

User's Guide

M/GE-PSW-SX-01, M/GE-PSW-LX-01 Stand-Alone Media Converters

- Copper to Fiber
- 10/100/1000Base-T to 1000Base-X

The miniature plug-and-play M/GE-PSW-xX-01, 2-port Ethernet/Fast Ethernet bridging media converters allow integrating fiber optic cable to

10/100/1000 Unshielded Twisted Pair (UTP) environments while providing a space-saving alternative to traditional sized media converters.

M/GE-PSW-xX-01: Auto-Negotiation, AutoCross, Link Pass-Through

Part Number	Copper - Port 10/100/1000Base-T	Fiber-Optic -Port 1000Base-FX (SC)
M/GE-PSW-SX-01	RJ-45 100 m (328 ft)*	SX, 850 nm, multimode 62.5/125 200m (722 ft), 50/125 550m (1,805 ft)
M/GE-PSW-LX-01	RJ-45 100 m (328 ft)*	LX, 1310 nm single mode 10 km (2.1 miles)*
M/GE-PSW-LX-01 (100) **	RJ-45 100 m (328 ft)*	LX, 1310TX/1550RX nm, single mode 20 km (12.4 miles)*
M/GE-PSW-LX-01 (101)**	RJ-45 100 m (328 ft)*	LX, 1550TX/1310RX nm, single mode 20 km (12.4 miles)*

*Typical maximum cable distance; actual distance is dependent upon the physical characteristics of the network.

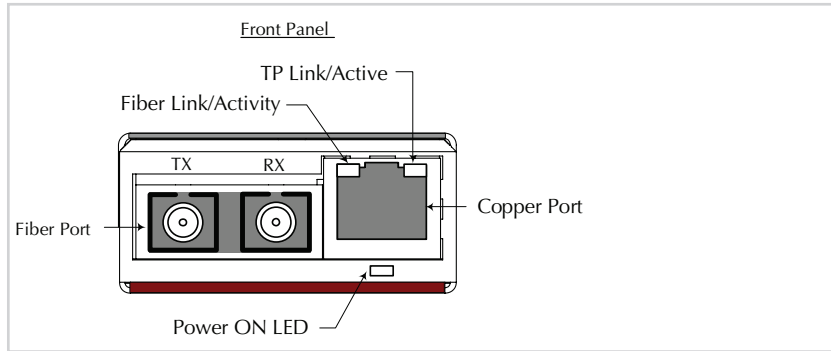
**M/GE-PSW-LX-01(100) and M/GE-PSW-LX-01(101) are single-stand models and are sold in pairs.

Installation	.2
Operation	.6
Cable Specifications	.10
Technical Specifications	.12
Troubleshooting	.13
Contact Us	.14
Declaration of Conformity	.14
Compliance Information	.15

Installation

Copper and fiber ports

The illustration below shows the front panel of the M/GE-PSW-xX-01 media converters.



Electrostatic Discharge (ESD)

Always observe the following ESD precautions when installing or handing the M/GE-PSW-xX-01 media converter:

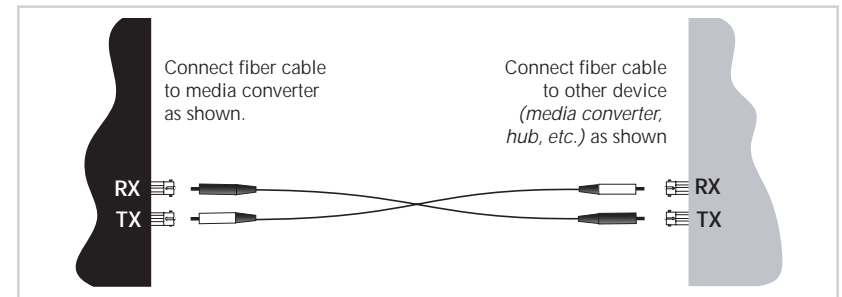
- Do not remove the converter from its protective packaging until you are ready to install it.
- Wear an ESD wrist grounding strap before handling any module or component. If you do not have a wrist strap, maintain grounded contact with the system unit throughout any procedure requiring ESD protection.

Installation—Continued

Connect the fiber cable

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 or build IEEE 803.2™ compliant 1000Base-X fiber cable with male, two-stranded TX to RX connectors installed at both ends.
2. Connect the fiber cable to the M/GE-PSW-xX-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 (*another 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.



