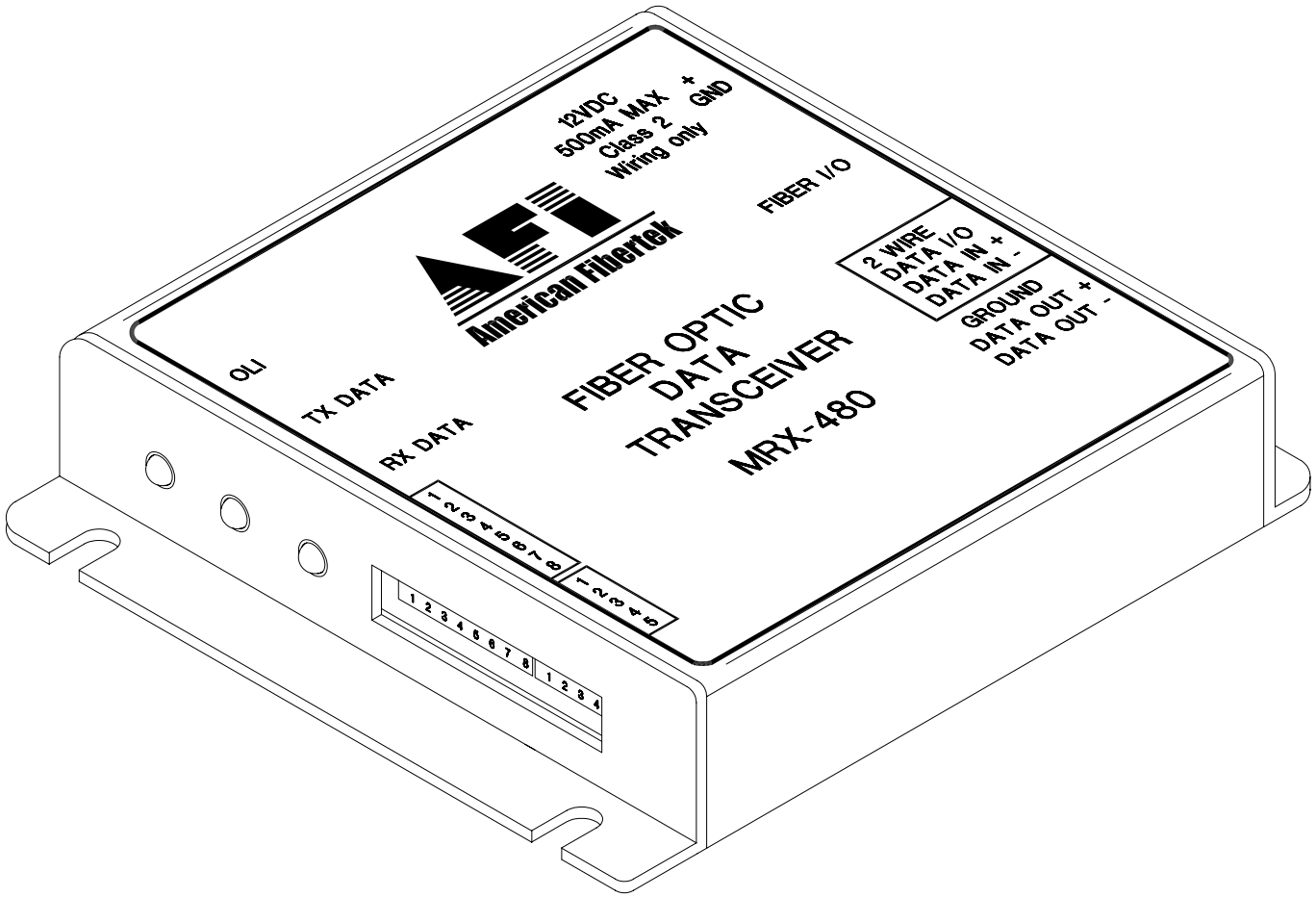
120 Belmont Drive
Somerset, NJ 08873-1204

