4 Channel 0-10VDC + 16 Channel Contact Closure ADIO Fiber Converter

Transmit Four 0-10VDC Analog Signals and 16 Digital Inputs Bi-Directionally Over Fiber with High Speed and Accuracy

Introduction

This Fiber Optic Media Converter unidirectionally transmits 4 channels of 0-10VDC analog signals, and bi-directionally transmits 16 contact closure signals over fiber optic cable. Premium features include 60,000 samples per second, 16 bit signal resolution, and less than 0.2% source signal variance.

Compatible with most PLCs, Sensors (2, 3, or 4 wire), and other types of equipment where precise voltage measurements must be taken and transmitted over fiber. The high-density digital contact closure channels support transporting up to 16 alarms bi-directionally.

This compact, rugged system provides convenient and easy-to-read LEDs, supports both single-mode and multimode fiber applications, and includes an alarm on either side for monitoring system power and fiber health.

Designed to operate over an extreme temperature range, providing reliability in harsh environments, each device is DIN rail and wall mountable. This Media Converter is Designed, Engineered, and Assembled in the USA - and covered by our Lifetime Warranty.

0-10VDC System (Unidirectional)

Extends up to 4 independent analog 0~10VDC signals. The high speed interface provides 60,000 samples per second, 16 bit signal resolution, and less than 0.2% source signal variance.

Contact Closure System (Bi-directional)

Extends up to 16 bi-directional contact closure signals over fiber to the paired device. A solid state relay output at the receiver device provides ultra fast response times.

ADIO Fiber Converter

Features
Convenient LED status indicators
Single and dual fiber models available
ST or SC connectors, singlemode or multi-mode fiber
Transmit 4 channels of 0~10VDC analog signals over fiber
60,000 Samples per Second, 16.6µs Update Rate
16 Bit Signal Resolution
99.8% Accuracy or Better Guaranteed
Bi-directional Contact Closure Transmission
Pluggable terminal blocks
Alarm contact for system status monitoring
Hardened to operate in -40°C to +70°C (-40°F to +158°F)
Standard T35 DIN rail or wall mount applications
Limited Lifetime Warranty
Designed, Engineered, and Assembled in the U.S.A.

General Safety Practices

Intended Audience

This guide is intended for use by knowledgeable installation, operation and repair personnel. Every effort has been made to ensure the accuracy of the information in this guide. However, due to constant product improvement, specifications and information contained in this document are subject to change without notice.

Conventions

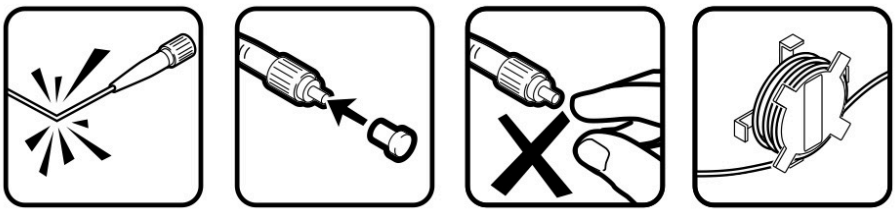
Symbols for notes, attention, and caution are used throughout this manual to provide readers with additional information, advice when special attention is needed, and caution to prevent injury or equipment damage.

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 copper lines may carry high voltages. Use caution when handling copper wiring
- Do not open the enclosure, there are no user serviceable parts

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 fiber spools or other fiber storage fixtures at the site

