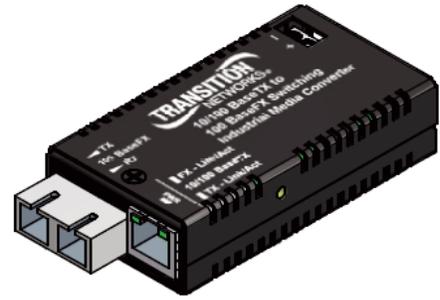


M/E-ISW-FX-01 Series

User Guide

Stand-Alone Industrial Media Converters

- Copper to Fiber
- 10/100Base-TX to 100Base-FX
- 10/100Base-TX to 100Base-LX10



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Introduction

Transition Networks Industrial Mini Media Converters provide a cost-effective method for integrating fiber optic cabling into industrial or outdoor 10/100 UTP Ethernet networks. Featuring wide operating temperature range, low-voltage DC power, multiple mounting methods and Transition Networks' Lifetime Warranty these problem solvers are guaranteed to be trouble free in harsh outdoor or industrial applications. The industrial mini is ideal for extending Ethernet over fiber to outdoor security cameras.

Model Numbers

Part Number	Copper Port 10/100Base-TX	Fiber-Optic Port 100Base-FX
M/E-ISW-FX-01	RJ-45 100 m (328 ft)*	ST, 1310nm multimode (ST) 2 km (1.2 miles)*
M/E-ISW-FX-01 (MMLC)	RJ-45 100 m (328 ft)*	LC, 1310nm multimode (LC) 2 km (1.2 miles)*
M/E-ISW-FX-01 (SC)	RJ-45 100 m (328 ft)*	SC, 1310nm multimode (SC) 2 km (1.2 miles)*
M/E-ISW-FX-01 (LH)	RJ-45 100 m (328 ft)*	SC, 1310nm single mode (SC) 40 km (24.8 miles)*

Part Number	Copper Port 10/100Base-TX	Fiber-Optic Port 100Base-LX10
M/E-ISW-FX-01 (SM)	RJ-45 100 m (328 ft)*	SC, 1310nm single mode (SC) 10 km (6.2 miles)*
M/E-ISW-FX-01 (SMLC)	RJ-45 100 m (328 ft)*	LC, 1310nm single mode (LC) 10 km (6.2 miles)*

Single Fiber Models

Part Number	Copper Port 10/100Base-TX	Fiber-Optic Port 100Base-FX
M/E-ISW-FX-01(100)	RJ-45 100 m (328 ft)*	SC, 1310nm (TX)/1550nm (RX) SM 20 km (12.4 miles)**
M/E-ISW-FX-01(101)	RJ-45 100 m (328 ft)*	SC, 1550nm (TX)/1310nm (RX) SM 20 km (12.4 miles)**
M/E-ISW-FX-01(102)	RJ-45 100 m (328 ft)*	SC, 1310nm (TX)/1550nm (RX) SM 40 km (24.8 miles)**
M/E-ISW-FX-01(103)	RJ-45 100 m (328 ft)*	SC, 1550nm (TX)/1310nm (RX) SM 40 km (24.8 miles)**

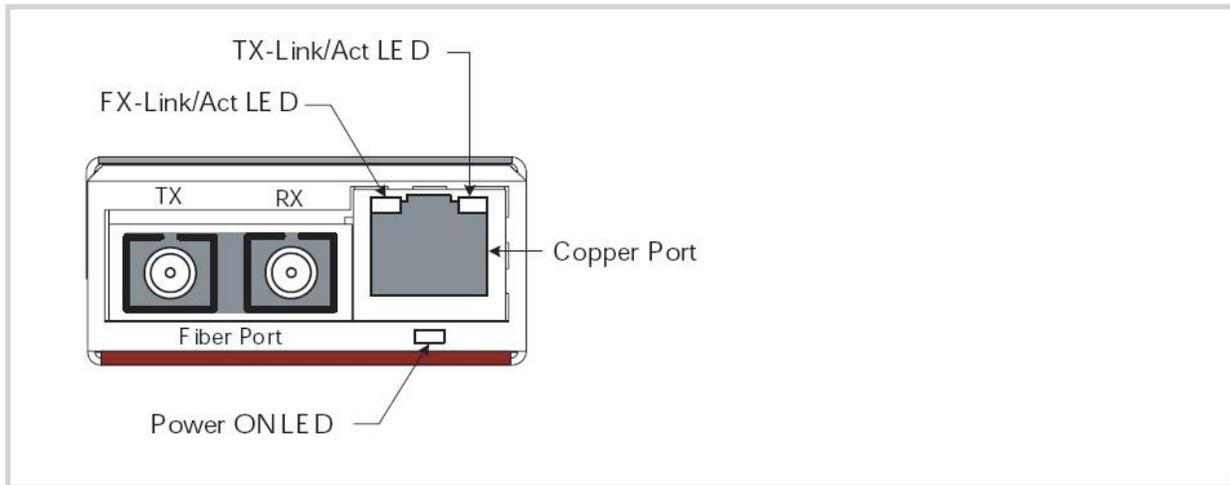
* Typical maximum cable distance. Actual distance depends on the physical characteristics of the network installation. For more information, see <https://www.transition.com/>.