American Fibertek

Phone: 732.302.0660 Fax: 732.302.0667



Instruction Manual

MRX-480
Bi-directional Multi-Protocol Data

© Copyright 2007, American Fibertek, Inc. 1210JD

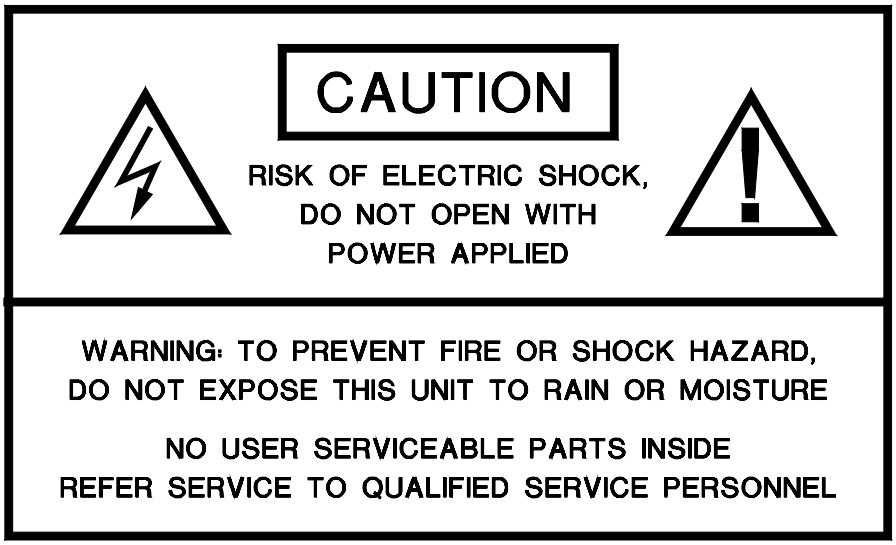


Table of Contents

Functional Description 3

Installation 3

Power Source 3

Power Connection 4

Fiber Connection 4

Data Input / Output Connections 5

Typical System Data Connections.....5

Data Configuration 5

Data Bias / Termination Switches.....6

RS485 Data Termination 6

Offset Bias - RS485 Data 6

MRX-480 Status LED Indicators.....7

Warranty / Service Information 8

INSTALLATION AND OPERATION INSTRUCTIONS

INTRODUCTION

Thank you for purchasing your American Fibertek MRX-480 multimode bi-directional multi-protocol data receiver. Please take a few minutes to read these installation instructions in order to obtain the maximum performance from this product.

FUNCTIONAL DESCRIPTION

The MRX-480 operates as half of a transmitter / receiver pair for the transmission of one bi-directional data channel. This data channel can be configured for any one of the following protocols:
RS485 (2 or 4 wire) data, RS422 data, RS232 data, or Manchester / Bosch data.

NOTE: This unit is shipped with the data channel in the RS485 4-wire configuration. For other configurations, please refer to the DATA CONFIGURATION section for changes to the default switch settings.

The MRX-480 is designed to operate with the MTX-480 or RTX-480 transmitter with bi-directional data over one multimode fiber optic cable.

The MRX-480 converts a single data signal into a high speed serial data stream. This serial data stream modulates a laser at 1550 nm wavelength. The MRX-480 also detects a return optical serial data stream signal containing one data channel at 1310 nm wavelength. The 480 Series product is designed to operate over an optical loss budget range of 0 to 18 dB on 62.5 um multimode fiber. The MTX-480 will also operate on 50 um multimode fiber at a reduced loss budget range. Refer to the product specification sheet for additional performance data.

The RS485 channel may be configured for 2-wire (half duplex) or 4-wire (full duplex) with or without biasing. Switch selectable internal 120 ohm terminations are available for RS422 or RS485 data.

This unit is contained in a rugged aluminum housing with internal dc voltage regulation. The detachable terminal blocks and LED indicators provide for easy installation and monitoring of data and optical power.

The MRX-480 is designed for mounting as a modular stand alone unit. For a rack mounted version please see the RRX-480.

INSTALLATION

THIS INSTALLATION SHOULD BE MADE BY A QUALIFIED SERVICE PERSON AND SHOULD CONFORM TO THE NATIONAL ELECTRICAL CODE, ANSI/NFPA 70 AND LOCAL CODES.

Mount the unit to a secure surface using #8 (3mm) hardware in four places. See the drawing on the next page for mounting dimensions. Be sure to allow sufficient room for the required minimum bend radius of the fiber cable used.

