



User's Guide

E-TBT-FRL-05

Stand-Alone Media Converter

- Ethernet
- Copper to Fiber
- 10Base-T to 10Base-FL

Transition Networks E-TBT-FRL-05 series Ethernet 10Base-T to 10Base-FL media converters connect 10 Mb/s twisted-pair copper cable to 10 Mb/s fiber-optic cable.

Standard Temperature Models:

The following models are designed for standard temperature environments ranging from 0°C to 50°C (32°F to 122°F).

| Part Number | Port One - Copper | Port Two - Duplex Fiber-Optic |
|-------------------------|------------------------------------|--|
| E-TBT-FRL-05 | RJ-45, 10Base-T 100 m (328 ft)* | ST, 10Base-FL, 850 nm multimode 2 km (1.2 miles)* |
| E-TBT-FRL-05(L) | RJ-45, 10Base-T 100 m (328 ft)* | ST, 10Base-FL, 1300 nm multimode 5 km (3.1 miles)* |
| E-TBT-FRL-05(LH) | RJ-45, 10Base-T 100 m (328 ft)* | ST, 10Base-FL, 1310 nm singlemode 40 km (24.9 miles)* |
| E-TBT-FRL-05(MT) | RJ-45, 10Base-T 100 m (328 ft)* | MT-RJ, 10Base-FL, 850 nm multimode 2 km (1.2 miles)* |
| E-TBT-FRL-05(SC) | RJ-45, 10Base-T 100 m (328 ft)* | SC, 10Base-FL, 850 nm multimode 2 km (1.2 miles)* |
| E-TBT-FRL-05(SM) | RJ-45, 10Base-T 100 m (328 ft)* | ST, 10Base-FL, 1310 nm singlemode 20 km (12.4 miles)* |
| E-TBT-FRL-05(XC) | RJ-45, 10Base-T 100 m (328 ft)* | SC, 10Base-FL, 1310 nm singlemode 20 km (12.4 miles)* |

* Typical maximum cable distance. Actual distance is dependent upon the physical characteristics of the network installation.

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E-TBT-FRL-05

Extended Temperature Models:

The following models are designed for extended temperature environments ranging from **-25°C to 70°C (-13°F to 158°F)**:

| Part Number | Port One - Copper | Port Two - Duplex Fiber-Optic |
|---------------------------|------------------------------------|--|
| E-TBT-FRL-05(HT) | RJ-45, 10Base-T 100 m (328 ft)* | ST, 10Base-FL, 850 nm multimode 2 km (1.2 miles)* |
| E-TBT-FRL-05(SCHT) | RJ-45, 10Base-T 100 m (328 ft)* | SC, 10Base-FL, 850 nm multimode 2 km (1.2 miles)* |
| E-TBT-FRL-05(SMHT) | RJ-45, 10Base-T 100 m (328 ft)* | ST, 10Base-FL, 1310 nm singlemode 20 km (12.4 miles)* |
| E-TBT-FRL-05(XCHT) | RJ-45, 10Base-T 100 m (328 ft)* | SC, 10Base-FL, 1310 nm singlemode 20 km (12.4 miles)* |
| E-TBT-FRL-05(XLHT) | RJ-45, 10Base-T 100 m (328 ft)* | SC, 10Base-FL, 1310 nm singlemode 50 km (31.1 miles)* |

* Typical maximum cable distance. Actual distance is dependent upon the physical characteristics of the network installation.

