RLH Industries, Inc.

USER GUIDE

U-088 2017A-0608

Gigabit Ethernet Media Converter

SYSTEM INSTALLATION INFORMATION

ETHERNET OVER FIBER

Gigabit Ethernet Media Converter

Introduction

The RLH Gigabit Ethernet over fiber system converts a copper 10Base-T or 100/1000Base-TX to a multimode or single-mode 1000Base-SX/LX fiber optic transmission signal. The converter transmits the data signals over fiber optic cable, permitting network extensions over long distances, and provides electrical isolation between both ends of the network.

The Gigabit Media Converter is DIN/Wall mounted. It may be used as a system, with a module at each end, or the fiber optic cable may be connected directly to any 1000Base-SX/LX compatible device.

Key Features

- Ideal for critical, high voltage, remote or un-manned locations that must remain operating 24/7/365

- Compatibility with IEEE 802.3/u/ab/z

- RJ45 port with 10/100/1000 auto-negotiation

- MDI/MDIX Auto-Crossover supported

- DIP Switch with optional settings

- Includes link alarm and store and forward

- Jumbo frame 9k bytes

- Extends network span up to 500m on multimode and up to 74 miles (120km) on single-mode fiber

- Convenient LED status indicators

- Dual and Single (bi-directional) fiber models available

- DIN rail and wall mount with brackets included

- Limited Lifetime Warranty

Contents

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

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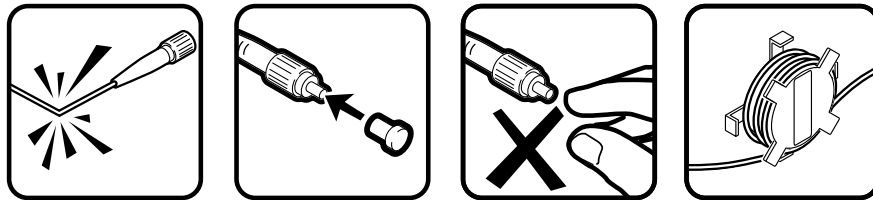
- Do not bend fiber cable sharply. Use gradual and smooth bends to avoid damaging glass fiber.
- Keep dust caps on fiber optic connectors at all times when disconnected.
- Do not remove dust caps from unused fiber.
- Keep fiber ends and fiber connectors clean and free from dust, dirt and debris. Contamination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

Applications

Network 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. Use of all-dielectric fiber optic cable instead of copper completely eliminates the presence of a remote ground, which dramatically increases safety of personnel and reliability of equipment. By utilizing fiber optic cable, the Gigabit Ethernet Media Converter provides absolute electrical isolation between both ends of the network.

Copper twisted pair Ethernet is limited to 100m/328ft without extenders. Using fiber optic cable provides long distance service up to 120km/74mi. without any additional equipment. Optical fiber is immune 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.
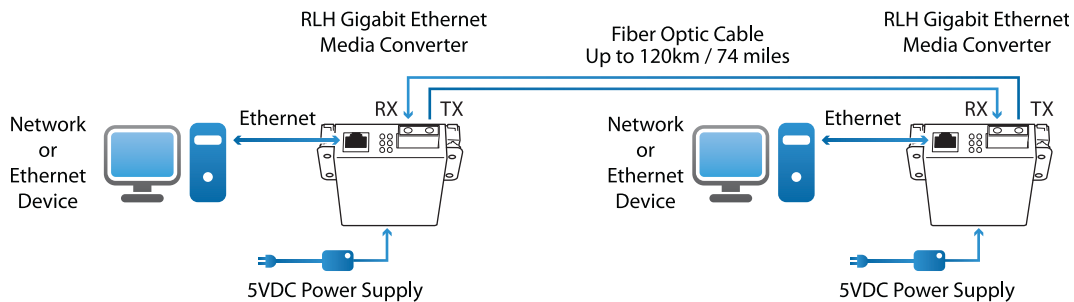
Typical Ethernet System Diagram

Installation

Prior to installation:

- Check for shipping damage
- Check the contents to ensure correct model and fiber type
- Have a clean, dry, DIN rail or wall mount installation environment ready

Required for installation:

- 115VAC local power source

The Media Converter uses the 115VAC to 5VDC power supply provided.

Note: In order to maintain high voltage isolation, Units at each end must be powered from separate isolated power sources.
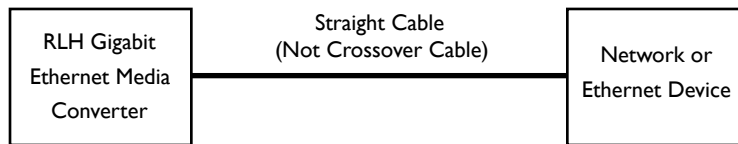
Connect fiber optic cable

Multimode and single-mode media converters are equipped with dual ST or SC female optical connectors, or a single bi-directional connector, depending on the model.

