

User Guide

M/GE-PSW-SX-01, M/GE-PSW-LX-01, and M/GE-PSW-SX-01(ST)



Standalone Mini Media Converters

- Unit and Port LEDs allow for quick status information
- Auto-Negotiation
- Fixed Full-Duplex on fiber
- AutoCross™
- Active Link Pass Through (ALPT)
- Automatic Link Restoration
- Auto-Negotiation

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Introduction

Transition Networks' miniature plug-and-play M/GE-PSW-xX-01 devices are two-port Ethernet/Fast Ethernet bridging media converters allow integrating fiber optic cable to 10/100/1000 Unshielded Twisted Pair (UTP) environments while providing a spacesaving alternative to traditional sized media converters.

The Mini Media Converters provide a cost-effective method for integrating fiber optic cabling into a 10/100/1000 UTP environment. With its miniature size, the Mini offers a space saving alternative while it converts copper to fiber within 65% less space.

Model Numbers

Note: Long Haul single mode and Single Strand single mode are available upon request.

Model	Copper - Port 10/100/1000Base-T	Fiber-Optic -Port 1000Base-FX
M/GE-PSW-SX-01	RJ-45 100 m (328 ft)*	SC, 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)*	SC, 1310 nm single mode 10 km (2.1 miles)*
M/GE-PSW-LX-01 (100)**	RJ-45 100 m (328 ft)*	SC, 1310TX/1550RX nm, single mode 20 km (12.4 miles)*
M/GE-PSW-LX-01 (101)**	RJ-45 100 m (328 ft)*	SC, 1550TX/1310RX nm, single mode 20 km (12.4 miles)*
M/GE-PSW-SX-01(ST)	RJ-45 100 m (328 ft)*	ST MM, 850 nm duplex ST multimode: 300 / 550* m (300 m for 62.5/125µm MMF, 550 m for 50/125 µm MMF). Temp.: 0 to 70° C.

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

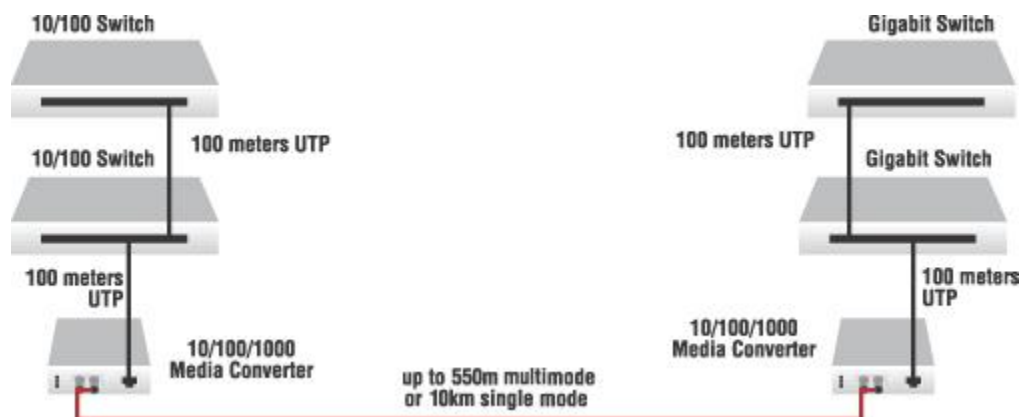
** M/GE-PSW-LX-01(100) and M/GE-PSW-LX-01(101) are single-strand models and are sold in pairs.

Options

Option	Description
SPS-2460-SA	Wide Input (24 - 60 VDC) Stand-Alone Power Supply
WMBM	Wall Mount Bracket for Mini Media Converters
RMBM	Rack Mount Bracket for Mini Media Converters in the RMS19-SA4-01, E-MCR-05, and/or M-MCR-01