**M/E-ISW-FX-01(100), (101), and (102), (103) are intended to be installed in the same network where one is the local Device and the other is the remote Device.

Installation

Copper and Fiber Ports

The illustration below shows the front panel of the M/E-ISW-FX-01 media converter.



Electrostatic Discharge (ESD)

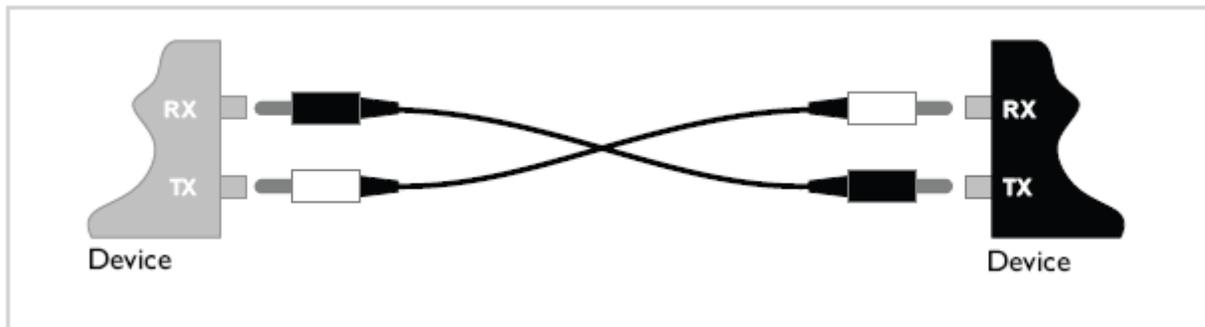
Always observe the following ESD precautions when installing or handling the M/E-ISW-FX-01 media converter:

- Do not remove the converter from its protective packaging until you are ready to install the M/E-ISW-FX-01 media converter.
- Wear an ESD wrist grounding strap before handling the M/E-ISW-FX-01 media converter or its component. If you do not have a wrist strap, maintain grounded contact with the unit throughout any procedure requiring ESD protection.

Connect Fiber Cables

Full duplex (*always ON*) is on the fiber side only, therefore, the 512-Bit Rule does not apply. The cable lengths are constrained by the cable requirement.

1. Locate a 100Base-FX or -LX10 fiber cable with male, two-stranded TX to RX connectors installed at both ends.
2. Connect the fiber cable to the M/E-ISW-FX-01 media converters as follows:
 - Connect the male TX cable connector to the female TX port.
 - Connect the male RX cable connector to the female RX port.
3. Connect the fiber cable to the other device (*media converter, hub, etc.*) as follows:
 - Connect the male TX cable connector to the female RX port.
 - Connect the male RX cable connector to the female TX port.



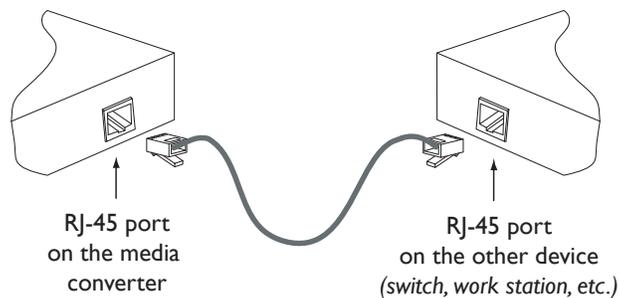
Connect the Twisted-pair Copper Cable

The AutoCross feature allows either MDI (*straight-through*) or MDI-X (*crossover*) cable connections to be configured automatically, according to network conditions.

- If half-duplex mode is used, refer to the 512-Bit Rule.
- If full-duplex mode is used, the 512-Bit Rule does not apply. The cable lengths are constrained by the cable requirements.

