Gigabit Switching
Ethernet Media Converters
-
Product User Guide

Introduction

These Tyco Electronics Gigabit Media Converters translate between 1000Base-T copper and 1000Base-X fiber optic cabling. The converters enable you to extend the distance of your 1000Base-T copper Gigabit Ethernet network by up to 500 meters using multi-mode fiber (1000Base-SX) or up to 10 kilometers for single-mode fiber cabling (1000Base-LX).

The converter can be either rack mounted in a 19” Chassis Unit or used as a standalone unit.

Package Contents

Unpack the contents and verify them against the items below.

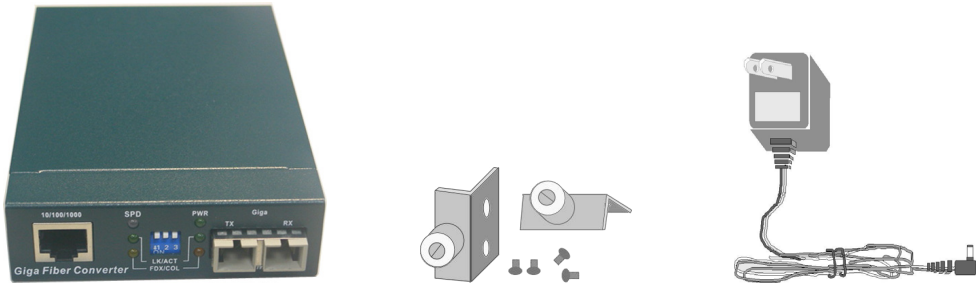


Figure 1 – Items in the packing box

If any item is damaged or missing, please contact your dealer.

Features

- **Converts between Ethernet Shielded or Unshielded twisted pairs and fiber-optic cabling**
- **Meets IEEE 802.3, 802.3u, 802.3x 802.3ab and 802.3z 1000BaseSX/LX Ethernet standards**
- **One 1000Base-T RJ-45 port with Auto MDI/MDI-X eliminates the need for cross-over LAN cables.**
- **Support for 10/100/1000 Mbps with auto negotiation on the RJ45 port**
- **One fiber Ethernet port with an SC fiber connector for 1000Base-SX or 1000Base-LX**
- **Uses store-and-forward to separate collision domains**
- **Fiber connectivity up to 500m (multi-mode) or 10Km (single-mode)**
- **6 LEDs for the :- RJ45 Speed, RJ45 & fiber Link Activity and RJ45 and fiber Full Duplex/Collision**
- **External AC/DC power adapter**
- **Stand-alone or mountable in 19” Converter Chassis**
- **FCC Class A, CE mark certification**
- **Support for backpressure and flow control**
- **3 Dip Switches to set converter operational mode and Link loss forwarding function**

Product Part Numbers

The products in this family of Gigabit media converters are:-

Product	Part Number
Converter with SC multimode (1000Base-SX)	1-1591020-x
Converter with SC singlemode (1000Base-LX)	1-1591022-x

Technical Support and Service

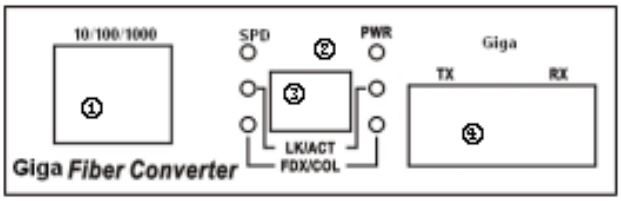
If you require technical advice for these products, please see the FAQ pages on the web address http://www.lan-electronics.com

If you still have problems, please contact us using the support form located on the above web site.

If you have a faulty unit then please contact us through the web site to arrange for a replacement unit. The faulty unit must be returned to us as part of the replacement agreement.

Front Panel

The front panel of the media converter has an RJ-45 Shielded/Unshielded Ethernet Port, 6 LED Indicators, 3 dip switches and a fiber Ethernet 1000Base-SX or 1000Base-LX Port.



(1) RJ-45 Port (3) DIP-Switch
(2) LED (4) Fiber Connector

Figure 2 – 1000Base-X Media Converter

Note that the front panel of the 1000Base-LX and 1000Base-SX media converter are very similar.
See page 4 for details of order codes.

Ports

- **RJ-45 Port.** This Ethernet RJ-45 port supports both shielded and unshielded cabling systems at 10/100/1000Mbit/s. The port uses auto-MDI/MDIX detection which eliminates the need for cross-over cables when connecting to LAN switches or workstations. In addition, the port auto-negotiates data rates and duplex modes. If the connected equipment should support Nway auto-negotiation the media converter will connect at the best speed and duplex mode possible. If the connected equipment is set for 100Mbps full duplex then the media converter will connect at 100Mbps but only at half duplex in this case data problems would occur so the connected equipment must be changed to 100Mbps half duplex.