POWER SOURCE

THIS PRODUCT SHALL BE POWERED BY A LISTED CLASS 2 POWER SUPPLY ONLY.

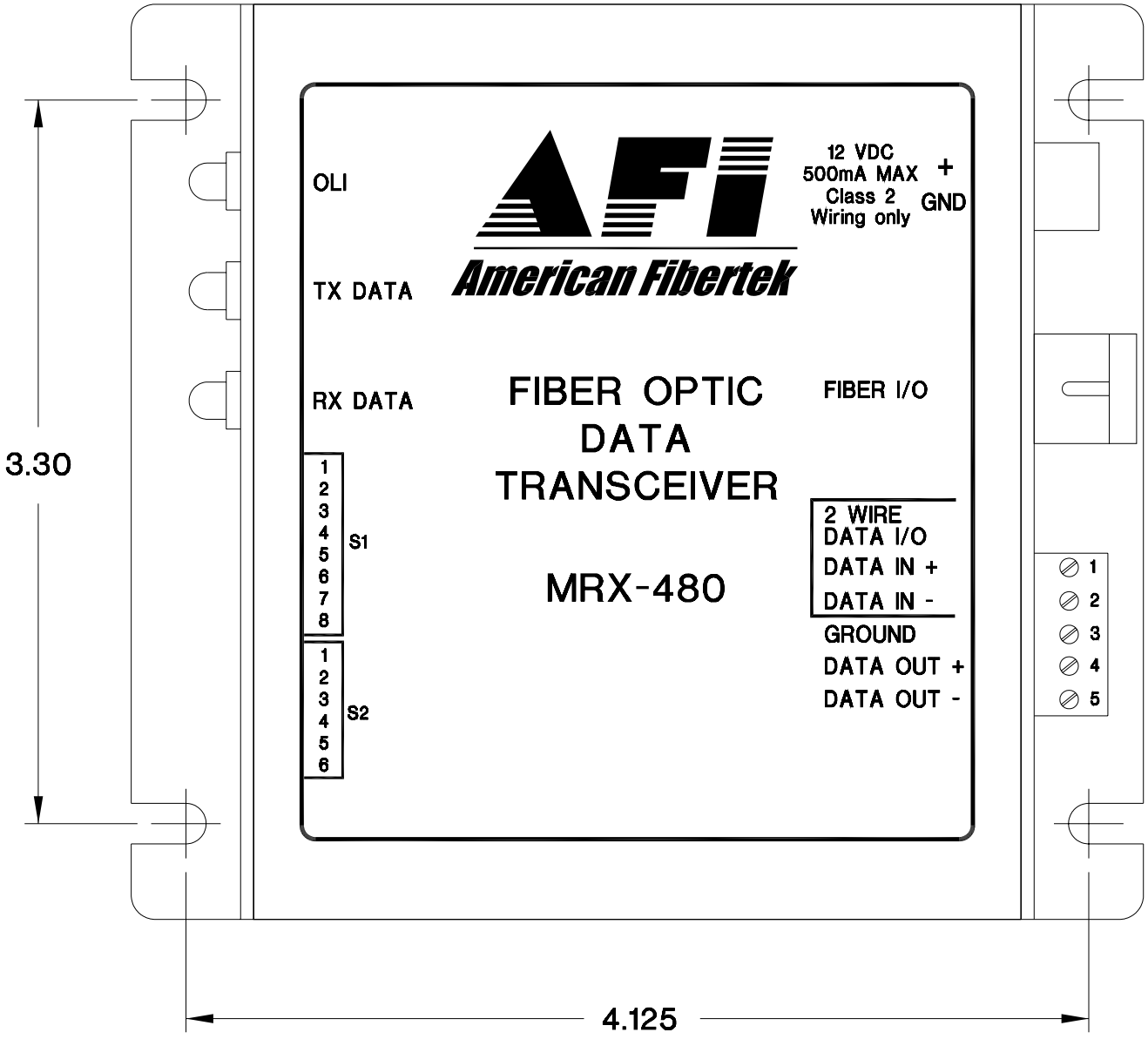
This unit requires a +12VDC power source with a current rating of 500 milliamps for proper operation. The DC input is diode protected. In the USA and in Canada an American Fibertek PS-12 is supplied with this unit. The negative side of the power input is directly connected to ground. ANSI/NFPA 70 Class 2 wiring is recommended.

