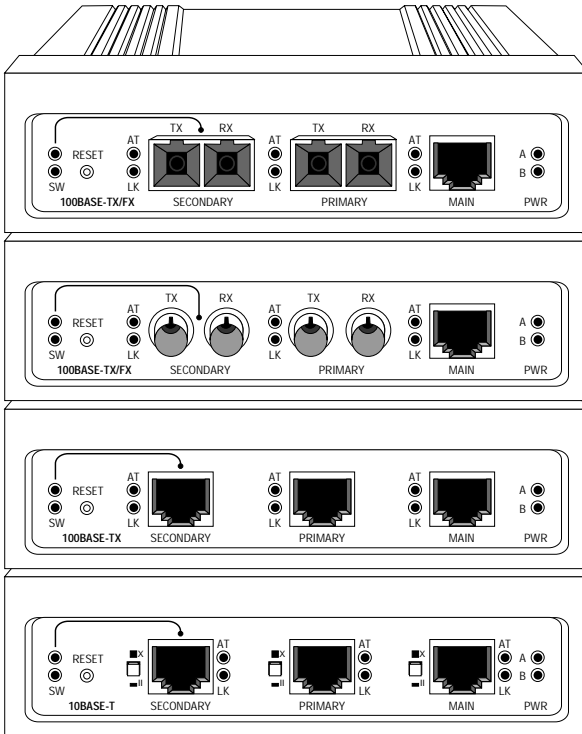




“redundant twister”™ MEDIA CONVERTERS



Installation & User Guide

**CUSTOMER
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INFORMATION**

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Table of Contents

“redundant twister” Media Converter Installation & User Guide

Product Overview	4
Installation Guide	7
STEP 1: Unpacking the “redundant twister”	7
STEP 2: Choosing an Appropriate Location	7
STEP 3: Setting the DIP Switches	8
STEP 4: Connecting to the Network	12
STEP 5: Applying Power	14
User Guide	17
LED Operation	17
Reset Push Button	18
Link Loss Carry Forward (LLCF)	19
Topology Solutions	20
Technical Specifications	22
Straight/Crossover RJ-45 Twisted-pair Cables	24
Product Safety, EMC and Compliance Statements	25

Overview

The “redundant twister” media converter offers the resiliency of data link redundancy to ensure network integrity with no down time. This link duplication provides the non-stop networking capability essential for high priority traffic and mission-critical applications. The “redundant twister” media converter is a 100BASE-TX to TX/FX or 10BASE-T to 10BASE-T converter that provides full redundant data paths. In Dynamic Recovery Mode (DRM), the “redundant twister” media converter actively monitors the primary link and if it fails, automatically activates the secondary link without interruption to network operation.

The “redundant twister” media converter has the following features:

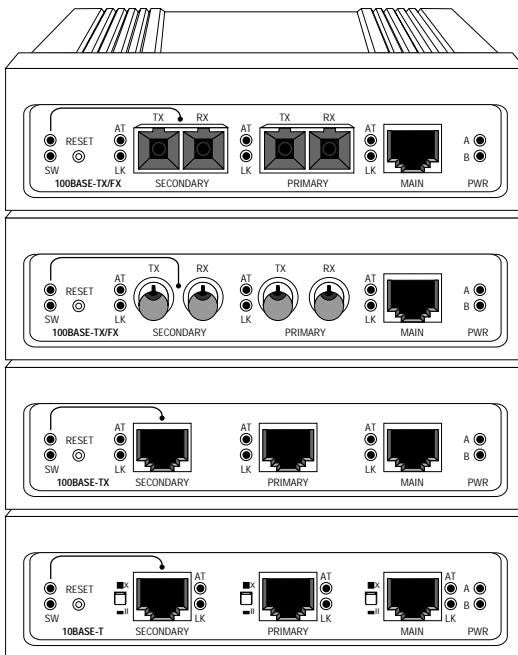
- Can be configured to operate in Dynamic Recovery Mode (DRM) to ensure session integrity and increased uptime.
- Can be configured to operate in Network Select Mode (NSM) to redirect and isolate traffic adding extra security.
- Immediately switches over from the primary link to the secondary link if the primary link fails.
- In addition to providing link and data on the active ports, the “redundant twister” can be configured to provide link or link and redundant transmit data on the non-active port.
- Fast Ethernet media converters demonstrate a maximum loss of 2-3 packets (measured with minimum packet size and minimum inter-packet gap) during fail-over transition.
- Can be configured to return automatically to the primary link after the failure condition is resolved or only upon secondary link failure.
- Supports full and half-duplex operation.
- Provides minimal impact on the round trip delay for communication in half duplex collision domains.
- Auto-polarity support on all twisted-pair ports.
- Link Loss Carry Forward* enable/disable functionality.

* Applies to LE7402A-TX only. Please refer to the page titled “*Link Loss Carry Forward (LLCF)*” in the **User Guide** section of this document for more detailed information.

