## LED Identification



### Analog Signal Fiber Link System

LED	Description	Status	Condition
<b>POWER</b>	DC Input Power	ON	DC input power OK
		OFF	DC input power Failed
<b>LINK</b>	System Link	ON	Fiber Link OK
		OFF	Fiber Link Failed
<b>INPUT 1~4</b>	Analog Input	On	Signal Present
		Off	No Signal Present
		Blinking	Signal Over Range
<b>OUTPUT 1~4</b>	Analog Output	On	Signal Present
		Off	No Signal Present
		Blinking	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:

Main Number: 800-877-1672 (6 am to 6 pm- PST),  
Direct to Technical Support: (855) 754-2497



## General Specifications

<b>Connector Types</b>	ST or SC			
<b>Transmission method</b>	<b>Multimode:</b>	1310nm		
	<b>Single-mode:</b>	1310nm/1550nm		
<b>Maximum Fiber Attenuation /Distance</b>	<b>Dual Fiber</b>	Multimode (50µm & 62.5/125µm):	1.25mi./2 km range	
		Single-mode (9/125µm):	12.4 mi./20km range	
			37 mi./60km range	
	<b>Single Fiber, Bi-directional</b>	Single-mode (9/125µm):	74 mi./120km range	
			12.4 mi./20km range	
		37 mi./60km range		
	<i>Note: Distances equated using industry standard fiber and connector attenuation. Fiber condition, splices, and connectors may affect actual range.</i>			
<b>System Accuracy</b>	<b>4~20mA Models</b>	99.9%		
	<b>0~10VDC Models</b>	99.9%		
		<i>Note: Accuracy for Complete Fiber Link System, Both Transmitter &amp; Receiver at 25C° and powered by 24VDC</i>		
	<b>Ambient Temp Effect:</b>	Approximately 0.2% over operational range		
	<b>Update Rate:</b>	12.8µs (78,000 updates per second)		
	<b>Signal Resolution:</b>	16 Bits		
	<b>Sensitivity:</b>	2 <sup>16</sup> (65,536) Steps		
<b>Analog Signal</b>		<b>4~20mA System</b>	<b>0~10VDC System</b>	
<b>Analog Input 1~4</b>	Differential Inputs			
	<b>Operating Range:</b>	0mA - 22mA (DC)	0 - 11VDC	
	<b>Impedance:</b>	250 Ohms	200K Ohms	
	<b>Protection:</b>	+/- 50mA	+/- 30V	
<b>Analog Output 1~4</b>	Single-ended (unipolar)			
	<b>Loop Voltage:</b>	23.7VDC	N/A	
	<b>Maximum Loop Resistance:</b>	1000 Ohms	1000 Ohms	
	<b>Protection:</b>	+/- 32mA	+/- 32mA	
<b>Power Requirements</b>	24 - 48VDC	Transmitter - 8 Watts Max.		
	Dual redundant power inputs	Receiver - 10 Watts Max.		
<b>Wire Connector</b>	Screw clamp terminal blocks, 16 ~ 26 AWG			
<b>DC Input Isolation</b>	1.5KV			
<b>Surge Protection</b>	PTC thermistors, zener diodes and varistors			
<b>Over Current Protection</b>	0.5A (Automatic Recovery)			
<b>Operating Temperature</b>	-40° to +158° F (-40° to +70° C), 95% non-condensing			
<b>Dimensions</b>	H4.93" x W1.2" x D3.5" (100mm x 31mm x 89mm) - Not including connectors			
<b>Warranty</b>	Limited Lifetime	Visit <a href="http://www.fiberopticlink.com">www.fiberopticlink.com</a> for warranty details		

## Ordering Information

Each 4 Channel 4~20mA or 0~10VDC Analog Signal DIN Fiber Link unit is identified with a part number.

Mode	Connector	Distance	Fibers	Description	System Part Numbers		
					4~20mA	0~10VDC	
Multimode	SC	2km / 1.2 mi	Dual Fiber	Transmitter	<b>ADH-420TX-03-1</b>	<b>ADH-010TX-03-1</b>	
				Receiver	<b>ADH-420RX-03-1</b>	<b>ADH-010RX-03-1</b>	
	ST	2km / 1.2 mi	Dual Fiber	Transmitter	<b>ADH-420TX-04-1</b>	<b>ADH-010TX-04-1</b>	
				Receiver	<b>ADH-420RX-04-1</b>	<b>ADH-010RX-04-1</b>	
Single-mode		20km / 12.4 mi.	Dual Fiber	Transmitter	<b>ADH-420TX-40-1</b>	<b>ADH-010TX-40-1</b>	
				Receiver	<b>ADH-420RX-40-1</b>	<b>ADH-010RX-40-1</b>	
	SC	60km / 37 mi.	Dual Fiber	Transmitter	<b>ADH-420TX-41-1</b>	<b>ADH-010TX-41-1</b>	
				Receiver	<b>ADH-420RX-41-1</b>	<b>ADH-010RX-41-1</b>	
		120km / 74 mi.	Dual Fiber	Transmitter	<b>ADH-420TX-45-1</b>	<b>ADH-010TX-45-1</b>	
				Receiver	<b>ADH-420RX-45-1</b>	<b>ADH-010RX-45-1</b>	
		20km / 12.4 mi.	Dual Fiber	Transmitter	<b>ADH-420TX-50-1</b>	<b>ADH-010TX-50-1</b>	
				Receiver	<b>ADH-420RX-50-1</b>	<b>ADH-010RX-50-1</b>	
	ST	60km / 37 mi.	Dual Fiber	Transmitter	<b>ADH-420TX-51-1</b>	<b>ADH-010TX-51-1</b>	
				Receiver	<b>ADH-420RX-51-1</b>	<b>ADH-010RX-51-1</b>	
		120km / 74 mi.	Dual Fiber	Transmitter	<b>ADH-420TX-55-1</b>	<b>ADH-010TX-55-1</b>	
				Receiver	<b>ADH-420RX-55-1</b>	<b>ADH-010RX-55-1</b>	
	SC		20km / 12.4 mi.	Single Fiber	Transmitter	<b>ADH-420TX-10-1</b>	<b>ADH-010TX-10-1</b>
					Receiver	<b>ADH-420RX-11-1</b>	<b>ADH-010RX-11-1</b>
		60km / 37 mi.	Single Fiber	Transmitter	<b>ADH-420TX-14-1</b>	<b>ADH-010TX-14-1</b>	
				Receiver	<b>ADH-420RX-15-1</b>	<b>ADH-010RX-15-1</b>	

- ▶ A complete system requires a **Transmitter** and a **Receiver**
- ▶ Single Fiber Systems: The transmitter is always **Side A** (T-1310/R-1550), the receiver is always **Side B** (T-1550/R-1310)
- ▶ Multimode systems are compatible with both 62.5µm & 50µm fiber cable



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

Specifications subject to change without notice.