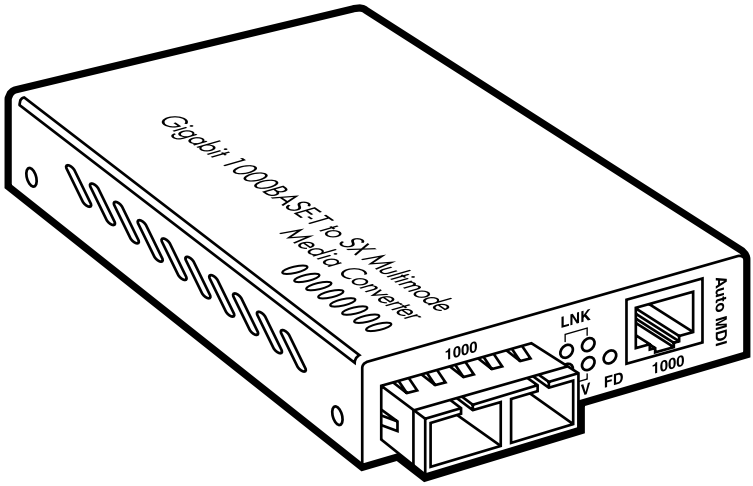
1000 Park Drive • Lawrence, PA 15055-1018 • 724-746-5500 • Fax 724-746-0746

FEBRUARY 2005
LGC1713A-SX
LGC1713A-LX

1000BASE-T to MM SX Media Converter
1000BASE-T to SM LX Media Converter



CUSTOMER SUPPORT INFORMATION

Order **toll-free** in the U.S.: Call **877-877-BBOX** (outside U.S. call **724-746-5500**)
FREE technical support 24 hours a day, 7 days a week: Call **724-746-5500** or fax **724-746-0746**
Mailing address: **Black Box Corporation**, 1000 Park Drive, Lawrence, PA 15055-1018
Web site: **www.blackbox.com** • E-mail: **info@blackbox.com**

FEDERAL COMMUNICATIONS COMMISSION
AND
INDUSTRY CANADA
RADIO FREQUENCY INTERFERENCE STATEMENTS

This equipment generates, uses, and can radiate radio-frequency energy, and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio communication. It has been tested and found to comply with the limits for a Class A computing device in accordance with the specifications in Subpart B of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when the equipment is operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be necessary to correct the interference.

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

This digital apparatus does not exceed the Class A 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 la classe A prescrites dans le Règlement sur le brouillage radioélectrique publié par Industrie Canada.

EUROPEAN UNION DECLARATION OF CONFORMITY

This equipment complies with the requirements of the European EMC Directive 89/336/EEC.

CE

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 connectado 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 fisica 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 lineas de energia.

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 objectos liquidos 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: Objectos 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.

TRADEMARKS USED IN THIS MANUAL

Any trademarks mentioned in this manual are acknowledged to be the property of the trademark owners.

Contents

1. Specifications

Standards: IEEE 802.3ab 1000BASE-T Gigabit Ethernet, 802.3z 1000BASE-SX/LX Gigabit Ethernet, IEEE 802.3x Full Duplex Flow Control

Data Transfer Rate: Gigabit Ethernet: 2000 Mbps (full duplex)

Maximum Distance: Using 1000BASE-T cable: 4-pair UTP Category 5, up to 328 ft. (100 m);
Using multimode fiberoptic cable: 726 ft. (221.3 m);
Using single-mode fiberoptic cable: 33,000 ft. (10 km)

User Controls: (1) 4-position DIP switch

Connectors: LGC1713A-SX: (2) MM SX, (1) RJ-45;
LGC1713A-LX: (2) SM LX, (1) RJ-45

Indicators: (6) LEDs: (1) Power, (1) FD, (2) LNK, (2) RCV

Temperature Tolerance: Operating: 32 to 122°F (0 to 50°C);
Storage: -4 to +158°F (-20 to +70°C)

Humidity: Operating: 10 to 80%; Storage: 5 to 90%

Power: External power supply: 12 VDC @ 0.8 amps, 50–60 Hz

Size: 2.3"H x 7.4"W x 10.9"D (5.8 x 18.8 x 27.7 cm)

Weight: 0.3 lb. (0.1 kg)

2. Overview

2.1 Introduction

The 1000BASE-T to MM SX (LGC1713A-SX) or SM LX (LGC1713A-LX) Media Converters connect copper and fiber Gigabit Ethernet segments together. These switching media converters are designed primarily for larger workgroups, demanding higher speed and broader bandwidth, and requiring migration and expansion from a copper-based Gigabit to a fiber-based Gigabit network.

