

User's Guide
CEMTF10xx-10x
Slide-in-Module Device
E&M 2/4 Wire to Fiber

Transition Networks CEMTF10xx-10x series E&M 2/4 Wire-to-Fiber Device connects central-office voice grade signals to distant PBX (*Private Branch eXchange*) equipment utilizing E&M signaling. The Device provides complete electrical isolation for 2- or 4-wire voice path cable in areas of high electrical noise or where high security is required.

Product Number	Port One - Copper	Port Two - Fiber-Optic
CEMTF1011-100	RJ-45 5 km (3.1 miles)*	ST, 1300 nm multimode 2 km (1.24 miles)*
CEMTF1013-100	RJ-45 5 km (3.1 miles)*	SC, 1300 nm multimode 2 km (1.24 miles)*
CEMTF1014-100	RJ-45 5 km (3.1 miles)*	SC, 1310 nm single mode 20 km (12.4 miles)*
CEMTF1015-100	RJ-45 5 km (3.1 miles)*	SC, 1310 nm single mode 40 km (24.9 miles)*

Part Number	Port One - Copper	Port Two - Fiber-Optic single-fiber single mode
CEMTF1029-100	RJ-45 5 km (3.1 miles)*	SC, 1310 (TX) / 1550 (RX) nm 20 km (12.4 miles)*
CEMTF1029-101	RJ-45 5 km (3.1 miles)*	SC, 1550 (TX) / 1310 (RX) nm 20 km (12.4 miles)*
CEMTF1029-102 and -103 are intended to be installed in the same network.		
CEMTF1029-102	RJ-45 5 km (3.1 miles)*	SC, 1310 (TX) / 1550 (RX) nm 40 km (24.8 miles)*
CEMTF1029-103	RJ-45 5 km (3.1 miles)*	SC, 1550 (TX) / 1310 (RX) nm 40 km (24.8 miles)*

CEMTF1029-100 and -101 are intended to be installed in the same network.

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

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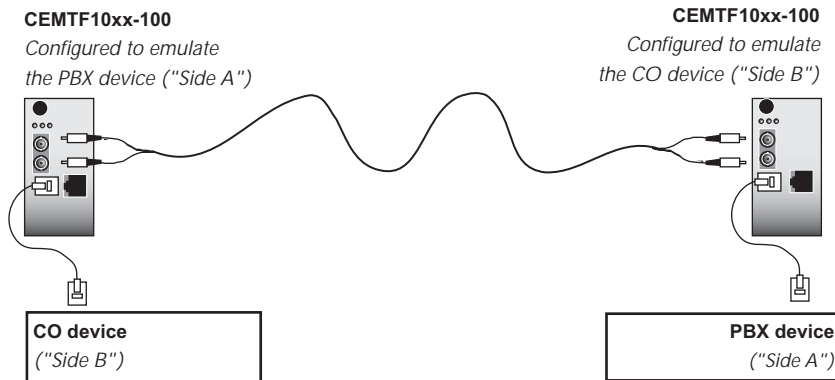
CEMTF10xx-10x in the Network

Install two CEMTF10xx-10x series Devices in series to extend, over fiber, the distance between two voice path communication devices. An E&M signal is used to communicate between a CO (*telephone company Central Office*) device and a PBX (*Private Branch eXchange*) device. An RJ-45 female connector provides the electrical interface between the Device and the communication device.

A fiber optic cable extends the distance between the two devices by up to 40 Km. The fiber optic cable is not susceptible to lightning impulse noise and, since signal ground is not carried over the link, the signal is not affected by elevated ground potential between locations.

(These models are intended for on-premise applications. Therefore, no provision for sealing the currents is provided.)

In order to transmit the voice signal from one communication device to the other, the Device connected to the CO device is configured to emulate the PBX device. Conversely, the Device connected to the PBX device is configured to emulate the CO device.



“Side A” and “Side B”

The term “Side A” is used to refer to a PBX device and “Side B” is used to refer to a CO device. Therefore, the network described above contains the following components

- A CO device (“Side B”).
- A CEMTF10xx-10x configured to emulate the PBX device (“Side A”).
- A CEMTF10xx-10x configured to emulate the CO device (“Side B”).
- A PBX device (“Side A”).

The table at the top of page 3 lists the common terminology used to describe “Side A” and “Side B” of an E&M interface (i.e, the interface between the communication device and the CEMTF10xx-10x Device).