Perform these steps:

1. Locate a 10Base-T or 100Base-TX cable with RJ-45 connectors installed at both ends.
2. Connect the RJ-45 connector at one end of the cable to the RJ-45 port on the M/E-ISW-FX-01 media converter.
3. Connect the RJ-45 connector at the other end of the cable to the RJ-45 port on the other device (*switch, workstation, etc.*).

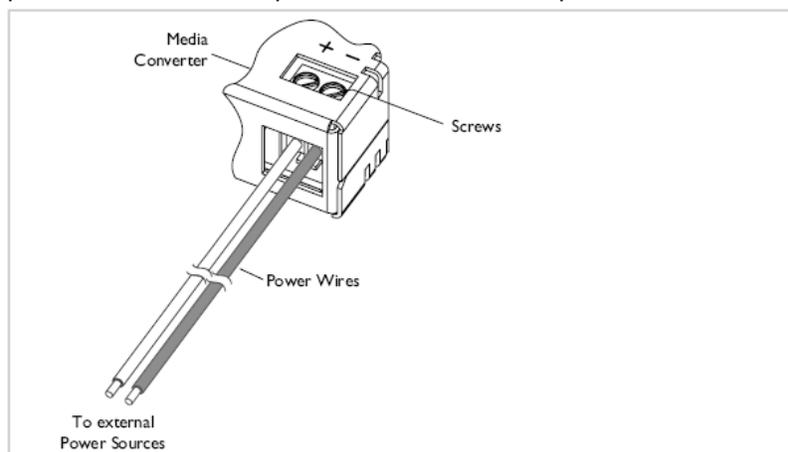


Connecting Power

Connect to DC (12 – 48 VDC)

Note: The Pitch EURO style terminal block accepts 14 – 24 gauge wire.

1. Turn OFF the main power source.
2. Strip the power wires to the proper strip length.
3. Loosen the two screws in the terminal block. See illustration below.
4. Insert the power wires into the terminal block as shown below (*note polarity*).
5. Tighten the screw for each.
6. Connect the other end of the power wires to the main power source (*note the polarity*).
7. Turn main power source ON: the power LED on the front panel should be ON.

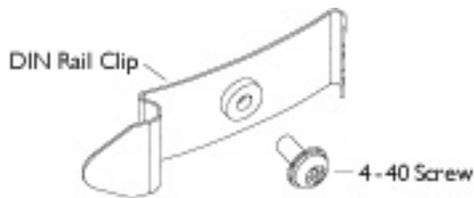


AC Power

The optional SPS-UA12DHT external AC power supply can be used to power the media converter.

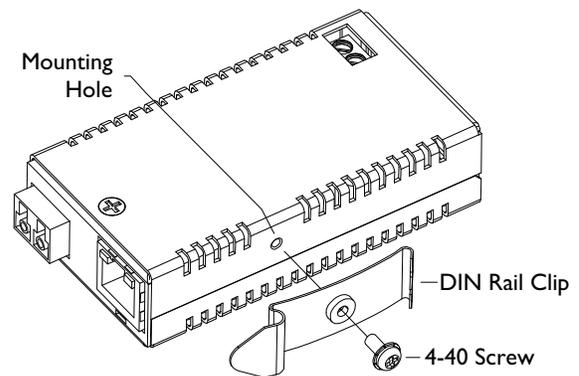
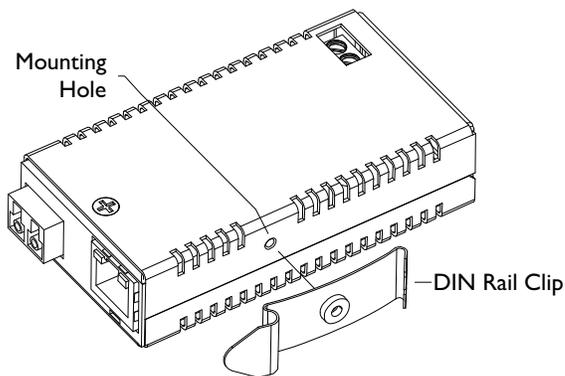
Installing DIN Rail Clip

Parts

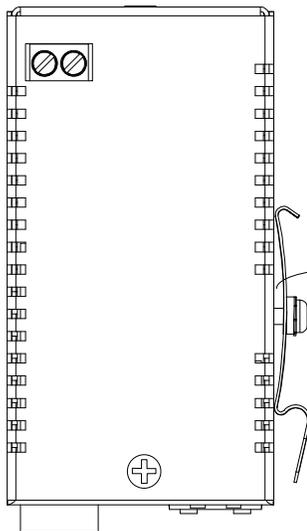


To install the DIN rail onto the media converter:

1. Position the DIN rail clamp to the side of the media converter as shown below left.



2. Position the 4-40 screw to attach the DIN rail to the media converter as shown above right.
3. Insert and tighten the 4-40 screw until the DIN rail clip appears as shown below.