The converters comply with IEEE 802.ab 1000BASE-T and 802.3z 1000BASE-SX/LX Gigabit Ethernet standards. Via auto-MDI/MDI-X selection, the converters automatically identify and adjust to whether the RJ-45 cable you connect is either crossover or straight-through cable. The RJ-45 port also corrects automatically for polarity.

Both converter models have an SC fiber connector for either multimode or single-mode operation and an RJ-45 connector for twisted-pair. The converters support full duplex and half-duplex modes for 1000BASE-SX/LX fiber.

Over multimode cable, the MM SX converter extends the distance up to 726 feet (221.3 m). Over single-mode cable, the SM LX converter increases the distance up to 33,000 ft. (10 km).

Choose either NWay or duplex settings, or run local and remote loopback tests via a 4-position DIP switch. LEDs provide quick and easy device status.

The converter can function as a high-speed bridge between switches, as a server aggregation for an enterprise or LAN, or as a high-speed dedicated link within a campus network. Examples 1 to 3 describe these typical applications. Other applications are possible. If your application is different, call Tech Support for help with setting it up.

Example 1

The converter functions as a high-speed bridge between switches, creating increased capacity for each user (node) on the LAN. It provides a 1000-Mbps full duplex link to a variety of Gigabit network devices within a LAN. See Figure 2-1.

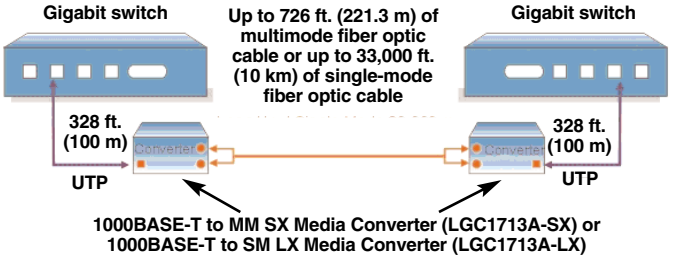


Figure 2-1. Bridge application.

Example 2

The converter works as a server aggregation for an enterprise or LAN configuration. It provides a 1000-Mbps full duplex link to 10/100 switch workgroups located on separate floors within a single building. See Figure 2-2.

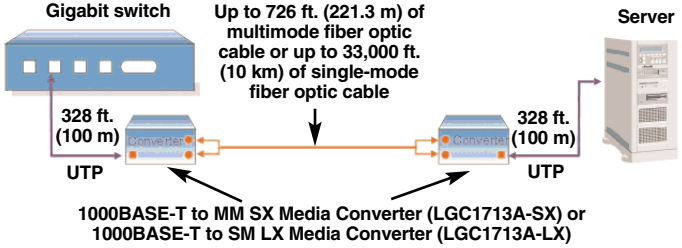


Figure 2-2. Server aggregation application.

Example 3

Use the converter as a high-speed dedicated link within a campus network configuration. It provides a 1000-Mbps full duplex link to a remote networking node. See Figure 2-3.

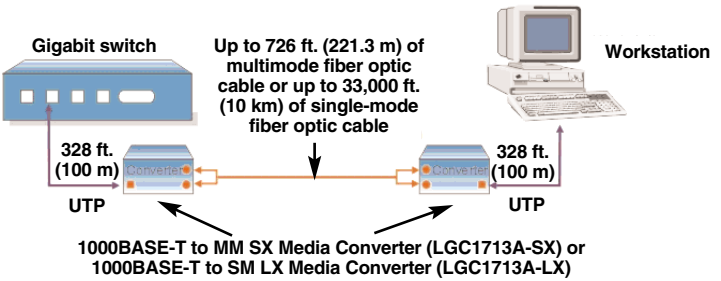


Figure 2-3. Dedicated link application.

