

# FOSTCDRI-SM

## Industrial Serial to Single-mode Fiber Converter



PRODUCT INFORMATION

B&B ELECTRONICS

- ✓ Data Rates up to 115.2 kbps
- ✓ 9 Mile (15 km) Range
- ✓ 10 to 48 VDC Input Voltage
- ✓ Wide Operating Temperature
- ✓ 2000V Isolation
- ✓ MODBUS ASCII/RTU Compatible
- ✓ Removable Terminal Blocks
- ✓ EMI/RFI Protection

The FOSTCDRI-SM is our premium Serial to Single-mode Fiber Optic Converter. Designed for industry, it extends serial data range up to nine miles and provides the most versatile connection possible between any asynchronous full or half-duplex serial equipment. In addition to direct point-to-point connectivity, it is capable operating in a multi-drop mode. This allows one serial device to communicate with up to 31 others around a fiber optic ring. Since it supports mixed serial standards, you can replace other converters and isolators and add the EMI/RFI immunity inherent to fiber optic communications.

In RS-232 mode, the FOSTCDRI-SM supports transmit and receive data. Handshaking signals are not passed through.

B&B's Automatic Send Data Control circuit controls the RS-422/485 driver chip, eliminating the requirement for special software.

Easy to install and configure, it has a 12 position DIP Switch to set up the RS-422/485 parameters and removable terminal blocks to connect serial signals and power.

When it comes to reliable communications in harsh duty industrial environments, ILinx™ is your Number One choice.

### Specifications

#### Serial Technology

RS-232	TD, RD, GND
RS-485 2-Wire	Data A(-), Data B(+), GND
RS-422/485 4-Wire	TDA(-), TDB(+), RDA(-), RDB(+), GND
Serial Connector	Removable Terminal Block (12 to 28 AWG)
Data Rate	9.6 to 115.2 kbps
Isolation	2KV RMS, 1 minute
Surge Protection	600 W Peak Power Dissipation Clamping time < 1 pico-second
Industrial Bus	MODBUS ASCII/RTU

#### Fiber Optic Technology

Type / Wavelength	Single Mode / 1310 nm
Output Power	(-) 15 to (-) 8 dBm
Receive Sensitivity	Less than or equal to (-) 32 dBm
Cable	9/125 micro-meter
Connector	SC
Data Rate	9.6 TO 115.2 kbps
Maximum Distance	9 miles (15 km)
Idle State	Transmitter Light ON

Note: This device is designed for long distance operation. If a fiber cable run of less than 820 feet (250 m) is used, the fiber optic receiver may over-saturate at data rates below 38.4 Kbps.

#### Power

Source	External
Input Voltage	10 to 48 VDC
Power Consumption	1.4 Watts
Connector	Removable Terminal Block (12 to 28 AWG)

#### Mechanical

LED Indicators	FO Receive, FO Transmit, Power
Dimensions	5.0 x 3.8 x 1.1 in (12.8 x 9.7 x 2.8 cm)
Enclosure	35mm DIN Mount, Plastic, IP 30
Weight	0.3 lbs (149.7 g)

#### Environmental

Op Temperature	- 40 to 176°F (- 40 to 80°C)
Storage Temp	- 40 to 185°F (- 40 to 85°C)
Op Humidity	0 to 95% Non-condensing

#### Regulatory

Approvals	FCC, CE, UL Class 1 DIV 2 Pending
MTBF	88423 hours
MTBF Calc. Method	Parts Count Reliability Prediction

### Ordering Information

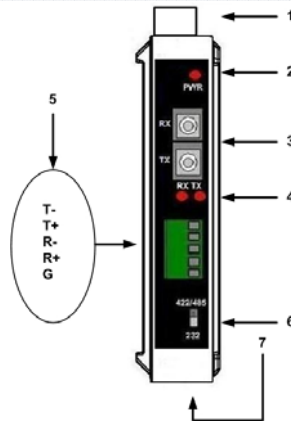
FOSTCDRI-SM	Serial to Single-mode fiber optic converter
<b>Accessories</b>	
MDR-20-24	24VDC DIN Rail Power Supply (not included)
7444	2 Position Terminal Block (1 included)
7466	5 Position Terminal Block (1 included)

