



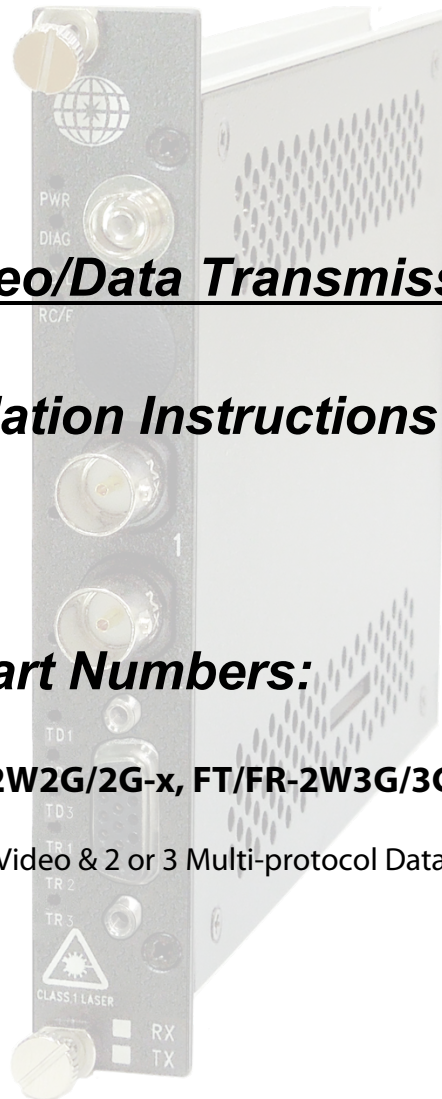
Fiber Optic Video/Data Transmission System

Installation Instructions

Part Numbers:

FT/FR-2W2G/2G-x, FT/FR-2W3G/3G-x

(2-Channel 10-Bit Video & 2 or 3 Multi-protocol Data Transceiver)



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1.0 Product Description

Meridian's FT/FR-2W2G/2G-x and FT/FR-2W3G/3G-x products are fiber optic cards that transmit two channels of 10-bit video and 2 or 3 bi-directional, user-selectable RS-232, RS-422 and RS-485 (2 & 4 wire) data signals over one optical fiber 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-1001/S, SR-1002/S, SR-1200/S, SR-1500/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 single-mode fiber applications. The FC connector is applicable only to single-mode products. Optional conformal coating provides an additional level of protection from environments with high humidity.

2.0 Installation

Series FT/FR-2W2G/2G-x and FT/FR-2W3G/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 FT/FR-2W2G/2G-x series products transmit and receive the following signals:

Signal Type	Channels	Transmit	Receive
NTSC/PAL/SECAM video	2	FT-2W2G/2G-x	FR-2W2G/2G-x
RS-232 (Tx & Rx data)	2	Yes	Yes
RS-422 (Tx & Rx data)	2	Yes	Yes
RS-485 (2 & 4-wire)	2	Yes	Yes

The FT/FR-2W3G/3G-x series products transmit and receive the following signals:

Signal Type	Channels	Transmit	Receive
NTSC/PAL/SECAM video	2	FT-2W3G/3G-x	FR-2W3G/3G-x
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.

Video 10-BIT	
Format	NTSC, PAL, SECAM
Voltage/Impedance	1Vp-p, 75 Ohm, 1.5Vp-p (max)
Bandwidth	5 Hz to 7 MHz @ -3 dB
Differential Gain	<0.6%
Differential Phase	<0.3°
SNR	>67dB (weighted)
Return Loss	>30dB
Field Tilt	<0.5%
Data	
Formats	RS-232, RS-422, RS-485
Date Rate (RS-232)	DC to 125 Kb/s
Data Rate (RS-422 & RS-485)	DC to 250 Kb/s
Bit Error Rate (BER)	Better than 10 ⁻⁹
Connectors	
Video	75 Ohm BNC w/gold center pin
Data	High Density DB-15
Optical	Single-mode – ST or FC, Multimode - ST