2.2 What's Included

Your package should contain the following items. If anything is missing or damaged, please contact Black Box at 724-746-5500.

- (1) 1000BASE-T to MM SX Media Converter or
  (1) 1000BASE-T to SM LX Media Converter
- (1) AC power adapter for an external power supply
- (1) power cable
- (4) self-adhesive rubber feet for desktop installation
- (1) CD-ROM containing this user's manual in PDF format

3. Hardware Description

3.1 Front-Panel Connectors and LEDs

Figure 3-1 shows the converter's front panel connectors and LEDs. Table 3-1 describes these components.

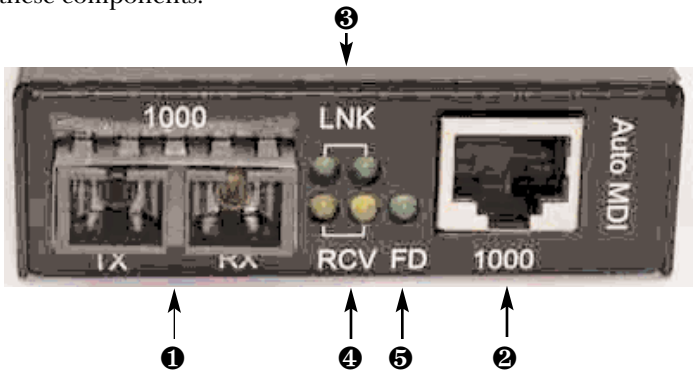


Figure 3-1. Front panel.

Table 3-1. Front-panel connectors and indicators.

Connector or Indicator	Description
❶ SC connectors	Connect single-mode or multimode fiber to this port. One connector is for TX; the other is for RX.
❷ RJ-45 connector	Connect twisted-pair cable to this port.
❸ LNK LEDs	These indicators light when a link on the connected port (fiberoptic [SC] or twisted-pair [RJ-45]) is detected.
❹ RCV LEDs	These indicators flash when data on the connected port (fiberoptic [SC] or twisted-pair [RJ-45]) is being received.
❺ FD LED	This indicator lights when the converter is operating in full duplex mode.

3.1.1 1000BASE-T Port

The 1000BASE-T port (❷ in Figure 3-1)is an RJ-45 connector. It supports 1000-Mbps network speeds and operates in full duplex transfer mode. This port also offers automatic MDI/MDI-X crossover detection that gives true plug-and-play capability—just plug in the network cable and the port will adjust according to the end node device. The RJ-45 connector is suitable for Category 5 unshielded twisted-pair (UTP) cable.

3.1.2 1000BASE-SX/LX Port

The 1000BASE-SX/LX port (❶ in Figure 3-1) is a pair of SX or LX connectors. It adds a fiber Gigabit Ethernet link to your network device. Compliant with IEEE 802.3z, this port transmits data at 1000 Mbps in full duplex mode across distances of up to 726 feet (221.3 m) over multimode fiberoptic cable (LG1713A-SX) or up to 33,000 feet (10 km) over single-mode fiberoptic cable (LG1713A-LX). The fiber port has NWay support and a pair of SC connectors.

3.2 Rear-Panel DIP Switch, Connector, and LED

Figure 3-2 shows the converter's rear-panel switch, connector, and LED. Table 3-2 describes these components.

Figure 3-2. Rear panel.

Table 3-2. Rear-panel connectors and indicators.

Switch, Connector, or LED	Description
❻ DIP switch	This 4-position switch sets NWay, local loopback, and remote loopback.
❼ Pwr LED	Lights when the unit is powered on.
❽ 12-VDC, 800-mA barrel connector	Plug the included power cable into this connector.

4. Installation

Before you install the converter, refer to **Section 2.2** and make sure your package includes everything listed. Then, start with **Section 4.1** and read all of **Chapter 4**.

4.1 Location

The site where you install the converter may greatly affect its performance. When installing, consider the following:

- Install the converter in a fairly cool and dry place. See **Chapter 1** for the acceptable temperature and humidity operating ranges.
- Install the converter in a site free from strong electromagnetic field generators (such as motors), vibration, dust, and direct exposure to sunlight.
- Leave at least 3.9" (9.9 cm) of space at the converter's front and rear for ventilation.