## Package Contents

- FOSTCDRI-SM Industrial Serial To Single-mode Fiber Optic Converter
  - Datasheet (One per shipment)
  - Power Terminal Block (installed)
  - Serial Terminal Block (installed)
  - Fiber Optic Dust Cover (installed)
- If any item is missing or damaged, contact B&B Electronics for a replacement

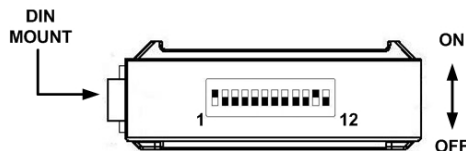
## Front Panel

**Note: The label for the serial connection terminal block is not visible with the TB installed. This detail is provided for reference.**



1	Power TB	2 Position, Removable
2	PWR LED	ON When Power Applied
3	Fiber Port	Single-mode, SC Connectors
4	Fiber RX LED	Normally ON, Flashed when data RCVD
4	Fiber TX LED	Normally OFF, Flashes when data sent
5	Serial Port TB	5 Position, Removable
6	Serial Switch	Selects RS-232 or RS-422/485 Mode
7	DIP Switch	12 Position

## DIP Switch (SW1)



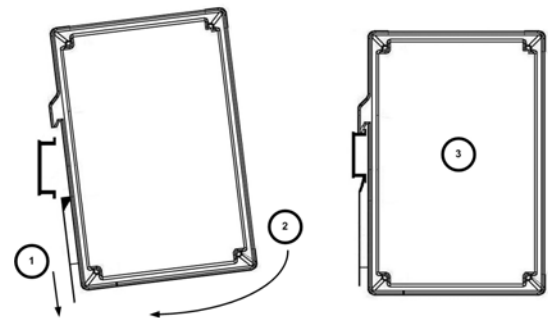
Pos	ON	OFF
1	RS-485	RS-422
2	HALF-DUPLEX	FULL-DUPLEX
3	2-WIRE	4-WIRE
4	2-WIRE	4-WIRE
5	TERMINATION IN	TERMINATION OUT
6	TX BIAS OUT	TX BIAS IN
7	RX BIAS OUT	RX BIAS IN
8	57.6 KBPS	
9	38.4 KBPS	
10	19.2 KBPS	
11	9.6 KBPS	
12	MULTI-DROP	POINT-TO-POINT

## Terminal Block

Terminal	RS-232
T-	Output
T+	Not Used
R-	Input
R+	Not Used
G	Ground

Terminal	RS 4852-Wire	RS-422/4854-Wire
T-	Data A(-)	TD A(-)
T+	Data B(+)	TD B(+)
R-	Not Used	RD A(-)
R+	Not Used	RD B(+)
G	Ground	Ground

## DIN Rail Mounting

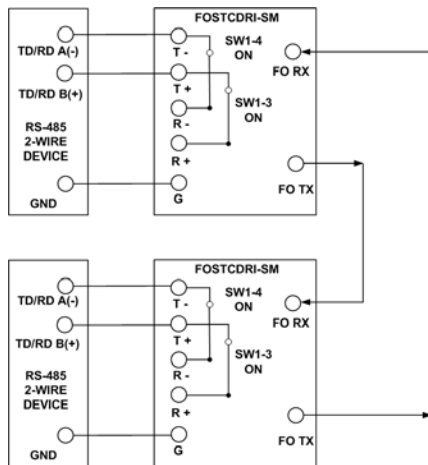


1. Slide and hold the DIN clip toward the bottom of the converter. Angle the top portion of the DIN mount over the top of DIN Rail.
2. Move the converter so that it is parallel with the DIN Rail.
3. Let go of the DIN Clip. The spring should return it to its original position.