- Functions with devices configured for auto-negotiation.
- The twisted-pair ports on the LE7402A-TX are equipped with an MDI-II to MDI-X switch eliminating the need for cross over cables.

The “redundant twister” media converter is available in five different models. These models each contain a MAIN port, a PRIMARY port and a SECONDARY port. Redundancy is provided between the PRIMARY and SECONDARY ports. The models are as follows:

Model Number	Mbps	Connectors	Maximum Supported Link Length
LE7402A-TX	10	RJ-45 to Redundant RJ-45	100m/100m
LMC400A-TX	100	RJ-45 to Redundant RJ-45	100m/100m
LMC400A-MMSC	100	RJ-45 to Redundant FX multimode SC	100m/2km
LMC400A-SMSC	100	RJ-45 to Redundant FX singlemode SC	100m/15km
LMC400A-MMST	100	RJ-45 to Redundant FX multimode ST	100m/2km



Installation Guide

Follow the simple steps outlined in this section of the guide to install and start using your “redundant twister” media converter.

1 **Unpack the “redundant twister” Media Converter.**

Check that the following components have been included:

- “redundant twister” media converter
- Two (2) 12V Power Supplies
- Four (4) Rubber Feet

Your order has been provided with the safest possible packaging, but shipping damage does occasionally occur. Inspect your order carefully for damage that may have occurred during shipment. If you discover any shipping damage, notify the carrier and follow their instructions for damage and claims. Be sure to save the original shipping carton in case return or storage of the unit is necessary.

2 **Choose an Appropriate Location.**

The “redundant twister” media converter is intended for use in either office or industrial environments. The converter must be located within six (6) feet of the AC power source being used and placed as far away as possible from electrical noise generating equipment such as copiers, electrostatic printers and other motorized equipment. If exposed twisted-pair wiring is used nearby, the wiring should be routed as far away as possible from power cords and data cables to minimize interference.

The units may be oriented in any manner which permits the user to make physical connection to the power supplies and leaves a minimum of six (6) inches of space for proper ventilation.

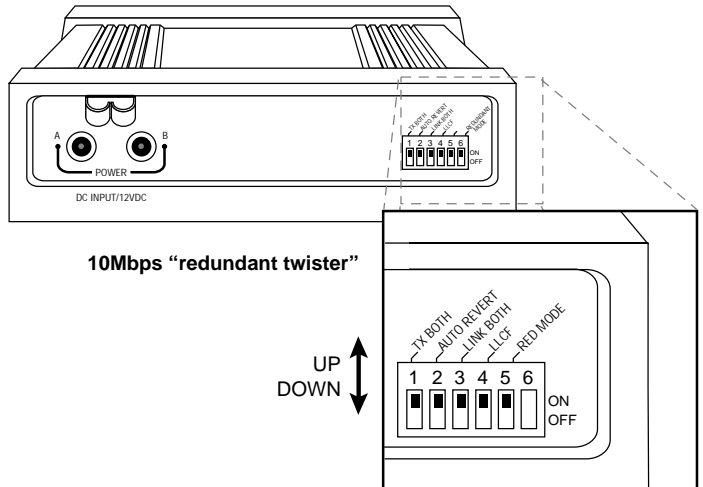
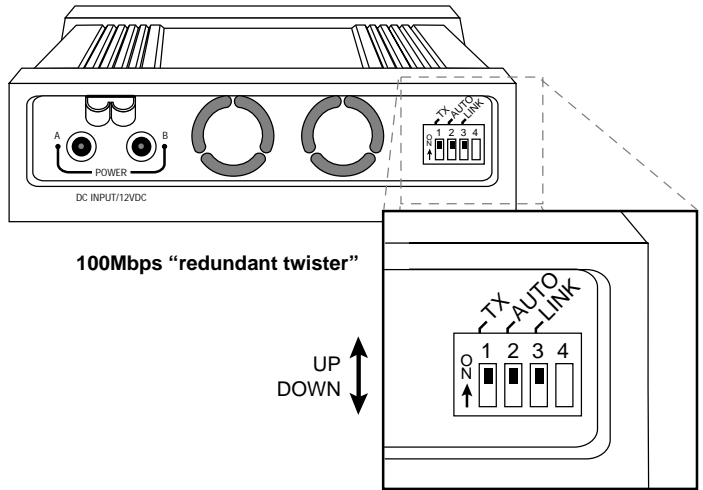
TUV Compliance Note. For pluggable equipment, the socket outlet must be installed near the equipment and be easily accessible.

Bei Geräten mit Steckanschluß muß die Steckdose nahe dem Gerät angebracht und leicht zugänglich sein.

3

Set the DIP Switches.

A set of DIP switches, located on the back panel, provides user-selectable configurability options for several modes of operation. Refer to the table on the next page for the proper setting of the DIP switches.