- **Fiber Port.** This is the 1000Base-X port for connection to the distant media converter, NIC card or Ethernet switch. The port operates in full duplex mode. The port can also operate in auto-negotiation mode.

Rear Panel

The rear panel contains a power socket. This power socket accepts DC 9V voltage and minimum 0.7A supplied current.

Installation

Copper and Fiber Cabling Guidelines

1. The RJ-45 port can be connected to unshielded twisted pair (UTP) or shielded twisted pair (STP) cabling systems. The cable must comply with the IEEE 802.3ab 1000Base-T standard for Category 5. The cable between the converter and the link partner device (switch, hub, workstation, etc.) must be kept as short as possible and ideally less than 25m.
2. The fiber link on the multi-mode converter must use either 50 or 62.5/125 micron multi-mode fiber cable. You can link two converter devices over a distance of up to 500 metres.
3. The fiber link on the single-mode converter must use 8/125 or 9/125 micron single-mode fiber cable. You can link two converters over a distance of up to 10 kilometres in full duplex operation.

Installing Media Converters into the Chassis

Follow the steps below to install converters into the 19” rack-mountable chassis (part number 1-1591032-1).

1. Remove the blank plate from the chassis using a screwdriver. Put the blank plate aside.
2. Open the rackmount bracket kit which contains two rackmount brackets with thumbscrews and four securing screws.
3. Attach a rackmount bracket on both sides of the media converter using a screwdriver.

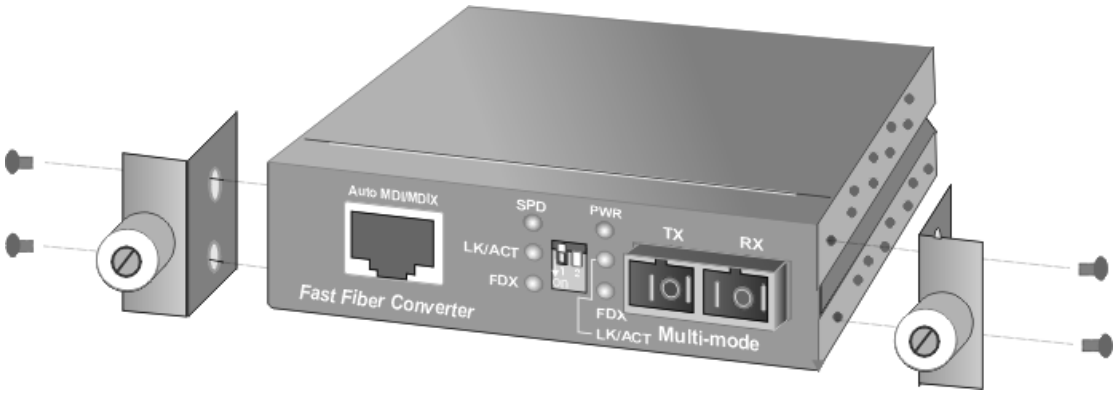


Figure 3 - Fitting the rack-mount brackets

4. Install the converter by inserting it into the chassis guides and carefully sliding it in until the converter is fully located.

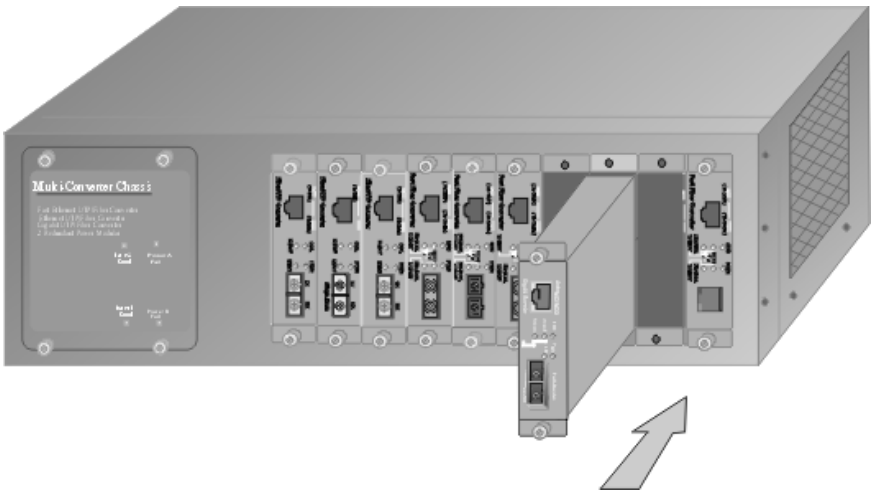


Figure 4 - Inserting the media converter into the chassis

5. Gently push the thumbscrews in and gently turn clockwise to tighten.

Completing The Installation

When the converter has been installed as specified previously, then the system can be configured as detailed below:-

