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LHC201A/LHC202A, version 1

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**BLACK BOX**  
NETWORK SERVICES

LHC201A  
LHC202A

## Pure Networking™ Fast Ethernet Media Converters

Link a 10/100BASE-TX segment to a 100BASE-FX segment on your network, and extend the 328 foot (100 m) distance limit of copper-based Ethernet.



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### FEDERAL COMMUNICATIONS COMMISSION AND INDUSTRY CANADA RADIO FREQUENCY INTERFERENCE STATEMENTS

Class B Digital Device. This equipment has been tested and found to comply with the limits for a Class B computing device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. This equipment generates, uses, and can radiate radio frequency energy, and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. If this equipment does cause harmful interference to radio or telephone reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult an experienced radio/TV technician for help.

#### **Caution:**

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

To meet FCC requirements, shielded cables and power cords are required to connect this device to a personal computer or other Class B certified device.

This digital apparatus does not exceed the Class B limits for radio noise emission from digital apparatus set out in the Radio Interference Regulation of Industry Canada.

*Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de classe B prescrites dans le Règlement sur le brouillage radioélectrique publié par Industrie Canada.*

### Normas Oficiales Mexicanas (NOM) Electrical Safety Statement INSTRUCCIONES DE SEGURIDAD

1. Todas las instrucciones de seguridad y operación deberán ser leídas antes de que el aparato eléctrico sea operado.
2. Las instrucciones de seguridad y operación deberán ser guardadas para referencia futura.
3. Todas las advertencias en el aparato eléctrico y en sus instrucciones de operación deben ser respetadas.
4. Todas las instrucciones de operación y uso deben ser seguidas.
5. El aparato eléctrico no deberá ser usado cerca del agua—por ejemplo, cerca de la tina de baño, lavabo, sótano mojado o cerca de una alberca, etc.
6. El aparato eléctrico debe ser usado únicamente con carritos o pedestales que sean recomendados por el fabricante.
7. El aparato eléctrico debe ser montado a la pared o al techo sólo como sea recomendado por el fabricante.
8. Servicio—El usuario no debe intentar dar servicio al equipo eléctrico más allá a lo descrito en las instrucciones de operación. Todo otro servicio deberá ser referido a personal de servicio calificado.
9. El aparato eléctrico debe ser situado de tal manera que su posición no interfiera su uso. La colocación del aparato eléctrico sobre una cama, sofá, alfombra o superficie similar puede bloquea la ventilación, no se debe colocar en libreros o gabinetes que impidan el flujo de aire por los orificios de ventilación.
10. El equipo eléctrico deber ser situado fuera del alcance de fuentes de calor como radiadores, registros de calor, estufas u otros aparatos (incluyendo amplificadores) que producen calor.
11. El aparato eléctrico deberá ser conectado a una fuente de poder sólo del tipo descrito en el instructivo de operación, o como se indique en el aparato.

12. Precaución debe ser tomada de tal manera que la tierra física y la polarización del equipo no sea eliminada.
13. Los cables de la fuente de poder deben ser guiados de tal manera que no sean pisados ni pellizcados por objetos colocados sobre o contra ellos, poniendo particular atención a los contactos y receptáculos donde salen del aparato.
14. El equipo eléctrico debe ser limpiado únicamente de acuerdo a las recomendaciones del fabricante.
15. En caso de existir, una antena externa deberá ser localizada lejos de las líneas de energía.
16. El cable de corriente deberá ser desconectado del cuando el equipo no sea usado por un largo periodo de tiempo.
17. Cuidado debe ser tomado de tal manera que objetos líquidos no sean derramados sobre la cubierta u orificios de ventilación.
18. Servicio por personal calificado deberá ser provisto cuando:
  - A: El cable de poder o el contacto ha sido dañado; u
  - B: Objetos han caído o líquido ha sido derramado dentro del aparato; o
  - C: El aparato ha sido expuesto a la lluvia; o
  - D: El aparato parece no operar normalmente o muestra un cambio en su desempeño; o
  - E: El aparato ha sido tirado o su cubierta ha sido dañada.

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### 1. Specifications

**Maximum Distance** — LHC201A: Multimode fiberoptic: 2 km,  
LHC202A: Single-mode fiberoptic: 20 km

**Standards** — IEEE 802.3, IEEE 802.3u

**Connectors** — (1) dual SC, (1) RJ-45

**Temperature Tolerance** — Operating: +32 to +104° F (0 to +40° C);  
Storage: -40 to +158° F (-40 to +70° C)

**Humidity** — Operating: 10 to 90% relative humidity, noncondensing;  
Storage: 5 to 90% relative humidity, noncondensing

**Power** — External: 100–240 VAC, 50–60 Hz, 0.3 A;  
Output: 9 VDC, 0.6 A, 5.4 W max.

**Size** — 1.1"H x 3.7"W x 2.9"D (2.7 x 9.4 x 7.4 cm)

**Weight** — 1.1 lb. (0.5 kg)



# Chapter 2: Overview

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## 2. Overview

### 2.1 Introduction

The Pure Networking Fast Ethernet Media Converters connect a 10/100BASE-TX network segment and a 100BASE-FX network segment. Use these units to join a 10/100BASE-TX segment to a 100BASE-FX segment on your network, or use them in pairs to extend the 328-foot (100-m) distance limitation of copper based Ethernet.