When the DIN Rail *Clip* is attached, there should be a “gap” between the *Clip* and media converter as shown.

Operation

Status LEDs

Use the LEDs to monitor the status of the media converter.

The LEDs are described below:

FX-Link/Act LED

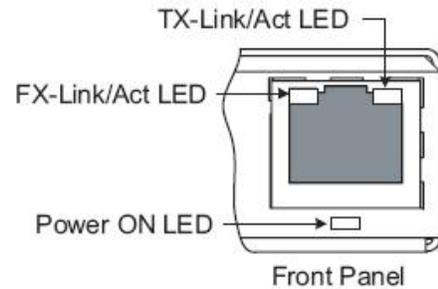
Green ON = Link (*fiber*)
Flashing = Activity

TX-Link/Act LED

Green ON = Link
Flashing = Activity

Power LED

Green ON = Connected to power



Product Features

The M/E-ISW-FX-01(xx) features are described below.

Congestion Reduction

The M/E-ISW-FX-01 media converters do not forward collision signals or error packets from one collision domain to another, resulting in improvements in baseline network performance. In addition, the media converter filters packets destined for local devices, which reduces network congestion.

Auto-Negotiation

The Auto-Negotiation feature is ON permanently for the M/E-ISW-FX-01 media converters. Auto-Negotiation allows the media converter to configure itself automatically to achieve the best possible mode of operation over a link. It broadcasts speed (*10 Mb/s or 100 Mb/s*) and duplex capabilities (full or half) to the other device and negotiates the best mode of operation. Auto-Negotiation allows quick and easy installation because the optimal link is established automatically.

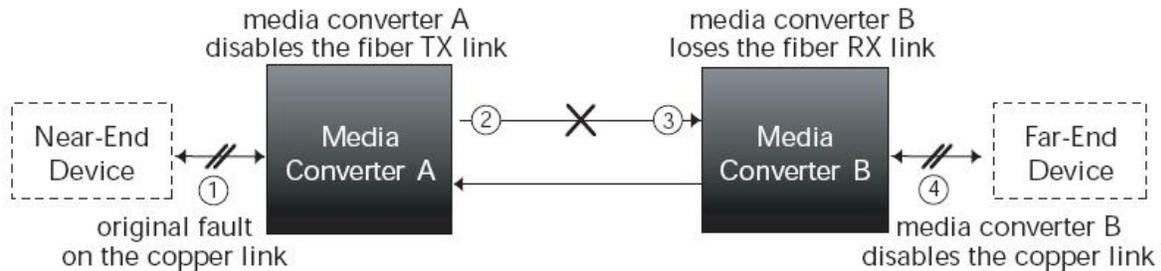
In a scenario where an auto-negotiation device is linked to a non-negotiating device, the negotiating device via parallel detection recognizes the speed of that second device then establishes the best operating speed (*10Mb/s or 100Mb/s*) at half duplex.

AutoCross™

The AutoCross feature allows using either straight-through (MDI) or crossover (MDI-X) copper cables when connecting to 10Base-T or 100Base-TX devices. AutoCross determines the characteristics of the connection and automatically configures the device to link up, regardless of the copper cable configuration, MDI or MDI-X.

Link Pass-Through

The Link Pass-Through feature (*illustrated below*) allows the media converter to monitor both the fiber and copper RX (receive) ports for loss of signal. In the event of an RX signal loss (1), the media converter will automatically disable the TX (transmit) signal (2), thus “passing through” the link loss (3). The far-end device is automatically notified of the link loss (4), which prevents the loss of valuable data unknowingly transmitted over an invalid link.



Note: In the link pass-through devices both copper and fiber cables must be installed before the LEDs will light.

Automatic Link Restoration

The M/E-ISW-FX-01 will automatically re-establish the link when connected to switches if the link is lost.

Full-Duplex flow control

In a full-duplex network, maximum cable lengths are determined by the type of cables used—see page 1 (front cover) for M/E-ISW-FX-01 cable specifications. The 512-Bit Rule does not apply in a full-duplex network. **Note:** Full duplex is ON permanently for the fiber port only.