1. Select the appropriate length Cat. 5/5e twisted pair cable, then connect one end of the cable to the RJ-45 connector on the media converter and the other end of twisted pair cable to the RJ-45 connector on the partner 1000Mbit/s Ethernet partner device.
2. Connect one end of a fiber cable to the SC connector on the converter and the other end of the fiber cable to the SC connector on the remote 1000Base-X device, typically another media converter.
3. Set dip switches for desired operation for both fiber negotiation and “link loss forwarding”.
4. Attach the power adapter DC jack to the converter and verify that the Power (PWR) LED on the front panel lights up (Stand alone operation) .
5. Verify that RJ45 LK/ACT LEDs light up when the RJ45 cable connection is correct, and Fiber LK/ACT LED is either green to show presence of a valid fiber link or blinks to indicate traffic activity.

LED Indicators

There are 6 diagnostic LEDs located on the front panel of the media converter. These LEDs provide real-time information of system status. The following table provides a description of the LED status and meaning.

	LED	Color	Function
	PWR	Green	Power on
RJ45 Port	**SPD**	Green	The RJ45 port is operating in 1000Mbit/s mode.
		Orange	The RJ45 port is operating in 100Mbit/s mode.
		Off	The RJ45 port is operating in 10Mbit/s or no device is attached.
	LK/ACT	Green	Link pulses are present
		Blinks	The unit is transmitting or receiving packets
		Off	No device attached or faulty cable
	FDX	Orange	The port is in full-duplex mode
		Blinks	Collisions in half-duplex mode
		Off	The port is in half-duplex mode

	LED	Color	Function
Fiber Port	**LK**	Green	Link pulses are present
		Off	No device attached or faulty cable
	FDX	Orange	The port is in full-duplex mode
		Blinks	Collisions in half-duplex mode
		Off	The port is in half-duplex mode

Table 1 - LED Status and description

DIP-Switch Settings

The configuration switch is used to set the operation mode for the fiber port and the Link Loss Forwarding of both the JR45 and the fiber port. The default switch setting is Fiber= Auto-negotiate, LLF for fiber port = disabled, LLF for RJ45 port = disabled.

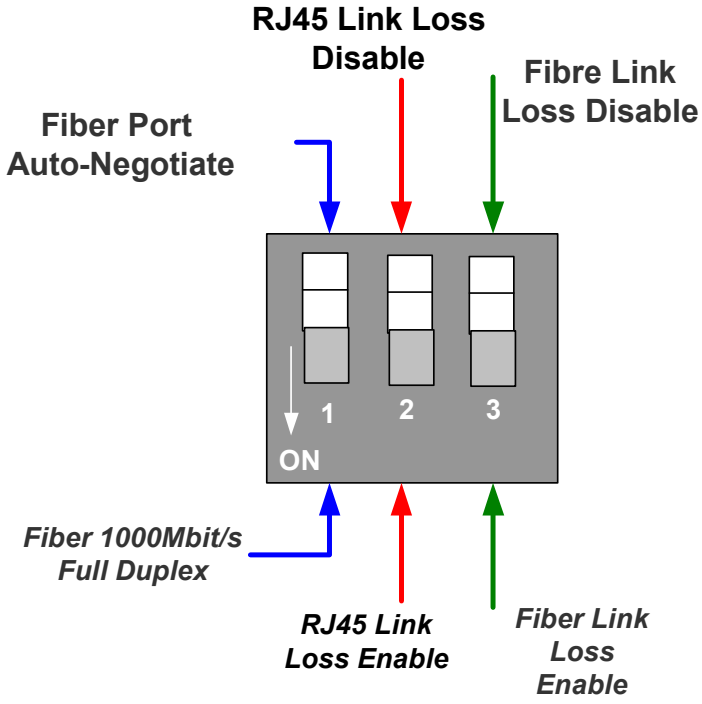


Figure 5 – Default DIP Switch Settings

Fiber Auto-negotiation

With **DIP-switch 1** in the **OFF** (up) position, the converter fiber port will auto-negotiate duplex modes with other Gigabit fiber ports, the speed will always be 1000Mbit/s. (**Default setting**).

1000M Full-duplex

With **DIP-switch 1** in the **ON** (down) position, the converter forces the fiber port to 1000Mbit/s full duplex operation.

Notes:-

- If the fiber port is set to auto-negotiate then the connected equipment will also need setting to auto-negotiate and Vise versa if the settings do not match then the fiber port will not link.

RJ45 Link Loss Forwarding Disable

With **DIP-switch 2** in the **OFF** (up) position, the RJ45 port Link loss forwarding will be disabled so if the RJ45 cable is disconnected the fiber port will continue to function.
(**Default setting**).