The converters also feature LFP (Link Fault Passthrough, as described in Section 5.3).

Two converter models are available:

- LHC201A: This fiber SC media converter transmits/receives data by 1310-nm short-wave laser over multimode fiber.
- LHC202A: This fiber SC media converter transmits/receives data by 1310-nm short-wave laser over single-mode fiber.

### 2.2 Features

- Complies with 802.3u 10/100BASE-TX and 100BASE-FX standards.
- Provides one SC connector and one RJ-45 connector.
- Supports autonegotiation of duplex mode on the twisted-pair port.
- Supports autonegotiation of 10/100 Mbps and auto MDI/MDI-X for the twisted-pair port.
- Supports Link Fault Passthrough (LFP) and Far End Fault (FEF) functions.
- Extends fiber distance up to 2 km for multimode fiber and 20 km for single-mode fiber.
- Easy-to-view LED indicators provide status to easily monitor network activity.
- Uses an external power supply (included).

### 2.3 What's Included

Your package should contain the following items. If anything is missing or damaged, contact Black Box Technical Support at 724-746-5500 or [info@blackbox.com](mailto:info@blackbox.com).

- (1) Pure Networking Fast Ethernet Media Converter
- (1) DC adapter
- This user's manual

### 2.4 Connectors and Network Cables Supported

The connectors and network cables supported by the converter are listed as follows.

- Connectors: RJ-45, SC.
- Network cables: CAT5 twisted-pair (TP), 1310-nm 62.5/125- $\mu$ m, 50/125- $\mu$ m single-mode/multimode fiber.

Table 2-1. Connectors and network cable supported.

Part Number	Interface	Transmission Distance	Transmission Media	Output Center Wavelength
LHC201A	RJ-45 TP and SC fiber	2 km	Multimode fiber, TP	1310 nm
LHC202A	RJ-45 TP and SC fiber	20 km	Single-mode fiber, TP	1310 nm

### 2.5 Hardware Description

Figures 2-1 through 2-4 show the front and back panels of the media converters. Tables 2-2 and 2-3 describe their components.

#### 2.5.1 LHC201A

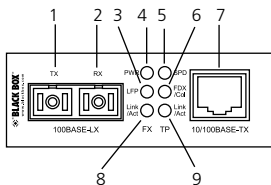


Figure 2-1. Front panel of the LHC201A.

## Chapter 2: Overview

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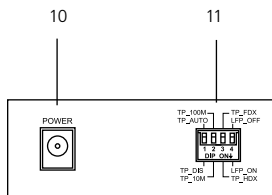


Figure 2-2. Back panel of the LHC201A.

Table 2-2. LHC201A components.

Number	Component	Description
1, 2	(1) dual SC connector (TX/RX)	Links to multimode fiber segment
3, 4, 5, 6, 8, 9	(6) LEDs	PWR, LFP, LINK/ACT FX, SPD, FDX/COL, LINK/ACT TP
7	RJ-45 connector	Connects to 10/100BASE-TX device
10	(1) barrel connector	Links to power
11	(1) 4-position DIP switch	TP-Auto or TP-Dis, TP-100M or TP10M, TP FDX or TP-HDX, LFD-ON or LFD-OFF

\*See Tables 5-1 and 5-2 for LED and DIP switch functions.

### 2.5.2 LHC202A

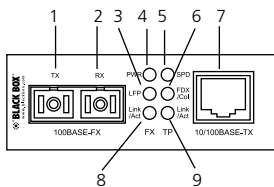


Figure 2-3. Front panel of the LHC202A.

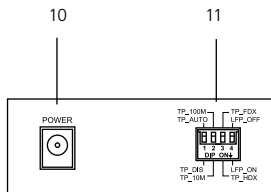


Figure 2-4. Back panel of the LHC202A.

## Chapter 2: Overview

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Table 2-3. LHC202A components.