Half-Duplex Flow Control (512-Bit Rule)

In a half-duplex network, the maximum cable lengths are determined by the roundtrip delay limitations of each Fast Ethernet collision domain. (A collision domain is the longest path between any two terminal devices; e.g., a terminal, switch, or router.) The 512-Bit Rule determines the maximum length of cable permitted by calculating the round-trip delay in bit-times (BT) of a particular collision domain. If the result is less than or equal to 512 BT, the path is good. For more information on the 512-Bit Rule, see the white paper titled “Collision Domains” on the Transition Networks [website](#).

Flow Control

The process of adjusting the flow of data from one device to another ensures that the receiving device can handle all of the incoming data. This is particularly important where the sending device is capable of transmitting data much faster than the receiving device can accept it.

Distance Extension

The M/E-ISW-FX-01 can segment one (1) 10Base-T copper Ethernet and/or 100Base-TX copper Fast Ethernet, and one (1) 100Base-Fx or -LX10 fiber Fast Ethernet collision domain:

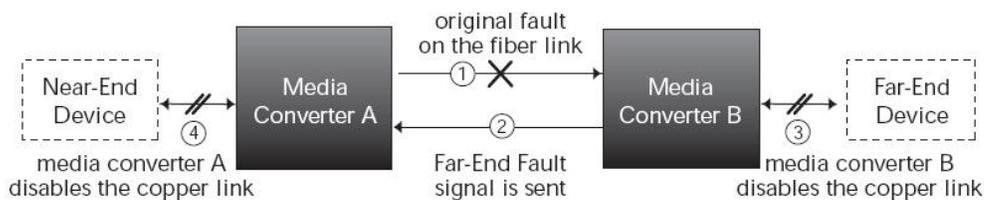
- In a half-duplex Ethernet or Fast Ethernet environment, the M/E-ISW-FX-01 media converters extend network distances by segmenting collision domains so that the 512-Bit Rule applies separately to each collision domain.
- In a full-duplex Ethernet or Fast Ethernet environment, the M/E-ISW-FX-01 media converters extend network distances to the physical cable limitations imposed by the selected twisted-pair copper fiber cables.

Rate Conversion

The M/E-ISW-FX-01 media converters allow connection of 10Mb/s terminal devices on a 10Base-T legacy Ethernet copper network to 100Mb/s terminal devices on a 100Base-TX Fast Ethernet copper network and/or to 100Mb/s terminal devices on a 100Base-FX or -LX10 Fast Ethernet fiber network.

Far-end Fault

When a fault occurs on an incoming fiber link (1), the media converter transmits a Far-End Fault signal on the outgoing fiber link (2). In addition the Far-End Fault signal also activates the Link Pass-Through, which in turn, disables the link on the copper portion of the network (3) and (4).



Optic and Cable Specifications

The fiber optic cable physical characteristics must meet or exceed IEEE 802.3ae specification.

Fiber Cable

Bit Error Rate:	<10 ⁻⁹
Single mode fiber (<i>recommended</i>):	9 μm
Multimode fiber (<i>recommended</i>):	62.5/125 μm
Multimode fiber (<i>optional</i>):	100/140, 85/140, 50/125 μm

Optics

M/E-ISW-FX-01	1310 nm multimode
Fiber Optic Transmitter Power:	min: -19.0 dBm max: -14.0 dBm
Fiber Optic Receiver Sensitivity:	min: -33.0 dBm max: -12.0 dBm
Link Budget:	14.0 dB
M/E-ISW-FX-01 MMLC)	1310 nm multimode
Fiber-optic Transmitter Power:	min: -19.0 dBm max: -12.0 dBm
Fiber-optic Receiver Sensitivity:	min: -30.0 dBm max: -8.0 dBm
Link Budget:	11.0 dB
M/E-ISW-FX-01 (SC)	1310 nm multimode
Fiber-optic Transmitter Power:	min: -19.0 dBm max: -14.0 dBm
Fiber-optic Receiver Sensitivity:	min: -33.0 dBm max: -12.0 dBm
Link Budget:	14.0 dB
M/E-ISW-FX-01 (SM)	1310 nm single mode
Fiber Optic Transmitter Power:	min: -15.0 dBm max: -8.0 dBm
Fiber Optic Receiver Sensitivity:	min: -34.0 dBm max: -3.0 dBm
Link Budget:	19.0 dB
M/E-ISW-FX-01 (SMLC)	1310 nm single mode
Fiber-optic Transmitter Power:	min: -15.0 dBm max: -8.0 dBm
Fiber-optic Receiver Sensitivity:	min: -34.0 dBm max: -3.0 dBm
Link Budget:	19.0 dB
M/E-ISW-FX-01(100)	1310 nm (TX)/1550 nm (RX) (SM)
M/E-ISW-FX-01(101)	1550 nm (TX)/1310 nm (RX) (SM)
Fiber Optic Transmitter Power:	min: -14.0 dBm max: -8.0 dBm
Fiber Optic Receiver Sensitivity:	min: -32.0 dBm max: -3.0 dBm
Link Budget:	18.0 dB
M/E-ISW-FX-01(102)	1310 nm (TX)/1550 nm (RX) (SM)
M/E-ISW-FX-01(103)	1550 nm (TX)/1310 nm (RX) (SM)
Fiber-optic Transmitter Power:	min: -8.0 dBm max: -3.0 dBm
Fiber-optic Receiver Sensitivity:	min: -34.0 dBm max: -3.0 dBm
Link Budget:	26.0 dB
M/E-ISW-FX-01 (SMLC)	1310 nm single mode (SMLC)
Fiber-optic Transmitter Power:	min: -15.0 dBm max: -8.0 dBm
Fiber-optic Receiver Sensitivity:	min: -34.0 dBm max: -3.0 dBm
Link Budget:	19.0 dB