RJ45 Link Loss Forwarding Enable

With **DIP-switch 2** in the **ON** (down) position, the LLF of the RJ45 port is enabled. If the RJ45 cable becomes disconnected then the fiber port will no longer function and the fiber link LED will go out.

Fiber Link Loss Forwarding Disable

With **DIP-switch 3** in the **OFF** (up) position, the fiber optic port will not operate in the Link Loss Forwarding mode. In this mode if the fiber optic cable is disconnected the RJ45 port will continue to transmit link pulses to connected equipment. (**Default setting**).

Fiber Link Loss Forwarding Enable

With **DIP-switch 3** in the **ON** (down) position, the Link Loss Forwarding function for the fiber port is enabled. If the fiber cable is now disconnected the RJ45 port will be disabled and no link pulses will be transmitted to the connected equipment.

Notes:-

- After changing the DIP-switch setting, the unit needs to be reset by power-cycling before the switch changes can take effect.

Trouble Shooting

Power

1. Only use the correct AC/DC power adapter (DC 9V, 0.7 Amp with the positive to the center pin of the power connector). Do not use a power adapter with DC output voltage higher than 9V, or with the wrong polarity as this will damage the converter.

Fiber Link

1. Select the correct fiber cable for your network. The multi-mode converter must use multi-mode fiber cable and the single-mode converter must use single-mode fiber cable. See page 6 for the supported cable types and installation settings.
2. Ensure that the optical loss budget of the fiber link is within the limits specified on page 13. Note that optical patch cables and other joints and splices can introduce additional optical losses that reduce the available working distance of the fiber link.
3. Ensure that dip switch 1 is set for the correct operation and matches the connected equipment.

Data Problems

1. Ensure that the Ethernet partner device (switch, router, NIC etc) connected to the RJ45 port of the converter is set for 1000Mbit/s Gigabit operation. If this Ethernet partner device does not support auto-negotiation then you need to program that device to operate at 1000Mbit/s half duplex ,100 Mbps half duplex or 10Mbps half duplex. This is because the media converter and the Ethernet device will not be able to correctly negotiate and will then revert to the lower level of half-duplex operation.

   This issue is common to all auto-negotiating Ethernet units and symptoms of failed negotiation include data errors and fragmented packets.
2. Auto-negotiation can take up to 30 seconds to achieve, depending on the connected partner device.

If you still have problems and need further advice, please see Technical Support section on page 4 to obtain more information.

Optical Fiber Specifications

The converters operate at 850nm wavelength for multimode (1000Base-SX) and 1310nm optical wavelength for singlemode (1000Base-LX).

The fiber size used for multimode links is 50/125 or 62/125 micron. The fiber size used for singlemode links is 8/125 or 9/125 micron.

The maximum distance between any two fiber optic devices is determined by a number of factors including optical link loss, the type and number of patch cords and joints in the link, the launch power of the transmitter and the sensitivity of the receiver. These variables make calculating the maximum working distance between two converters quite difficult and so it is best to design networks using optical loss budgets rather than using just working distance.

Fast Ethernet Converter Type	Launch Power dBm	Power Loss Budget dB	Sensitivity dBm
Multimode Converter (SC)	-9dBm	5dB	-14dBm
Singlemode Converter (SC)	-9dBm	6dB	-15dBm

Table 2 – Worst Case Optical Specifications

Product Specification

LAN Standards Compliance	IEEE 802.3ab 1000Base-T Ethernet IEEE 802.3z 1000 BASE-X Gigabit Ethernet IEEE 802.3u 100Base-TX/100Base-FX IEEE 802.3X Flow Control & Back Pressure (only when converter set for Auto-Negotiation) ANSI/IEEE standard 802.3 N-way Auto-Negotiation
Max Forwarding Rate	1,488,000 pps Gigabit (1000Mbit/s)
LED Indicators	Device: Power. RJ45: Speed, Link Activity, Full Duplex/Collision Fiber: Link Activity, Full Duplex/Collision
Ethernet LAN Copper Network Cable	100Base-TX: 2-pair UTP/STP Cat. 5 cable EIA/TIA-586 100-ohm
Fiber Link Max. Distance	SC Multi-mode: Full-duplex: 500m SC Single-mode: Full-duplex: 10 Km.
Dimensions	118mm x 84mm x 25mm (L x W x H)
Weight	340g
Operating Temperature	0ºC to 45ºC (32ºF to 113ºF)
Operating Humidity	10% to 90% (Non-condensing)
Power Supply	External Power Adapter DC 9V, 0.7 A
Power Consumption	6.5 Watt. (Max.)
EMI & Safety	UL, CUL,FCC Class A, and CE

Table 3 - Product Specifications