POWER CONNECTION

Power is supplied to the unit via a two pin terminal connector on the right side of the unit. Follow the label on unit for proper orientation of +12 volt dc and ground.

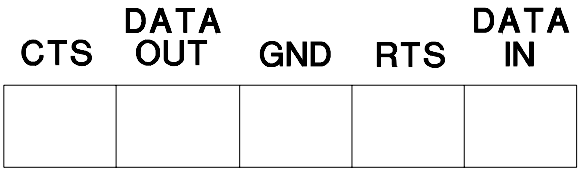
FIBER CONNECTION

The fiber optic connection is made via a SC connector located on the right side of the unit.



DATA INPUT / OUTPUT CONNECTIONS

Data input and output connections are made via terminal blocks on the right side of the unit. For RS485, RS422, and Manchester data, please follow the label on the unit for proper orientation of the data connections. Please note RS485 2-wire data uses the two terminals labeled DATA IN. For RS232 data please see the drawing below for proper orientation of the input and output connections.



RS232 DATA

For all formats with the exception of 2-wire RS485, DATA OUT on the MRX-480 becomes DATA IN on the MTX-480 or RTX-480 after going across the fiber. The reverse flow follows the same orientation. For 2-wire RS485 format data flows through DATA IN on both ends.

TYPICAL SYSTEM DATA CONNECTIONS

The RS422 or RS485 four wire interconnection between the MRX-480 and the copper device to which it is attached is based on industry standard EIA terminology for the transmission of electronic data signals. Using this terminology, the driver of an electronic signal is labeled TX or Data Out. Correspondingly, the receiver of an electronic signal is labeled RX or Data In. Following this standard, the Data Out of the copper device is connected to the Data In of the MRX-480. The plus terminal of the copper device is connected to the plus terminal of the MRX-480 and the minus is connected to the minus. The reverse flow of data from the MRX-480 to the copper device follows the same pattern. Not all manufactures follow standard EIA terminology. Consult the installation instructions for your copper device if you are unsure which two wires are the drive (data out) wires and which two wires are the receive (data in) wires.

DATA CONFIGURATION

NOTE: This unit is shipped with the data channel in the RS485 4-wire configuration.

For other data configurations please refer to the drawing below for changes to the default switch settings of switch bank S1. These configuration switches are located on the left side of the unit and can be modified without opening the unit.

SWITCH S1 LEGEND								
1	2	3	4	5	6	7	8	ON=DOWN / OFF=UP
OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	RS485-4W (FACTORY SHIPPED)
OFF	OFF	ON	OFF	OFF	OFF	ON	ON	RS485-2W
OFF	ON	OFF	OFF	OFF	OFF	ON	ON	RS422/MANCHESTER
ON	OFF	OFF	OFF	ON	ON	OFF	OFF	RS232

DATA BIAS / TERMINATION SWITCHES

NOTE: This unit is shipped with the data bias and termination switches in the off position .

Switches are available externally that allow offset bias and termination features to be activated when using RS485 data. These bias / termination switches, labeled S2, are located on the left side of the unit and can be modified without opening the unit. These switches also allow termination features to be activated when using RS422 data. When transmitting RS232 or Manchester data, the bias and termination switches must remain in the off (up) position. Please refer to the drawing below for changes to the default switch settings of switch bank S2.

SWITCH S2 LEGEND			
	ON=DOWN	OFF=UP	FACTORY SHIPPED
1	INPUT BIAS ON	INPUT BIAS OFF	OFF
2	INPUT TERM. ON	INPUT TERM. OFF	OFF
3	INPUT BIAS ON	INPUT BIAS OFF	OFF
4	OUTPUT BIAS ON	OUTPUT BIAS OFF	OFF
5	OUTPUT TERM. ON	OUTPUT TERM. OFF	OFF
6	OUTPUT BIAS ON	OUTPUT BIAS OFF	OFF

Please remember when using offset bias switches that they must be used in pairs. If switch # 1 is down then switch # 3 must also be down. The same situation applies for switch # 4 and switch # 6. Also, if using offset bias, it is important that the corresponding termination resistor switch be in the on (down) position. Using offset bias without a termination on the line will cause communications to fail. An explanation follows on general bias and termination guidelines.