The DIP switches are marked on the back panel and can be set for the following operational functions:

Switch Name	Position	Operation
TX	UP	Data transmits on both the PRIMARY and SECONDARY ports simultaneously
	DOWN <i>(default)</i>	Data transmits on the active port only.
AUTO	UP	Active port automatically reverts back to the PRIMARY port when the primary link is re-established.
	DOWN <i>(default)</i>	Active port will not revert back to the PRIMARY port when a primary link is re-established. The SECONDARY port remains active. Use the RESET push button located on the front of the unit to force the active port back to the PRIMARY port and clear the SW LED.
LINK	UP	Link symbols are sent out on both the PRIMARY and SECONDARY ports (i.e. Link is sent out both ports).
	DOWN <i>(default)</i>	Link symbols are sent out on the active port only. With the LINK switch in this position, data is <u>not</u> transmitted out the non-active port regardless of the TX switch setting. IMPORTANT NOTE: With the LINK switch in this position, the device on the other end of the PRIMARY and SECONDARY ports must <u>not</u> be in auto-sense mode.

LLCF*	UP	Link Loss Carry Forward is enabled.
	DOWN (default)	Link Loss Carry Forward is disabled.
RED	UP (default)	Operates in Dynamic Recovery Mode (DRM). If the PRIMARY link fails, the SECONDARY port becomes active. Refer to the description of the AUTO switch.
	DOWN	Operates in Network Select Mode (NSM). Use the RESET push button on the front of the unit to toggle between PRIMARY and SECONDARY. In NSM, the AUTO switch sets the initial active port on power up. Up is SECONDARY and down is PRIMARY. Note that the SW LED remains off in NSM.

* LE7402A-TX only. Refer to the page titled *Link Loss Carry Forward (LLCF)* in the **User Guide** section of this manual for more detailed information.

LE7402A-TX ONLY:

Set the MDI-II/MDI-X Switches

Next to each RJ-45 connector is a small push button switch used to implement the transmit and receive crossover functionality for that particular port. The position of this switch connects the transmit and receive signal pairs in either a straight through or crossover configuration. The signal routing is as follows:

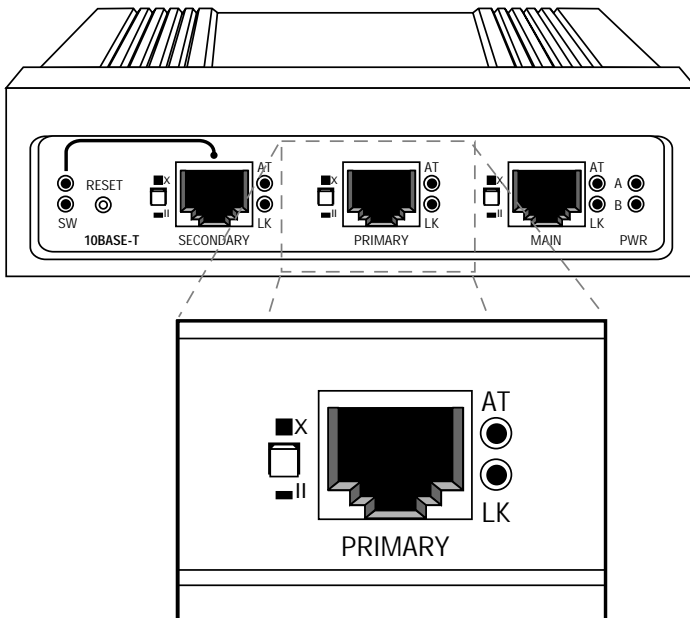
Switch Position	Connection
	TX+ to TX+ TX- to TX- RX+ to RX+ RX- to RX-
X	TX+ to RX+ TX- to RX- RX+ to TX+ RX- to TX-

When setting the MDI-II/MDI-X switch, simply press the push button IN or OUT to achieve the desired setting. Observe the positioning of the push button in relation to these symbols:

- The parallel symbol (II) indicates a straight through or parallel connection. Press the button OUT for a straight through connection.
- The cross symbol (X) indicates a crossover connection. Press the button IN for a crossover connection.

These two symbols are clearly marked on the front panel in conjunction with each switch

Refer to the illustration below:



4

Connect to the Network.

A total of three connections must be made on the front panel when connecting the “redundant twister” media converter to the network.

Connect to the MAIN port.

- Each “redundant twister” media converter provides one RJ-45 jack for 10BASE-T connections that supports a maximum segment length of 100m Category 3, 4, or 5 twisted-pair; or one RJ-45 jack for 100BASE-TX connections that support a maximum segment length of 100m of Category 5 twisted-pair.

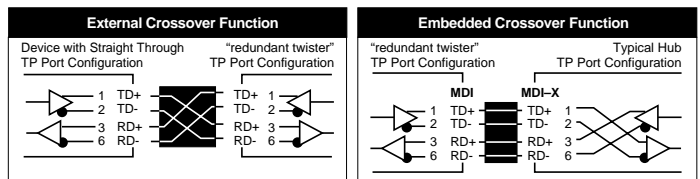
Connect to the PRIMARY port.