	PBX Device (Side A)	CO Device (Side B)
ANSI	Customer Installation (CI)	Network (N)
Telcordia	Connecting Equipment	DLC System
Lucent	Trunk Side	Signaling Side

E&M Signal Types

The CEMTF10xx-10x Media Converter can be set for the five different E&M signal types (*Type I, II, III, IV, and V*). Each signal type has a different wiring arrangement, hence a different approach to transmitting the E&M supervision signals (*on-hook / off hook signaling*). The Device is configured for the various signal types by setting the jumpers located on the Device circuit board.

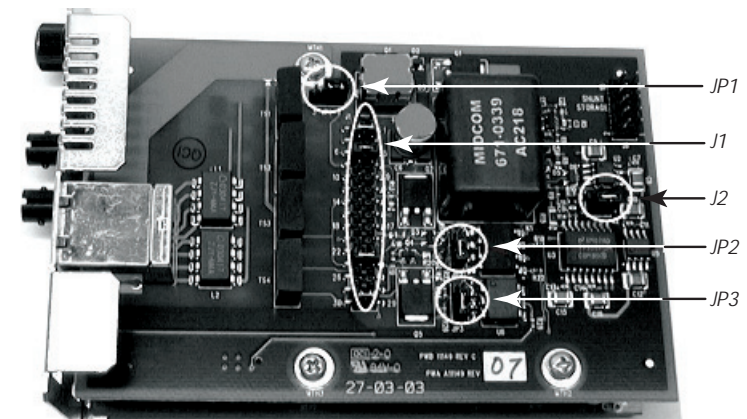
The jumper configurations for the various signal types are detailed in the Installation section of this manual.

Installation

CAUTION: Wear a grounding device and observe electrostatic discharge precautions when setting the jumpers and when installing the CEMTF10xx-10x Device. Failure to observe this caution could result in damage to, and subsequent failure of, the Device slide-in-module.

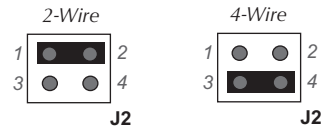
Setting the Jumpers

The CEMTF10xx-10x Device has five jumpers that are located on the circuit board. One jumper (J2) is used to set the Device for 2-wire or 4-wire mode. The other four jumpers (J1, JP1, JP2, JP3) are used to configure the Device for the five E&M signal types (*Type I, II, III, IV, and V*). The specific settings for the 2-wire, 4-wire mode and each of the E&M signal types (*including a “No Signaling” setting*). The drawing below shows the locations of the five jumpers on the circuit board. Use a pair of small needle-nosed pliers to set the jumpers.



Audio interface (2-wire / 4-wire)

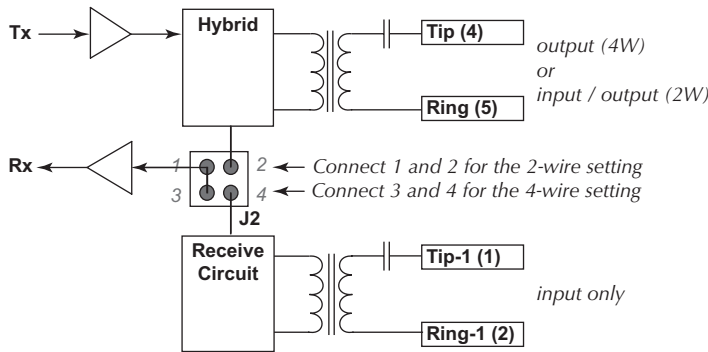
There are two types of audio interfaces: 2-wire and 4-wire; which describe the number of wires used to transmit audio signals. The figure to the right illustrates the jumper configurations for the 2-wire and 4-wire implementations.



Note: The jumper for the 2-wire or 4-wire setting (J2) must be set for any of the E&M Signal Types described on pages 5-10.

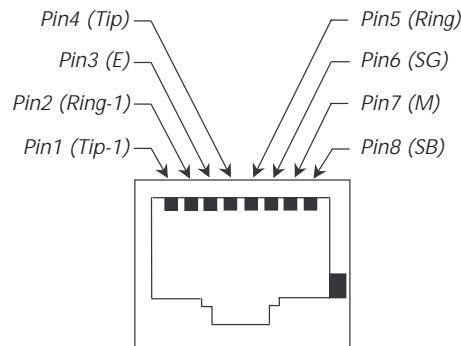
The figure below is a connection diagram for the 2-wire and 4-wire settings. For the 2-wire interface, the send and receive paths for the audio signals are transmitted over a single pair of wires: Tip (4) and Ring (5). For the 4-wire interface, the send and receive paths for the audio signals are in separate paths. The send path is via the Tip (4) and Ring (5) wires while the receive path is via the Tip-1 (1) and Ring-1 (2) wires.

Note: Even though an E&M circuit may be classified as “4-wire”, it is likely to have six or eight physical wires, depending on the signaling type and audio implementation that are used.