Connect fibers to the TX (Transmit) and RX (Receive) optical connectors. The other end of the fiber may be connected to another media converter or any compatible 1000SX/LX Ethernet device. For dual fiber models, the TX connector must go to the RX connector on the unit at the other end. For bi-directional, single fiber models, there is only one connector used for transmitting and receiving.

**Note**: Fiber cable should always be routed loosely avoiding tight bends.

Connect Ethernet cable

The 10/100/1000Base-T UTP connection is made via the RJ45 port located next to the status LEDs. The TP port is auto-negotiating and requires no additional settings. Use a standard CAT-5e or CAT-6 Ethernet cable terminated in standard straight through configuration when connecting network equipment to the converter.

```
┌─────────────────┐   Straight Cable        ┌─────────────────┐
│  RLH Gigabit    │  (Not Crossover Cable)  │   Network or    │
│ Ethernet Media  │─────────────────────────│ Ethernet Device │
│   Converter     │                         │                 │
└─────────────────┘                         └─────────────────┘
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Ethernet Connection Block Diagram

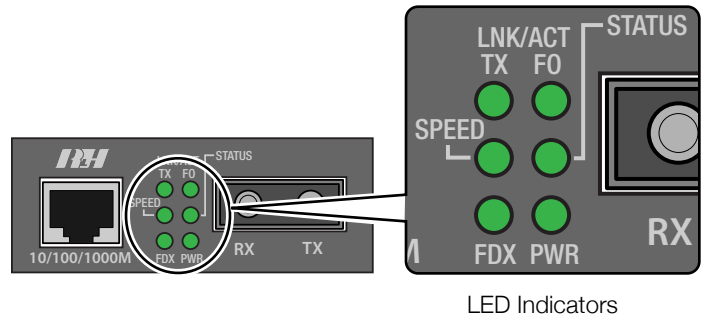| RJ-45 Pin No.	10/100Base-T Signal	1000Base-T Signal
1	Transmit+	BI_DA+
2	Transmit-	BI_DA-
3	Receive+	BI_DB+
4	Unused	BI_DC+
5	Unused	BI_DC-
6	Receive-	BI_DB-
7	Unused	BI_DD+
8	Unused	BI_DD-

RJ-45 Jack

PIN 8   PIN 1
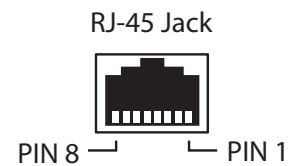
**10/100/1000 Ethernet Pin Diagram**

Connect Power

Connect the included 5VDC power supply to the power input port, then connect the AC plug to a 115VAC power source.

LED Indicators

LED Indicators

Indicator	Color	LED	Description
TX LNK/ACT	GRN	OFF	No remote device detected on TP port
		ON	TP connection with remote device is OK
		Blinking	TP traffic is present
FO LNK/ACT	GRN	OFF	No remote device detected on fiber optic port
		ON	Fiber optic connection with remote device is OK
		Blinking	Fiber optic port traffic is present
SPEED	GRN	OFF	TP port is operating at 10M or there is no link
		ON	TP port is operating at 100M
	ORG	ON	TP port is operating at 1000M
STATUS	GRN	ON	TP or fiber optic link is up
	ORG	ON	TP or fiber optic link is down
FDX	GRN	ON	TP port is full duplex
		OFF	TP port is half duplex
PWR	GRN	ON	Power is OK
		OFF	No power is present

DIP Switch Settings

DIP Switch
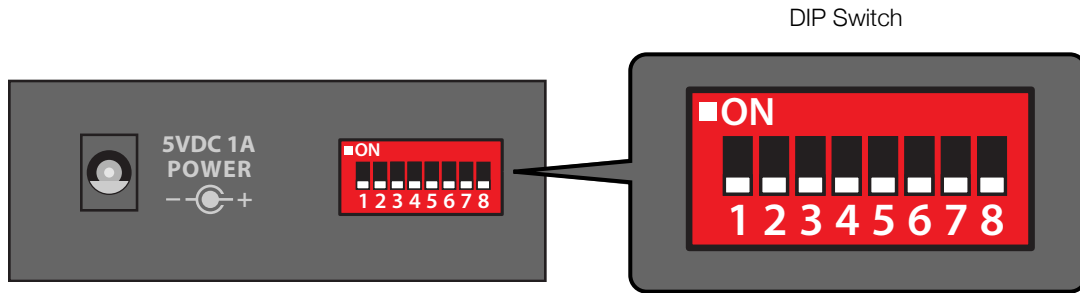
Switch No.	Function	OFF	ON
1	TP Auto-Negotiation	Disable	Enable
2	Manual TP Speed	10M	100M
3	Manual TP Speed	N/A	1000M
4	Duplex Mode	Half	Full
5	Flow Control	Disable	Enable
6	Fiber Optic Mode	Force	Auto
7	Link Alarm	Disable	Enable
8	Transmission Mode	Store & Forward	Pass-Through

Note:

- Before changing TP speed, duplex mode or flow control setting, set switch 1 to OFF.
- When setting TP speed manually to 10M or 100M with switch 2, switch 3 must be OFF.
- The 1000Mbps speed supports full duplex mode only.
- When switch 8 set to ON, the TP speed is forced to 1000M, and full duplex and flow control are disabled.

Troubleshooting