Connect to the SECONDARY port.

- The LMC400A-TX (100Mbps) and LE7402A-TX (10Mbps) each provide two sets of RJ-45 connectors that support a maximum cable length of up to 100m.
- The LMC400A-MMSC and LMC400A-MMST each provide two sets of 100BASE-FX multimode SC/ST connectors that each support a maximum cable length of up to 2km.
- The LMC400A-SMSC provides two sets of 100BASE-FX singlemode SC connectors that support a maximum cable length of up to 15km.

IMPORTANT: 100Mbps RJ-45 ports are wired straight through. Before making the proper twisted-pair connection, you must verify the port configuration of the connected device. This does not apply to 10Mbps models.

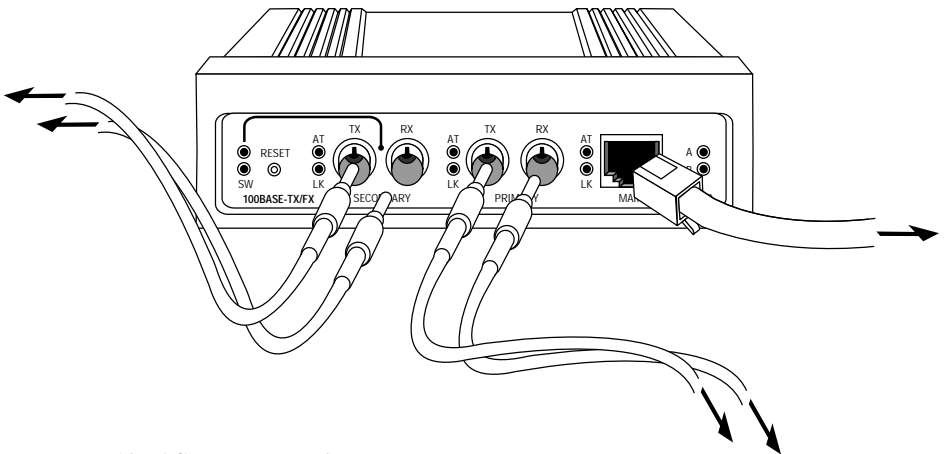
100BASE-TX connections:



- When connecting a “redundant twister” to another device that is internally wired straight through, use a crossover cable.

- When connecting a “redundant twister” to a device that is internally wired crossed over, use a straight through cable.
- If you do not know the internal wiring configuration of the other device’s RJ-45 port, consult the product documentation.
- Refer to the diagrams titled Straight/Crossover RJ-45 Twisted-pair Cable in the **User Guide** section of this manual for more detailed information.

When making fiber optic connections, be sure that the transmit (TX) optical conductor of the “redundant twister” connects to the receive (RX) optical conductor of the connected device; and be sure that the transmit (TX) optical conductor of the device connects to the receive (RX) optical conductor of the “redundant twister” for both the PRIMARY and SECONDARY links.



10BASE-T connections:

- Be sure to set the MDI-II/MDI-X switch appropriately for each port.

Once power is applied to the unit, use the Link (LK) LEDs on the front panel to verify correct segment connectivity. The LK LED illuminates provided there is an active device connected to the other end of the cable sending idle link symbols.

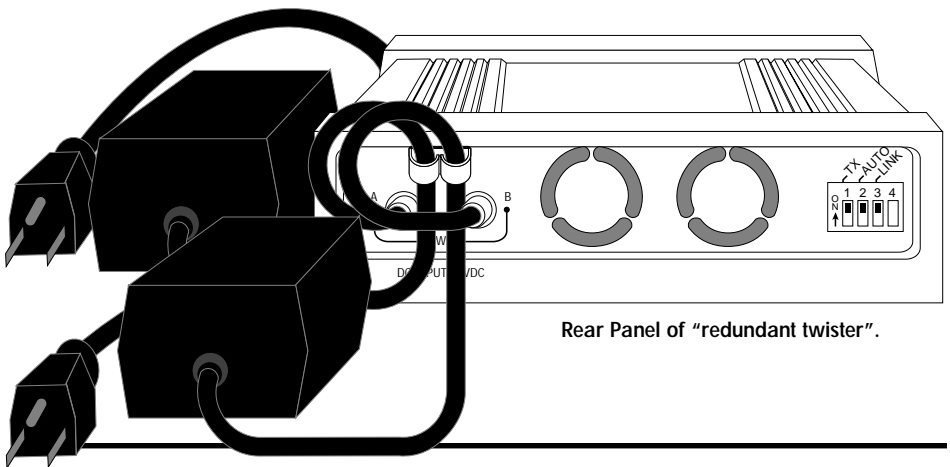
5 Apply Power to the “redundant twister” Media Converter.