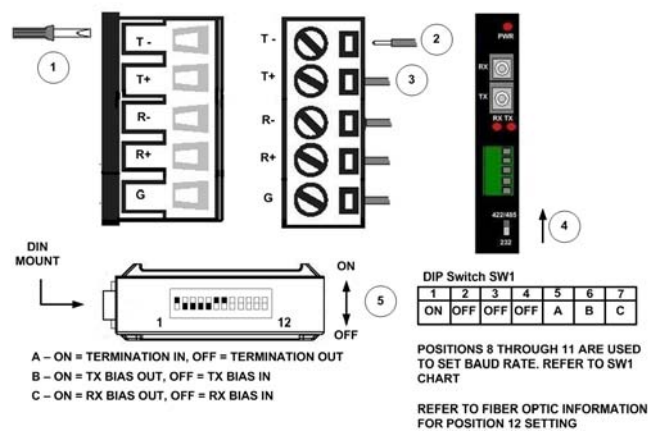
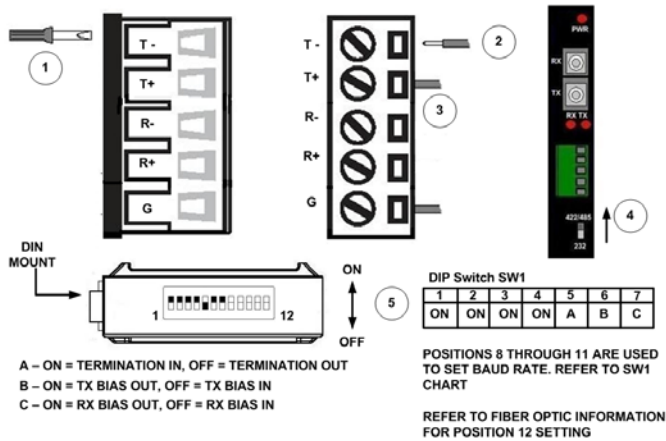
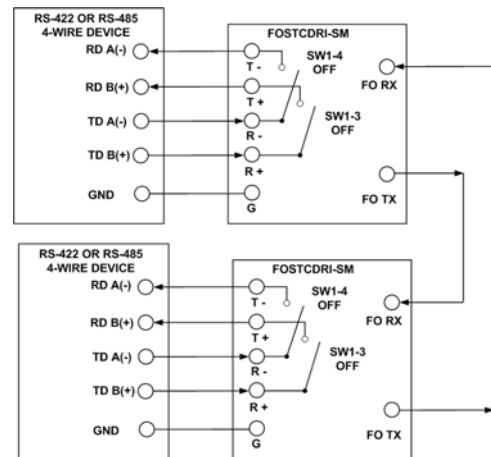
## RS-422/485 Baud Rate / Timeout

Baud	SW1 8	SW1 9	SW1 10	SW1 11	Timeout (ms)
9600	OFF	OFF	OFF	ON	1.30
19.2K	OFF	OFF	ON	OFF	0.56
38.4K	OFF	ON	OFF	OFF	0.27
57.6K	ON	OFF	OFF	OFF	0.22
76.8K	ON	OFF	ON	ON	0.14
115.2K	ON	OFF	ON	OFF	0.10

## RS-485 2-Wire



## RS-422 / RS-485 4-Wire



- Loosen the screws to open the Serial TB Lead Clamps for the T-, T+, and G terminals.
- Insert the RS-485 2-Wire Signals Leads. The TB will accept 12 to 28 AWG wire.
- Tighten the screws to close the Serial TB Lead Clamps. Ensure the clamps hold the leads securely. However, do not over tighten.
- Position the 422/485/232 Switch to the 422/485 position.
- Configure the DIP Switch on the bottom of the converter for RS-485 2-Wire operation.