3.1 Optical Specifications

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

Optical Specifications								
Meridian Optical Code	Fiber Type/Size (um)	Optical Output (dBm)	Receiver Sensitivity (dBm)	Optical Budget (dB)	Wavelength (nm)	Optical Connector	Optical Dynamic Range (dB)	Max Distance (Km)
22	Single-mode (DFB Laser) 9 / 125	+1 (per channel)	-20	21	1310 nm Band	FC, ST	21	50
23	Single-mode (DFB Laser) 9 / 125	+1 (per channel)	-20	21	1550 nm Band	FC, ST	21	80

4.0 Data Connector Pin Assignment

The high-density DB-15 connector on the front of the module is used for all data interfaces. Following data formats are supported depending on system:

The FT/FR-2W2G/2G-x and FT/FR-2W3G/3G-x system:

Signal Type	Channels	
	FT/FR-2W2G/2G-x	FT/FR-2W3G/3G-x
RS-232 - full speed transmission with Handshake (Tx/Rx)	2	3
RS-422 - Manchester, Bi-phase (Tx/Rx)	2	3
RS-485 (2 & 4-wire), 2-wire or 4-wire (default) (Tx/Rx)	2	3

The RS-232 channel is used for transmitting/receiving three channels of 2-wire RS-232 w/Handshake (Tx/Rx).

In addition to the RS-232, this module supports both RS-422 and 2-wire* or 4-wire RS-485 signals.

User-settable switches on the module's motherboard are used to select the appropriate data format as required.

*** Note: The RS-485 2-wire setting requires external connection of pins 1&3, 2&4, 6&8, 7&9, 11&13, 12&14**

DB-15 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/OUT (-)	Ch 1 IN (-)
2	Ch 1 IN (DTR)	Ch 1 IN (+)	Ch 1 IN/OUT (+)	Ch 1 IN (+)
3	Ch 1 OUT (TD)	Ch 1 OUT (-)		Ch 1 OUT (-)
4	Ch 1 OUT (DSR)	Ch 1 OUT (+)		Ch 1 OUT (+)
5	GROUND			
6	Ch 2 IN (RD)	Ch 2 IN (-)	Ch 2 IN/OUT (-)	Ch 2 IN (-)
7	Ch 2 IN (DTR)	Ch 2 IN (+)	Ch 2 IN/OUT (+)	Ch 2 IN (+)
8	Ch 2 OUT (TD)	Ch 2 OUT (-)		Ch 2 OUT (-)
9	Ch 2 OUT (DSR)	Ch 2 OUT (+)		Ch 2 OUT (+)
10	GROUND			
11	Ch 3 IN (RD)	Ch 3 IN (-)	Ch 3 IN/OUT (-)	Ch 3 IN (-)
12	Ch 3 IN (DTR)	Ch 3 IN (+)	Ch 3 IN/OUT (+)	Ch 3 IN (+)
13	Ch 3 OUT (TD)	Ch 3 OUT (-)		Ch 3 OUT (-)
14	Ch 3 OUT (DSR)	Ch 3 OUT (+)		Ch 3 OUT (+)
15	GROUND			

FT-2W2F/2F-x FT-2W2G/2G-x FT-2W3G/3G-x PIN-OUT DIAGRAM

STATUS INDICATORS

PWR - POWER (GREEN)

TX - TX CARRIER (GREEN)/ ERROR (RED)

RX - RX CARRIER (GREEN)/ ERROR (RED)

SYN - (CH.2) SYNC PRESENT (GREEN)
/ LOAD ABSENT (RED)

VIDEO - (CH.2) VIDEO PRESENT (GREEN)
/ OVERLOAD (RED)

SYN - (CH.3) SYNC PRESENT (GREEN)
/ LOAD ABSENT (RED)

VIDEO - (CH.3) VIDEO PRESENT (GREEN)
/ OVERLOAD (RED)

TD1 - (CH.1) DATA INPUT (GREEN)