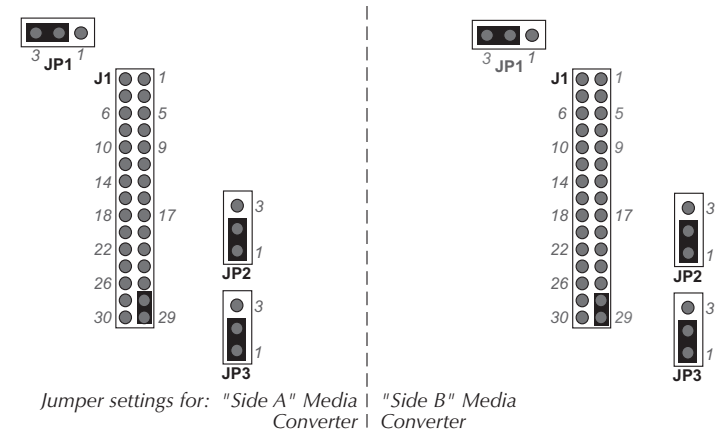
RJ-45 Connector

An understanding of the RJ-45 connector pins will provide insight into how the communication signals are transmitted between the CEMTF10xx-10x Device and the communication devices via the copper cable. The drawing to the right identifies the 8 pins within the RJ-45 connector.

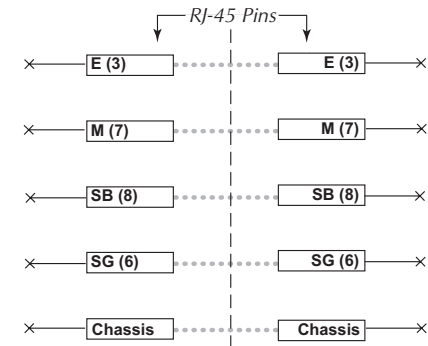


No Signaling

A “No Signalling” configuration is used for a leased line operation. Set the jumpers on the “Side A” Device and the “Side B” Device as follows:



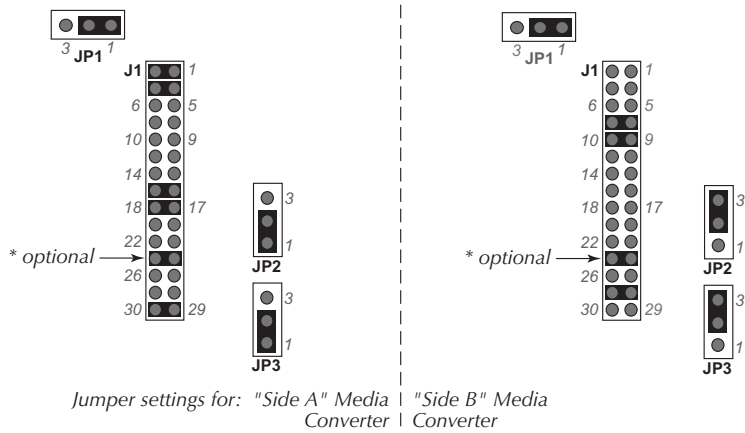
The figure below illustrates the wiring connections for the “Side A” and “Side B” devices that have been configured for no signaling. Note that there is no E&M signaling between the two devices.



Connection diagrams for: “Side A” device.....”Side B” Media Converter
or: “Side A” Media Converter.....”Side B” device

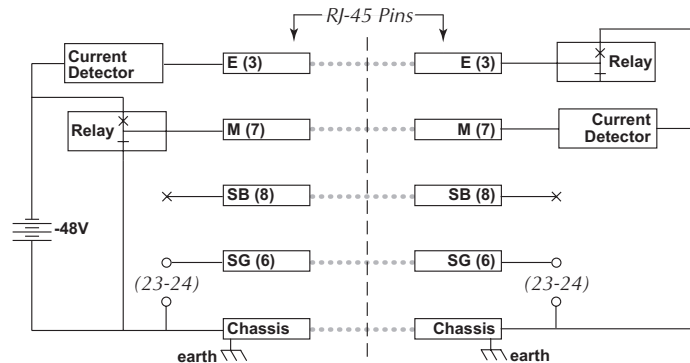
E&M Signal Type I

E&M Signal Type I is the most common interface in North America. Set the jumpers on the "Side A" and "Side B" Devices as follows:



The figure below illustrates the wiring connections for the "Side A" and "Side B" devices that have been configured for E&M Signal Type I. The specifics of the wiring connections are as follows:

- Type I uses two leads for supervisor signaling: E and M.
- During inactivity, E-lead is open and M-lead is connected to ground.
- The PBX circuit (Side A) indicates the off-hook condition by connecting the M-lead to the battery.
- The CO device (Side B) indicates the off-hook condition by connecting the E-lead to ground.