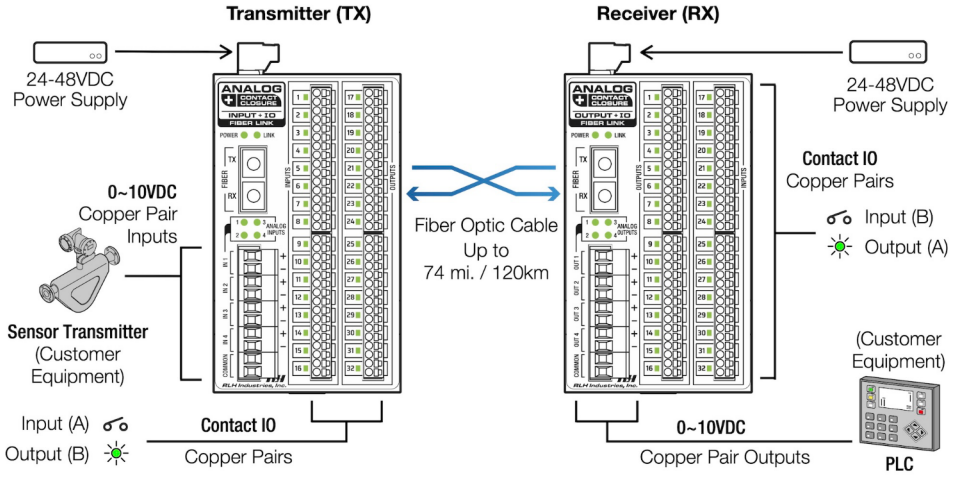
Laser Safety

Do not look directly into a fiber-optic transceiver or into the ends of fiber-optic cables.
Fiber-optic transceivers and fiber-optic cable connected to a transceiver emit laser light that can cause eye damage.

System Description

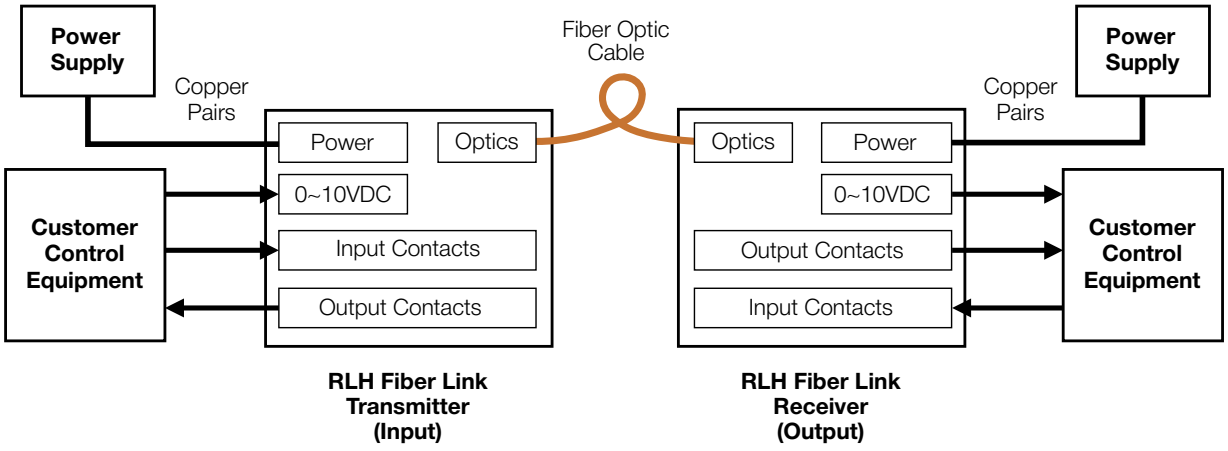
Applications

By utilizing fiber optic cable, the 0~10VDC and contact closure 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.



