



10/100BASE-TX TO 100BASE-FX MEDIA CONVERTERS

EM4000

EM4001

Installation Guide

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TRADEMARKS

Ethernet is a registered trademark of Xerox Corp.

FCC NOTICE

This device complies with Class B Part 15 the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received including the interference that may cause.

CE NOTICE

Marking by the symbol  indicates compliance of this equipment to the EMC directive of the European Community. Such marking is indicative that this equipment meets or exceeds the following technical standards:

EMC Class B

EN 50081-1/1992 : EN55022, EN61000-3-2, EN61000-3-3

EN 50082-1/1998 : EN61000-4-2, EN61000-4-3, EN61000-4-4, EN61000-4-5,
EN61000-4-6, EN61000-4-8, EN61000-4-11

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1. Introduction

The 10/100BASE-TX to 100BASE-FX media converter series provides a media conversion allowing high-speed integration of fiber optic and twisted-pair segments. With 10BASE-T and 100BASE-TX support, the converters provide seamless translation between Ethernet and Fast Ethernet networks. A complete set of LEDs allows for quick status verification.



1.1 Key Features

The media converters also provide the following key features:

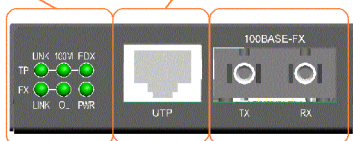
- Convert speed and media type
- Support full wire speed conversion
- Support 10Mbps and 100Mbps speed on TP connections
- Auto MDI/MDI-X detection function on the TP port
- Auto-negotiation function on the TP port
- Link fault pass through function
- Transparent to 802.1Q VLAN tagged packets
- Far End Fault function on FX port
- Low power consumption
- Support center chassis installation (up to 16 units in one chassis)

1.2 Specifications

LED Indicators

Twisted-pair Interface (TP Port)

**EM4000
Front Panel**

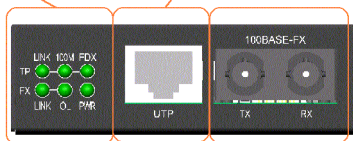


Fiber Optic Interface (FX Port, SC)

LED Indicators

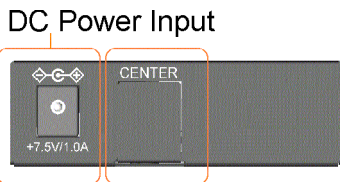
Twisted-pair Interface (TP Port)

**EM4001
Front Panel**



Fiber Optic Interface (FX Port, ST)

Rear Panel



Center Connector
with cover

Twisted-Pair Interface (TP Port)

Connector	Shielded RJ-45
Pin Assignments	Auto MDI/MDI-X detection
Signal Compliance	IEEE 802.3 10BASE-T, 802.3u 100BASE-TX
Data Speed	10Mbps or 100Mbps
Duplex Mode	Half-duplex or Full-duplex
Configuration	Auto-negotiation capable and optional forced manual settings
Cable Types	10Mbps - Category 3, 4, or 5 UTP 100Mbps - Category 5 UTP
Supported Link Distance	Up to 100 meters


Fiber Optic Interface (FX Port)

Signal Compliance	IEEE 802.3u 100BASE-FX
Connector	EM4000 - SC connector EM4001 - ST connector
Data Speed	100Mbps
Duplex Mode	Full-duplex and optional half duplex
Cable Types	Multimode (MMF) - 50/125, 62.5/125 mm Single mode (SMF) - 9/125 mm
Supported Link Distance	MMF up to 2km SMF up to 100km Single SMF WDM up to 40km
Eye Safety compliance	IEC825 Class 1

LED Indicators

LED	DISPLAY	STATE	INTERPRETATION
PWR	Power status	ON	Power on
		OFF	Power off
TP LINK	TP port link status	ON	Link up and no traffic
		OFF	Link fault
		Blink	Rx/Tx activities
TP 100M	TP port speed status	ON	100Mbps
		OFF	10Mbps
TP FDX	TP port duplex status	ON	Full duplex
		OFF	Half duplex
		Blink	Collisions on half duplex
FX LINK	FX port link status	ON	Link up and no traffic
		OFF	Link fault
		Blink	Rx/Tx activities
FX OL	FX port optical link	ON	Optical signal is detected
		OFF	No optical signal

DC Power Input

DC Input Jack	D 6.3mm —  + D 2.0mm
Operating Input Voltages	+4.75V ~ +12.6V
Power consumption	2W max. (0.27A @ +7.5V)
Power Supply Options	External AC-DC power adapters Rated AC120V/60Hz DC7.5V 1A Rated AC230V/50Hz DC7.5V 1A Rated AC100V/50-60Hz DC7.5V 1A Rated AC100V/50-60Hz DC5V 1A Rated AC240V/50Hz DC7.5V 1A

