



Fiber Optic Data Transmission System

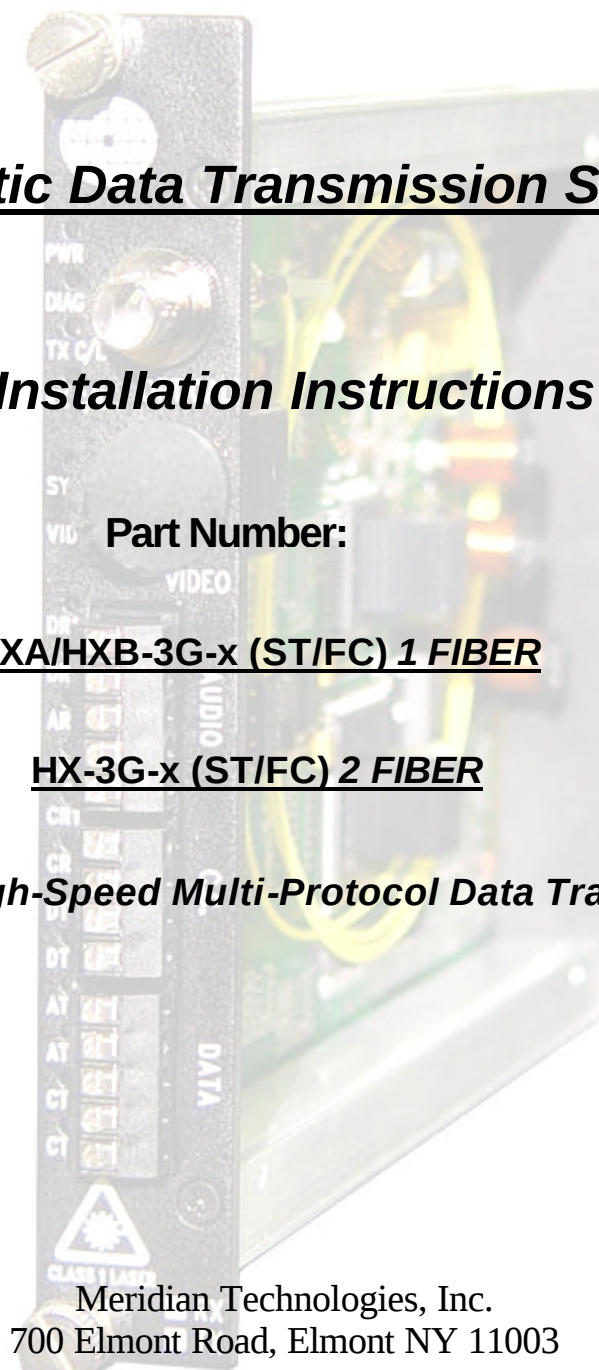
Installation Instructions

Part Number:

HXA/HXB-3G-x (ST/FC) 1 FIBER

HX-3G-x (ST/FC) 2 FIBER

(3-Channel High-Speed Multi-Protocol Data Transceiver)



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HX & HXA/HXB-3G-x **Fiber Optic Data Transmission System** **Installation Instructions**

1.0 Product Description

Meridian's HX & HXA/HXB-3G-x products are fiber optic modems that transmit three high-speed channels of bi-directional, user-selectable RS-232, RS-422 and RS-485 (2 & 4 wire) data signals over one optical fiber (HXA/HXB) or two optical fibers (HX) using digital transmission technologies. This product series uses Meridian's standard 1-slot wide chassis mount card assembly and plugs into the following Meridian chassis: SR-500/S, SR-1002/S, SR-1600/S and SR-2001 & SR-2000 series equipment chassis.

Both ST and FC optical connectors are supported, depending on the part number. An ST optical interface is available for both multimode and singlemode fiber applications. The FC optical interface is available only for singlemode products. Optional conformal coating provides an additional level of protection from environments with high humidity.

2.0 Installation

Series HX & HXA/HXB-3G-x products are one-slot wide cards and, as such, occupy one slot in Meridian's standard chassis. To install in these chassis, orient the card with the Meridian logo at the top of the module and slide onto the top and bottom card guides in the chassis. Press securely on the top and bottom of the module to ensure that it is fully seated in the chassis so that the electrical connector mates with the chassis-mounted motherboard. Once installed, manually tighten the two thumbscrews located at the top and bottom of the card. Do not use tools to secure these and do not over tighten.