Typical System Diagram

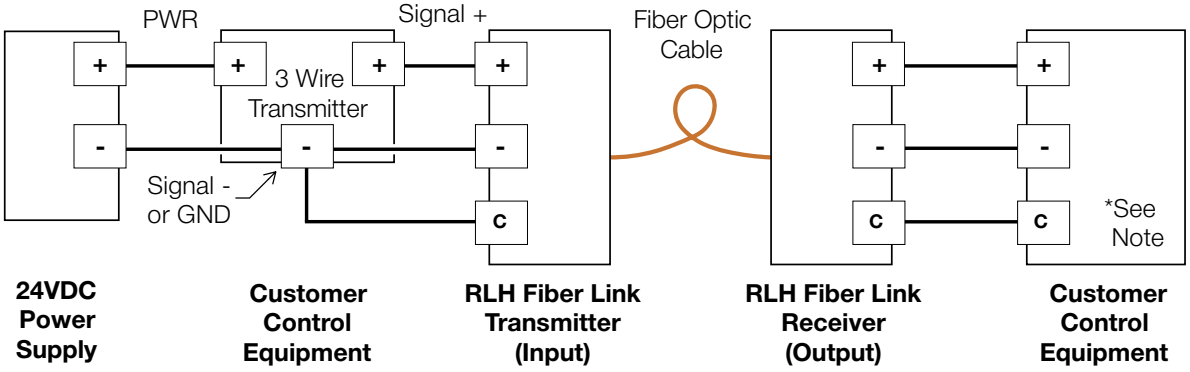
Control equipment in high voltage areas can be at risk due to Ground Potential Rise (GPR). A copper network cable referenced to a remote ground can become a path for high voltages during a ground fault. Placement of all-dielectric fiber optic cable (instead of copper) completely eliminates the presence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



System Connection Diagram

0-10VDC Analog Interface – 3-Wire Transmitter Wiring

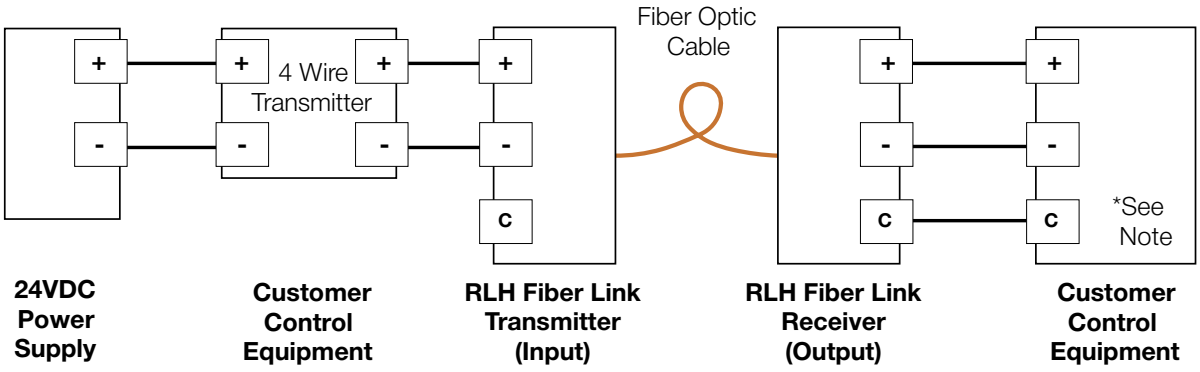
Connecting a 3-Wire Transmitter to a RLH Transmitter (ADIO-010TX-DR-NO-XX-1). The RLH Fiber Transmitter is always a sinking input, expecting the source current to be supplied by the remote device. The common terminal can be used from the transmitter, and if used it should connect to the negative terminal of the Fiber transmitter and the negative terminal of the power supply. Below is a typical configuration for 3-Wire Transmitters.



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

0-10VDC Analog Interface – 4-Wire Transmitter Wiring

Connecting a 4-Wire Transmitter to a RLH Fiber Transmitter (ADIO-010TX-DR-NO-XX-1). The RLH Fiber 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

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

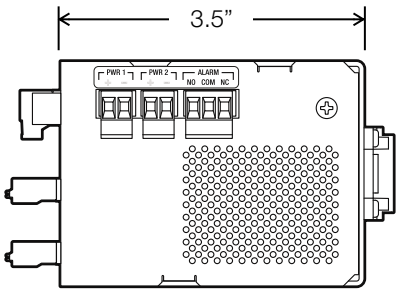
Required for installation

- 24-48 VDC Power Source
- T35 DIN rail or suitable wall mount location
- A weatherproof enclosure is required for outdoor use