4.2 Auto-MDI/MDI-X Connection

The RJ-45 port is auto-MDI. The converter can auto transform to MDI-II or MDI-X, so you can make an easy connection without worrying if you are using a standard or crossover RJ-45 cable.

4.3 DIP-Switch Settings

Use the DIP switch to activate the operations described in Table 4-1.

Table 4-1. DIP-switch settings.

DIP-Switch Position	Setting	Description
1	ON*	NWay is on, so the converter will automatically set half- or full duplex mode on the fiber segment with a 1000-Mbps transmission speed.
	OFF	NWay is off, so the converter will operate using the default full duplex, 1000-Mbps setting.

Table 4-1 (continued). DIP-switch settings.

DIP-Switch Position	Setting	Description
2	ON	No function. This switch is reserved for future use.
	OFF	No function. This switch is reserved for future use, but keep the switch in the OFF position.
3	ON**	When this switch is on, LLB (Local Loopback) is enabled. The local loopback function is used to check if the copper segment is functioning properly. Put the switch in the ON position to perform the local loopback function test.
	OFF	When this switch is off, LLB is disabled. This is the default setting.
4	ON**	When this switch is on, RLB (Remote Loopback) is enabled. The remote loopback function is used to check if the fiber segment is functioning properly at the remote site. To perform the remote loopback function test, put this switch in the ON position, but disable the LLB and RLB at the locally attached converter.
	OFF	When this switch is off, RLB is disabled. This is the default setting.

NOTES

*** Setting the NWay mode is feasible while the media converter is online.**

If you experience the following problems, make sure that the NWay switch is properly set.

1. The LNK LED is not lit and the connection cannot be established.

2. The LNK LED is lit and the connection is fine, but the converter can't transmit or receive data.

3. The converter functions properly for a while, then it does not work. When you power off the converter, then power it on again, it returns to functioning properly.

**** Enabling the LLB or RLB function means that the converter's normal function will stop.**

While performing the local or remote loopback test, make sure the network has more than 50% of fully loaded traffic. Less traffic will dim the indicator.

4.4 Installing the Converter

NOTE

The devices attached to each port can be connected and operating in any sequence, but the factory-recommended procedure is as follows.

1. Power OFF the converter.

2. Set the DIP switches (ON or OFF).

3. Power ON the converter.

4. Connect the fiber links.

5. Connect the copper links.

4.5 Desktop Installation

Follow the instructions below to install the converter on a desktop.

1. Place the converter in a clean, flat, and safe position that has easy access to AC power.
2. Affix the four self-adhesive rubber feet to the converter's underside.
3. Apply AC power to the converter. (The rear-panel PWR LED should light.)

4. Connect cables from the network partner devices to the converter's front-panel ports. (The front-panel LNK LED associated with the port should light.)

You can also mount the converter on a vertical surface, such as a wall. Simply use the converter's underside as a template to measure and mark the holes' position onto the surface where you will install the converter. Then use two screws (not included) to mount the converter firmly in place.

WARNING

Install the converter away from damp or wet locations, and away from very hot surfaces. These environments can have a detrimental effect on both the converter and the cables. An ideal location is a cool, dry environment such as a typical equipment room.

4.6 Powering On the Unit

The converter uses a 12-VDC, 0.8-amp, 50–60-Hz external power supply.

1. Insert the power cable plug directly into the receptacle located on the converter's back panel.

2. Plug the power adapter into an available socket.

3. As the converter is powered on, verify that the rear-panel PWR LED is lit. If not, check that the power cable. Is it correctly and securely plugged in?

NOTE

For international use, you may need to change the AC power adapter cord. You must use a power cord that has been approved for the receptacle type and electrical current in your country.

4.7 Connecting Fiber Cables

Recommendations for what you should and should not do when installing fiber cables are listed below. Remember—cables are the defining factor in network performance.

1. Try to maintain a minimum bend radius of four times the UTP cable's diameter and 100 times the fiberoptic cable's diameter.

2. Try not to allow the cable to twist too much; this creates a strain on the internal cables.

3. Place cable ties at regular intervals, and do not overtighten them. For best results, try to avoid using cable ties with fiber.