Power is provided to the “redundant twister” media converter from the desktop, universal input, switching power modules. Each universal power supply module provides a DC jack for connection of the desktop switching power supply module. The power modules are equipped with S760 hollow-type plugs and standard IEC 320-type AC power receptacles.

IMPORTANT: When making power connections, connect the DC power cord to the DC input jack located on the back panel ***before*** making the connection to the outlet. **Failure to do this properly can damage the product and void the unit’s warranty.**

If a redundant power supply module is being used, simply connect the individual power cords to separate power sources. A convenient bracket provides strain relief from the weight of the cords to eliminate an accidental disconnection.

The “redundant twister” media converter does not have a power switch. After connecting the unit to the AC receptacle, verify that the PWR (power) LEDs illuminate. A steady green light indicates the unit is receiving power. There is one LED for each power supply. They are labeled A and B.



Upon receiving power, the “redundant twister” media converter goes into normal operation mode and automatically provides the appropriate signal conversion between the connected network segments. Use the individual Link (LK) LEDs on the front panel to verify correct segment connectivity.

Refer to the section titled **LED Operation** in the **User Guide** section of this manual for more information.

If an additional extension cord is used to connect the power module to the power source, the following guidelines must be followed:

While one end of the AC power cord can be fitted with whatever plug is standard for the country of operation, the end that connects to the “redundant twister” power supply module must have a female plug that fits this type of AC receptacle.

- AC 115V (North American): use a UL-listed and CSA-certified cord set consisting of a minimum 18 AWG, type SVT or SJT three conductor cord, a maximum of 15 feet in length and a parallel blade, grounding-type attachment plug rated 15A, 125V.
- AC 230V (USA): use a UL-listed cord set consisting of a minimum No. 18 AWG, type SVT three-conductor cord, a maximum of 15 feet in length and a Tandem blade grounding-type attachment plug rated 15A, 250V.
- 240V (outside USA): use a cord set consisting of a minimum No. 18 AWG cord and grounding-type attachment plug rated 15A, 250V. The cord set should have the appropriate safety approvals for the country in which the “redundant twister” unit is installed and should be marked HAR.

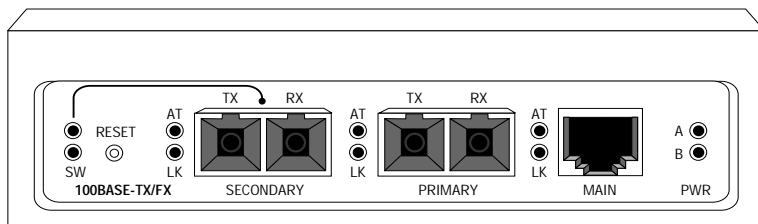
User Guide

This section contains more detailed user information regarding the operating features of your “redundant twister” media converter.

LED Operation

All LEDs are located on the front panel. These include SW, PWR A & B, SECONDARY, LK and AT LEDs. There are separate LK and AT LEDs for each of the three ports (MAIN, PRIMARY and SECONDARY). Refer to the table below for reference. The function of each LED is specified below:

LED Label	Color (Status)	Indication
SW*	Amber (steady)	SECONDARY port was the active port at some point
PWR (A & B)	Green (steady)	Power ON
SECONDARY	Green (steady)	ON SECONDARY active OFF PRIMARY active
(MAIN) LK	Green (steady)	Receive link present
(MAIN) AT	Green (blinking)	Receiving data
(PRIMARY) LK	Green (steady)	Receive link present
(PRIMARY) AT	Green (blinking)	Receiving data
(SECONDARY) LK	Green (steady)	Receive link present
(SECONDARY) AT	Green (blinking)	Receiving data



* This LED functions in Dynamic Recovery Mode (DRM) only.

Reset Push Button

A small RESET push button is located on the front panel of the “redundant twister” media converter. When used in conjunction with the unit’s SW and SECONDARY LEDs, and the AUTO DIP switch setting, this push button allows a network administrator to effectively maintain or troubleshoot a PRIMARY link connection.

Because of its small size and recessed placement within the front panel, press the RESET push button with the tip of a pointed object. Pushing and holding the RESET push button has no effect. It is the act of pressing the push button that causes a reset.