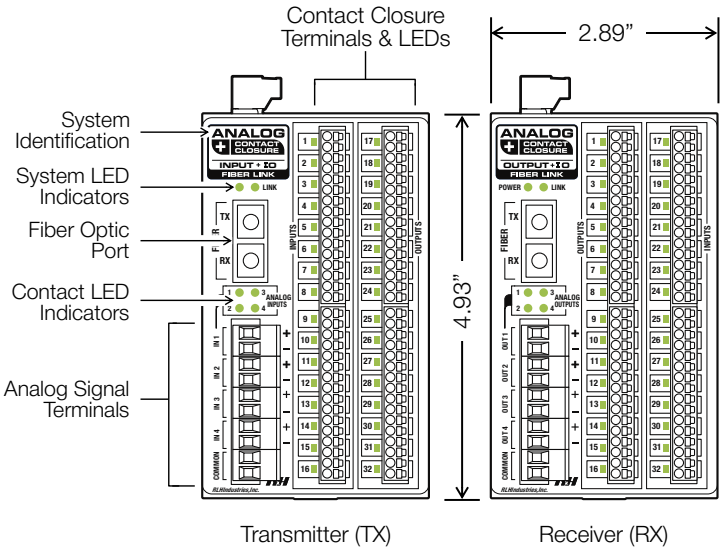
Measure the DC voltage of the source power to ensure that it is at least 24VDC. All electrical and fiber optic connections are made directly onto the unit.

Physical layout

The front panel contains the input and output contact closure terminals, analog contact terminals, LEDs, and the TX or RX fiber port. The top panel contains the power and alarm terminals.

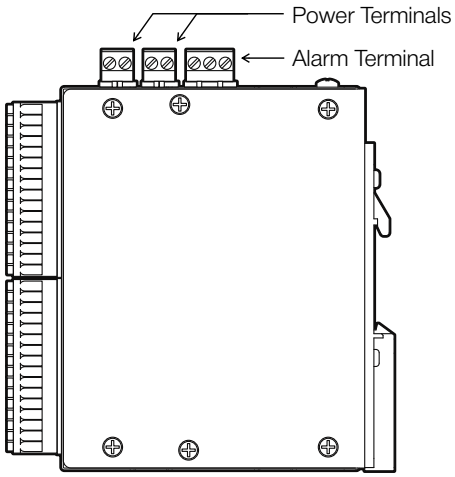


Top View



Transmitter (TX) Receiver (RX)