4. Do not stretch the cable—especially in corners, in vertical cable trays, and when spanning long distances.

When connecting fiber cable to the converter's 100BASE-SX/LX port, be sure that you use the correct type (SC) connector. Follow the steps below to properly connect fiber cable.

1. Remove, but do not discard the SC port's protective rubber cover. When the converter's not connected to a fiber cable, replace the protective rubber cover to protect the optical transceivers from dust and debris.

2. Make sure that the fiber terminators are clean. You can clean the cable plugs by wiping them gently with a clean tissue or cotton ball moistened with a little rubbing alcohol. Dirty fiber terminators on fiberoptic cables will impair the quality of the light transmitted through the cable and lead to degraded performance on the port.

3. Connect one end of the cable to the converter's SC port and the other end to the other device's SC port.

NOTE

When inserting the cable, be sure the tab on the plug clicks into position so that it is properly seated.

4. Check the converter's corresponding LNK LED to make sure that the connection is detected.

WARNING

Laser radiation can be harmful to your eyes! Because invisible laser radiation may be emitted from the fiber port's aperture when no cable is connected, do not stare into the open apertures.

4.8 Connecting Copper Cables

Use 100-ohm Category 5, 5e, or 6 unshielded twisted-pair (UTP) or shielded twisted-pair (STP) cable for 1000BASE-T configurations. The pin assignments are shown in Tables 4-2 through 4-4.

Table 4-2. RJ-45 connector MDI/MDI-X signal assignments.

Pin	MDI Signal Name	MDI-X Signal Name
1	Bidirectional Data One Plus (BI_D1+)	Bidirectional Data Two Plus (BI_D2+)
2	Bidirectional Data One Minus (BI_D1-)	Bidirectional Data Two Minus (BI_D2-)
3	Bidirectional Data Two Plus (BI_D2+)	Bidirectional Data One Plus (BI_D1+)
4	Bidirectional Data Three Plus (BI_D3+)	Bidirectional Data Four Plus (BI_D4+)
5	Bidirectional Data Three Minus (BI_D3-)	Bidirectional Data Four Minus (BI_D4-)
6	Bidirectional Data Two Minus (BI_D2-)	Bidirectional Data One Minus (BI_D1-)
7	Bidirectional Data Four Plus (BI_D4+)	Bidirectional Data One Plus (BI_D1+)
8	Bidirectional Data Four Minus (BI_D4-)	Bidirectional Data Three Minus (BI_D3-)

Table 4-3. Category 6 cable (568A) pinning.

Pin	Description
1	White/Green
2	Green
3	White/Orange
4	Blue
5	White/Blue
6	Orange
7	White/Brown
8	Brown

Table 4-4. Category 6 cable (568B) pinning.

Pin	Description
1	White/Orange
2	Orange
3	White/Green
4	Blue
5	White/Blue
6	Green
7	White/Brown
8	Brown

All Category 5 UTP cables that are used for 100BASE-TX connections should also work for 1000BASE-T, providing that all four wire pairs are connected. However, for all critical connections, or for any new cable installations, we recommend that you use Category 6 cable.

The converter's 1000BASE-T RJ-45 Ethernet port fully supports autosensing and autonegotiation. Follow the steps below to connect copper cable to the converter.

1. Insert one end of Category 5 twisted-pair cable into the converter's RJ-45 port. Plug the cable's other end into a network node's RJ-45 port.

2. Check the converter's corresponding LNK LED to make sure that the connection is detected.

5. Operation

Once the converter is installed, it operates unattended. Diagnostic LEDs (see Tables 3-1 and 3-2) on the converter's front and rear panel tell you status at a glance.

6. Troubleshooting

6.1 Calling Black Box

If you determine that your 1000BASE-T to MM SX or SM LX Media Converter is malfunctioning, do not attempt to alter or repair the unit. It contains no user-serviceable parts. Contact Black Box at 724-746-5500.

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 1000BASE-T to MM SX or SM LX Media Converter:

- Package it carefully. We recommend that you use the original container.
- If you are shipping the 1000BASE-T to MM SX or SM LX Media Converter for repair, make sure you include everything that came in the original package. Before you ship, contact Black Box to get a Return Authorization (RA) number.