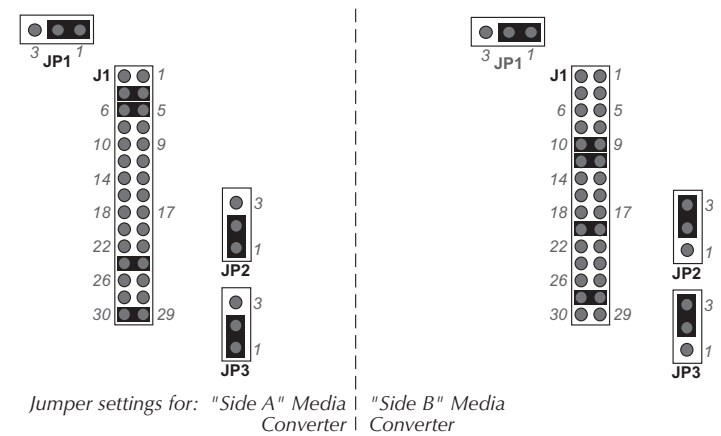


Connection diagrams for: "Side A" device "Side B" Media Converter
or: "Side A" Media Converter "Side B" device

* An optional configuration with a jumper installed on pins 23 and 24 (J1) will complete the connection labeled "23-24" in the wiring diagram. The specifics of the wiring diagram are the same whether or not the optional jumper is installed.

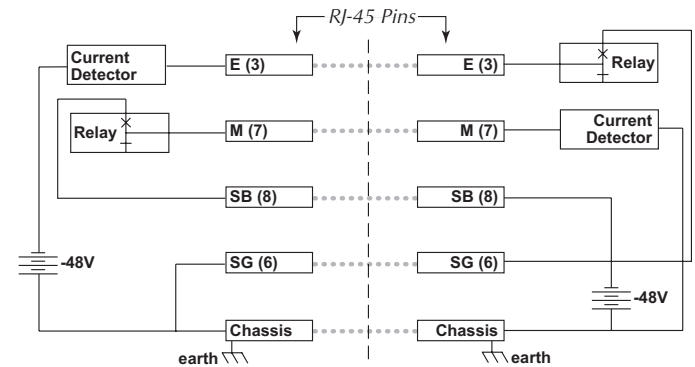
E&M Signal Type II

With E&M Signal Type II configuration, two CO device ("Side B") nodes can be connected back-to-back. For Type II configuration, set the jumpers on the "Side A" Device and the "Side B" Device as follows:



The figure below illustrates the wiring connections for the "Side A" and "Side B" devices that have been configured for E&M Signal Type II. The specifics of the wiring connections are as follows:

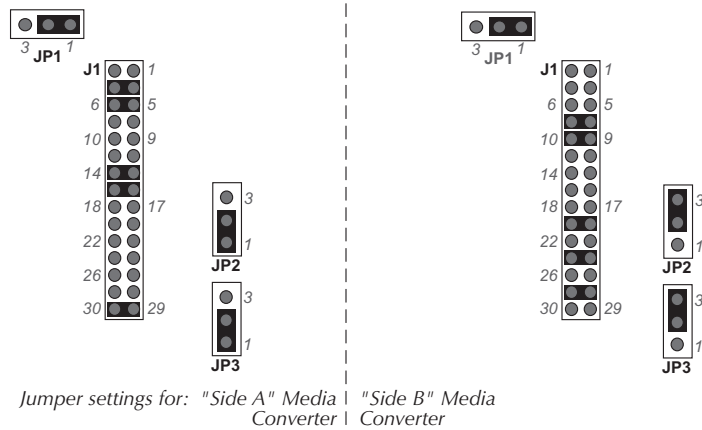
- Type II uses four leads for supervision signaling: E, M, SB, and SG.
- During inactivity, both the E-lead and the M-lead are open.
- The PBX circuit (Side A) indicates the off-hook condition by connecting the M-lead to the signal battery (SB) lead, which is connected to the battery of the CO device (Side B).
- The CO device (Side B) indicates the off-hook condition by connecting the E-lead to the signal ground (SG) lead, which is connected to the PBX circuit (Side A) ground.