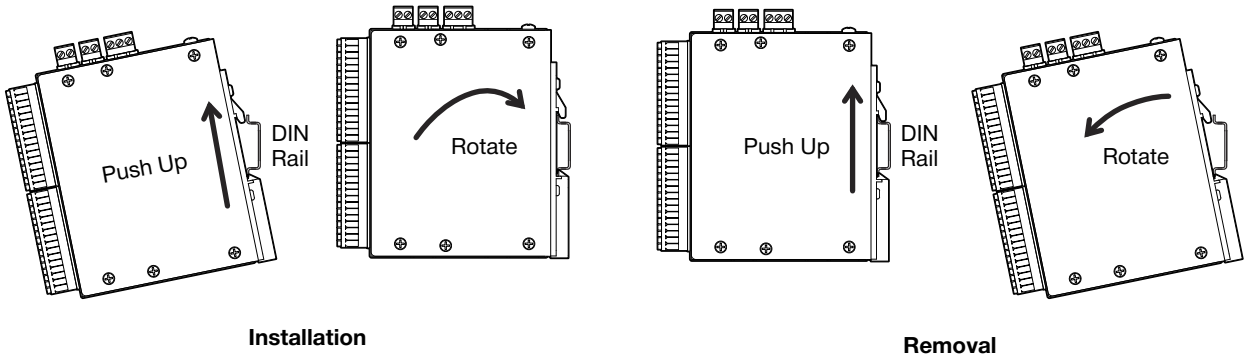
Front View



Side View

DIN Rail Mounting

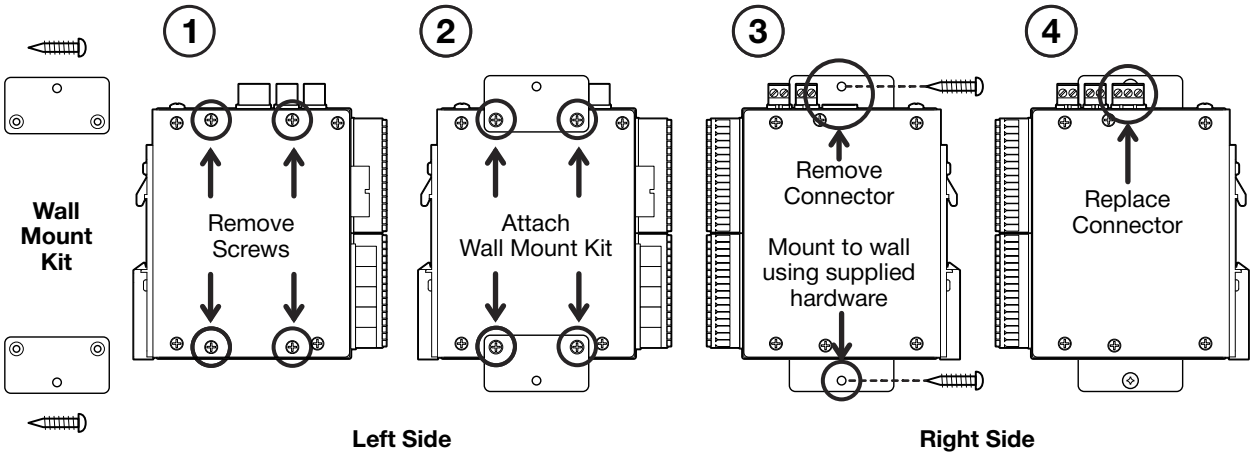
The DIN clip for mounting the system is mounted onto the rear panel. Hook the DIN clip on the top flange of the DIN rail, press down and rotate to the locked position to install. To remove, push down to depress the spring latch and rotate off of the DIN rail.



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 Analog Signal 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 16~26 AWG wire sizes
- Fully seat the terminal block back into the connector before operating the system
- When using 3-Wire devices ensure common terminals are connected

Connect Contact Closure 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 indicated pairs for correct operation. Connectors are not polarity sensitive
- The contact terminals may be removed and accept 16~26 AWG wire sizes
- Fully seat the terminal block back into the connector before operating the system

Alarm Contact Wiring

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

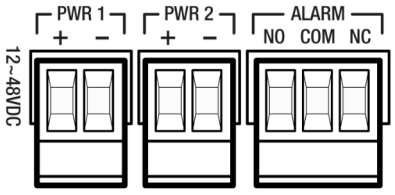
- Use the NO or NC contact positions as required
- The alarm terminal block may be removed and accepts wire sizes 16~26AWG
- Fully seat the terminal block back into the connector before operating the system
- An alarm terminal is present on both the Transmitter and Receiver

Connect Power Cable

Ensure power supply is OFF prior to wiring the system. Connect a 24-48VDC power supply to the screw down terminals located on the top of the unit.

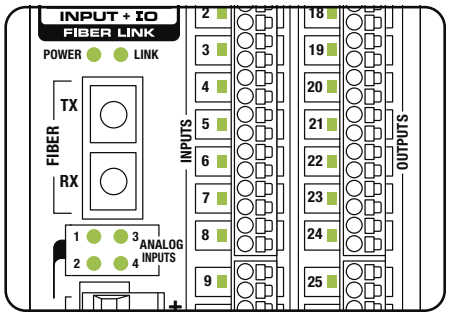
- Requires one (1) 24-48VDC power supply. Use a second power source for redundant power
- The terminal blocks are removable and accept 16~26 AWG wire sizes
- Fully seat the terminal blocks back into the connector before operating the system

Note: The power inputs are polarity insensitive. Ensure that the appropriate power source is being used before wiring.



