

# RS-485/422 Serial-Port Fiber Extension Media Converters

## RS485-CF-01, RS485-CF-02

### USER'S GUIDE

The TRANSITION Networks RS485-CF-0x series serial-port fiber extension Media Converters extend distances between RS-485 or RS-482 nodes for **up to two (2) kilometers over multimode fiber** or **up to twenty (20) kilometers over singlemode fiber**.

RS485-CF-0x series Media Converters allow RS-485 two-wire half-duplex operation, RS-485 four-wire full-duplex operation, and RS-422 four-wire operation, with switch-selectable termination and biasing resistors, at speeds from 1 Kb/s to 500 Kb/s.

#### RS485-CF-01

Provides one (1) terminal block RS-485/RS-422 copper connector and one (1) set of RX (receive) and TX (transmit) ST 100BASE-FX connectors to **multimode fiber @ 850 nM**.

#### RS485-CF-01(SM)

Provides one (1) terminal block RS-485/RS-422 copper connector and one (1) set of RX (receive) and TX (transmit) ST 100BASE-FX connectors to **singlemode fiber @ 1300 nM**.

#### RS485-CF-01(SC)

Provides one (1) terminal block RS-485/RS-422 copper connector and one (1) set of RX (receive) and TX (transmit) SC 100BASE-FX connectors to **multimode fiber @ 850 nM**.

#### RS485-CF-02

Provides one (1) DB-9 RS-485/RS-422 copper connector and one (1) set of RX (receive) and TX (transmit) ST 100BASE-FX connectors to **multimode fiber @ 850 nM**.



#### RS485-CF-02(SM)

Provides one (1) DB-9 RS-485/RS-422 copper connector and one (1) set of RX (receive) and TX (transmit) ST 100BASE-FX connectors to **singlemode fiber @ 1300 nM**.

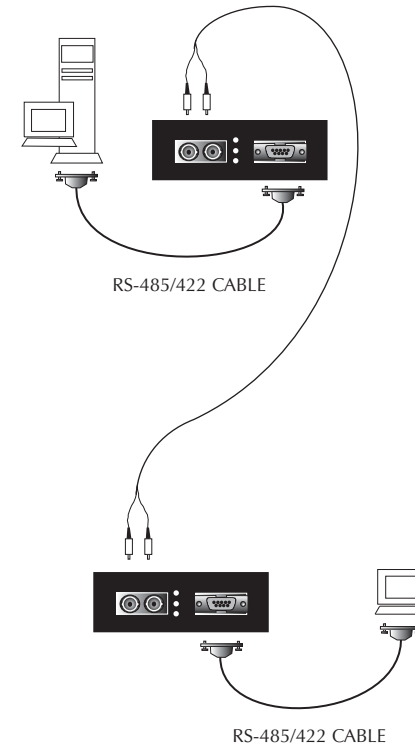
#### RS485-CF-02(SC)

Provides one (1) DB-9 RS-485/RS-422 copper connector and one (1) set of RX (receive) and TX (transmit) SC 100BASE-FX connectors to **multimode fiber @ 850 nM**.

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## RS485-CF-0X in the NETWORK

The RS485-CF-0x can be used to install a fiber network extension between RS-485 or RS-422 network nodes.



One slide switch on the RS485-CF-0x series Media Converter allows site selection of RS-485 2-wire (half-duplex) operation, RS-485 4-wire (full-duplex) operation, or RS-422 4-wire (full-duplex) operation (see page 3).

A second slide switch on the RS485-CF-0x series Media Converter allows echo prevention in two-wire mode or transmission only on "transmit/receive - (B) RS-485 2wire, transmit - RS-422 and transmit/receive + (A) RS-485 2wire, transmit + RS-422" pair (see page 3).

A 4-position dip switch on the RS485-CF-0x series Media Converter allows site selection of 130 ohm terminator insertion on the "receive - RS485 4 wire, RS422 and receive + RS485 4 wire, RS422" pair or on the "transmit/receive - (B) RS485 2wire, transmit - RS422 and transmit/receive + (A) RS485 2wire, transmit + RS422" pair (see page 3).

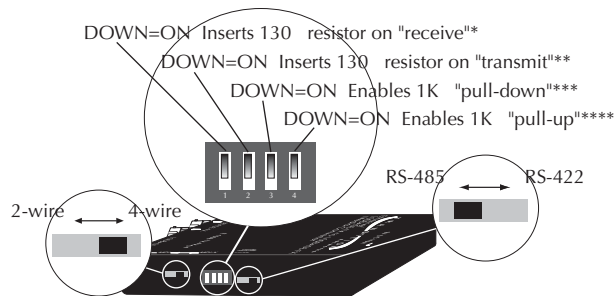
The dip switch also allows site selection of 1K ohm pull down on "transmit/receive - (B) RS485 2wire, transmit - RS422" or of 1K ohm pull up on "transmit/receive + (A) RS485 2wire, transmit + RS422" (see page 3).

# INSTALLATION

## Set Switches

Use small flatblade screwdriver or similar device to set recessed switches according to site installation.