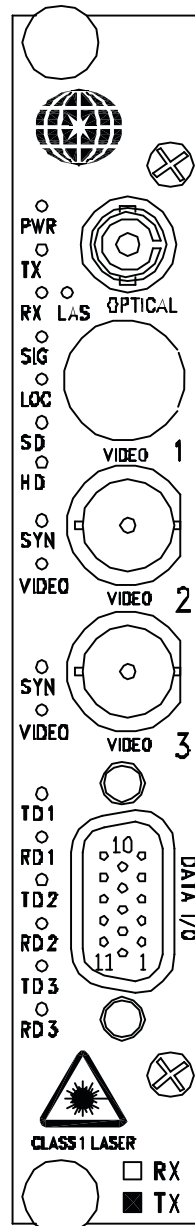
RD1 - (CH.1) DATA OUTPUT (GREEN)

TD2 - (CH.2) DATA INPUT (GREEN)

RD2 - (CH.2) DATA OUTPUT (GREEN)

TD3 - (CH.3) DATA INPUT (GREEN)

RD3 - (CH.3) DATA OUTPUT (GREEN)



OPTICAL PORT (ST, FC)

VIDEO INPUT CH.2

VIDEO INPUT CH.3

DATA INPUT/OUTPUT
(DB-15 FEMALE)

Pin #	RS-232	RS-422	RS-485 (2-wire)	RS-485 (4-wire)
1	Ch 1 IN (RD)	Ch 1 IN (-)	Ch 1 IN/OUT (-)	Ch 1 IN (-)
2	Ch 1 IN (DTR)	Ch 1 IN (+)	Ch 1 IN/OUT (+)	Ch 1 IN (+)
3	Ch 1 OUT (TD)	Ch 1 OUT (-)		Ch 1 OUT (-)
4	Ch 1 OUT (DSR)	Ch 1 OUT (+)		Ch 1 OUT (+)
5	GROUND			
6	Ch 2 IN (RD)	Ch 2 IN (-)	Ch 2 IN/OUT (-)	Ch 2 IN (-)
7	Ch 2 IN (DTR)	Ch 2 IN (+)	Ch 2 IN/OUT (+)	Ch 2 IN (+)
8	Ch 2 OUT (TD)	Ch 2 OUT (-)		Ch 2 OUT (-)
9	Ch 2 OUT (DSR)	Ch 2 OUT (+)		Ch 2 OUT (+)
10	GROUND			
11	Ch 3 IN (RD)	Ch 3 IN (-)	Ch 3 IN/OUT (-)	Ch 3 IN (-)
12	Ch 3 IN (DTR)	Ch 3 IN (+)	Ch 3 IN/OUT (+)	Ch 3 IN (+)
13	Ch 3 OUT (TD)	Ch 3 OUT (-)		Ch 3 OUT (-)
14	Ch 3 OUT (DSR)	Ch 3 OUT (+)		Ch 3 OUT (+)
15	GROUND			

Figure 4.1
Rx Card Front Panel Layout Diagram

FR-2W2F/2F-x FR-2W2G/2G-x FR-2W3G/3G-x PIN-OUT DIAGRAM

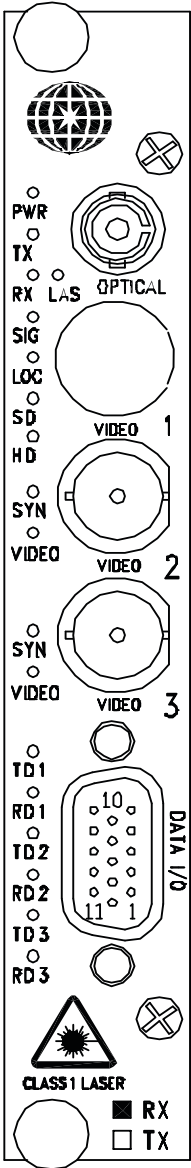
STATUS INDICATORS

PWR - POWER (GREEN)
TX - TX CARRIER (GREEN)/ ERROR (RED)
RX - RX CARRIER (GREEN)/ ERROR (RED)