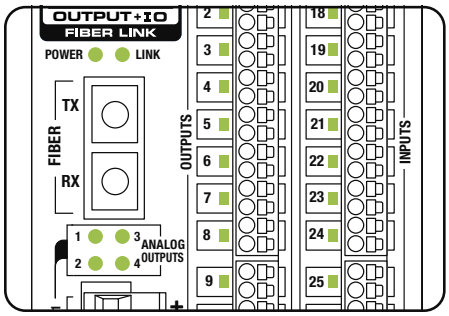
Power and Alarm Terminals

LED Identification



Transmitter Device (Input)

Detail of Power, Fiber, Analog Input, and Contact Closure LEDs



Receiver Device (Output)

Detail of Power, Fiber, Analog Output, and Contact Closure LEDs

Device	LED	Description	LED Status	Condition
Both	**Power**	DC Input Power	ON	DC Input power OK
			OFF	DC Input power failed
Both	**Link**	System Link	ON	Fiber Link OK
			OFF	Fiber Link Failed
Transmitter	**Analog Inputs 1-4**	Analog Input	ON	Signal Present
			OFF	No Signal Present
			FLASHING	Signal Over Range
Receiver	**Analog Outputs 1-4**	Analog Output	ON	Signal Present
			OFF	No Signal Present
			FLASHING	Signal Over Range
Transmitter	**Inputs 1~16**	Contact Closure Inputs	ON	Signal Present
			OFF	No Signal Present
	Outputs 17~32	Contact Closure Outputs	ON	Signal Present
			OFF	No Signal Present
Receiver	**Outputs 1~16**	Contact Closure Outputs	ON	Signal Present
			OFF	No Signal Present
	Inputs 17~32	Contact Closure Inputs	ON	Signal Present
			OFF	No Signal Present

Troubleshooting

If trouble is encountered, verify the copper and fiber connections, and the analog signal and voltage levels. If the alarm is on, check the fiber cable connection, the power supply, and connections of the unit on the other end.

- Ensure power supply is OFF prior to wiring the system
- Check that the appropriate 24-48VDC power is provided to the unit
- Ensure that the terminal block screws are tight and fully seated into the connectors
- The terminal blocks accept 16~26 AWG wire sizes

support@fiberopticlink.com
Toll Free: 1-855-754-2497

General Specifications

Fiber Connector Types:	ST or SC		
Transmission Method:	**Multimode:**	1310nm	
	Single-mode:	1310nm/1550nm	
Maximum Fiber Attenuation/Distance:	**Dual Fiber**	Multimode (50µm & 62.5/125µm)	1.25 mi./2 km range
		Single-mode (9/125µm)	12.4 mi./20km range
			37 mi./60km range
			74 mi./120km range
	Single Fiber, Bi-directional	Single-mode (9/125µm)	12.4 mi./20km range
			37 mi./60km range
	Note: *Distances equated using industry standard fiber and connector attenuation. Fiber condition, splices, and connectors may affect actual range.*		
System accuracy:	**0~10VDC Analog**	99.8% analog signal conversion accuracy	
	Note: *Accuracy is for complete Fiber Link System, both Transmitter & Receiver at 25C° and powered by 24VDC*		
	Ambient Temp Effect:	Approximately 0.4% over operational range	
	Update Rate:	16.6µs (60,000 updates per second)	
	Signal Resolution:	16 Bits	
	Sensitivity:	2^16 (65,536) Steps	
Analog Input 1~4:	**Signaling:**	Differential Inputs	
	Operating Range:	0~10VDC	
	Impedance:	200K Ohms	
	Protection:	24VDC	
Analog Output 1~4:	**Signaling:**	Single-ended (unipolar)	
	Maximum Loop Resistance:	1000 Ohms	
	Maximum Output Signal:	10.6VDC	
Contact IO:	16 channels Bidirectional contact closure		
	Inputs:	DR: Dry Contact Sensing	
		12: Wetting voltage (5~12VDC) Sensing	
		48: Wetting voltage (24~48VDC) Sensing	
	Output:	NO: Normally Open Relay	
		NC: Normally Closed Relay	
		Rating: 2A @ 60VDC (Maximum)	
Power Requirements:	24~48VDC	Transmitter - 8 Watts Max.	
	Dual redundant power options	Receiver - 10 Watts Max.	
Wire Connector:	Screw clamp terminal blocks, 16~26 AWG		
DC Input Isolation (In/Out):	1.5KV		
Surge Protection:	PTC Thermistors, zener diodes and varistors		
Overcurrent Protection:	0.5A (Automatic recovery)		
Operating Temperature:	-40˚C to +70˚C (-40˚F to +158˚F), 95% non-condensing		
Dimensions:	4.93"(H) x 2.89"(W) x 3.5"(D) (125mm x 73mm x 89mm) - Not including connectors		
Warranty:	Lifetime - Visit www.fiberopticlink.com for warranty information and coverage details		