1. Set the 2-wire /4-wire slide switch to the 4-wire setting to enable the "receive – RS485 4 wire, RS422 and receive + RS485 4 wire, RS422" pair for RS422 4 wire full duplex operation.
2. Set the RS-485/RS-422 slide switch to the RS-485 position to prevent echo in two-wire mode. Set the RS-485/RS-422 slide switch to the RS-422 to allow transmit only on "transmit/receive - (B) RS-485 2wire, transmit - RS-422 and transmit/receive + (A) RS-485 2wire, transmit + RS-422" pair.



3. Refer to drawing and to notes below for setting 4-position DIP switch.
  - \* Position 1 ON inserts 130 ohm terminator on the "receive – RS485 4 wire, RS422 and receive + RS485 4 wire, RS422" pair.
  - \*\* Position 2 ON inserts 130 ohm terminator on the "transmit/receive - (B) RS485 2wire, transmit - RS422 and transmit/receive + (A) RS485 2wire, transmit + RS422" pair.
  - \*\*\* Position 3 ON enables 1K ohm pull down on "transmit/receive - (B) RS485 2wire, transmit - RS422".
  - \*\*\*\* Position 4 ON enables 1K ohm pull up on "transmit/receive + (A) RS485 2wire, transmit + RS422".

## Install Cable

### COPPER /DB-9 CONNECTOR

**NOTE:** Shielded cables are required on the DB-9 for EMC compliance.

1. Locate or build TIA/EIA-574-DB-9 compliant cables configured as shown on page 6, with a male DB-9 connector at one end of cable and with a straight-through cable.
2. Connect the male DB-9 connector at one end of cable to the Media Converter female DB-9 connector.
3. Connect the other end of cable to the node device.

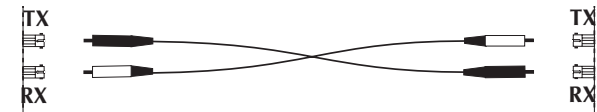
# INSTALLATION -- Continued

## COPPER /TERMINAL BLOCK CONNECTOR

1. Locate or build TIA/EIA-574-compliant terminal block cables configured as shown on page 6 and with straight-through cable.
2. Using a small flatblade screwdriver or a similar device, release each terminal block installation location as necessary. Refer to the diagram on page 6, connect the wires at one end of cable to the Media Converter terminal block connector.
3. Connect the other end of the cable to the node device.

## FIBER

1. Locate or build TIA/EIA-574-compliant fiber cable with male two-stranded TX to RX connectors at both ends.



2. Connect the male TX and RX cable connectors at one end of the cable to the TX and RX female connectors, respectively, on the Media Converter.
3. Connect the male TX and RX cable connectors at the other end of the cable to the RX and TX connectors of the IEEE 802.3™ compliant fiber device.

## Connect to Power

1. Install the power adapter cord at 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(s).

## OPERATION

After installation, the Media Converter should function without operator intervention.

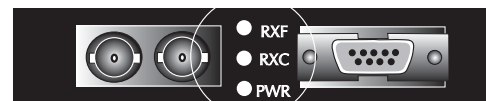
### Status LEDs:

Use the status LEDs to monitor Media Converter operation in the network.

**RXF** Flashing LED indicates data reception on the fiber link.

**RXC** Flashing LED indicates data reception on the copper link.

**P(o)W(e)R** Steady LED indicates connection to external power.



## FAULT ISOLATION and CORRECTION

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 P(o)w(e)r LED on the Media Converter illuminated?

#### NO

- Is the power adapter the proper voltage and cycle frequency for the AC outlet?  
NOTE: Refer to the “Power Supply Requirements” on page 7.
- Is the power adapter properly installed in the Media Converter and in the grounded AC outlet?
- Does the grounded AC outlet provide power?
- Contact Technical Support at (800) 260-1312.

#### YES

- Proceed to step 2.

### 2. Is the RXF LED illuminated?

#### NO

- Disconnect and reconnect the fiber cable to restart the initialization process.
- Contact Technical Support: (800) 260-1312.

#### YES

- Proceed to step 3.

### 3. Is the RXC LED illuminated?

#### NO

- Disconnect and reconnect the copper cable to restart the initialization process.
- Restart the terminal device(s) to restart the initialization process.
- Contact Technical Support: (800) 260-1312.

#### YES

- Proceed to step 4.

### 4. Does the data fail to move across the link, even though both LEDs are illuminated?

#### YES

- Check the RS-485/RS-422 cables for proper configuration and connection.
- Contact Technical Support at (800) 260-1312.