SYN - (CH.2) SYNC PRESENT (GREEN)
/ LOAD ABSENT (RED)
VIDEO - (CH.2) VIDEO PRESENT (GREEN)
/ OVERLOAD (RED)

SYN - (CH.3) SYNC PRESENT (GREEN)
/ LOAD ABSENT (RED)
VIDEO - (CH.3) VIDEO PRESENT (GREEN)
/ OVERLOAD (RED)

TD1 - (CH.1) DATA INPUT (GREEN)
RD1 - (CH.1) DATA OUTPUT (GREEN)
TD2 - (CH.2) DATA INPUT (GREEN)
RD2 - (CH.2) DATA OUTPUT (GREEN)
TD3 - (CH.3) DATA INPUT (GREEN)
RD3 - (CH.3) DATA OUTPUT (GREEN)



OPTICAL PORT (ST, FC)

VIDEO OUTPUT CH.2

VIDEO OUTPUT CH.3

DATA INPUT/OUTPUT
(DB-15 FEMALE)

Pin #	RS-232	RS-422	RS-485 (2-wire)	RS-485 (4-wire)
1	Ch 1 IN (RD)	Ch 1 IN (-)	Ch 1 IN/OUT (-)	Ch 1 IN (-)
2	Ch 1 IN (DTR)	Ch 1 IN (+)	Ch 1 IN/OUT (+)	Ch 1 IN (+)
3	Ch 1 OUT (TD)	Ch 1 OUT (-)		Ch 1 OUT (-)
4	Ch 1 OUT (DSR)	Ch 1 OUT (+)		Ch 1 OUT (+)
5	GROUND			
6	Ch 2 IN (RD)	Ch 2 IN (-)	Ch 2 IN/OUT (-)	Ch 2 IN (-)
7	Ch 2 IN (DTR)	Ch 2 IN (+)	Ch 2 IN/OUT (+)	Ch 2 IN (+)
8	Ch 2 OUT (TD)	Ch 2 OUT (-)		Ch 2 OUT (-)
9	Ch 2 OUT (DSR)	Ch 2 OUT (+)		Ch 2 OUT (+)
10	GROUND			
11	Ch 3 IN (RD)	Ch 3 IN (-)	Ch 3 IN/OUT (-)	Ch 3 IN (-)
12	Ch 3 IN (DTR)	Ch 3 IN (+)	Ch 3 IN/OUT (+)	Ch 3 IN (+)
13	Ch 3 OUT (TD)	Ch 3 OUT (-)		Ch 3 OUT (-)
14	Ch 3 OUT (DSR)	Ch 3 OUT (+)		Ch 3 OUT (+)
15	GROUND			

Figure 4.2
Rx Card Front Panel Layout Diagram

5.0 Signal Conditioning Switch Settings & Data Format Selection

Tx and Rx cards can be configured differently allowing each to have a unique data format (see Figure 5.1)