Copper Cable

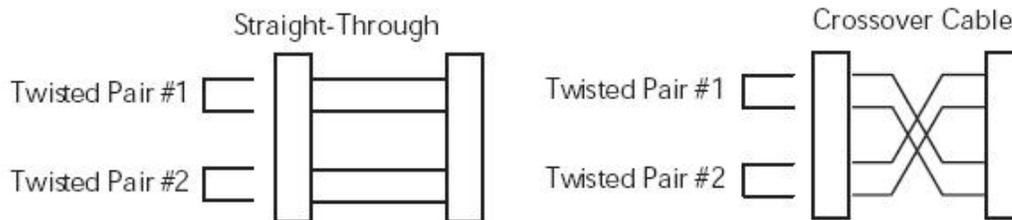
Category 3: (Minimum requirement for 10 Mb/s operation)

Gauge	24 to 22 AWG
Attenuation	11.5 dB/100m @ 5-10 MHz
Maximum Cable Distance	100 meters

Category 5: (Minimum requirement for 100 Mb/s operation)

Gauge	24 to 22 AWG
Attenuation	22.0 dB /100m @ 100 MHz
Maximum Cable Distance	100 meters

- Straight-through or crossover twisted-pair cable may be used.
- Shielded (STP) or unshielded (UTP) twisted-pair cable may be used.
- Pins 1&2 and 3&6 are the two active pairs in an Ethernet network.
- Use only dedicated wire pairs for the active pins:
(*e.g., blue/white & white/blue, orange/white & white/orange, etc.*)
- Do not use flat or silver satin wire.



Technical Specifications

For use with Transition Networks Model M/E-ISW-FX-01 converters.

Data rate:	10 Mb/s, 100 Mb/s
Dimensions:	1.8"W x 3.3"D x 0.85"H (46 x 85 x 22 mm)
Weight:	2 lbs. (0.90 kg) approximately
Power consumption:	2.5 typical (3.3 watts max)
MTBF*:	Greater than 41,680 hours ((MIL-HDBK-217F) Greater than 114,580 hours (Bellcore7 V5.0)
Unicast MAC addresses:	1K
Maximum packet size:	2046 bytes
Power sources:	12 - 48 VDC or 22-36 VAC ±10%
Operating temp:	-40°C to 75°C (-40°F to 167°F)
Storage temp:	-40°C to 85°C (-40°F to 185°F)
Humidity:	5% to 95%, non-condensing
Warranty:	Lifetime

* MTBF calculation is based on use with a 50,000 hour power supply.

Caution: Copper based media ports, e.g., Twisted Pair (TP) Ethernet, USB, RS232, RS422, RS485, DS1, DS3, Video Coax, etc., are intended to be connected to intrabuilding (inside plant) link segments that are not subject to lightening transients or power faults. Copper-based media ports, e.g., Twisted Pair (TP) Ethernet, USB, RS232, RS422, RS485, DS1, DS3, Video Coax, etc., are NOT to be connected to interbuilding (outside plant) link segments that are subject to lightening transients or power faults. Failure to observe this caution could result in damage to equipment.

Warning: Visible and invisible laser radiation when open. Do not stare into the beam or view directly with optical instruments. Failure to observe this warning could result in an eye injury or blindness.