RS485 DATA TERMINATION

The RS485 protocol is an expanded version of the original RS422 protocol. RS485 differs from RS422 in the ability of the transmitter devices to go into a high impedance (Hi-Z) state. This allows multiple transmitter devices to reside on the same wire pair. The software must dictate a protocol that allows only one device to transmit at any one time to prevent data crashes. In many cases the system head end controller will continuously poll data from all remote devices. The remote devices all respond back to the head end (one at a time) as they are addressed. The driver chips that are used in RS485 communications are capable of changing into their high impedance state very rapidly. On even short lengths of wire there can exist a residual voltage after a driver circuit turns off. This can interfere with circuits that are used to detect the Hi-Z state. It is very important that the copper communications lines be terminated with resistors across the data wire pair. The best place to locate such resistors is at the furthest electrical devices at the ends of the wire pair. For instance, if several RS485 devices are connected in a daisy chain fashion, the wire connection would loop across all devices in a chain. The furthest two points in the chain would need to be terminated.

OFFSET BIAS – RS485 DATA

The RS485 specification requires receivers to detect input signals down to 200mVp-p of voltage level. In many cases this can cause systems to be sensitive to noise on the data wires. In an effort to eliminate the effects of low levels of noise, some manufacturers of equipment that communicate using RS485 have introduced a small voltage bias to the data lines. This is usually accomplished using a 470 Ohm resistance to +5V on the positive line and 470 Ohm resistance to ground on the negative line. When used in conjunction with the appropriate termination resistors referred to in the previous section, this introduces about a 300 mV offset, improving noise immunity.

MRX-480 STATUS INDICATORS

The MRX-480 transmitter provides the following LED status indicators to aid in installation and troubleshooting:

OLI

A bi-color LED indicator monitors the optical input power of the data signal that is being received at the MRX-480 from the MTX-480 or the RTX-480. DC power and optical input status associated with this LED are summarized below.

Optical Level Indicator	DC Power Status	Optical Status
Green	On	Proper Optical Input Power Present
Red	On	Optical Input Not Detected
Off	Off	Check Power Supply

TX DATA

A green LED indicator is provided to monitor the data coming in from the electrical interface, through the MRX-480, and out onto the fiber. The intensity of this indicator will vary with input data patterns, however in typical applications it will cycle on and off as data is transmitted. Data transmitted status associated with this LED is summarized below.

TX DATA LED	Data Status
Green	Data Flow Present
Off	Data Flow Not Detected

RX DATA

A green LED indicator is provided to monitor the data coming in from the fiber, through the MRX-480, and out onto the electrical interface. The intensity of this indicator will vary with input data patterns, however in typical applications it will cycle on and off as data is received. Data received status associated with this LED is summarized below.

RX DATA LED	Data Status
Green	Data Flow Present
Off	Data Flow Not Detected

This unit complies with 21 CFR 1040.10 and 1040.11

LIFETIME WARRANTY INFORMATION

American Fibertek, Inc warrants that at the time of delivery the products delivered will be free of defects in materials and workmanship. Defective products will be repaired or replaced at the exclusive option of American Fibertek. A Return Material Authorization (RMA) number is required to send the products back in case of return. All returns must be shipped prepaid. This warranty is void if the products have been tampered with. This warranty shall be construed in accordance with New Jersey law and the courts of New Jersey shall have exclusive jurisdiction over this contract. **EXCEPT FOR THE FOREGOING WARRANTY, THERE IS NO WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR OTHERWISE, EXPRESSED OR IMPLIED, WHICH EXTENDS BEYOND THE WARRANTY SET FORTH IN THIS AGREEMENT.** In any event, American Fibertek will not be responsible or liable for contingent, consequential, or incidental damages. No agreement or understanding, expressed or implied, except as set forth in this warranty, will be binding upon American Fibertek unless in writing, signed by a duly authorized officer of American Fibertek.

SERVICE INFORMATION

There are no user serviceable parts inside the unit.
In the event that service is required to this unit, please direct all inquiries to:

American Fibertek, Inc.
120 Belmont Drive
Somerset, NJ 08873

Phone: (877) 234-7200
Phone: (732) 302-0660
FAX (732) 302-0667
E-mail: techinfo@americanfibertek.com