Connection diagrams for: "Side A" device "Side B" Media Converter
or: "Side A" Media Converter "Side B" device

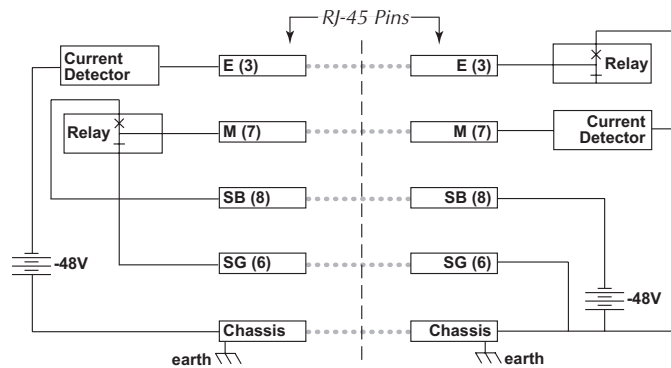
E&M Signal Type III

E&M Signal Type III is not commonly used in modern systems. For this configuration, set the jumpers on the "Side A" Device and the "Side B" Device as follows:



The figure below illustrates the wiring connections for the "Side A" and "Side B" devices that have been configured for E&M Signal Type III. The specifics of the wiring connections are as follows:

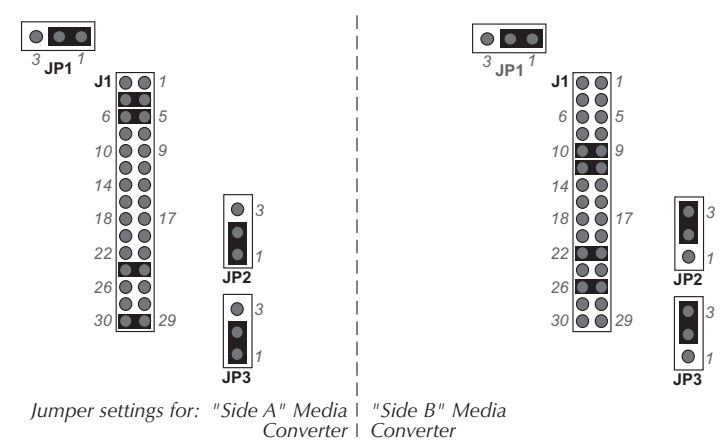
- Type III uses four leads for supervision signaling: E, M, SB, and SG.
- During inactivity, the E-lead is open and the M-lead is set to ground, which is connected to the SG lead of the CO device (Side B).
- The PBX circuit (Side A) indicates the off-hook condition by connecting the M-lead to the (SG) lead and connecting it to the SB lead of the CO device (Side B).
- The CO device (Side B) indicates the off-hook condition by connecting the E-lead to ground.



Connection diagrams for: "Side A" device "Side B" Media Converter
or: "Side A" Media Converter "Side B" device

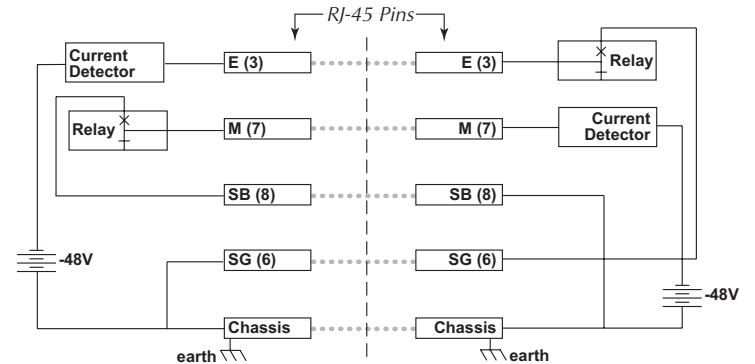
E&M Signal Type IV

As in Type III, E&M Signal Type IV is also not commonly used in modern systems. For this configuration, set the jumpers on the "Side A" Device and the "Side B" Device as follows:



The figure below illustrates the wiring connections for the "Side A" and "Side B" devices that have been configured for E&M Signal Type IV. The specifics of the wiring connections are as follows:

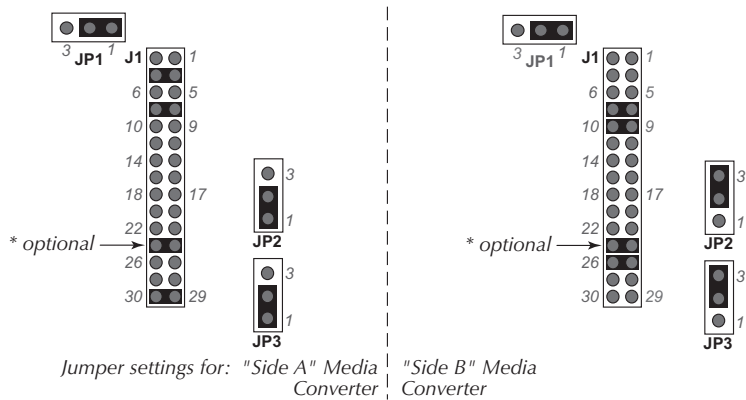
- Type IV uses four leads for supervision signaling: E, M, SB, and SG.
- During inactivity, the E-lead and the M-lead are open.
- The PBX circuit (Side A) indicates the off-hook condition by connecting the M-lead to the (SG) lead.
- The CO device (Side B) indicates the off-hook condition by connecting the E-lead to the SG lead.



