

# MOXA®

## TCF-142 Series

### Serial to Fiber-optic Converter

### Quick Installation Guide

Ninth Edition, April 2008

## 1. Overview

### Introduction

TCF-142 series (Rev. 3.1 or later) converters are equipped with a multiple interface circuit that can handle RS-232, RS-422, and RS-485 serial interfaces, as well as multi-mode or single-mode fiber. TCF-142 converters are used to extend serial transmission distance up to 5 km (TCF-142-M, with multi-mode fiber) or up to 40 km (TCF-142-S, with single-mode fiber). The TCF-142 must be configured to transmit a particular serial interface. You cannot transmit both RS-232 and RS-485 signals at the same time.

### Why Convert Serial to Fiber?

Fiber communication not only extends the communication distance, but also provides many advantageous features.

**IMMUNITY FROM ELECTRICAL INTERFERENCE:** Fiber is not affected by electromagnetic interference or radio frequency interference. It provides a clean communication path and is immune to cross-talk.

**INSULATION:** Optical fiber is an insulator; the glass fiber eliminates the need for using electric currents as the communication medium.

**SECURITY:** Fiber cannot be tapped by conventional electric means and is very difficult to tap into optically.

**RELIABILITY & MAINTENANCE:** Fiber is immune to adverse temperature and moisture conditions, does not corrode or lose its signal, and is not affected by short circuits, power surges, or static electricity.

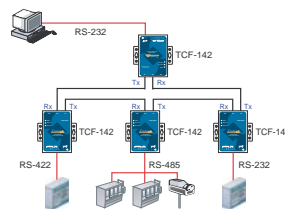
### Reverse Power Protection

The Reverse Power Protection feature provides extra protection against accidentally connecting the power cables to the wrong terminal. The converter automatically detects which power wire is positive and which is negative.

### Ring Mode

To allow one half-duplex serial device to communicate with multiple half-duplex devices connected to a fiber ring, you should configure the TCF-142 for “ring mode” by setting DIP switch “SW4” to the “On” position. The Tx port of a particular TCF-142 unit connects to the neighboring converter’s Rx port on the ring. Note that when one

node transmits a signal, the signal travels around the ring until it returns back to the transmitting unit, which then blocks the signal. Users should ensure that the total fiber ring length is less than 100 km when using either single-mode models (TCF-142-S) or multi-mode models (TCF-142-M).



### ATTENTION

#### For Fiber Ring Users:

To avoid problems when setting up a fiber ring, each TCF-142 unit making up the ring must be powered down and set to “Ring mode.” Next, make sure all cables are connected properly, and then power up all devices connected to the ring. After powering up the TCF-142 units, if the Rx LEDs of the converters are **ON** continuously, power down and then power up **ONE** of the TCF-142 units in the ring to return the network to normal operation.

**NOTE** “Ring Mode” can only be used with half-duplex applications (i.e., RS-485 multi-drop communication).

### DIP Switch Selectable Terminator

The TCF-142’s termination resistor is set with a DIP switch located on the outside of the converter’s casing.

### No Configuration Required for Baudrate Settings

The TCF-142 is compatible with any baudrate from 300 bps to 921.6 Kbps. The TCF-142 automatically converts the signal back and forth between serial (RS-232, RS-422, or RS-485) and fiber, and does not need to interpret the signal or the baudrate of the transmitting device. For this reason, the TCF-142 does not have any DIP switches or jumpers for setting the baudrate.

## 2. Features

- “Ring” or “Point to Point” transmission
- Extend RS-232/422/485 transmission distance:
  - > up to 40 km with single-mode—TCF-142-S Series
  - > up to 5 km with multi-mode—TCF-142-M Series
- Compact size
- Decrease signal interference
- Protect against electronic degradation and chemical corrosion
- Supports baudrates up to 921.6 Kbps
- Extended operating temperature from -40 to 75°C (for “T” models)

## 3. Package Checklist

Before installing the TCF-142, verify that the package contains the following items:

- TCF-142 Fiber Converter
- Quick Installation Guide
- 7-contact terminal block connector
- 3-contact terminal block connector

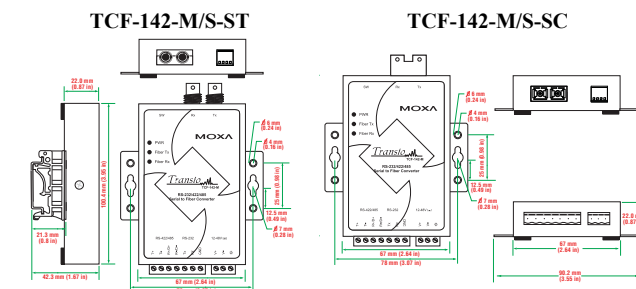
**NOTE:** Please notify your sales representative if any of the above items are missing or damaged.

## 4. Dimensions and Appearance

TCF-142 fiber converters are easy to set up and use. The serial terminal block of one of the converters connects to your computer, the serial terminal block of the other converter connects to your serial device, and the two converters are connected by fiber cable(s).

### NOTE Electrostatic Discharge Warning!

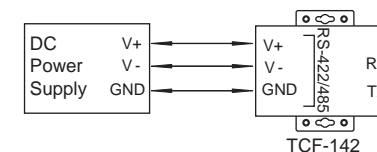
To protect the product from damage due to electrostatic discharge, we recommend wearing a grounding device when handling your TCF-142.