### Installation Notes:

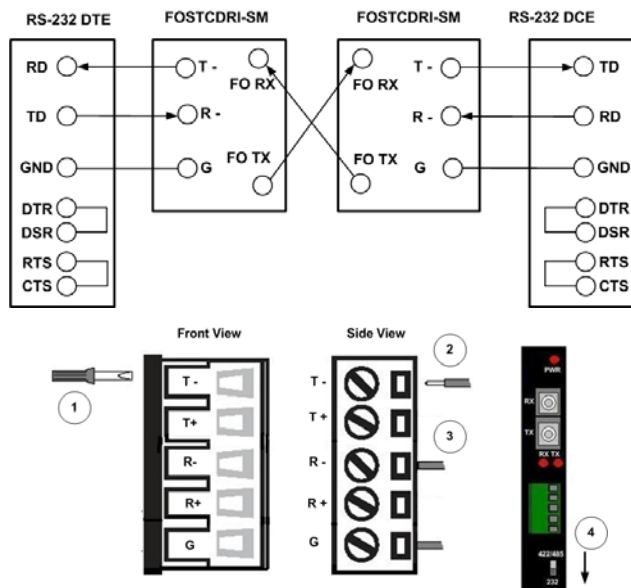
- In 2-Wire mode, T(-) and T(+) terminals are tied to the R(-) and R(+) terminals with DIP Switch SW1-3 and SW1-4.
- If Termination is required, a 120Ω resistor can be placed across the R(-) and R(+) terminals by setting SW1-5 to ON.
- This converter has 1.2 KΩ pull-up/down bias resistors built in. To use this bias, set SW1-6 and SW1-7 to ON.
- B&B Electronics' RS-485 Application Note contains more information about termination and biasing. This reference is available on our web site.
- For a replacement TB, order part number 7466.

- Loosen the screws to open the Serial TB Lead Clamps for the T-, T+, R-, R+, and G terminals.
- Insert the RS-422/485 4-Wire Signal Leads. The TB will accept 12 to 28 AWG wire.
- Tighten the screws to close the Serial TB Lead Clamps. Ensure the clamps hold the leads securely. However, do not over tighten.
- Position the 422/485/232 Switch to the 422/485 position.
- Configure the DIP Switch on the bottom of the converter for RS-422/485 4-Wire operation.

### Installation Notes:

- If Termination is required, a 120Ω resistor can be placed across the R(-) and R(+) terminals by setting SW1-5 to ON.
- This converter has 1.2 KΩ pull-up/down bias resistors built in. To use this bias, set SW1-6 and SW1-7 to ON.
- B&B Electronics' RS-485 Application Note contains more information about termination and biasing. This reference is available on our web site.
- For a replacement TB, order part number 7466.

## RS-232 Configuration



1. Loosen the screws to open the Serial TB Lead Clamps for the T-, R-, and G terminals.
2. Insert the RS-232 Signal Leads into the TB.
3. Tighten the screws to close the Serial TB Lead Clamps. Ensure the clamps hold the leads securely. However, do not over tighten.
4. Position the 422/485/232 Switch to the 232 position.

### Installation Notes:

- DIP Switch SW1 Positions 1 through 11 (on the bottom of the converter) are not used in RS-232 Mode. Refer to the fiber optic section for Position 12 setting.
- The wiring example shows a DTE device on one end and a DCE device on the other.
- Handshaking signals are not passed through.
- The loopback jumpers shown in the wiring diagram may or may not be required. Refer to the operating manual for your RS-232 device for more information.

## Need More Information?

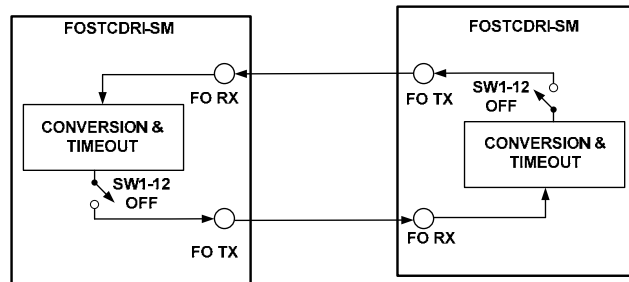
For more information about serial communications, visit B&B Electronics' web site:

[www.bb-elec.com](http://www.bb-elec.com)