Connection diagrams for: "Side A" device "Side B" Media Converter
or: "Side A" Media Converter "Side B" device

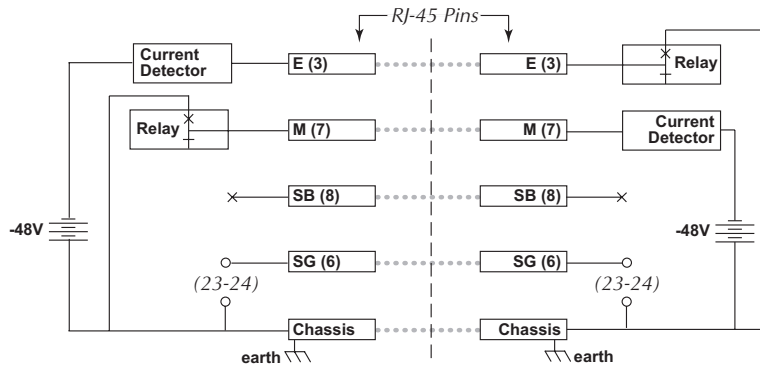
E&M Signal Type V

E&M Signal Type V is symmetrical and allows two CO devices (Side B) nodes to be connected back-to-back. This signal type is also the most common interface type used outside North America. For this configuration, set the jumpers on the “Side A” and “Side B” Devices as follows:



The figure below illustrates the wiring connections for the “Side A” and “Side B” devices that have been configured for E&M Signal Type IV. The specifics of the wiring connections are as follows:

- Type V uses two leads for supervision signaling: E and M.
- During inactivity, the E-lead and the M-lead are open.
- The PBX circuit (Side A) indicates the off-hook condition by connecting the M-lead to ground.
- The CO device (Side B) indicates the off-hook condition by connecting the E-lead to ground.



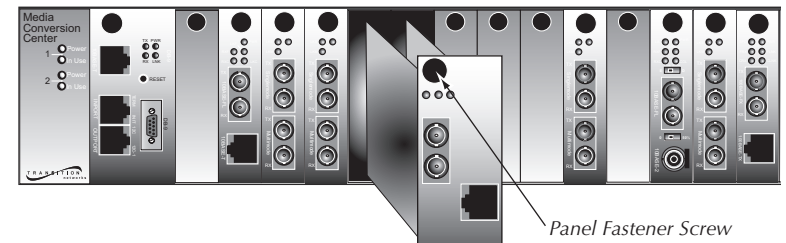
Connection diagrams for: "Side A" device-----"Side B" Media Converter
or: "Side A" Media Converter-----"Side B" device

* An optional configuration with a jumper installed on pins 23 and 24 (J1) will complete the connection labeled “23-24” in the wiring diagram. The specifics of the wiring diagram are the same whether or not the optional jumper is installed.

Install the Slide-in-Module

To install the CEMTF10xx-10x Device slide-in-module:

1. Locate two adjacent, empty installation slots on the PointSystem™ chassis.
2. Carefully slide the slide-in-module into the installation slots, aligning the module with the installation guides.
3. Ensure the module is seated inside the chassis.
4. Push in and rotate the attached panel fastener screw to secure the module to the chassis front.

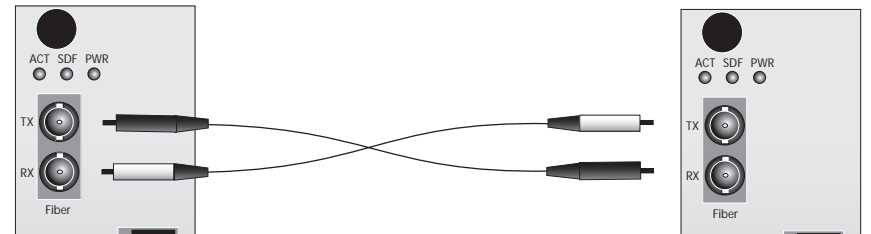


Install the Fiber Cable

1. Locate or build fiber cable with male, two-stranded TX to RX connectors installed at both ends.
2. Connect the fiber cable to the “Side A” Device as described:
 - Connect the male TX cable connector to the female TX connector.
 - Connect the male RX cable connector to the female RX connector.