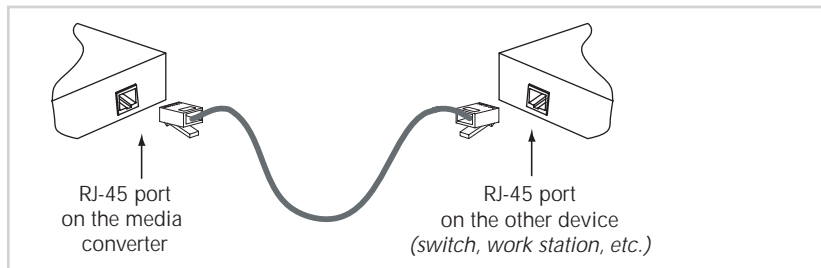
Note: With AutoCross permanently enabled, the link LED only lights when a valid end-to-end connection is made.

Installation—Continued

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.

1. Locate or build IEEE 803.2™ compliant 10/100/1000Base-T cables 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/GE-PSW-xX-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.*).

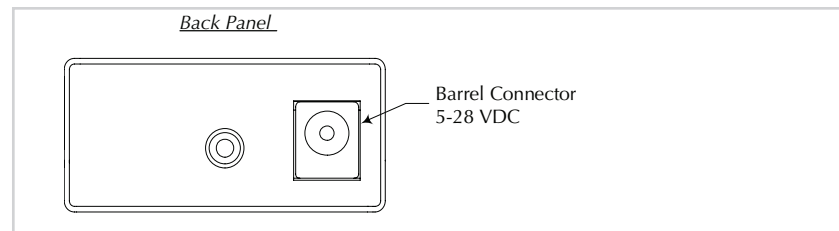


Note: With AutoCross permanently enabled, the link LED only lights when a valid end-to-end connection is made.

Installation—Continued

Powering the media converter

The M/GE-PSW-xX-01 media converter is powered by using a DC power adapter through the barrel connector on its rear panel, as shown below.



M/GE-PSW-xX-01 Back Panel Power

Power adapter

AC power

1. Connect the barrel connector of the power adapter to the media converter's power port (*located on the back panel of the media converter*).
2. Connect the power adapter plug to AC power.
3. Verify that the media converter is powered up by observing the illuminated LED power indicator light on the front panel.

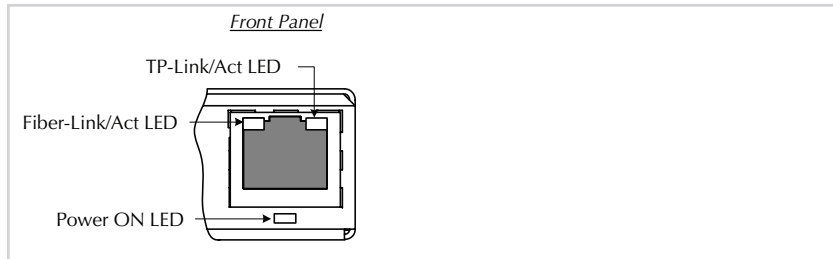
DC power

Consult the user's guide for the Transition Networks SPS-1872-SA DC external power supply for powering the media converter.

Operation

Status LEDs

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



LED states are as follows:

Fiber-Link/Act LED

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

TP-Link/Act LED

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

Power LED

Green ON = Connected to power

Operation—Continued

Product features

Congestion reduction

The M/GE-PSW-xX-01 media converters do not forward collision signals or error packets from one collision domain to another, which results 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/GE-PSW-xX-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 /100/1000 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.

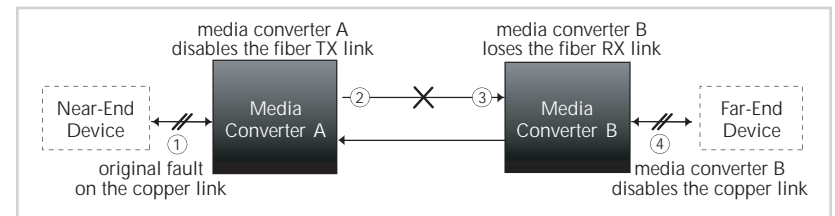
In a scenario where an auto-negotiation device is linked to a non-negotiating device, the negotiating device via parallel detection recognizes the speed of the second device then establishes the best operating speed (*10/100/100Mbps*) at half-duplex.