Ordering Information

Mode	Connector	Fibers	Distance	Description	Part Number
Multimode	SC	Dual Fiber	2km / 1.2mi	Transmitter	**ADIO-010TX-DR-NO-03-1**
				Receiver	**ADIO-010RX-DR-NO-03-1**
	ST	Dual Fiber	2km / 1.2mi	Transmitter	**ADIO-010TX-DR-NO-04-1**
				Receiver	**ADIO-010RX-DR-NO-04-1**
Single-mode	SC	Dual Fiber	20km / 12.4 mi.	Transmitter	**ADIO-010TX-DR-NO-40-1**
				Receiver	**ADIO-010RX-DR-NO-40-1**
			60km / 37 mi.	Transmitter	**ADIO-010TX-DR-NO-41-1**
				Receiver	**ADIO-010RX-DR-NO-41-1**
			120km / 74 mi.	Transmitter	**ADIO-010TX-DR-NO-45-1**
				Receiver	**ADIO-010RX-DR-NO-45-1**
	ST	Dual Fiber	20km / 12.4 mi.	Transmitter	**ADIO-010TX-DR-NO-50-1**
				Receiver	**ADIO-010RX-DR-NO-50-1**
			60km / 37 mi.	Transmitter	**ADIO-010TX-DR-NO-51-1**
				Receiver	**ADIO-010RX-DR-NO-51-1**
			120km / 74 mi.	Transmitter	**ADIO-010TX-DR-NO-55-1**
				Receiver	**ADIO-010RX-DR-NO-55-1**
	SC	Single Fiber	20km / 12.4 mi.	Side A	**ADIO-010TX-DR-NO-10-1**
				Side B	**ADIO-010RX-DR-NO-11-1**
			60km / 37 mi.	Side A	**ADIO-010TX-DR-NO-14-1**
				Side B	**ADIO-010RX-DR-NO-15-1**

- A complete system requires both a **Transmitter** unit and a **Receiver** unit
- Digital Inputs can be ordered as 5-12 VDC voltage sensing by replacing **DR** with **12**, contact Sales for availability and pricing
- Digital Inputs can be ordered as 24-48 VDC voltage sensing by replacing **DR** with **48**, contact Sales for availability and pricing
- Relay Outputs can be ordered normally closed by replacing **NO** with **NC**, contact Sales for availability and pricing
- For Single Fiber Systems, the Transmitter is **Side A** (T-1310/R-1550) and the Receiver is **Side B** (T-1550/R-1310)

Contact

By Mail:	ATN: Sales RLH Industries, Inc. 936 N. Main Street Orange, CA 92867	
By Phone:	Local	714-532-1672
Sales/Sevice	Toll Free	800-877-1672
Mon - Fri, 6am - 6pm, PST		866-DO-FIBER
By Email:	info@fiberopticlink.com	
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Support

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