“Side A”

“Side B”

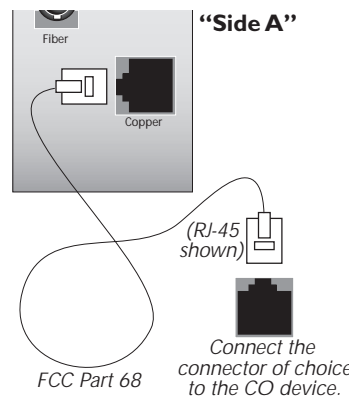


3. Connect the fiber cable to the “Side B” Device as described:
 - Connect the male TX cable connector to the female RX connector.
 - Connect the male RX cable connector to the female TX connector.

Install the Copper Cable

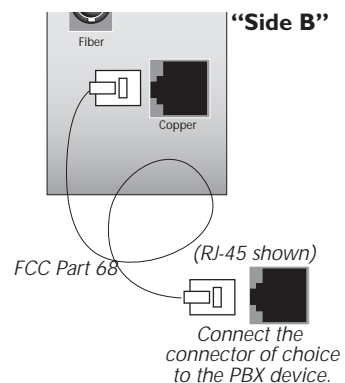
1. Locate or build two custom copper cables with a male, RJ-45 connector at one end and a connector of choice at the other end.
2. Connect the copper cable to the “Side A” Device as described:

- Connect the RJ-45 connector at one end of the cable to the RJ-45 port on the “Side A” Device.
- Connect the connector of choice at the other end of the cable to the port on the CO device. (RJ-45 connector is shown in the drawing.)



3. Connect the copper cable to the “Side B” Device as described:

- Connect the RJ-45 connector at one end of the cable to the RJ-45 port on the on the “Side B” Device.
- Connect the connector of choice at the other end of the cable to the port on the PBX device. (RJ-45 connector is shown in the drawing.)



Operation

Power the Slide-in-Module

The slide-in-module is powered through the PointSystem™ chassis.

Status LEDs

Use the status LEDs to monitor the CEMTF10xx-10x Device operation in the network.

- | | |
|-----|---|
| PWR | (Power) Steady LED indicates power is on. |
| SDF | (Signal Detect Fiber Link) Steady LED indicates the fiber link is active. |
| ACT | (Active Link) Steady LED indicates the local unit is off the hook. |



SNMP

See the on-line documentation that comes with Transition Networks FocalPoint™ software for applicable commands and usage.

Use SNMP at an attached terminal or at a remote location to monitor the Device by monitoring:

- Device power
- Copper link status
- Fiber link status
- Copper receive status
- Fiber receive status

Also, use SNMP to enter network commands that:

- Power down the Device.

Cable Specifications

The physical characteristics must meet or exceed FCC Part 68 specifications.

Fiber Cable

Bit Error Rate:	<10 ⁻⁹	
Single mode fiber (recommended):	9 μm	
Multimode fiber (recommended):	62.5/125 μm	
Multimode fiber (optional):	100/140, 85/140, 50/125 μm	
CEMTF1011-100	1300 nm multimode	
Fiber Optic Transmitter Power:	min: -19.0 dBm	max: -14.0 dBm
Fiber Optic Receiver Sensitivity:	min: -30.0 dBm	max: -14.0 dBm
Link Budget:	11.0 dB	
CEMTF1013-100	850 nm multimode	
Fiber Optic Transmitter Power:	min: -19.0 dBm	max: -14.0 dBm
Fiber Optic Receiver Sensitivity:	min: -30.0 dBm	max: -14.0 dBm
Link Budget:	11.0 dB	
CEMTF1014-100	1310 nm single mode	
Fiber Optic Transmitter Power:	min: -15.0 dBm	max: -8.0 dBm
Fiber Optic Receiver Sensitivity:	min: -31.0 dBm	max: -8.0 dBm
Link Budget:	16.0 dB	
CEMTF1015-100	1310 nm single mode	
Fiber Optic Transmitter Power:	min: -8.0 dBm	max: -2.0 dBm
Fiber Optic Receiver Sensitivity:	min: -34.0 dBm	max: -7.0 dBm
Link Budget:	26.0 dB	
CEMTF1029-100	1310(TX)/1550(RX) nm single mode	
Fiber Optic Transmitter Power:	min: -13.0 dBm	max: -6.0 dBm
Fiber Optic Receiver Sensitivity:	min: -32.0 dBm	max: -3.0 dBm
Link Budget:	19.0 dB	
CEMTF1029-101	1550(TX)/1310(RX) nm single mode	
Fiber Optic Transmitter Power:	min: -13.0 dBm	max: -6.0 dBm
Fiber Optic Receiver Sensitivity:	min: -32.0 dBm	max: -3.0 dBm
Link Budget:	19.0 dB	
CEMTF1029-102	1310(TX)/1550(RX) nm single mode	
Fiber Optic Transmitter Power:	min: -8.0 dBm	max: -3.0 dBm
Fiber Optic Receiver Sensitivity:	min: -33.0 dBm	max: -3.0 dBm
Link Budget:	25.0 dB	
CEMTF1029-103	1550(TX)/1310(RX) nm single mode	
Fiber Optic Transmitter Power:	min: -8.0 dBm	max: -3.0 dBm
Fiber Optic Receiver Sensitivity:	min: -33.0 dBm	max: -3.0 dBm
Link Budget:	25.0 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