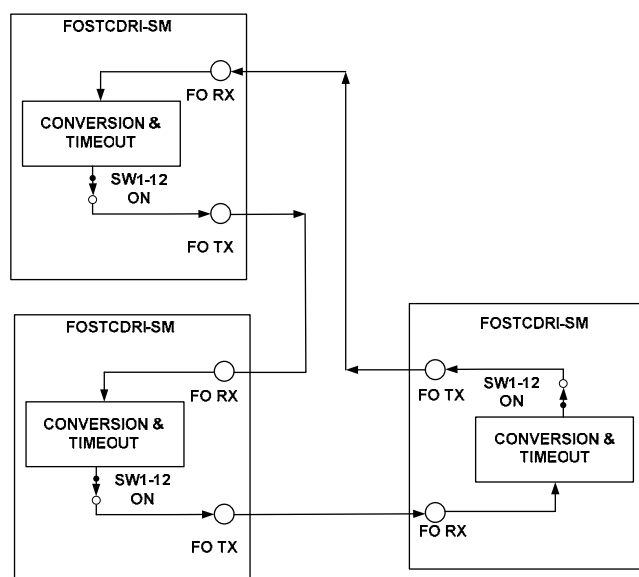
B&B Electronics maintains an extensive technical library available for download free of charge. The following titles are of particular interest to users of this product.

RS-422/485 Application Note  
 RS-232 Connections That Work - DTE/DCE  
 An Overview of Fiber Optic Technology

## Fiber Optic



Fiber Optic Point-to-Point

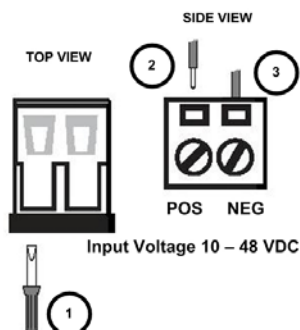


Fiber Optic Multi-drop Ring

1. Ensure your fiber optic cable is terminated with an SC type connector. 9/125 micro-meter single-mode cable is recommended.
2. Connect the converter's transmitter to the distant end receiver and vice-versa.
3. The fiber optic transmitter light is ON in the idle state. Therefore, the RX indicator will be lighted when data is not being transferred.
4. DIP Switch SW1-12 is used to select point-to-point or multi-drop mode. For point-to-point, set the switch to OFF for both converters. For multi-drop, set the switch to ON for each converter in the ring. With SW1-12 in the ON position, receive data will be looped back to the fiber optic transmitter. Data will repeat around the ring until it finally reaches its source. When the data is received by the originator, timeout circuitry will prevent it from being re-transmitted.

Maximum Converters in a Fiber Ring		
Baud Rate	RS-232	RS-422/485
19.2 kbps and lower	32	32
37.4 kbps	16	24
115.2 kbps	2	8

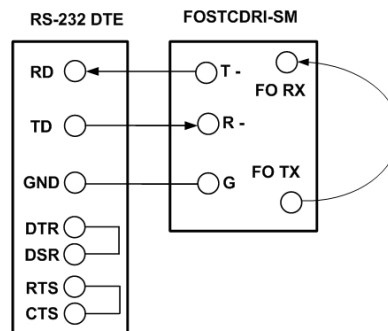
## Attach Power Leads External Supply Required



1. Loosen the screw to open the terminal block lead clamp.
2. Insert the power lead. TB will accept 12-28 AWG wire.
3. Tighten the screw to close the terminal block lead clamp. Ensure the clamp holds the lead securely. However, do not over tighten.

**NOTE: For replacement Terminal Block order Part # 7444.**

## RS-232 Loopback Test



1. Configure the converter for RS-232.
2. Set DIP Switch SW1 Position 12 to OFF.
3. Cross-connect the fiber optic transmitter to the fiber optic receiver using a single-mode patch cord. Note: This device is designed for long distance operation. To perform this test with a patch cord, use a data rate of 38.4 or above. An attenuator can also be placed on the receiver.
4. Connect a PC to the serial port.
5. Using Hyper Terminal or similar program, connect to the appropriate COM port. Set the baud rate to match the converter. Ensure Hyper Terminal local echo is OFF.
6. Transmit data. If the same character string is returned, the test is good.

## Mechanical Diagram