If trouble is encountered, verify all copper and fiber connections. Refer to the LED Indicators on of the unit. They show availability of power, modes of operation, and data being received by the fiber and TP ports. If trouble persists, replace the unit and retest. If technical assistance is required, contact the RLH Industries, inc. technical support department:

800-877-1672 (6 am to 6 pm- PST),
or call our 24/7 Technical/Customer Service: (714) 366-2503 or (714) 457-5740

Ordering Information

Each Gigabit Ethernet Media Converter is identified by the part number.

Description	Side	Distance	Wavelength	Fiber	Part Number
Multimode ST	-	500m/1804 ft.	1310nm	62.5µm	**RLH-EGD-04-3**
Multimode SC	-	500m/1804 ft.	1310nm	62.5µm	**RLH-EGD-03-3**
Bi-Directional Multimode SC	A	500m/1804 ft.	Tx 1310nm / Rx 1550nm	62.5µm	**RLH-EGD-01-3**
	B	500m/1804 ft.	Tx 1550nm / Rx 1310nm	62.5µm	**RLH-EGD-02-3**
Single-mode ST	-	20km/12.4mi.	1310nm	8~9µm	**RLH-EGD-50-3**
	-	60km / 37mi.	1310nm	8~9µm	**RLH-EGD-51-3**
	-	120km / 74 mi.	1550nm	8~9µm	**RLH-EGD-55-3**
Single-mode SC	-	20km/12.4mi.	1310nm	8~9µm	**RLH-EGD-40-3**
	-	60km / 37mi.	1310nm	8~9µm	**RLH-EGD-41-3**
	-	120km / 74 mi.	1550nm	8~9µm	**RLH-EGD-45-3**
Bi-Directional Single-mode SC	A	20km/12.4mi.	Tx 1310nm / Rx 1550nm	8~9µm	**RLH-EGD-10-3**
	B	20km/12.4mi.	Tx 1550nm / Rx 1310nm	8~9µm	**RLH-EGD-11-3**
	A	60km / 37mi.	Tx 1310nm / Rx 1550nm	8~9µm	**RLH-EGD-14-3**
	B	60km / 37mi.	Tx 1550nm / Rx 1310nm	8~9µm	**RLH-EGD-15-3**

▶ Bidirectional single fiber models require an **A** Side and **B** Side unit for a complete system.

▶ Bidirectional optic wavelength may be special ordered. Contact factory for availability.

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

General Specifications

Protocols	1000BASE-SX/LX, 10BASE-T, or 100/1000BASE-TX	
Standards Compliance	IEEE 802.3, IEEE 802.3u , IEEE 802.3ab, IEEE 802.3z	
	UL60950-1, FCC Part 15, Class A,VCCI	
	IEC61000-4-8, IEC61000-4-11	
	Generally conforms to electro magnetic compatibility requirements for outdoor equipment	
Copper Connector	RJ45 UTP, Auto Negotiation, MDI/MDIX Auto-Crossover supported	
Copper Distance	100m / 328 feet	
Fiber connector	100BaseFX ports, ST or SC connectors, single or multi mode	
	Dual fiber or single fiber (bi-directional) connectors (multimode single fiber is SC only)	
LED Indicators	**TX LNK/ACT**	GRN/ON-TP port connected, OFF-no connection, Blink-traffic detected
	FO LNK/ACT	GRN/ON-Fiber optic port connected, OFF-no connection, Blink-traffic detected
	SPEED	GRN/ON-TP port at 100, OFF-TP port at 10M or no connection ORG/ON-TP port at 1000M
	STATUS	GRN/ON-TP or fiber ports are up ORG/ON-TP or fiber ports are down
	FDX	GRN/ON-TP port at full duplex, OFF-TP port at half duplex
	PWR	GRN/ON-Power is OK, OFF-Power is down
Power Input	115VDC to 5VDC @ 3W, power supply included	
Dimensions	H3.6" x W2.8" x 1.1" not including DIN/wall mount bracket	
Temperature	Operating	32°F to + 122°F (0°C to +50°C)
	Storage	-14°F to +158°F (-10°C to +70°C)
Humidity	5~90% non-condensing	
Warranty	Limited Lifetime	*Visit* www.fiberopticlink.com *for warranty details*