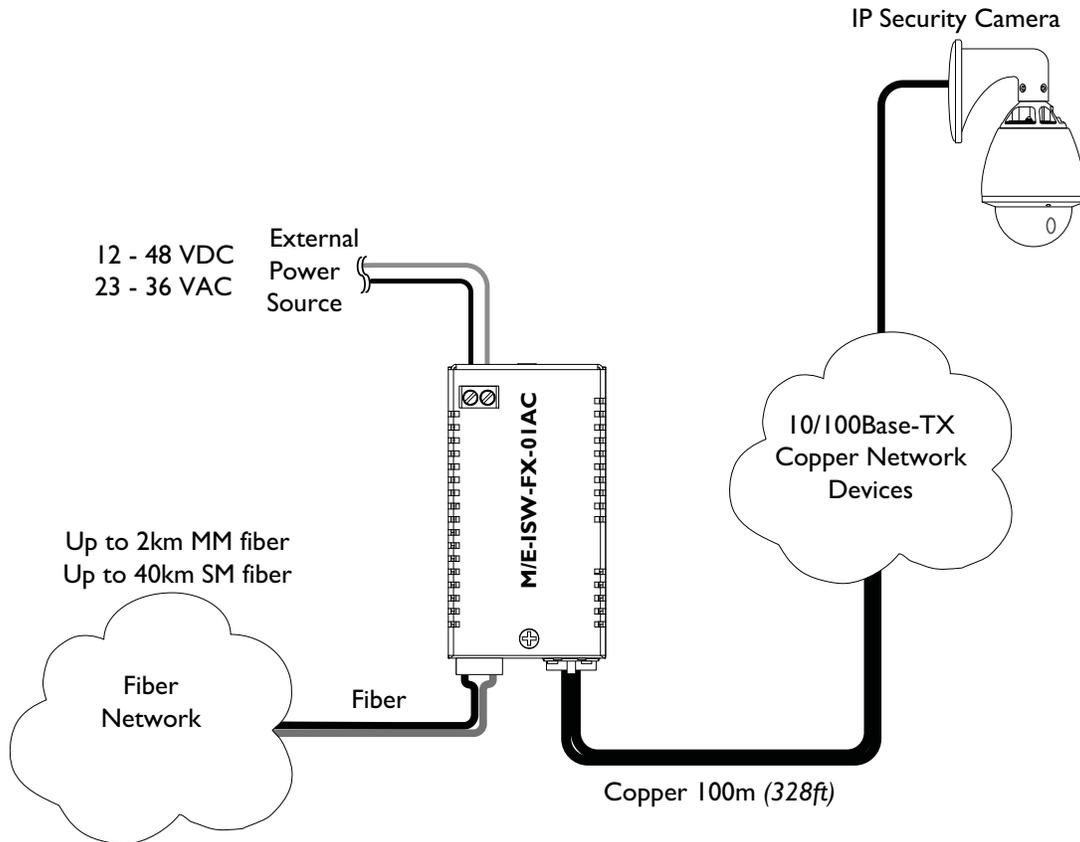
Warning: Use of controls, adjustments, or the performance of procedures other than those specified herein could result in hazardous radiation exposure.

High Risk Activities Disclaimer: Components, units, or third-party products used in the product described herein are NOT fault-tolerant and are NOT designed, manufactured, or intended for use as on-line control equipment in the following hazardous environments requiring fail-safe controls: the operation of Nuclear Facilities, Aircraft Navigation or Aircraft Communication Systems, Air Traffic Control, Life Support, or Weapons Systems ("High Risk Activities"). Transition Networks and its supplier(s) specifically disclaim any expressed or implied warranty of fitness for such High Risk Activities.

The information in this user's guide is subject to change. For the most current information, view the user guide on-line at <https://www.transition.com/>.

Application Example

The illustration below shows the M/E-ISW-FX-01 in a sample configuration with a security camera.



For More Information

For Transition Networks Drivers, Firmware, etc. go to the [Product Support](#) webpage (logon required).

For Transition Networks Manuals, Brochures, Data Sheets, etc. go to the [Support Library](#) (no logon required).

For SFP manuals see Transition Networks [SFP webpage](#).