Note: A fully loaded 19" subrack should have forced-air cooling to avoid excessive heat generation inside the chassis. A fan assembly tray (P/N FA-2000) with three (3) fans is available and should be installed under the 19" SR-2000/1 whenever possible.

3.0 Product Signal Format & Specifications

The HX & HXA/HXB-3G-x series products transmit and receive the following signals:

Signal Type	Channels	Transmit	Receive
RS-232 (Tx & Rx data)	3	Yes	Yes
RS-422 (Tx & Rx data)	3	Yes	Yes
RS-485 (2 & 4-wire)	3	Yes	Yes

The tables below identify the specifications for the various signals that these modems transmit/receive.

Data	
Formats	RS-232, RS-422, RS-485
Date Rate (RS-232)	DC to 250 Kb/s
Data Rate (RS-422 & RS-485)	DC to 500 Kb/s
Bit Error Rate (BER)	Better than 10^{-9}
PWD	10%

Connectors	
Data	14 pin terminal strip
Optical	Singlemode – ST or FC Multimode - ST

3.1 Optical Specifications

The table below lists the optical specifications for both singlemode and multimode fiber applications.

Optical Specifications						
Fiber Type/Size (um)	Optical Output (dBm)	Rx Sensitivity (dBm)	Optical Budget (dB)	Wavelength (nm)	Optical connector	Optical Dynamic Range (Db)
One Fiber Units						
Multimode (Laser) 62.5 / 125	-5	-25	20	850/1300	ST	25
Singlemode (FP Laser) 9 / 125	-5	-25	20	1310/1550	ST, FC	25
Two Fiber Units						
Multimode (Laser) 62.5 / 125	-5	-27	22	1300	ST	27
Singlemode (FP Laser) 9 / 125	-5	-27	22	1310	ST, FC	27
Singlemode (CWDM DFB Laser) 9 / 125	+1	-27	28	1270-1610	ST, FC	27

Refer to section 7.0 for CWDM wavelength selections.

4.0 Data Connector Pin Assignment

The 14 pin terminal block connector on the front of the module are used for all data interfaces. This module supports the following data formats:

RS-232 One channel w/Handshake (Tx/Rx)
RS-422 One channel
RS-485 One channel (either 2 or 4 wire)

The RS-232 channel is used for transmitting/receiving one channel of RS-232 w/Handshake (Tx/Rx). In addition to the RS-232, this module supports both RS-422 and 2 or 4-wire RS-485 signals. User-settable switches on the module's motherboard are used to select the appropriate data format as required.

Port 1 Data Connector Pinout Assignment				
Pin #	RS-232	RS-422	RS-485 (2-wire)	RS-485 (4-wire)
1	Ch 1 IN (RD)	Ch 1 IN (-)		Ch 1 IN (-)
2	Ch 1 IN (DTR)	Ch 1 IN (+)		Ch 1 IN (+)
3	Ch 1 OUT (TD)	Ch 1 OUT (-)	Ch 1 IN/OUT (-)	Ch 1 OUT (-)
4	Ch 1 OUT (DSR)	Ch 1 OUT (+)	Ch 1 IN/OUT (+)	Ch 1 OUT (+)
5	GND	GND	GND	GND
Port 2 Data Connector Pinout Assignment				
Pin #	RS-232	RS-422	RS-485 (2-wire)	RS-485 (4-wire)
1	Ch 2 IN (RD)	Ch 2 IN (-)		Ch 2 IN (-)
2	Ch 2 IN (DTR)	Ch 2 IN (+)		Ch 2 IN (+)
3	Ch 2 OUT (TD)	Ch 2 OUT (-)	Ch 2 IN/OUT (-)	Ch 2 OUT (-)
4	Ch 2 OUT (DSR)	Ch 2 OUT (+)	Ch 2 IN/OUT (+)	Ch 2 OUT (+)
Port 3 Data Connector Pinout Assignment				
Pin #	RS-232	RS-422	RS-485 (2-wire)	RS-485 (4-wire)
1	Ch 3 IN (RD)	Ch 3 IN (-)		Ch 3 IN (-)
2	Ch 3 IN (DTR)	Ch 3 IN (+)		Ch 3 IN (+)
3	Ch 3 OUT (TD)	Ch 3 OUT (-)	Ch 3 IN/OUT (-)	Ch 3 OUT (-)
4	Ch 3 OUT (DSR)	Ch 3 OUT (+)	Ch 3 IN/OUT (+)	Ch 3 OUT (+)
5	GND	GND	GND	GND

4.1 Front Panel Indicator Lights

There are 9 LED indicator lights mounted on the left side of the module's front panel (see Figure 4.1 below). These indicators show the operation status of the module's power, optical carriers and data channels. These indicators can be used for troubleshooting the module, electrical and optical connections.