Applications

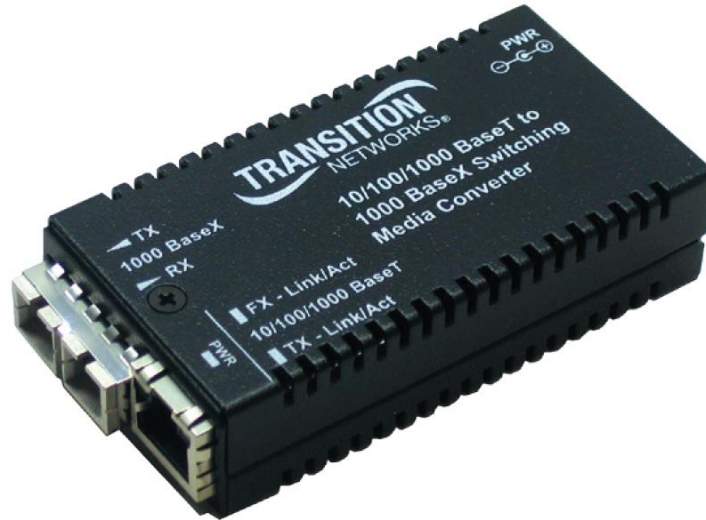
Connect Legacy Networking Equipment: Connect an existing 10/100 Mbps device to 1000 Mbps devices.



Package Contents

Make sure you have received the items below. Contact your sales representative if any items are missing. Save the packaging for possible future use.

- One M/GE-PSW-SX-01
- One Power Supply
- One Documentation postcard



M/GE-PSW-SX-01

Installation

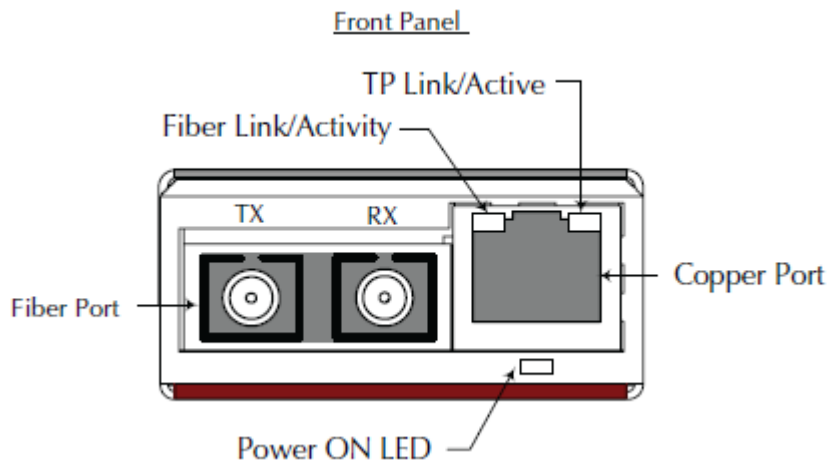
Electrostatic Discharge (ESD)

Always observe the following ESD precautions when installing or handling 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.

Copper and Fiber Ports

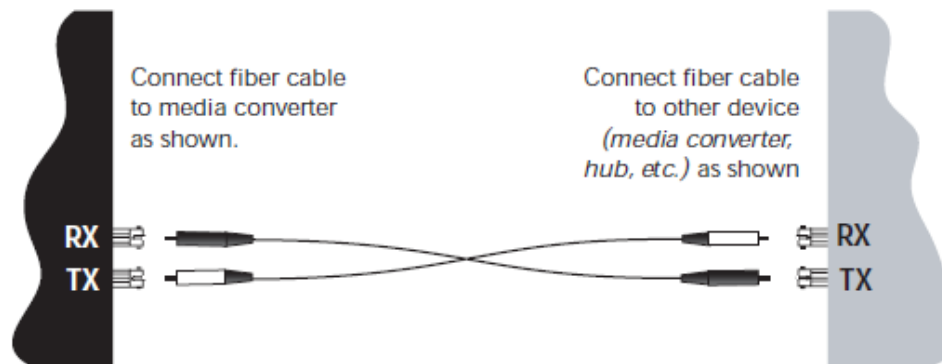
The figure below shows the front panel of the M/GE-PSW-SX-01 media converter.



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-SX-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.

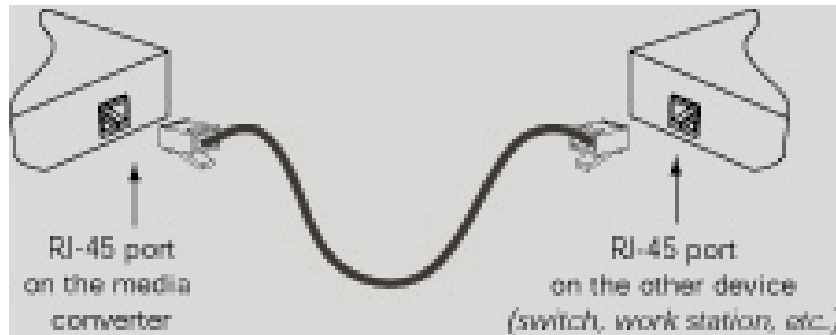


Note: With AutoCross permanently enabled, the link LED only lights when a valid end-to-end connection is made.