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: Both copper and fiber cables must be installed before the LEDs will light.

Operation—Continued

Product features—continued

Automatic link restoration

The media converter will automatically re-establish the link when connected to a switch if the link is lost, even with Auto-Negotiation and Link Pass-through (*both directions*) enabled.

Full-duplex flow control

In a full-duplex network, maximum cable lengths are determined by the type of cables used—see front cover and cable specifications section.

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 round-trip 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 at: www.transition.com

Back pressure

Back pressure is used in half duplex mode. It ensures the retransmission of incoming packets when a port using half-duplex is temporarily unable to receive incoming frames.

Flow control

The process of adjusting the flow of data from one device to another ensures that the receiving device can handle all 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.

Operation—Continued

Product features—continued

Distance extension

The M/GE-PSW-xX-01 media converters can segment one (1) 10Base-T copper Ethernet, 100Base-T copper fast Ethernet, or 1000Base-T copper Gigabit Ethernet, and one (1)1000 Base-X fiber Fast Ethernet collision domain:

In a half-duplex Ethernet or Fast Ethernet environment, the M/GE-PSW-xX-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/GE-PSW-xX-01 media converters extend network distances to the physical cable limitations imposed by the selected twisted-pair copper fiber cables.

Rate conversion

The M/GE-PSW-xX-01 media converters allow the following connections:

- 10Mb/s devices on a 10Base-T legacy copper network to 1000Mb/s devices on a 1000Base SX/LX Gigabit Ethernet fiber network.
- 100Mb/s devices on a 100Base-T legacy copper network to 1000Mb/s devices on a 1000Base SX/LX Gigabit Ethernet fiber network.

Cable Specifications

The physical characteristics must meet or exceed IEEE 802.3™ specifications.

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	
M/GE-PSW-SX-01	850nm multimode	
Fiber Optic Transmitter Power:	min: -10.0 dBm	max: -4.0 dBm
Fiber Optic Receiver Sensitivity:	min: -17.0 dBm	max: -0.0 dBm
Link Budget:	7.0 dB	
M/GE-PSW-LX-01	1310 nm single mode	
Fiber-optic Transmitter Power:	min: -9.5 dBm	max: -3.0 dBm
Fiber-optic Receiver Sensitivity:	min: -20.0 dBm	max: -3.0 dBm
Link Budget:	10.5 dB	
M/GE-PSW-LX-01(100)	1310TX/1550RX nm single mode	
M/GE-PSW-LX-01(101)	1550TX/1310RX nm single mode	
Fiber-optic Transmitter Power:	min: -8.0 dBm	max: -3.0 dBm
Fiber-optic Receiver Sensitivity:	min: -21.0 dBm	max: -3.0 dBm
Link Budget:	13 dB	

The fiber optic transmitters on this device meet Class I Laser safety requirements per IEC-825/CDRH standards and comply with 21 CFR1040.10 and 21CFR1040.11.

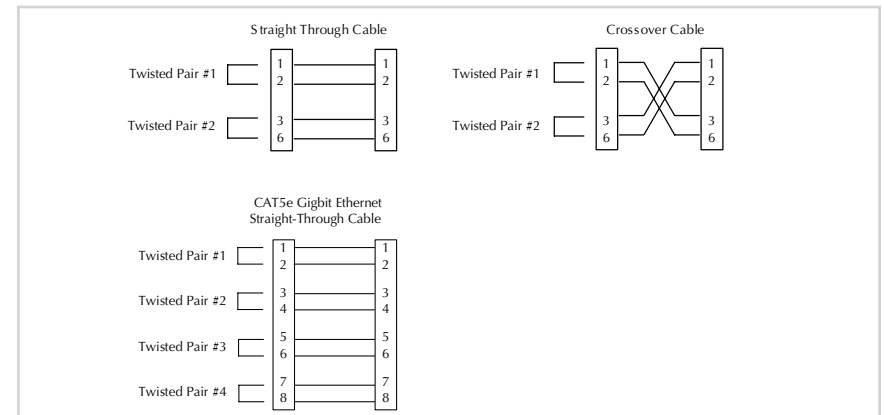
Cable Specifications—Continued

Copper cable

Categories 5 and 5e: minimum requirement

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.
- All four pairs are used in a gigabit 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/GE-PSW-xx-01 converters.