Not all of the LEDs apply to all versions of these modules. Please refer to the module's part number for the appropriate signals, description.

Indicator	Function
Power	Green – ON
Tx Carrier	Optical output (Green – OK, Red – Error)
Rx Carrier	Optical Carrier input (Green – OK, Red – Error)

TX Data 1	Data input ch.1 - Green
RX Data 1	Data output ch.1 - Green
TX Data 2	Data input ch.2 - Green
RX Data 2	Data output ch.2 - Green
TX Data 3	Data input ch.3 - Green
RX Data 3	Data output ch.3 - Green

HXA/HXB-3G/3G-x

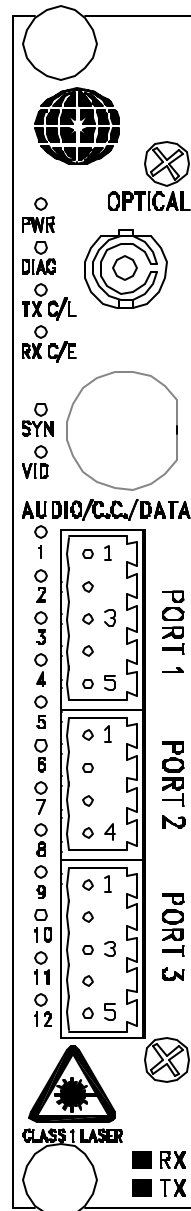
PINOUT DIAGRAM

STATUS INDICATORS

PWR - POWER (GREEN)
 DIAG - CARD DIAGNOSTIC*
 (GREEN-OK, RED-ALARM)
 TX C/L - TX CARRIER (GREEN)
 /OVERLOAD (RED)
 RX C/E - RX CARRIER (GREEN)
 /ERROR (RED)
 SYN - NA
 VID - NA

STATUS INDICATORS

1 - NA
 2 - NA
 3 - NA
 4 - NA
 5 - NA
 6 - NA
 7 - (CH.1) DATA INPUT (GREEN)
 8 - (CH.1) DATA OUTPUT (GREEN)
 9 - (CH.2) DATA INPUT (GREEN)
 10 - (CH.2) DATA OUTPUT (GREEN)
 11 - (CH.3) DATA INPUT (GREEN)
 12 - (CH.3) DATA OUTPUT (GREEN)



OPTICAL PORT (ST, FC)

PORT 1 DATA MULTI PROTOCOL

PIN #	RS-232	RS-422	RS-485 2W	RS-485 4W
1	CH1 IN (RD)	CH1 IN-		CH1 IN-
2	CH1 IN (DTR)	CH1 IN+		CH1 IN+
3	CH1 OUT (TD)	CH1 OUT-	CH1 IN/OUT-	CH1 OUT-
4	CH1 OUT (DSR)	CH1 OUT+	CH1 IN/OUT+	CH1 OUT+
5	GND	GND	GND	GND

PORT 2 DATA MULTI PROTOCOL

PIN #	RS-232	RS-422	RS-485 2W	RS-485 4W
1	CH2 IN (RD)	CH2 IN-		CH2 IN-
2	CH2 IN (DTR)	CH2 IN+		CH2 IN+
3	CH2 OUT (TD)	CH2 OUT-	CH2 IN/OUT-	CH2 OUT-
4	CH2 OUT (DSR)	CH2 OUT+	CH2 IN/OUT+	CH2 OUT+

PORT 3 DATA MULTI PROTOCOL

PIN #	RS-232	RS-422	RS-485 2W	RS-485 4W
1	CH3 IN (RD)	CH3 IN-		CH3 IN-
2	CH3 IN (DTR)	CH3 IN+		CH3 IN+
3	CH3 OUT (TD)	CH3 OUT-	CH3 IN/OUT-	CH3 OUT-
4	CH3 OUT (DSR)	CH3 OUT+	CH3 IN/OUT+	CH3 OUT+
5	GND	GND	GND	GND