In the event of a PRIMARY link failure, pressing the RESET push button has the following effect:

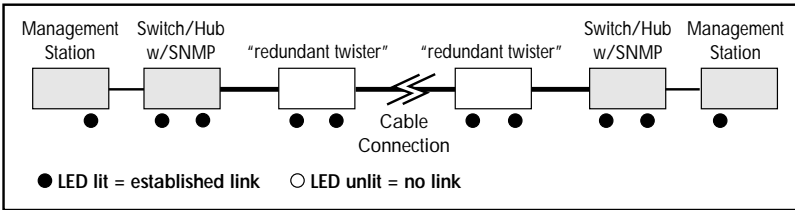
If the AUTO switch is UP and RED switch is UP	The active port automatically reverts to PRIMARY when primary link is re-established and pressing the RESET switch clears the SW LED.
If the AUTO switch is DOWN and RED switch is UP	The active port does <u>not</u> automatically revert to PRIMARY when a primary link is re-established. Pressing the RESET switch clears the SW LED and the SECONDARY LED and forces the PRIMARY port to be the active port. If the SECONDARY link is disabled, it reverts to the PRIMARY if the PRIMARY has a good link.
	If there is only a SECONDARY link, then the SW and SECONDARY LEDs remain illuminated and pressing the RESET switch has no effect.
If the RED switch is DOWN	The unit operates in Network Select Mode (NSM). The RESET push button toggles the active link between the PRIMARY and SECONDARY ports. Note that the SW LED remains off during Network Select Mode (NSM) operation.

Link Loss Carry Forward (LLCF)

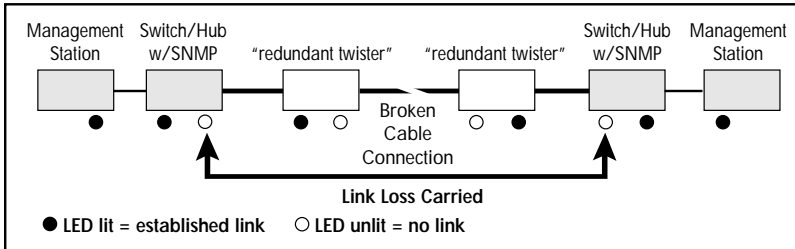
The “redundant twister” has been designed with an LLCF function for troubleshooting a remote connection. The unit is shipped with the LLCF disabled.

When LLCF is enabled, the twisted-pair ports on the “redundant twister” media converter do not transmit a link signal until they receive a link signal from the opposite port. For example, if LLCF is enabled and two “redundant twister” units are connected via a twisted-pair cable with nothing else connected to them, the Link LED does *not* illuminate. When a valid link is established at the twisted-pair port, a complete connection is accomplished.

The diagram below shows a typical network configuration using a “redundant twister” media converter for remote connectivity:

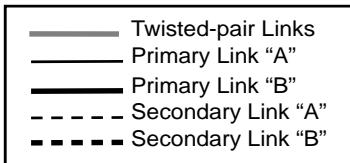
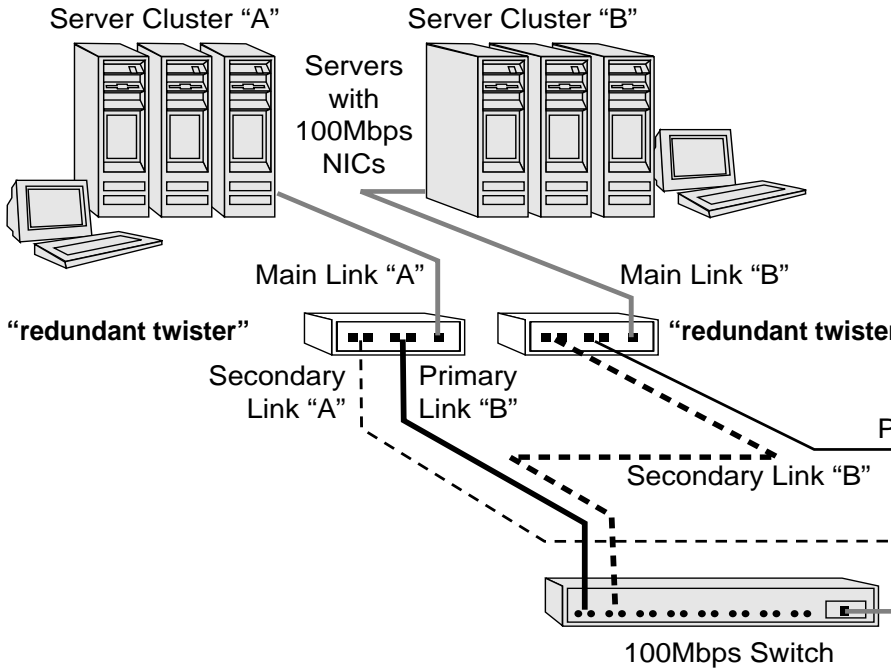


If the connection breaks, or the device fails, the “redundant twister” carries that link loss all the way to the switch/hub which generates a trap to the management station. The administrator can then look at the “redundant twister” media converter to determine the source of the loss.