Basic Information

Forwarding Throughput	Full wire speed at 100M full duplex 10Mbps - 14,880 pps at 64-byte packets 100Mbps - 148,800pps at 64-byte packets
Packet Types	Transparent and no modification for - IEEE 802.3 standard packets - IEEE 802.1Q VLAN tagged packets
Packet Length	Up to 1522 bytes at 10 to 100 mode No limit at 100 to 100 mode
Flow Control	Back-pressure for half-duplex mode 802.3x pause-frame base for full duplex mode

Mechanical

Dimension	H 23mm x W 72.5mm x D 108mm
Housing	Enclosed metal with no fan
Mounting	Desktop, Wall mount, Center chassis
Weight	210g

Environmental

Operating Temperature	-5°C ~ 40°C
Storage Temperature	-20°C ~ 85°C
Relative Humidity	5% ~ 90%

Certificate

FCC	Part 15 Class B
CE/EMC	EMI EN50081-1 Class B, EMS EN55024
CE/LVD	EN 60950

1.3 Optical Specifications

The media converter series provides the following fiber options:

Duplex Fiber Series

<u>Model</u>	<u>Port</u>	<u>Fiber</u>	<u>Wavelength</u>	<u>Tx Power</u>	<u>Rx Sensitivity</u>
EM4000	SC	MMF	1310nm	-19 ~ -14dBm	-33dBm
EM4001	ST	MMF	1310nm	-19 ~ -14dBm	-33dBm

1.4 Special Functions

Auto MDI/MDI-X Function

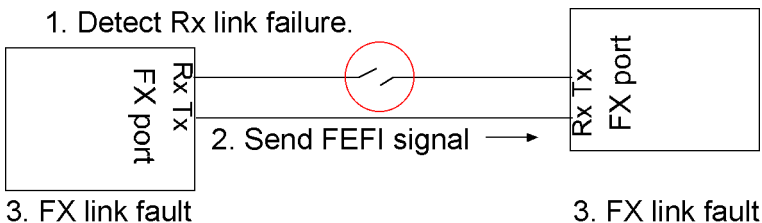
This function allows the TP port to auto-detect the twisted-pair signals and adapts itself to form a valid MDI to MDI-X connection with the remote connected device automatically.

Auto-negotiation Function

The TP port is featured with auto-negotiation function and full capability. It performs a negotiation process for the speed and duplex configuration with the connected device automatically when each time a link is being established.

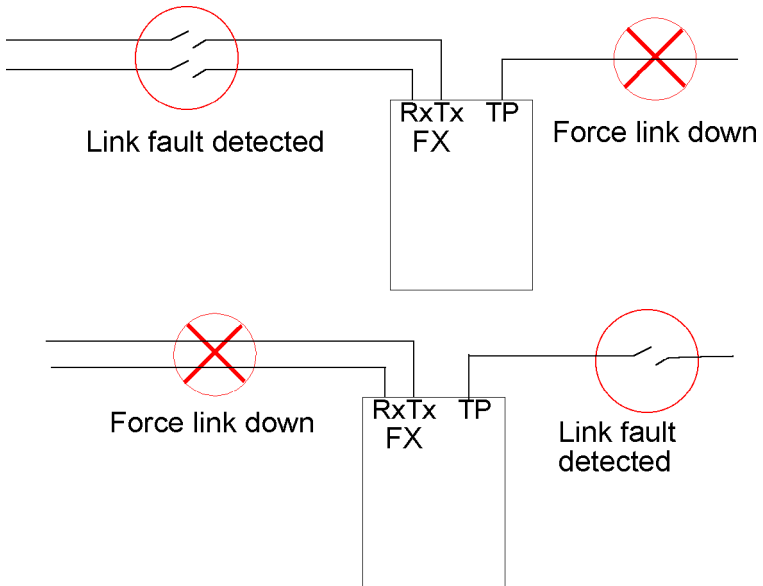
Far End Fault Function

The FX port is facilitated with this function, which conforms to IEEE 802.3u 100BASE-FX specifications. When the FX port detects a link failure on its receiving circuitry, it will send out an FEFI (Far End Fault Indication) signal to the remote connected device to indicate a remote fault is detected. It also is capable to receive FEFI signal sent from the remote link partner. Upon receiving an FEFI signal, it indicates a link failure occurred on the transmitting path. This function allows the converter to report a fiber link fault even when a link failure occurred on transmitting fiber cable.



Link Fault Pass Through Function

This function supports a link fault detected on the TP port will force a link down on the FX port. Similarly, a link fault detected on the FX port will also force a link down on the TP port. As illustrated in the following figure, this function allows to pass TP link fault to the remote link partner and makes the converter like a TP cable extender.