Troubleshooting

If the media converter fails, isolate and correct the fault by determining the answers to the following questions and then taking the indicated action:

If the media converter fails, determine the answers to the following questions and then taking the indicated action:

1. Is the power LED illuminated and did the TX and FX LEDs turn ON and then turn OFF?
NO
 - Is the device powered by an adapter?
 - Is the power adapter the proper type of voltage and cycle frequency for the AC outlet?
 - Is the power adapter properly installed in the media converter and in the outlet?
 - Contact Technical Support. See Contact Us below.YES
 - Proceed to step 2.
2. Note the following:
 - In the link pass-through devices both copper and fiber cables must be installed before the LEDs will light.
 - The TX LED will turn ON when the twisted pair copper cable is installed; the FX LED will turn ON when the fiber cable is installed.
3. Are the “TX and FX-Link/ACT” LEDs illuminated on the RJ-45 port?
NO
 - Check the copper cables for proper connection.
 - Check the fiber cables for proper connection.
 - Contact Technical Support: US/Canada: 1-800-260-1312, International: 00-1-952-941-7600.YES
 - Contact Technical Support. See Contact Us below.

Contact Us

Technical Support: Technical support is available 24-hours a day

US and Canada: 1-800-260-1312

International: 00-1-952-941-7600

Main Office

tel: +1.952.941.7600 | toll free: 1.800.526.9267 | fax: 952.941.2322

sales@transition.com | techsupport@transition.com | customerservice@transition.com

Address

Transition Networks

10900 Red Circle Drive

Minnetonka, MN 55343, U.S.A.

Web: <https://www.transition.com>

Compliance Information

Declaration of Conformity

<i>Declaration of Conformity</i>			
<i>Transition Networks, Inc.</i>			
<small>Manufacture's Name</small>			
<i>10900 Red Circle Drive, Minnetonka, Minnesota 55343 U.S.A.</i>			
<small>Manufacture's Address</small>			
Declares that the products:			
Mx/E-ISW-FX-01(xx)			
Conforms to the following Product Regulations:			
FCC Part 15 Class A, EN 55032:2012, EN 55024:2010			
Directive 2014/30/EU			
Low-Voltage Directive 2014/35/EU			
IEC /EN 60950-1:2006+A2:2013			
2011/65/EU EN 50581:2012			
With the technical construction on file at the above address, this product carries the			
CE Mark			
I, the undersigned, hereby declare that the equipment specified above conforms to the above Directive(s) and Standards(s).			
<i>Minnetonka, Minnesota</i>	<i>Jan 9, 2018</i>		
<small>Place</small>	<small>Date</small>	<small>Signature</small>	
	<i>Stephen Anderson</i>	<i>Vice President of Engineering</i>	
	<small>Full Name</small>	<small>Position</small>	<small>28141B</small>

FCC Regulations

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at the user's own expense.

Canadian Regulations

This digital apparatus does not exceed the Class A limits for radio noise for digital apparatus set out on the radio interference regulations of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la Class A prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

European Regulations

Warning

This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Achtung !

Dieses ist ein Gerät der Funkstörgrenzwertklasse A. In Wohnbereichen können bei Betrieb dieses Gerätes Rundfunkstörungen auftreten. In diesem Fall ist der Benutzer für Gegenmaßnahmen verantwortlich.

Attention !



Ceci est un produit de Classe A. Dans un environnement domestique, ce produit risque de créer des interférences radioélectriques, il appartiendra alors à l'utilisateur de prendre les mesures spécifiques appropriées.

In accordance with European Union Directive 2002/96/EC of the European Parliament and of the Council of 27 January 2003, Transition Networks will accept post usage returns of this product for proper disposal. The contact information for this activity can be found in the 'Contact Us' portion of this document.



CAUTION: RJ connectors are NOT INTENDED FOR CONNECTION TO THE PUBLIC TELEPHONE NETWORK. Failure to observe this caution could result in damage to the public telephone network.

Der Anschluss dieses Gerätes an ein öffentliches Telekommunikationsnetz in den EGMitgliedstaaten verstößt gegen die jeweiligen einzelstaatlichen Gesetze zur Anwendung der Richtlinie 91/263/EWG zur Angleichung der Rechtsvorschriften der Mitgliedstaaten über Telekommunikationsendeinrichtungen einschliesslich der gegenseitigen Anerkennung ihrer Konformität.

Record of Revisions

Rev	Date	Notes
A	7/26/10	Initial release.
B	12/5/11	M/E-ISW-FX-01 (SMLC) changed the " nm" from 1550 to 1310.
C	7/27/15	Add optical for M/E-ISW-FX-01. Product Name: M/E-ISW-FX-01(LH); Optic p/n: 13857 (Industrial Mini 10/100Base-TX to 100Base-FX SM 1310nm SC 40km). Update 100BASE-LX10 information.
D	6/14/18	Update DoC and contact info.

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