Figure 4.1
HXA/HXB-3G-x Front Pane Layout Diagram One Optical Fiber

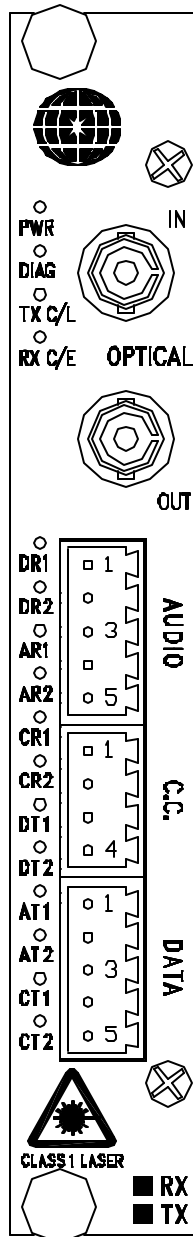
HX-3G/3G-X (2 FIBER) PINOUT DIAGRAM

STATUS INDICATORS

PWR - POWER (GREEN)
 DIAG - CARD DIAGNOSTIC*
 (GREEN-OK, RED-ALARM)
 TX C/L - TX CARRIER (GREEN)
 /OVERLOAD (RED)
 RX C/E - RX CARRIER (GREEN)
 /ERROR (RED)

STATUS INDICATORS

DR1 - NA
 DR2 - NA
 AR1 - NA
 AR2 - NA
 CR1 - NA
 CR2 - NA
 DT1 - (CH.1) DATA INPUT (GREEN)
 DT2 - (CH.1) DATA OUTPUT (GREEN)
 AT1 - (CH.2) DATA INPUT (GREEN)
 AT2 - (CH.2) DATA OUTPUT (GREEN)
 CT1 - (CH.3) DATA INPUT (GREEN)
 CT2 - (CH.3) DATA OUTPUT (GREEN)



OPTICAL PORT INPUT (ST, FC)

OPTICAL PORT OUTPUT (ST,FC)

PORT 1 DATA MULTI PROTOCOL

PIN #	RS-232	RS-422	RS-485 2W	RS-485 4W
1	CH1 IN (RD)	CH1 IN-		CH1 IN-
2	CH1 IN (DTR)	CH1 IN+		CH1 IN+
3	CH1 OUT (TD)	CH1 OUT-	CH1 IN/OUT-	CH1 OUT-
4	CH1 OUT (DSR)	CH1 OUT+	CH1 IN/OUT+	CH1 OUT+
5	GND	GND	GND	GND

PORT 2 DATA MULTI PROTOCOL

PIN #	RS-232	RS-422	RS-485 2W	RS-485 4W
1	CH2 IN (RD)	CH2 IN-		CH2 IN-
2	CH2 IN (DTR)	CH2 IN+		CH2 IN+
3	CH2 OUT (TD)	CH2 OUT-	CH2 IN/OUT-	CH2 OUT-
4	CH2 OUT (DSR)	CH2 OUT+	CH2 IN/OUT+	CH2 OUT+

PORT 3 DATA MULTI PROTOCOL

PIN #	RS-232	RS-422	RS-485 2W	RS-485 4W
1	CH3 IN (RD)	CH3 IN-		CH3 IN-
2	CH3 IN (DTR)	CH3 IN+		CH3 IN+
3	CH3 OUT (TD)	CH3 OUT-	CH3 IN/OUT-	CH3 OUT-
4	CH3 OUT (DSR)	CH3 OUT+	CH3 IN/OUT+	CH3 OUT+
5	GND	GND	GND	GND

Figure 4.1
HX-3G-x Front Pane Layout Diagram for Two Optical Fibers

5.0 Data Format Selection

A group of 10 switches is located on the bottom center of the module's circuit card (see figure 5.1 below). The first six of these switches control the data format for ch.1, ch.2 & ch.3 that is transmitted/received. These switches on both transceivers must be set the same in order to have proper data communications format between them. But optionally they also can be configured differently allowing each to have a different data protocol. For example: HXA side can be set as RS-232 and HXB side as RS-422 to allow data format conversion.

The figure and table below illustrates these switch locations on the board and how they are configured for the proper data format options. The factory-supplied default setting is for RS-232 data (Switch #1-6 OFF (up)).

Data Format Selection Switch Settings					
	RS-232	RS-422	RS-485 (2-wire)	RS-485 (4-wire)	DATA
Switch #1	OFF (up)	ON (down)	OFF (up)	ON (down)	CH.1
Switch #2	OFF (up)	ON (down)	ON (down)	OFF (up)	
Switch #3	OFF (up)	ON (down)	OFF (up)	ON (down)	CH.2
Switch #4	OFF (up)	ON (down)	ON (down)	OFF (up)	
Switch #5	OFF (up)	ON (down)	OFF (up)	ON (down)	CH.3
Switch #6	OFF (up)	ON (down)	ON (down)	OFF (up)	

Switches #7-9 factory-supplied default settings are OFF (up). These switches are used to configure RS-422/RS-485 data load for HX and HXA/HXB cards. The illustration below describes the function of each of these switches.