## 5. Wiring Examples

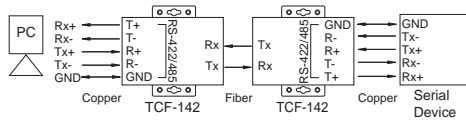
### Connecting the Power Supply

Before using the TCF-142, first connect the DC power supply to the power supply terminal block located on the TCF-142’s bottom panel.

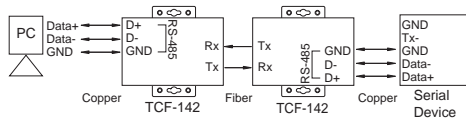


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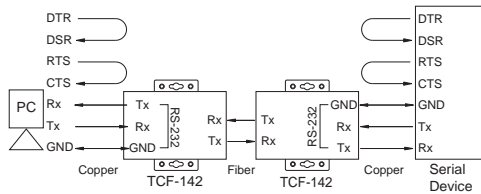
### Connecting RS-422 and 4-wire RS-485 Serial Devices



### Connecting 2-wire RS-485 Serial Devices



### Connecting an RS-232 Serial Device to a PC



## 6. Switch Settings



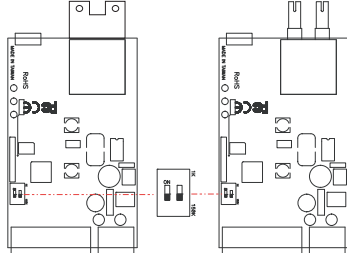
Serial Connection	SW1	SW2
RS-232	ON	OFF
RS-422	OFF	OFF
RS-485 4-wire	OFF	OFF
RS-485 2-wire	OFF	ON

Built-in 120 Ω Terminator	SW3
Enable	ON
Disable	OFF
Ring mode	SW4
Point to Point mode	ON

Two additional DIP switches (SW1 and SW2) are located inside the TCF-142. These switches are used to configure the pull high/low resistors. Note that SW1 and SW2 must both be configured to ON or both must be configured to OFF.

TCF-142-M/S-SC

TCF-142-M/S-ST



Pull High/Low Resistor	SW1*	SW2*
150K (default)	OFF	OFF
1 K	ON	ON

\* These DIP switches are located inside the TCF-142.

**NOTE** We recommend setting SW1 and SW2 to the 1 K option (ON/ON) when termination is enabled.

## 7. LED Description

There are 3 LEDs on the front panel of the TCF-142.

LED	Color	Function
PWR	Red	Steady ON: Power is ON
Fiber Tx	Green	Blinking when fiber is transmitting data
Fiber Rx	Orange	Blinking when fiber is receiving data

## 8. Specifications

<b>Model Names</b>	TCF-142-M-ST TCF-142-M-SC TCF-142-S-ST TCF-142-S-SC TCF-142-M-ST-T TCF-142-M-SC-T TCF-142-S-ST-T TCF-142-S-SC-T
<b>Serial Communication</b>	
Signals for RS-232	TxD, Rx D, SGND
Signals for RS-422	TxD+, TxD-, Rx D+, Rx D-, SGND
Signals for 4-wire RS-485	TxD+, TxD-, Rx D+, Rx D-, SGND
Signals for 2-wire RS-485	Data+, Data-, SGND
Baudrate	300 bps to 921.6 Kbps
Surge protection	15 KV ESD
<b>Fiber Communication</b>	
Connector type	ST or SC
Distance	TCF-142-S series: Single mode fiber for 40 km TCF-142-M series: Multi mode fiber for 5 km
Cable Specifications	TCF-142-S series: 8.3/125, 8.7/125, 9/125 or 10/125 μm TCF-142-M series: 50/125, 62.5/125, or 100/140 μm
Wavelength	TCF-142-S series: 1310 nm TCF-142-M series: 850 nm
TX Output	TCF-142-S series: > -5 dBm TCF-142-M series: > -5 dBm
RX Sensitivity	TCF-142-S series: -25 dBm TCF-142-M series: -20 dBm

Point-to-Point Transmission	Half or Full duplex
Multi-drop Transmission	Half duplex, fiber ring
<b>Environmental Limits</b>	
Operating Temperature	0 to 60°C (32 to 142°F), 5 to 95 % RH
Extended Operating Temperature (T models)	-40 to 75°C (-40 to 167°F)
Storage Temperature	-20 to 85°C (-4 to 185°F), 5 to 95 % RH
<b>Power</b>	
Input Power Voltage	12 to 48 VDC
Power Line Protection	1 KV Burst (EFT), EN61000-4-4 1 KV Surge, EN61000-4-5
Reverse Power Protection	Protects against V+/V- reversal
Over Current Protection	Protects against 2 signals shorted together: 1.1A
Power Consumption	100 mA at 12 VDC
<b>Physical Characteristics</b>	
Dimensions	67 × 100 × 22 mm 90 × 100 × 22 mm (including ears)
Material	Aluminum (1 mm)
Gross Weight	140g
<b>Regulatory Approvals</b>	
CE	Class B
FCC	Part 15 sub Class B
TÜV	EN 60950
UL	UL 60950
EMI	EN55022 1998, Class B
EMS	EN61000-4-2 (ESD), Criteria A, Level 2 EN61000-4-3 (RS), Criteria A, Level 2 EN61000-4-4 (EFT), Criteria A, Level 2 EN61000-4-5 (Surge), Criteria A, Level 3 EN61000-4-6 (CS), Criteria A, Level 2
Freefall	IEC 60068-2-32

**MOXA**

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