Number	Component	Description
1, 2	(1) dual SC connector (TX/RX)	Links to single-mode fiber segment
3, 4, 5, 6, 8, 9	(6) LEDs	PWR, LFP, LINK/ACT FX, SPD, FDX/COL, LINK/ACT TP
7	RJ-45 connector	Connects to 10/100BASE-TX device
10	(1) barrel connector	Links to power
11	(1) 4-position DIP switch	TP-Auto or TP-Dis, TP-100M or TP10M, TP FDX or TP-HDX, LFD-ON or LFD-OFF

*\*See Tables 5-1 and 5-2 for LED and DIP switch functions.*

### 3. Configuration

To expand a Fast Ethernet network, you can use the converter as described in the following examples:

1. Place two converters back to back between the end devices as shown in Figure 3-1.

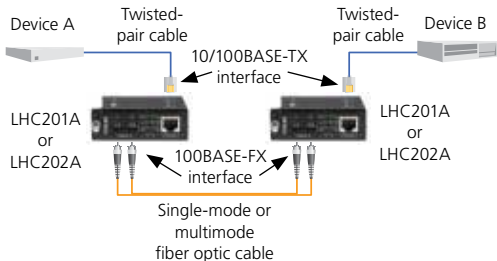


Figure 3-1. Application using two media converters.

*NOTE: Use two LHC201A Media Converters or two LHC202A media converters to expand your network.*

## Chapter 3: Configuration

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2. Place one converter directly between a 10/100BASE-TX network segment and a 100BASE-FX network segment as shown in Figure 3-2.

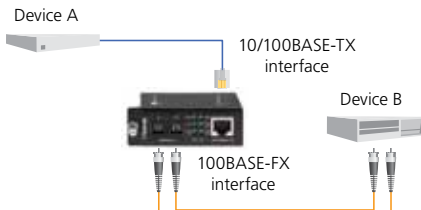


Figure 3-2. Application using one LHC201A or one LHC202A.

### 4. Installation

#### 4.1 Typical Installation

1. The SC fiber connector of an LHC201A transmits/receives data by 1310-nm short-wave laser on multimode fiber.
2. The SC fiber connector of an LHC202A transmits/receives data by 1310-nm short-wave laser on single-mode fiber.

Figure 4-1 shows a typical installation.

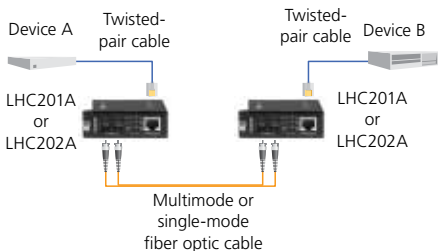


Figure 4-1. Transmits and receives data on different fibers.

*NOTE: The units work in pairs. You have to use either two LHC201A converters or two LHC202A converters.*

#### 4.2 Installation Procedure

Use a fiber cable to connect two converters, or connect a converter with a 100BASE-FX device.

1. Connect a converter to a 10/100BASE-TX device (hub or switch).
  - Make sure that the CAT5 twisted pair cable between the 10/100BASE-TX device and the converter is less than 328 feet (100 meters) long.
  - Connect one end of the CAT5 twisted pair cable to the RJ-45 jack on the converter and the other end of the cable to the RJ-45 jack on the 10/100BASE-TX device.



## Chapter 4: Installation

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2. Connect two converters or a converter and a 100BASE-FX device.
  - Use an SC fiber cable to connect the two converters' SC connector or the SC connector of a converter and a 100BASE-FX device.
3. Turn on the power.

### 5. Operation

#### 5.1 LEDs on the Media Converters

The converters have real-time LED indicators that can provide real-time status reports. Just look at the LEDs to determine the link status. Figure 5-1 shows the LEDs and Table 5-1 describes their functions.

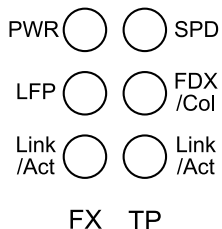


Figure 5-1. LEDs.

## Chapter 5: Operation

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Table 5-1. LED functions.

Name	Status	Description	
PWR	ON	Power to the unit is ON.	
	OFF	Power to the unit is OFF.	
FX	LFP	ON	The Link Fault Passthrough (LFP) function is enabled.
		OFF	The Link Fault Passthrough (LFP) function is disabled.
	Link/Act	ON	There is a valid link.
		Flashing	The converter is receiving or transmitting data from the fiberoptic connector.
		OFF	There is no valid link.
	TP	SPD	ON
OFF			The TP port is connected to 10BASE-T or is not connected.
FDX/Col		ON	The TP port is operating in full-duplex mode.
		Flashing	There is a collision.
		OFF	The TP port is operating in half-duplex mode.
Link/Act		ON	There is a valid link.
		Flashing	The converter is receiving or transmitting data from the TP port.
		OFF	There is no connection on the port.

### 5.2 Switch

The converters have a 4-position DIP switch. Figure 5-2 shows the DIP switch and Table 5-2 describes its functions.