Optional Accessories: (sold separately)

| Part Number | Description |
|--------------------|--|
| SPS-2460-SA | Optional External Power Supply; 24-60VDC Stand-Alone Output: 12.25VDC, 1.0 A |
| E-MCR-05 | 12-Slot Media Converter Rack (includes universal internal power supply) 17 x 15 x 5 in. (432 x 381 x 127 mm) |
| WMBS | Optional Wall Mount Brackets Length: 3.2 in. (81 mm), Fits converter length: 3.9 in. (99 mm) |
| WMBV | Optional Vertical Mount Bracket; 5.0 in. (127 mm) |
| WMBD | Optional DIN Rail Mount Bracket; 5.0 in. (127 mm) |
| WMBD-FS | Optional DIN Rail Mount Bracket (flat, small); 3.1 in. (79 mm) |

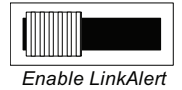
Installation

Set the LinkAlert™ Switch

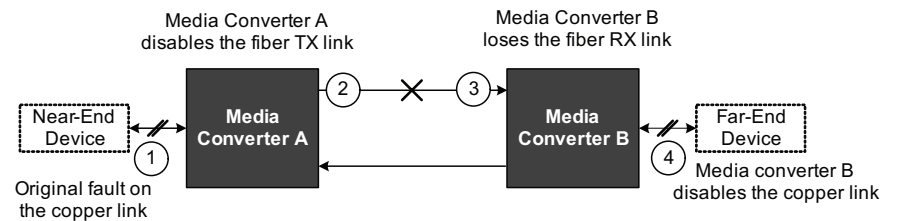
The LinkAlert switch is located on the side of the media converter. Use a small flat-blade screwdriver or a similar device to set the recessed switch:

Left = Enables the LinkAlert function

Right = Disables the LinkAlert function.



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



Note: The enable/disable switch allows the LinkAlert feature to be disabled. LinkAlert may interfere with the Auto-Negotiation feature of other devices in networks where there are two media converters installed in series.

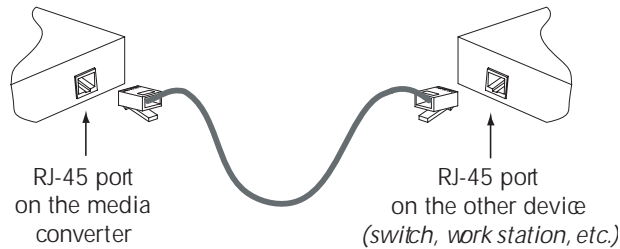
AutoCross™ Feature

The AutoCross feature detects and configures the twisted-pair copper port on the E-TBT-FRL-05 media converter to the correct straight-through (MDI) or crossover (MDI-X) configuration. This feature allows either MDI or MDI-X cable to connect the media converter to devices such as hubs, transceivers, or network interface cards (NICs). (Requires no operator intervention).

Installation -- Continued

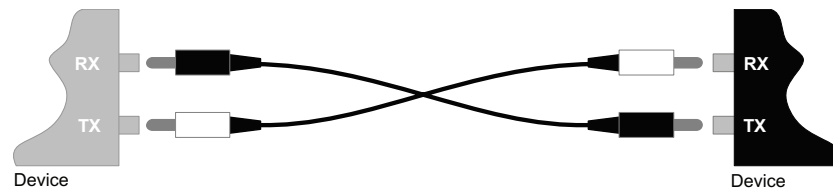
Install the Copper Cable

1. Locate or build 10Base-T compliant copper cables with male, 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 E-TBT-FRL-05 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.).



Install the Fiber Cable

1. Locate or build 10Base-FL compliant fiber cable with male, two-stranded TX to RX connectors installed at both ends.
2. Connect the fiber cables to the E-TBT-FRL-05 media converter as described:
 - 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 cables to the other device (another media converter, hub, etc.) as described:
 - Connect the male **TX** cable connector to the female **RX** port.
 - Connect the male **RX** cable connector to the female **TX** port.



Installation -- Continued

Power the Media Converter

AC

1. Install the power adapter cord to the back of the media converter.
2. Connect the power adapter plug to AC power.
3. Verify that the media converter is powered by observing the illuminated LED power indicator light.