2. Installation

2.1 Unpacking

Check that the following components have been included:

- Product CD
- 10/100 Media Converter
- One AC power adapter

If any item is found missing or damaged, please contact your local reseller for replacement.

2.2 Mounting the Device

Desktop Mounting

The media converter can be mounted on a desktop or shelf. Make sure that there is proper heat dissipation from and adequate ventilation around the device. Do not place heavy objects on the device.

Wall Mounting

The media converter also can be mounted on a wall. On bottom of the device, wall mounting hole is provided for wall mounting.

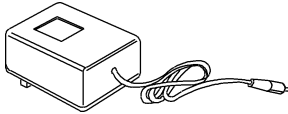
Installation into Center Chassis

The media converter also can be installed in a center chassis. The center chassis provides the power supply to the converter. Up to 16 units can be installed in one chassis. Unscrew and remove the cover of the center connector before inserting the converter into the chassis.

2.3 Applying Power

Before you begin the installation, check the AC voltage of your area. The AC power adapter which is used to supply the DC power for the unit should have the AC voltage matching the commercial power voltage in your area.

The AC Power Adapter Specifications



AC input power: AC power voltage of your area, options -
Rated AC120V/60Hz DC7.5V 1A
Rated AC230V/50Hz DC7.5V 1A
Rated AC100V/50-60Hz DC7.5V 1A
Rated AC100V/50-60Hz DC5V 1A
Rated AC240V/50Hz DC7.5V 1A

Steps to apply the power to the converters are:

1. Connect power adapter DC plug to the DC input jack located on the back of the converter before connecting to the AC outlet.
2. To ensure against accidental disconnection, tie the DC cable with the cable tie located the back of the converter.
3. Connect the power adapter to the AC outlet.
4. Check Power LED indication.

2.4 Making TP Port Connection

TP port is featured to support connection to :

- Auto-negotiation devices
- Auto-negotiation incapable 10BASE-T devices
- Auto-negotiation incapable 100BASE-TX devices

Network Cables

10BASE-T: 2-pair UTP Cat. 3,4,5 , EIA/TIA- 568 100-ohm STP

100BASE-TX: 2-pair UTP Cat. 5, EIA/TIA-568 100-ohm STP

Link distance: Up to 100 meters

2.5 Making FX Port Connection

FX port operates on 100Mbps and full duplex (factory default). A variety of fiber options is provided as follows:

Duplex Fiber Series

<u>Model</u>	<u>Connector</u>	<u>Wavelength</u>	<u>Fiber</u>	<u>Max. distance</u>
EM4000	SC	1310nm	Duplex MMF	2km
EM4001	ST	1310nm	Duplex MMF	2km

2.6 LED Indicators

<u>LED</u>	<u>Display</u>	<u>Status</u>	<u>Interpretation</u>
PWR	Power status	On	Power on
		Off	Power off
TPLINK	TP port link status	On	Link up and no traffic
		Off	Link fault
		Blink	Rx/Tx activities
TP 100M	TP port speed status	On	100Mbps
		Off	10Mbps
TPFDX	TP port duplex status	On	Full duplex
		Off	Half duplex
		Blink	Collisions on half duplex
FXLINK	FX port link status	On	Link up and no traffic
		Off	Link fault
		Blink	Rx/Tx activities
FXOL	FX port optical link	On	Optical signal is detected
		Off	No optical signal is detected

Link Fault Pass Through Function

<u>TPLINK</u>	<u>FXLINK</u>	<u>FXOL</u>	<u>Interpretation</u>
On	On	On	Both TP and FX ports link up
Off	Off	On	(1) TP port link fault or (2) FX port received FEFI signal (FX port Tx path failed.)
Off	Off	Off	(1) TP port link fault or (2) FX port Rx link failure detected

2.7 Smart Forwarding

The media converters are featured with a smart forwarding design. The following table lists the forward method used in different TP to FX conversions:

<u>TP port to/from FX port</u>	<u>Forward method</u>
10BASE-T to 100BASE-FX	Store and forward
100BASE-TX to 100BASE-FX	Direct conversion

The converter can change to direct conversion automatically when it detects same speed on both TP port and FX port. Direct conversion method converts the signal between TP port and FX port without storing the received packet on one port then forwarding to another port. The media converter operates with the minimum latency.

Note:

1. In direct conversion, be sure both devices connected to the TP port and FX port have same duplex mode for proper transmission.
2. In direct conversion, 802.3x function is disabled and the media converter will not generate pause frame, but just forwards the received pause frame directly from one port to another port.
3. In direct conversion, the media converter is not limited to the maximal length of the receiving packets.