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.

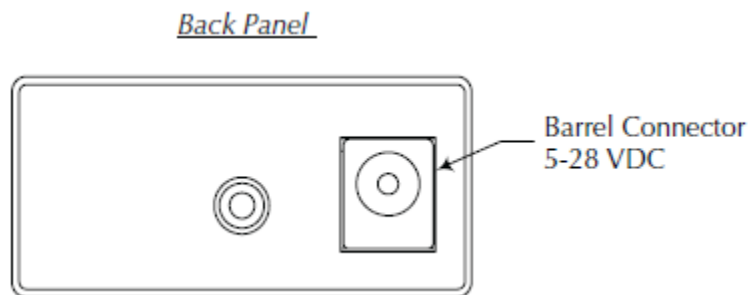
1. Locate or build IEEE 803.2™ compliant 10/100/1000Base-T cables with RJ-45 connectors installed at both ends.
2. Connect the RJ-45 connector at one end of the cable to the RJ-45 port on the M/GE-PSW-SX-01 media converter.
3. Connect the RJ-45 connector at the other end of the cable to the RJ-45 port 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.

Power up the Media Converter

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



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

Power Supply optional. Power Supply Unit accepts 5 VDC to 28 VDC Wall Mount AC adapter: 12 VDC 400mA. To order the corresponding country specific power supply, add the extension from the list below to the end of the SKU (Ex: M/GE-PSW-SX-01-NA): -NA = North America, -LA = Latin America, -EU = Europe, -UK = United Kingdom, -SA = South America, -JP = Japan, -OZ = Australia, -BR = Brazil.

See the Transition Networks SPS-2460-SA DC external power supply User's Guide for information on powering the media converter.

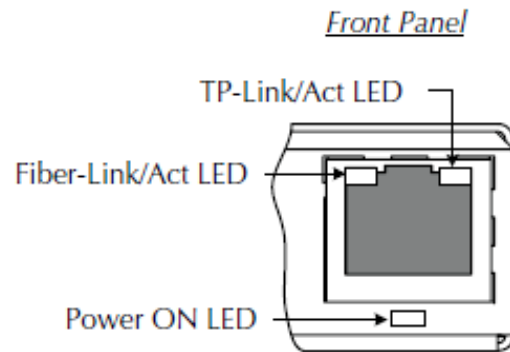
DC Power Adapter:

1. Insert the power adapter barrel into the barrel connector located on the back of the media converter.
2. Connect the power adapter to DC power source.
3. Observe that the power ON LED is lit.

Operation

Status LEDs

Use the status 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
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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.

Active Link Pass-Through (ALPT)

Link Pass-Through is a troubleshooting feature that allows the media converter to monitor both the fiber and copper RX ports for loss of signal. With the loss of RX signal on one media port, the converter will automatically disable the TX signal of the other media port, thus “passing through” the link loss.

- End device automatically notified of link loss
- Prevents loss of valuable data unknowingly transmitted over invalid link

Active LPT is a form of LPT that requires the links to become Active before LPT becomes Active.

With Active LPT there are 2 states: **Diagnostic** and **Active**.

The media converter enters the **Diagnostic** state when either of the following conditions is met:

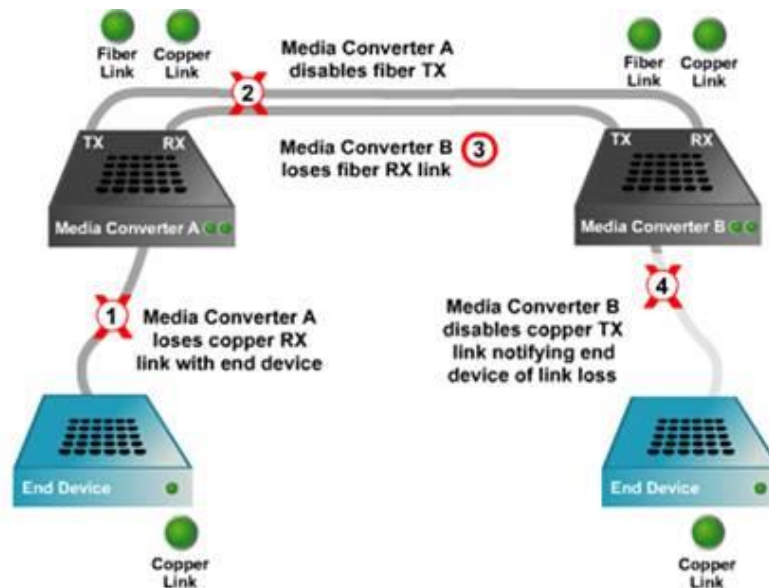
- Upon power-up of the converter.
- Upon removing the converter’s SFP module (if equipped).

In the **Diagnostic** state, the link for each of the media converter’s ports can come up independently of each other, just like a converter that has no LPT functionality, or a converter that has LPT disabled. The Diagnostic state is helpful during first power up, before all links of a circuit are connected, as it allows the installer to see each link turn on as the cables are plugged in. It’s also helpful for finding the location of a fault, if one exists.

The media converter remains in the Diagnostic state until the following condition is met:

- The link status for both of the media converter’s ports is up, simultaneously.

After that condition is met, ALPT enters the **Active** state. It remains in the Active state until the converter is either powered down, or its SFP module is removed. In the Active state, Active LPT works as shown below (the same as when regular LPT is enabled).



Note: Active Link Pass-Through (ALPT) support requires firmware Rev. C or higher.

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.

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 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 at: <https://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.

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	
M/GE-PSW-SX-01(ST)	850 nm duplex ST multimode	
Fiber-optic Transmitter Power:	min: -9.5 dBm	max: -4 dBm
Fiber-optic Receiver Sensitivity:	-18 dBm	
Link Budget:	8.5 db	

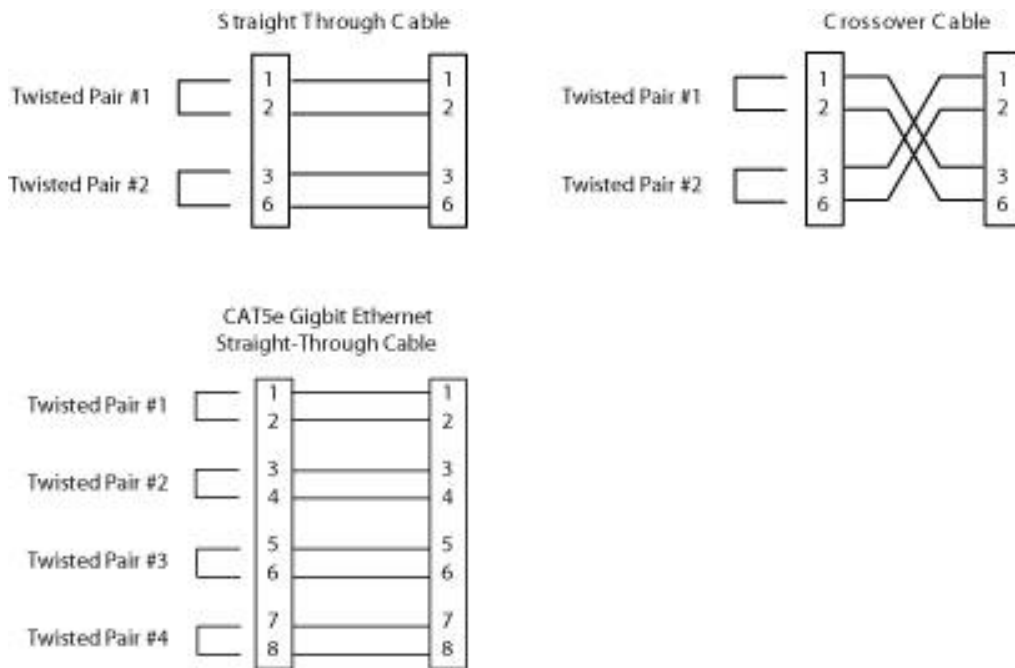
Class 1 Laser International Safety Standard IEC 60825-1 Compliant. Complies with IEC 60825-1 and FDA 21 CFR 1040.10 and 1040.11. The transceiver must be operated within the specified temperature and voltage limits. The fiber optic transmitters on this device meet Class I Laser safety requirements per IEC-825/CDRH standards and comply with 21 CFR1040.10 and 21CFR1040.11.