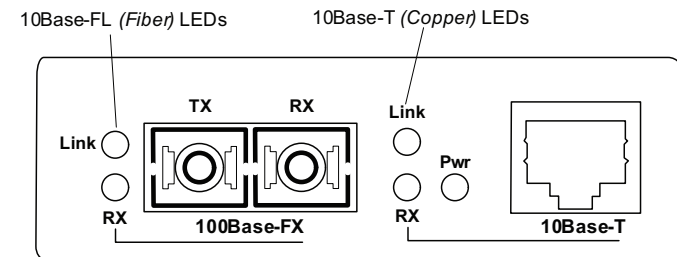
DC

Consult the user's guide for the Transition Networks SPS2460-xx DC external power supply for powering the media converter.

Operation

After installation, the media converter should function without operator intervention. Use the status LEDs to monitor media converter operation in the network.

| | |
|---------------|---|
| Pwr (Power) | On = A connection to external AC power. |
| RX (Fiber) | On = Data reception on the 10Base-FL link. |
| Link (Fiber) | On = A good 10Base-FL link and normal operation. Off = Lack of power or a downed 10Base-FL link. |
| RX (Copper) | On = Data reception on the 10Base-T link. |
| Link (Copper) | On = A good 10Base-T link and normal operation. Off = Lack of power or a downed 10Base-T link. |



Technical Specifications

| | |
|-----------------|--|
| Standards | IEEE 802.3™ |
| Data Rate | 10 Mb/s |
| Case Dimensions | 3.9" x 3.0" x 1.0" (99mm x 76mm x 25mm) |
| Shipping Weight | 6 oz. (181 g) |
| Power Supply | E-TBT-FRL-05, E-TBT-FRL-05(SC), E-TBT-FRL-05(SM), |
| DC Output | E-TBT-FRL-05(L), E-TBT-FRL-05(MT), E-TBT-FRL-05(LH), E-TBT-FRL-05(XC): 12VDC, 0.5 A (<i>minimum</i>) E-TBT-FRL-05(HT), E-TBT-FRL-05(SCHT), E-TBT-FRL-05(SMHT), E-TBT-FRL-05(XCHT), E-TBT-FRL-05(XLHT): 9VDC, 1.0 A (<i>minimum</i>) minimum output regulation: 5% Connector: 2.1mm barrel, center pin positive |
| MTBF | 54,337 hours (MIL217F2 V5.0) (MIL-HDBK-217F) 131,255 hours (Bellcore7 V5.0) |
| Tmra* | E-TBT-FRL-05, E-TBT-FRL-05(SC), E-TBT-FRL-05(SM), E-TBT-FRL-05(L), E-TBT-FRL-05(MT), E-TBT-FRL-05(LH), E-TBT-FRL-05(XC): 0°C to 50°C (32°F to 122°F) E-TBT-FRL-05(HT), E-TBT-FRL-05(SCHT), E-TBT-FRL-05(SMHT), E-TBT-FRL-05(XCHT), E-TBT-FRL-05(XLHT): -25°C to 70°C (-13°F to 158°F) |
| Environment | Storage Temperature: -20°C to 85°C (-4°F to 185°F) Humidity: 5 to 95%, non condensing Altitude: 0 to 10,000 feet |
| Warranty | Lifetime |

*Manufacturer's rated ambient temperature.

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.

IMPORTANT: 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.

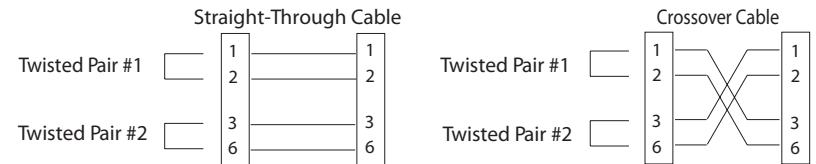
Cable Specifications

Copper Cable

Category 3: (*minimum requirement*)

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

- Straight-through or crossover cable may be used.
- Do not use flat or silver satin wire.
- Shielded twisted-pair (STP) or unshielded twisted-pair (UTP) may be used.
- Pins 1&2 and 3&6 are the two active pairs in an Ethernet network .
- RJ-45 Pin-out: Pin 1 = TD+, Pin 2 = TD-, Pin 3 = RD+, Pin 6 = RD-
- Use only dedicated wire pairs for the active pins:
(e.g., blue/white & white/blue, orange/white & white/orange, etc.)