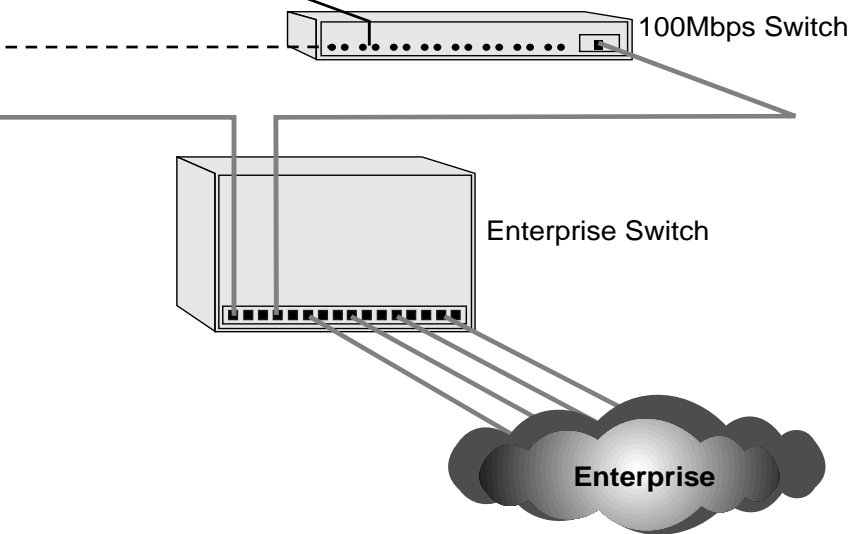
IMPORTANT: When connecting a “redundant twister” media converter to a port that supports auto-negotiation, it is strongly recommended to fix the port setting to the appropriate speed (100Mbps or 10Mbps) and to either full or half-duplex. This allows the media converter to sense receive link and select the active port.

Topology Solutions



”

Primary Link “A”



Technical Specifications

Data Rate

LE7402A	Half-duplex _____	10Mbps
	Full-duplex _____	20Mbps
LMC400A	Half-duplex _____	100Mbps
	Full-duplex _____	200Mbps

10Mbps Twisted-Pair Interface

Connector _____	Shielded RJ-45, 8-pin jack
Impedance _____	100 Ohms nominal
Signal Level Output (differential) _____	2.2 to 2.8V
Signal Level Input _____	.3 to 3.1V p-p minimum
Supported Link Length _____	100m
Cable Type _____	Category 3, 4, or 5 UTP

100Mbps Twisted-Pair Interface

Connector _____	Shielded RJ-45, 8-pin jack
Impedance _____	100 Ohms nominal
Signal Level Output (differential) _____	.95 to 1.05V
Signal Level Input _____	350mV minimum
Supported Link Length _____	100m
Cable Type _____	Category 5 UTP

100Mbps Multimode Fiber Optic Interfac

Connector _____	ST or SC
RX Input Sensitivity _____	-31 dBm peak minimum
Output Power _____	-14 dBm to -23.5 dBm (50/125 μ m)
_____	-14 dBm to -20 dBm (62.5/125 μ m)
Supported Link Length _____	up to 2km full duplex
Cable Type _____	50/125, 62.5/125, 100/140 μ m F/O

100Mbps Singlemode Fiber Optic Interface

Connector _____	SC
RX Input Sensitivity _____	-31 dBm peak minimum
Output Power _____	-8 dBm to -15 dBm (9/125 μ m)
Supported Link Length _____	up to 15km full duplex
Cable Type _____	8.3/125, 8.7/125, 9/125, 10/125 μ m F/O