Standards:	IEEE 802.3-2000
Data rate:	10 Mb/s, 100 Mb/s, 1000 Mb/s
Dimensions:	1.8"W x 3.35"D x 0.85"H (45.7 x 85.1 x 21.6 mm)
Weight:	3.15 oz. (127.5 g) approximately
MTBF*:	24,466 hours (MIL217F2 V5.0) (MIL-HDBD-217F) 100,130 hours (Bellcore7 V5.0)
Memory:	1Meg
MAC addresses:	8K
Maximum packet size:	1632 bytes, untagged 1628 bytes, tagged
Power sources:	Unit will accept - 5 to 28 VDC Barrel connector – Wall Mount AC Adapter (400mA at 12VDC)(The external power supply provided with this product is UL listed by the power supply's manufacturer.)
Power consumption:	262mA @ 12VDC, 3.15 watts
Environment:	Tmra**:
	0°C to 50°C (32°F to 122°F)
	Storage Temp:
	-25°C to 65°C (-13°F to 149°F)
	Humidity:
	5% to 95%, non-condensing
	Altitude:
	0 to 10,000 feet
Warranty:	Lifetime

*MTBF is estimated using the predictability method. This method is based on MIL-217F at 25°C ambient temperature, typical enclosure heat rise of 10°C with nominal operating conditions and parameters. Installation and configuration specific MTBF estimates are available upon request. Contact Technical Support.

**Manufacturer's rated ambient temperature.

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 intra-building (*inside plant*) link segments that are not subject to lightning 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 inter-building (*outside plant*) link segments that are subject to lightning transients or power faults. Failure to observe this caution could result in damage to equipment.

Technical Specifications—Continued

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 intra-building (*inside plant*) link segments that are not subject to lightning 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 inter-building (*outside plant*) link segments that are subject to lightning transients or power faults.

The product is certified by the manufacturer to comply with DHHS Rule 21/CFR, Subchapter J applicable at the date of manufacture.

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.

The information in this user's guide is subject to change. For the most up-to-date information, view the user's guide on-line at: www.transition.com.

Troubleshooting

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

- Is the power LED illuminated and did the TX and FX LEDs turn ON then turn OFF?
NO
 - 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: US/Canada: 1-800-260-1312, International: 00-1-952-941-7600.
 YES
 - Proceed to step 2.
- Note the following:
- As a link pass-through device both copper and fiber cables must be installed before the LEDs will light.
- 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: US/Canada: 1-800-260-1312, International: 00-1-952-941-7600.

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

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Chat live via the Web with Transition Networks Technical Support.
Log onto www.transition.com and click the Transition Now link.

Web-Based Seminars



Transition Networks provides seminars via live web-based training.
Log onto www.transition.com and click the Learning Center link.

E-Mail

Ask a question anytime by sending an e-mail to our technical support staff.
techsupport@transition.com

Address

Transition Networks
10900 Red Circle Drive
Minnetonka MN 55343, U.S.A.
telephone: 952-941-7600
toll free: 800-526-9267
fax: 952-941-2322

		Declaration of Conformity	
Name of Mfg:	Transition Networks 10900 Red Circle Drive, MinnetonkaMN 55343 U.S.A.		
Model:	M/GE-PSW-xX-01 Series Media Converters		
Part Number(s):	M/GE-PSW-LX-01, M/GE-PSW-SX-01, M/GE-PSW-LX-01(100), M/GE-PSW-LX-01(101)		
Regulation:	EMC Directive 89/336/EEC		
Purpose: To declare that the M/GE-PSW-xX-01 to which this declaration refers is in conformity with the following standards. EN 55022:1994 + A1:1995 + A2:1997; EN 55024:1998 + A1:2001 + A2:2003			
I, the undersigned, hereby declare that the equipment specified above conforms to the above Directive(s) and Standard(s).			
 Stephen Anderson, Vice President of Engineering		February, 2009 Date	

Compliance Information

CE Mark

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 EG-Mitgliedstaaten 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.

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