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 Transition Networks' M/GE-PSW-SX-01 or equivalent:

Standards	IEEE 802.3-2000, IEEE-802.3z 1000BASE-SX
Max Frame Size	Untagged: 1632 bytes Tagged: 1628 bytes
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 Shipping Weight 2 lbs. [0.90 kg]
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 Supply	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
Operating Temp**	0°C to 50°C (32°F to 122°F)
Storage Temp	-15°C to 65°C (5°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 maximum rated ambient temperature (TMRA).

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 the beam 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 may result in hazardous radiation exposure.

Copper based media ports such as 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 such as 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 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:

1. Is the **PWR** (power) LED lit 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 TN Tech Support. See [Contact Us](#) on page 13 below.

YES

- Proceed to step 2.

Note: As a link pass-through device, both the copper and the fiber cables must be installed before the LEDs will light.

2. Are the “**FX – Link**” and “**TX-Link/Act**” LEDs lit on the RJ-45 port?

NO

- Check the copper cables for proper connection. See “[Copper and Fiber Ports](#)” on page 4.
- Check the fiber cables for proper connection. See “[Copper and Fiber Ports](#)” on page 4.
- Contact TN Tech Support. See [Contact Us](#) on page 13 below.

YES

For More Information

Other related manuals are listed below.

- Product Documentation Postcard, 33504 (shipped with each media converter)
- SPS-2460-xx Power Supply User Guide (33455)
- WMBS, WMBL, WMBP, & WMBM Wall-Mount Brackets Install Guide (33393)
- Release Notes (firmware version specific)

For Transition Networks Drivers, Firmware, Manuals (Quick Start Guides, Install Guides, User Guides) go to the Product Support webpage at <https://www.transition.com/support/product-support/> (registration / logon required).

For Transition Networks Application Notes, Brochures, Case Studies, Data Sheets, Specifications, Webinars, etc. go to <https://www.transition.com/support/library/> (no registration / logon required).

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

The M/GE-PSW-xX-01 is in conformity with the following standards: EN 55022:1994 + A1:1995 + A2:1997; EN 55024:1998 + A1:2001 + A2:2003. Compliance: Safety: Wall Mount Power Supply, UL Listed, cUL Listed (Canada); FCC Class A, CISPR22/EN55022 Class A, EN55024, CE Mark.

Declaration of Conformity

EU Declaration of Conformity

***M/GE-PSW-SX-01, M/GE-PSW-LX-01, M/GE-PSW-LX-01 (100)
M/GE-PSW-LX-01 (101) and M/GE-PSW-SX-01(ST)***


Model/Part Number

Transition Networks, Inc.

10900 Red Circle Drive, Minnetonka, Minnesota 55343 U.S.A.

Manufacturer's Name and Address

This declaration of conformity is issued under the sole responsibility of the manufacturer.

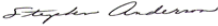


***M/GE-PSW-SX-01, M/GE-PSW-LX-01, M/GE-PSW-LX-01 (100)
M/GE-PSW-LX-01 (101) and M/GE-PSW-SX-01(ST)*** is in conformity with the relevant Union harmonisation legislation:

*Electromagnetic Compatibility (EMC) Directive 2014/30/EU: EN 55022:2010, EN 55024:2010
Low-Voltage Directive (LVD) 2014/35/EU: EN 60950-1:2006*

And hereby is declared compliant and carries the CE marking

I, the undersigned, hereby declare that the equipment specified above conforms to the above Directive(s) and Standards(s).

<u>Minnetonka, Minnesota</u>	<u>March 14, 2016</u>	
<small>Place</small>	<small>Date</small>	<small>Signature</small>
		<u>Stephen Anderson</u> <small>Full Name</small>
		<u>Vice President of Engineering</u> <small>Position</small>

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 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	1/25/08	Initial release.
B	11/20/09	Correct the product description on page 1 and add DoC.
C	3/14/17	Add M/GE-PSW-SX-01(ST), change format, add ALPT feature at FW Rev. C, and update contact information.

Trademark Notice

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