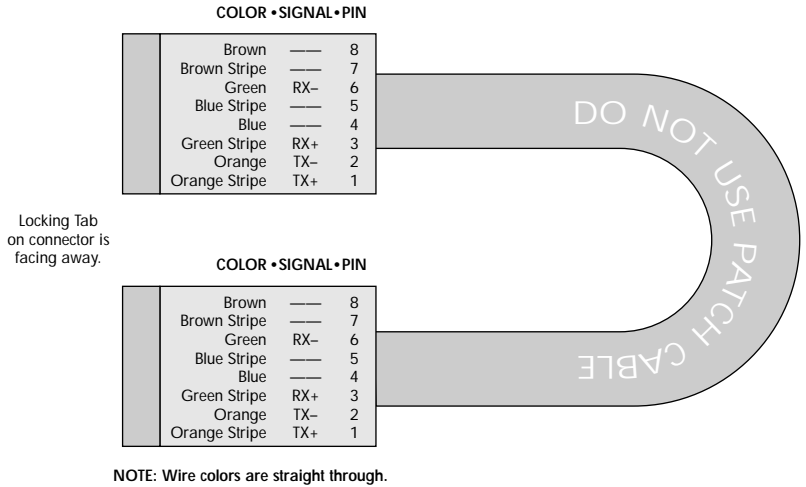
Power Requirements

Input _____ 90 -260V AC 50/60 Hz
Output _____ +12 VDC @ 1 A

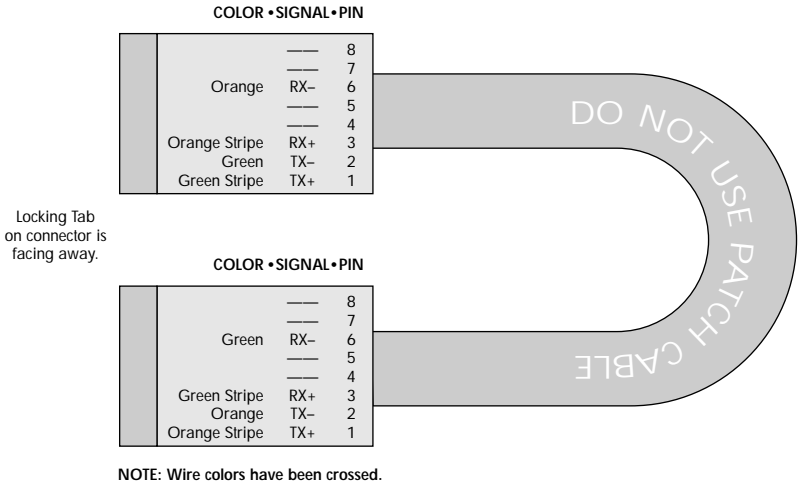
Environmental

Operating Temperature _____ 0 – 50° C
Storage Temperature _____ -30 – 70° C
Operating Humidity _____ 5% – 95% non-condensing
Dimensions _____ 4.5”L x 5.75”W x 1.5”H
Weight _____ 3 lbs. (including power supplies)

Straight RJ-45 Twisted-pair Cables



Crossover RJ-45 Twisted-pair Cables



Product Safety, EMC and Compliance Statements

This equipment complies with the following requirements:

- UL
- CSA
- EN60950 (safety)
- FCC Part 15, Class A
- EN55022 Class A (emissions)
- EN50082-1 (immunity)
- IEEE 802.3/802.3u
- IEC 825-1 Classification
Class 1 Laser Product

Radio Frequency Interference Statement

FCC Radio Frequency Interference Statement

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 his own expense.

Caution: *Changes or modifications to this equipment not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.*

Canadian Radio Frequency Interference Statement

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Electrical Safety Statement
Normas Oficiales Mexicanas (NOM)

INSTRUCCIONES DE SEGURIDAD

1. Todas las instrucciones de seguridad y operación deberán ser leídas antes de que el aparato eléctrico sea operado.
 2. Las instrucciones de seguridad y operación deberán ser guardadas para referencia futura.
 3. Todas las advertencias en el aparato eléctrico y en sus instrucciones de operación deben ser respetadas.
 4. Todas las instrucciones de operación y uso deben ser seguidas.
 5. El aparato eléctrico no deberá ser usado cerca del agua—por ejemplo, cerca de la tina de baño, lavabo, sótano mojado o cerca de una alberca, etc.
 6. El aparato eléctrico debe ser usado únicamente con carritos o pedestales que sean recomendados por el fabricante.
 7. El aparato eléctrico debe ser montado a la pared o al techo sólo como sea recomendado por el fabricante.
 8. Servicio—El usuario no debe intentar dar servicio al equipo eléctrico más allá a lo descrito en las instrucciones de operación. Todo otro servicio deberá ser referido a personal de servicio calificado.
 9. El aparato eléctrico debe ser situado de tal manera que su posición no interfiera su uso. La colocación del aparato eléctrico sobre una cama, sofá, alfombra o superficie similar puede bloquea la ventilación, no se debe colocar en libreros o gabinetes que impidan el flujo de aire por los orificios de ventilación.
 10. El equipo eléctrico deber ser situado fuera del alcance de fuentes de calor como radiadores, registros de calor, estufas u otros aparatos (incluyendo amplificadores) que producen calor.
-

11. El aparato eléctrico deberá ser conectado a una fuente de poder sólo del tipo descrito en el instructivo de operación, o como se indique en el aparato.
 12. Precaución debe ser tomada de tal manera que la tierra física y la polarización del equipo no sea eliminada.
 13. Los cables de la fuente de poder deben ser guiados de tal manera que no sean pisados ni pellizcados por objetos colocados sobre o contra ellos, poniendo particular atención a los contactos y receptáculos donde salen del aparato.
 14. El equipo eléctrico debe ser limpiado únicamente de acuerdo a las recomendaciones del fabricante.
 15. En caso de existir, una antena externa deberá ser localizada lejos de las líneas de energía.
 16. El cable de corriente deberá ser desconectado del cuando el equipo no sea usado por un largo periodo de tiempo.
 17. Cuidado debe ser tomado de tal manera que objetos líquidos no sean derramados sobre la cubierta u orificios de ventilación.
 18. Servicio por personal calificado deberá ser provisto cuando:
 - A: El cable de poder o el contacto ha sido dañado; u
 - B: Objetos han caído o líquido ha sido derramado dentro del aparato; o
 - C: El aparato ha sido expuesto a la lluvia; o
 - D: El aparato parece no operar normalmente o muestra un cambio en su desempeño; o
 - E: El aparato ha sido tirado o su cubierta ha sido dañada.
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