Shielded twisted pair (STP) or unshielded twisted pair (UTP) is acceptable

Maximum # Nodes:	2
Maximum Cable Length:	5 km (3.1 miles)

Category 3 (minimum requirement)

Gauge:	24 to 22 AWG
Attenuation:	11.5 dB/100m @ 5-10 MHz

Category 5 (acceptable)

Gauge:	24 to 22 AWG
Attenuation:	22.0 dB/100m @ 5-10 MHz

Technical Specifications

For use with Transition Networks Model CEMTF10xx-10x or equivalent

Standards	FCC Part 68
Data Rate	25 mhz (over fiber cable)
Dimensions	2.9" x 4.8" x 1.4" (74 mm x 122 mm x 36 mm)
Weight	8 oz (227 g) approximately
Power Consumption	9.0 watts
MTBF	522,000 hours (MIL217F2V5.0) (MIL-HDBK-217F) 939,000 hours (Bellcore7V5.0)
Environment	Tmra*: 0 to 60°C (32° to 140° F) Storage Temperature: -15° to 65°C (-4° to 122°F) Humidity: 5-95%, non condensing Altitude: 0-10,000 feet
Warranty	Lifetime

*Manufacturer's rated ambient temperature: Tmra range for this slide-in-module depends on the physical characteristics and the installation configuration of the Transition Networks PointSystem™ chassis in which this slide-in-module will be installed.

The information in this user's guide is subject to change. For the most up-to-date information on the CEMTF10xx-10x Device, view the user's guide on-line at: www.transition.com.

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

CAUTION: Visible and invisible laser radiation when open. Do not stare into the beam or view directly with optical instruments.

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

Troubleshooting

1. Is the PWR (power) LED illuminated?

NO

- Is the Device slide-in-module installed properly in the chassis?
- Is the power cord properly installed in the chassis and at the external power source?
- Does the external power source provide power?
- Contact Technical Support: US/Canada: 1-800-260-1312, International: 00-1-952-941-7600.

YES

- Proceed to step 2.

2. Is the SDF (signal detect fiber link) LED illuminated?

NO

- Check fiber cables for proper connection.
- Verify that TX and RX cables on Device are connected to RX and TX ports, respectively, on the other device.
- Contact Technical Support: US/Canada: 1-800-260-1312, International: 00-1-952-941-7600.

YES

- Proceed to step 3.

3. Is the ACT (active) LED illuminated?

NO

- Ensure that the local unit is off-hook.
- 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.

Compliance Information

CISPR22/EN55022 Class A + EN55024

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.

VCCI Class I Compliance

This equipment is in the 1st Class category (information equipment to be used in commercial and/or industrial areas) and conforms to the standards set by the Voluntary Control Council For Interference by Data Processing Equipment and Electronic Office Machines aimed at preventing radio interference in commercial and/or industrial areas. When used in a residential area or in an adjacent area thereto, interference may be caused to radio and TV receivers, etc. Read the instructions for correct handling.

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

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 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, Minnetonka MN 55343 U.S.A.
 Model: CEMTF10xx-10x Series Devices
 Part Number(s): CEMTF1011-100, CEMTF1012-100, CEMTF1013-100, CEMTF1014-100,
 CEMTF1015-100, CEMTF1029-100, CEMTF1029-101, CEMTF1029-102,
 CEMTF1029-103
 Regulation: EMC Directive 89/336/EEC
 Purpose: To declare that the CEMTF10xx-10x to which this declaration refers is in conformity with the following standards.
 TIA/EIA 464B, ANSIT1.409-1996, ANSITR.5, FCC Part 68, EIA/TIA-464-B,
 FCC Class A, VCCI Class A, EN 55022(CISPR 22) Class A, ICES-003
 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 2008
 Date

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