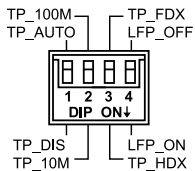


Figure 5-2. DIP switch.

## Chapter 5: Operation

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Table 5-2. DIP switch functions.

Switch Position	Name	Position	Description
1	TP-AUTO	UP	The TP port operates in autonegotiation mode.
	TP-DIS	DOWN	The TP port operates in FORCE mode.
2	TP-100M	UP	The TP port operates in 100BASE-TX mode.
	TP-10M	DOWN	The TP port operates in 10BASE-T mode.
3	TP_FDX	UP	The TP port operates in full-duplex mode.
	TP_HDX	DOWN	The TP port operates in half-duplex mode.
4	LFP_OFF	UP	The Link Fault Passthrough function is disabled.
	LFP_ON	DOWN	The Link Fault Passthrough function is enabled.

Some common configurations are shown in Table 5-3.

Table 5-3. Common configurations.

Device Mode	Switch
TP: AUTO; LFP ON	TP_AUTO, TP_100M, TP_FDX, LFP_ON
TP: AUTO; LFP OFF	TP_AUTO, TP_100M, TP_FDX, LFP_OFF
TP: FORCE; 100M FULL; LFP ON	TP_DIS_TP_100M, TP_FDX, LFP_ON
TP: FORCE; 100M FULL; LFP OFF	TP_DIS_TP_100M, TP_FDX, LFP_OFF
TP: FORCE; 100M HALF; LFP ON	(TP_DIS or TP_AUTO), TP_100M, TP_HDX, LFP_ON
TP: FORCE; 100M HALF; LFP OFF	(TP_DIS or TP_AUTO), TP_100M, TP_HDX, LFP_OFF
TP: FORCE; 10M FULL; LFP ON	TP_DIS, TP_10M, TP_FDX, LFP_ON
TP: FORCE; 10M FULL; LFP OFF	TP_DIS, TP_10M, TP_FDX, LFP_OFF
TP: FORCE; 10M HALF; LFP ON	(TP_DIS or TP_AUTO), TP_10M, TP_HDX, LFP_ON
TP: FORCE; 10M HALF; LFP OFF	(TP_DIS or TP_AUTO), TP_10M, TP_HDX, LFP_OFF

**NOTES:**

1. We suggest leaving the switches on TP\_AUTO, TP\_100M, TP\_FDX, and LFP\_ON, because this configuration is suitable for most applications.
2. The converter must be powered for the new configuration to take effect.

## Chapter 5: Operation

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### 5.3 Link Fault Pass Through Function

In common situations, when one side of the link fails, the other side continues transmitting packets and waits for a response that never arrives from the disconnected side.

With the Link Fault Passthrough function enabled (optional with switch LFP), the TP port and FX port of the same converter will tell each other the fault link status so that when one side of the link fails, the other side will force the link to shut down as soon as noticed. See Figure 5-3.

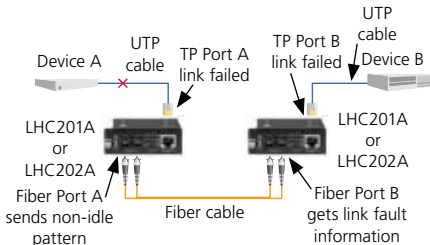


Figure 5-3. Link Fault Passthrough.

If link fail happens on TP port (A), the FX port (A) sends a non-idle pattern to notice the FX port (B). The FX port (B) then forces its TP port (B) to link failed after receiving the non-idle pattern. Link status LED will also be off for both converters and devices as shown in Table 5-4.

Table 5-4. Link LED functions.

	Link LED		
Device A	OFF		
Device B	OFF		
	FX_LFP	FX_Link/Act	TP_Link/Act
Converter A	ON	OFF	OFF
Converter B	ON	OFF	OFF



## Chapter 6: Troubleshooting

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### 6. Troubleshooting

#### 6.1 Calling Black Box

If you determine that your Pure Networking Fast Ethernet Media Converter is malfunctioning, do not attempt to alter or repair the unit. It contains no user-serviceable parts. Contact Black Box Technical Support at 724-746-5500 or [info@blackbox.com](mailto:info@blackbox.com).

Before you do, make a record of the history of the problem. We will be able to provide more efficient and accurate assistance if you have a complete description, including:

- the nature and duration of the problem.
- when the problem occurs.
- the components involved in the problem.
- any particular application that, when used, appears to create the problem or make it worse.

#### 6.2 Shipping and Packaging

If you need to transport or ship your Pure Networking Fast Ethernet Media Converter:

- Package it carefully. We recommend that you use the original container.
- If you are returning the unit, make sure you include everything you received with it. Before you ship for return or repair, contact Black Box to get a Return Authorization (RA) number.



## NOTES

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