Cable Specifications -- Continued

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

Fiber Cable

| | |
|---------------------------------|----------------------------|
| Bit Error Rate: | <10 ⁻⁹ |
| Singlemode fiber (recommended): | 9 μm |
| Multimode fiber (recommended): | 62.5/125 μm |
| Multimode fiber (optional): | 100/140, 85/140, 50/125 μm |

Standard Temperature Models: 0°C to 50°C (32°F to 122°F)

| | |
|-----------------------------------|----------------------------------|
| E-TBT-FRL-05 | 850 nm multimode |
| Fiber Optic Transmitter Power: | min: -19.0 dBm max: -10.0 dBm |
| Fiber Optic Receiver Sensitivity: | min: -32.5 dBm max: -14.0 dBm |
| Link Budget: | 13.5 dB |

| | |
|-----------------------------------|----------------------------------|
| E-TBT-FRL-05(L) | 1300 nm multimode |
| Fiber Optic Transmitter Power: | min: -19.0 dBm max: -15.0 dBm |
| Fiber Optic Receiver Sensitivity: | min: -32.5 dBm max: -14.0 dBm |
| Link Budget: | 13.5 dB |

| | |
|-----------------------------------|----------------------------------|
| E-TBT-FRL-05(LH) | 1310 nm singlemode |
| Fiber Optic Transmitter Power: | min: -15.0 dBm max: -5.0 dBm |
| Fiber Optic Receiver Sensitivity: | min: -34.0 dBm max: -14.0 dBm |
| Link Budget: | 19.0 dB |

| | |
|-----------------------------------|----------------------------------|
| E-TBT-FRL-05(MT) | 850 nm multimode |
| Fiber-optic Transmitter Power: | min: -16.0 dBm max: -10.0 dBm |
| Fiber-optic Receiver Sensitivity: | min: -29.5 dBm max: -7.2 dBm |
| Link Budget: | 13.5 dB |

| | |
|-----------------------------------|----------------------------------|
| E-TBT-FRL-05(SC) | 850 nm multimode |
| Fiber Optic Transmitter Power: | min: -19.0 dBm max: -10.0 dBm |
| Fiber Optic Receiver Sensitivity: | min: -32.5 dBm max: -14.0 dBm |
| Link Budget: | 13.5 dB |

| | |
|-----------------------------------|----------------------------------|
| E-TBT-FRL-05(SM) | 1310 nm singlemode |
| Fiber Optic Transmitter Power: | min: -27.0 dBm max: -10.0 dBm |
| Fiber Optic Receiver Sensitivity: | min: -34.0 dBm max: -14.0 dBm |
| Link Budget: | 7.0 dB |

| | |
|-----------------------------------|----------------------------------|
| E-TBT-FRL-05(XC) | 1310 nm singlemode |
| Fiber Optic Transmitter Power: | min: -27.0 dBm max: -10.0 dBm |
| Fiber Optic Receiver Sensitivity: | min: -34.0 dBm max: -14.0 dBm |
| Link Budget: | 7.0 dB |

Cable Specifications -- Continued

Extended Temperature Models: -25°C to 70°C (-13°F to 158°F)

| | |
|-----------------------------------|----------------------------------|
| E-TBT-FRL-05(HT) | 850 nm multimode |
| Fiber Optic Transmitter Power: | min: -19.0 dBm max: -10.0 dBm |
| Fiber Optic Receiver Sensitivity: | min: -32.5 dBm max: -14.0 dBm |
| Link Budget: | 13.5 dB |

| | |
|-----------------------------------|----------------------------------|
| E-TBT-FRL-05(SCHT) | 850 nm multimode |
| Fiber Optic Transmitter Power: | min: -19.0 dBm max: -10.0 dBm |
| Fiber Optic Receiver Sensitivity: | min: -32.5 dBm max: -14.0 dBm |
| Link Budget: | 13.5 dB |