## CABLE SPECIFICATIONS

### Fiber Cable

#### MULTIMODE

Fiber Optic Cable Recommended: 62.5 / 125  $\mu$ m multimode fiber  
Optional: 100/140, 85/125, 50/125  $\mu$ m mm fiber  
Wavelength: 850 nanometers

#### RS485-CF-01, RS485-CF-01(SC), RS485-CF-02, RS485-CF-02(SC):

Fiber Optic Transmitter Power: min: -16.0 dBm max: -10.0 dBm  
Fiber Optic Receiver Sensitivity: min: -32.0 dBm max: -7.2 dBm  
Link Budget: 16.0 dB  
Typical Maximum Cable Distance\*\*: 2 kilometers

#### SINGLEMODE

Fiber Optic Cable Recommended: 9  $\mu$ m singlemode fiber  
Wavelength: 1300 nanometers

#### RS485-CF-01(SM), RS485-CF-02(SM)

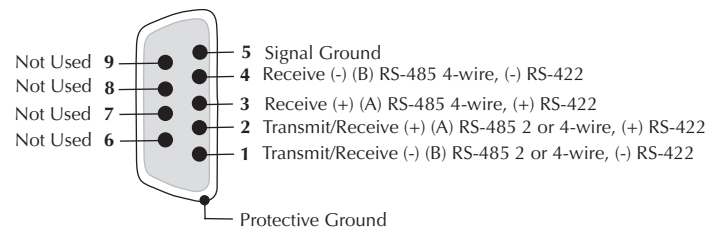
Fiber Optic Transmitter Power: min: -23.0 dBm max: -14.0 dBm  
Fiber Optic Receiver Sensitivity: min: -34.0 dBm max: -14.0 dBm  
Link Budget: 11.0 dB  
Typical Maximum Cable Distance\*\*: 20 kilometers

\*\*Actual distance dependent upon physical characteristics of network installation.

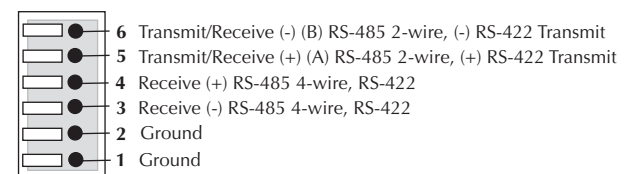
### RS-485/422 Copper Cable

Gauge: 24 to 22 AWG  
Attenuation: 20 dB/1000' @ 10 MHz  
Differential Characteristic Impedance: 100  $\Omega$   $\pm$ 10% @ 10 MHz  
Maximum Cable Distance varies by baud rate: 4000ft[1220M] at <90kbaud decreasing logarithmically to 300ft[92M] at 500kbaud.

#### RS-485/422 DB-9 SIGNALS



#### RS-485/422 TERMINAL BLOCK SIGNALS



## TECHNICAL SPECIFICATIONS

<b>Standards</b>	ANSI/TIA/EIA-485-A, IEEE 802.3™	
<b>Data Rate</b>	1000 baud to 500,000 baud. (No rate setting is required. The Media Converter adjusts automatically to the baud rate.)	
<b>Case Dimensions</b>	4.7" x 3.0" x 1.8"	(119mm x 76mm x 46mm)
<b>Shipping Weight</b>	3 pounds	(1.4 kilograms)
<b>Environment</b>	Temperature:	0-50°C (32° to 122° F)
	Storage Temperature:	-20 to 85°C
	Humidity	10-90%, non condensing
	Altitude	0-10,000 feet

**Power Supply Requirements** Replace the power supply only with the equivalent input rating (see below) and output rating (regulated 9VDC at 500 mA).

TN PN	Requirement	Location
3525	240 volts, 50 hertz	United Kingdom
3525	230 volts, 50 hertz	Europe
3518	120 volts, 60 hertz	USA/Canada/Mexico
3514	100 volts, 50-60 hertz	Japan
3348	240 volts, 50 hertz	Australia
<b>Power Consumption</b>	2.2 Watts	
<b>Warranty</b>	Lifetime	

## COMPLIANCE INFORMATION

**UL Listed**  
**C-UL Listed (Canada)**  
**CISPR22/EN55022 Class A + EN55204**  
**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 weichen Fällen der Benutzer für entsprechende Gegenmaßnahmen verantwortlich ist.

#### 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.



**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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	<b>DECLARATION OF CONFORMITY</b>
Name of Mfg:	<b>Transition Networks</b> 6475 City West Parkway, Minneapolis MN 55344 USA
Model:	<b>RS485-CF-0x Series Serial-Port Extension Media Converters</b>
Part Number(s):	<b>RS485-CF-01, RS485-CF-01(SM), RS485-CF-01(SC), RS485-CF-02, RS485-CF-02(SM), RS485-CF-02(SC)</b>
Regulation:	<b>EMC Directive 89/336/EEC</b>
Purpose:	To declare that the <b>RS485-CF-0x</b> to which this declaration refers is in conformity with the following standards. EMC-CISPR 22: 1985 Class A; EN 55022: 1988 Class A; EN 50082-1:1992; EN 60950 A4:1997; IEC 801.2, IEC 801.3, and IEC 801.4; IEC 950
<i>I, the undersigned, hereby declare that the equipment specified above conforms to the above Directive(s) and Standard(s).</i>	
	April 11, 2000
Stephen Anderson, Vice-President of Engineering	Date