Data Load Format Selection Switch Settings			
	Load Disable	Load Enable	DATA
Switch #7	ON (down)	OFF (up)	CH.1
Switch #8	ON (down)	OFF (up)	CH.2
Switch #9	ON (down)	OFF (up)	CH.3

SWITCH SETTINGS HXA/HXB-3G/3G-x CARD

Test Signals					
	RS-232	RS-422	RS485 (4W)	RS485 (2W)	DATA
Switch #1	1	0	1	0	CH.1
Switch #2	1	0	0	1	
Switch #3	1	0	1	0	CH.2
Switch #4	1	0	0	1	
Switch #5	1	0	1	0	CH.3
Switch #6	1	0	0	1	
Switch #7	0 - Load Disable / 1 - Enable				CH.1
Switch #8	0 - Load Disable / 1 - Enable				CH.2
Switch #9	0 - Load Disable / 1 - Enable				CH.3
Switch #10	0 - Screw Terminal / 1 - DB-9 F.P.				

*Default switch settings all off(1).

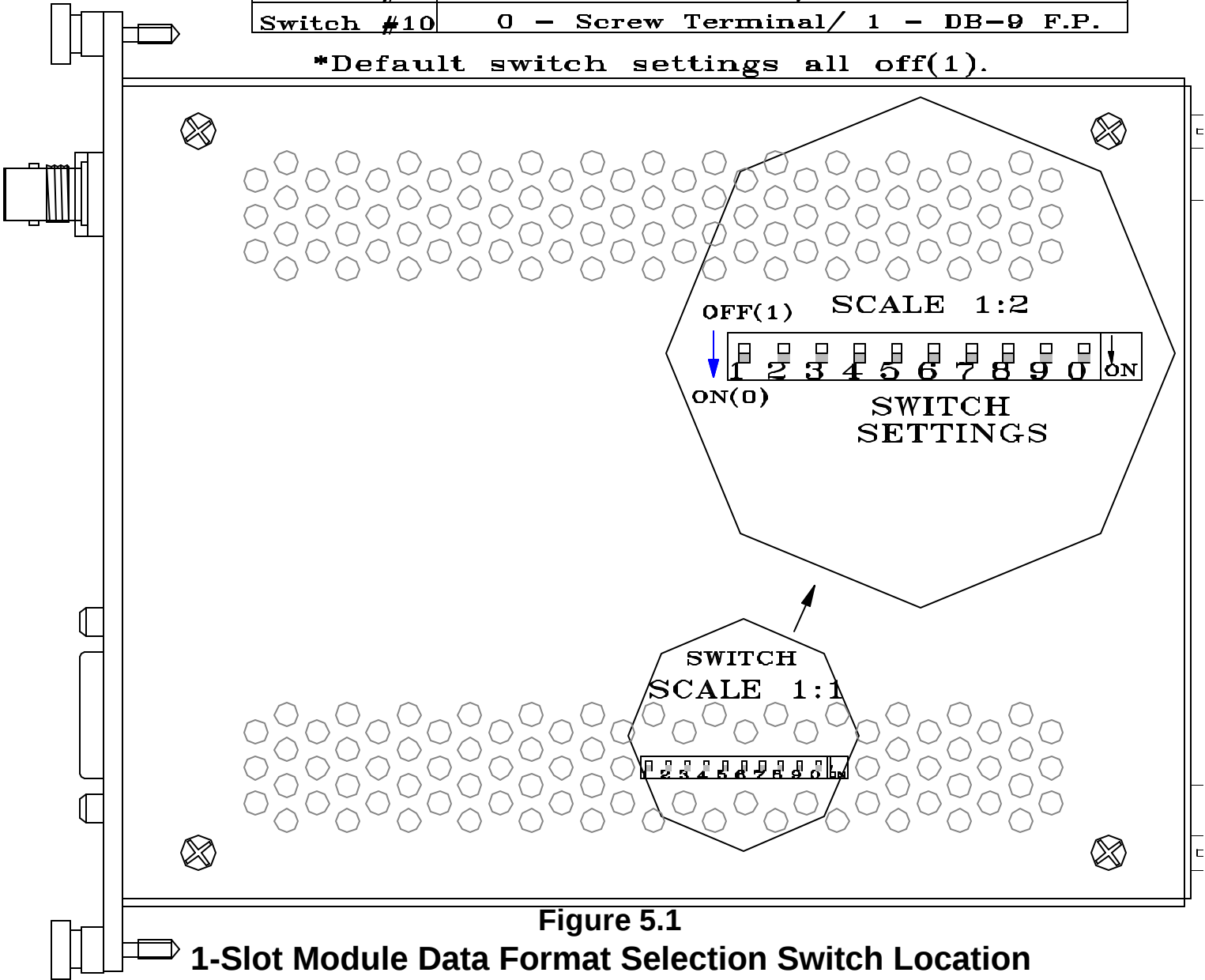


Figure 5.1

1-Slot Module Data Format Selection Switch Location

6.0 Product Part Number Variations

The table below lists the various part numbers and description that are available for one fiber series of product.

Product Part Number Guide				
Part Number	Matching Part #	Fiber Interface	Wavelength	Optical Connector
HXA-3G-2	HXB-3G-2	Multimode	850/1300nm	ST
HXA-3G-5	HXB-3G-5	Singlemode	1310/1550nm	FC
HXA-3G-5ST	HXB-3G-5ST	Singlemode	1310/1550nm	ST

Note: *This HXA & HXB series cards are not compatible with the other 1-slot FT/FR & ST/SR cards.*

7.0 2 Fiber, CWDM Option

These cards are also available with a CWDM laser/wavelength. In this configuration, 1 fiber on each unit is used for transmission of the uni-directional signals. One of the 2-fiber HX cards will incorporate one of the CWDM wavelengths while the complementary HX card will use a different CWDM wavelength. Since the receiver portion of the card is wavelength agnostic, it is not necessary to specify the wavelength of the receive channel. This receive channel will receive any wavelength from 1270nm to 1625nm. The table below shows these various wavelength combinations for this particular unit. Please consult the part number label on the rear of the unit to properly identify the wavelengths for your specific cards.

Part #	Transmit Wavelength
HX-3G-27	1270nm
HX-3G-29	1290nm
HX-3G-31	1310nm
HX-3G-33	1330nm
HX-3G-35	1350nm
HX-3G-37	1370nm
HX-3G-39	1390nm
HX-3G-41	1410nm
HX-3G-47	1470nm
HX-3G-49	1490nm
HX-3G-51	1510nm
HX-3G-53	1530nm
HX-3G-55	1550nm
HX-3G-57	1570nm
HX-3G-59	1590nm
HX-3G-61	1610nm