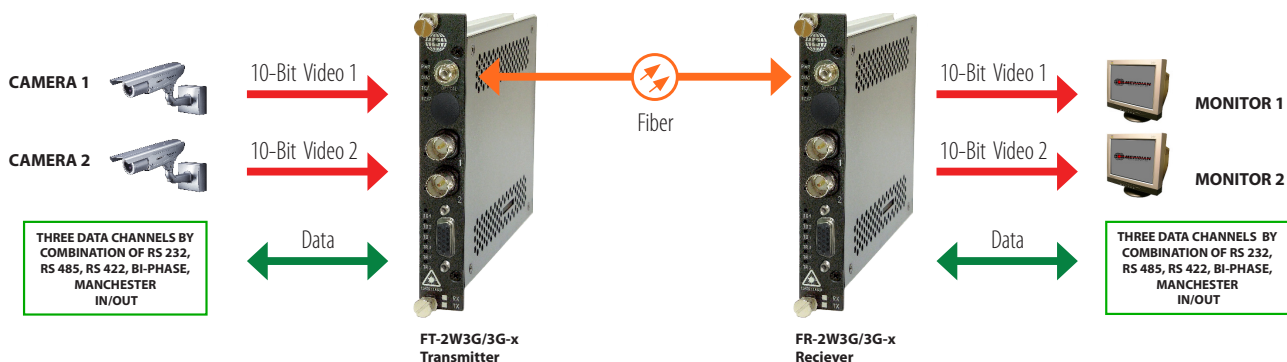


Figure 5.1

A group of 10 switches is located on the bottom center of the module's circuit card (see Figure 5.2). The switches 1-6 control data format of transmitted/received data channels (ch.1, ch.2 & ch.3). These switches on both the Tx and Rx must be set the same in order to have proper data communications format between them.

The below tables and figures show switch locations on the board and their configuration for the proper data format selection.

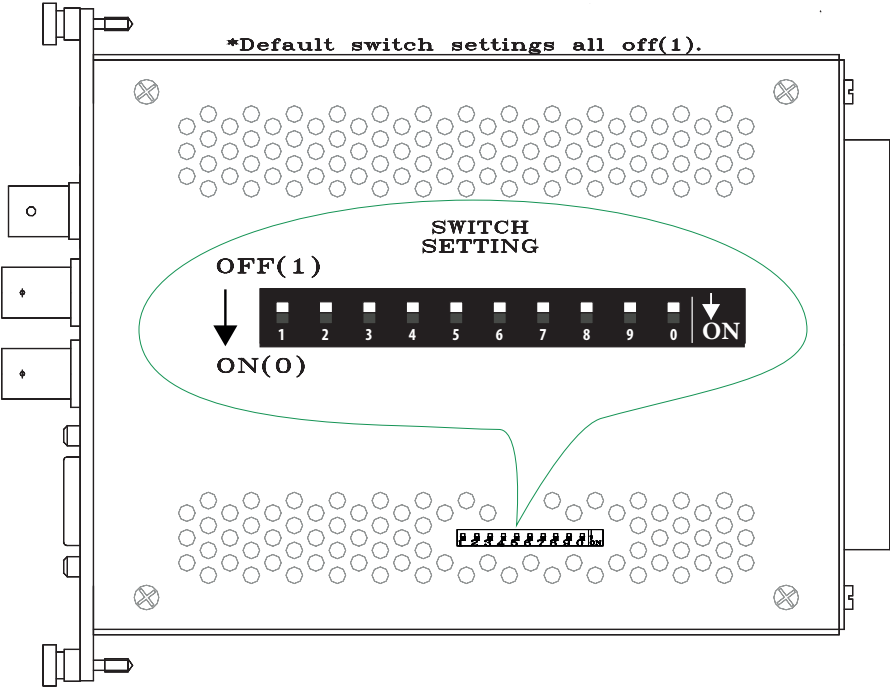
The factory-supplied default setting is for RS-232 data (Switch #1-6 OFF (up)).

Data Format Selection Switch Settings					
	RS-232	RS-422	RS-485 (2-wire)	RS-485 (4-wire)	DATA
Switch #1	OFF (up)	ON (down)	ON (down)	OFF (up)	CH.1
Switch #2	OFF (up)	ON (down)	OFF (up)	ON (down)	
Switch #3	OFF (up)	ON (down)	ON (down)	OFF (up)	CH.2
Switch #4	OFF (up)	ON (down)	OFF (up)	ON (down)	
Switch #5	OFF (up)	ON (down)	ON (down)	OFF (up)	CH.3
Switch #6	OFF (up)	ON (down)	OFF (up)	ON (down)	
Switch #10	OFF (up) Spectra View Enable / ON (down) Spectra View Disable				