| | |
|-----------------------------------|---------------------------------|
| E-TBT-FRL-05(SMHT) | 1310 nm singlemode |
| Fiber-optic Transmitter Power: | min: -15.0 dBm max: -8.0 dBm |
| Fiber-optic Receiver Sensitivity: | min: -38.0 dBm max: -8.0 dBm |
| Link Budget: | 23.0 dB |

| | |
|-----------------------------------|----------------------------------|
| E-TBT-FRL-05(XCHT) | 1310 nm singlemode |
| Fiber-optic Transmitter Power: | min: -16.0 dBm max: -10.0 dBm |
| Fiber-optic Receiver Sensitivity: | min: -29.5 dBm max: -7.2 dBm |
| Link Budget: | 13.5 dB |

| | |
|-----------------------------------|---------------------------------|
| E-TBT-FRL-05(XLHT) | 1310 nm singlemode |
| Fiber Optic Transmitter Power: | min: -5.0 dBm max: 0.0 dBm |
| Fiber Optic Receiver Sensitivity: | min: -38.0 dBm max: -8.0 dBm |
| Link Budget: | 33.0 dB |

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 power LED on the media converter illuminated?
NO
 - Is the power adapter the proper voltage and frequency for AC outlet? Refer to “Power Supply” on page 6.
 - Is the power adapter properly installed in the media converter and in the outlet?
 - Contact Tech Support: 1-800-260-1312, Int'l: 00-1-952-941-7600.
 YES
 - Proceed to step 2.

2. Is the 10Base-T link LED illuminated?
NO
 - Check the twisted-pair cables for proper connection.
 - Contact Tech Support: 1-800-260-1312, Int'l: 00-1-952-941-7600.
 YES
 - Proceed to step 3.

3. Is the 10Base-FL link LED illuminated?
NO
 - Check the fiber cables for proper connection.
 - Verify that the TX and RX cables on the media converter are connected to RX and TX ports, respectively, on the other device.
 - Contact Tech Support: 1-800-260-1312, Int'l: 00-1-952-941-7600.
 YES
 - Proceed to step 4.

4. Is the 10Base-T RX LED illuminated?
NO
 - Disconnect and reconnect the 10Base-T cable to restart the initialization process.
 - Restart the attached device to restart the initialization process.
 - Contact Tech Support: 1-800-260-1312, Int'l: 00-1-952-941-7600.
 YES
 - Proceed to step 5.

5. Is the 10Base-FL RX LED illuminated?
NO
 - Disconnect and reconnect the 10Base-FL cable to restart the initialization process.
 - Restart the attached device to restart the initialization process.
 - Contact Tech Support: 1-800-260-1312, Int'l: 00-1-952-941-7600.
 YES
 - Contact Tech Support: 1-800-260-1312, Int'l: 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

Transition Now

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 MN 55343 U.S.A. |
| Model: | E-TBT-FRL-05 Series Media Converter |
| Part Number: | E-TBT-FRL-05, E-TBT-FRL-05(SC), E-TBT-FRL-05(SM), E-TBT-FRL-05(L), E-TBT-FRL-05(MT), E-TBT-FRL-05(LH), E-TBT-FRL-05(XC), E-TBT-FRL-05(LVW), E-TBT-FRL-05(HT), E-TBT-FRL-05(SCHT), E-TBT-FRL-05(SMHT), E- TBT-FRL-05(XCHT), E-TBT-FRL-05(XLHT) |
| Purpose: | To declare that the E-TBT-FRL-05 to which this declaration refers is in conformity with the following standards. EN 55022:1998 Class A; EN 55024:1998; FCC Part 15 Subpart B; 21 CFR Subpart J; EN 61000-3-2:1995+A14:2000; EN61000-3-3:1995; CFR Title 21 Section 1040.10 Class I; CE Mark |
| 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 | July 11, 2011 Date |

Compliance Information

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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