When using in a system with a CWDM multiplexer/demultiplexer, it is essential that the specific wavelengths to and from these units be connected to the corresponding

input/output wavelengths on the CWDM mux/demux units. Otherwise, the individual wavelengths will not pass through the CWMD mux/demux device.

When using higher power CWDM lasers, an external attenuator of 5dB minimum is required when performing short distance testing to eliminate optical overload at the Rx card.

8.0 Troubleshooting

Below is a listing of several problems that may arise during the installation & operation of the modules. If you are having difficulty installing or operating the modules please refer to this list below.

Problem: *Module does not fit in chassis slots*

Action: Check module orientation. Meridian “Globe” must be oriented on the top left hand side of the module. Make sure the card guides in the chassis are aligned with the extrusion on the module.

Problem: *Card power LED does not light when power to the module/subrack is applied or power indicator turns on and off*

Action: Check power supply to ensure that it is plugged in and turned on. If flashing continues, move module to another chassis or location in the same chassis, if available.

Problem: *No Tx Carrier light*

Action: Optical module is defective, return to factory for repair.

Problem: *No Rx Carrier light*

Action: Received optical signal absent or low. Check fiber connection and optical power at receiver.

Problem: *No Data*

Action: Verify that the PWR, Tx and Rx lights on both modems are on GREEN. Confirm that the data pinouts/connections are correct (see section 4.0 for data pinout connections).

Verify that the TD1 light flashes when transmitting data and that the corresponding RD1 light on the other modem is flashing.

Confirm that the data connections are correct (Check to ensure that the data source is operating properly). The front panel lights located next to the DB9 connector should be flashing as data is being sent to the transmit side. Check to ensure that data is being transmitted to the unit.

If the problem still persists after reviewing the above items, please contact Meridian technical support (516-285-1000).

Notes:



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