SWITCH SETTINGS FOR FT/FR-1HD2W3G/3G, FT/FR-1HD2W2G/2G, FT/FR-2W3G/3G, FT/FR-2W2G/2G CARDS

DATA FORMAT SELECTION SWITCH SETTINGS					
	RS-232	RS-422	RS-485 (2-wire)	RS-485 (4-wire)	DATA
Switch #1	OFF (up)	ON (down)	ON (down)	OFF (up)	CH.1
Switch #2	OFF (up)	ON (down)	OFF (up)	ON (down)	
Switch #3	OFF (up)	ON (down)	ON (down)	OFF (up)	
Switch #4	OFF (up)	ON (down)	OFF (up)	ON (down)	CH.2
Switch #5	OFF (up)	ON (down)	ON (down)	OFF (up)	
Switch #6	OFF (up)	ON (down)	OFF (up)	ON (down)	CH.3

VIDEO FORMAT SELECTION SWITCH SETTINGS (FOR CARDS WITH HD VIDEO ONLY)				
Switch #7	OFF (up) SDI bypass / ON (down) Re-clock			
	Transmitter		Receiver	
Switch #8	ON - SDI Flash Enable	OFF - Disable	ON - SDI Clock Out	OFF- Data Out
Switch #9	ON - SDI EQ Disable	ON - Enable	ON - Auto Mute Enable	ON - Disable
Switch #10	OFF (up) Spectra View Enable / ON (down) Spectra View Disable			



FOR RS-485 2-WIRE DATA ONLY

DB15-MALE

* Note:
The RS-485 2-wire setting requires jumpers on following DB15-M connector pins pares :
Ch. 1: pins 1 & 3, 2 & 4
Ch. 2: pin 6 & 8, 7 & 9
Ch. 3: pin 11 & 13, 12 & 14
Place jumpers on DB15-Male connector of RS-485 2-wire Data IN/OUT cable for Tx and Rx cards.

Figure 5.2
Video/Data Format Selection Switch Location

6.0 SpectraView™ Network Monitoring

This module series is equipped with Meridian's SpectraView network diagnostics that continuously monitors the fiber system and associated equipment to provide real-time information regarding the integrity of the system.

SpectraView supports the following diagnostic functions:

1. Fiber continuity
2. Presence/loss of video

Notification and identification of faults for the above conditions is automatically displayed on the monitor connected to the video output on the receiver module.

The table below lists the detected faults and associated alert messages that are displayed on the monitor:

Fault	Video Display Message
Broken optical fiber between Tx & Rx units	8 vertical gray-scale bars
Loss of video signal at CCTV (Tx) side	4 vertical gray-scale bars

In addition to the loss of video on the monitor, these messages alert the operator as to the cause of the associated video loss. Upon receiving one of these messages, the operator should inform their technical service center to remedy the situation.

The table in Figure 5.2 lists the function of switch 10 (numbered from left to right) and identifies how to set the diagnostic test modes.

Note: To turn a switch “ON”, move the switch in the down position. Likewise, to turn a switch “OFF”, move it in the up position.

In order to enter the test modes on the module, it is necessary to actuate one of the above switches as described below:

SpectraView Enabled (SW10) - (Applicable to one-way transmission modules with video (FT & FR units) This video mode will enable the vertical video bars to be displayed in the event that either the incoming video signal has been removed or if the optical signal from the transmitter has been interrupted.

To enable this video bars feature it is necessary to configure the modules as follow:

- SW 10 on the FR (video Receiver) module must be set to the ON (down) position
- SW 10 on the FT (video Transmitter) module must be set to the ON (down) position

Under normal operation, the video from the CCTV camera will be displayed on the respective monitor at the receive side. There are two ‘alarm’ modes - one for loss of

video sync and one for loss of optical signal. When one or the other of these alarm modes is present, the monitor will display the following:

Loss of video sync - 4 vertical gray-scale bars across the monitor screen

Loss of optical signal - 8 vertical gray-scale bars across the monitor screen

Note: Modules equipment with Meridian's SpectraSmart Network Diagnostic System option will have a slightly different video display. Instead of the vertical bars, the monitor will actually display a text message (as described below):

Loss of video sync error: will display the message "No Video Sync"

Loss of Optional signal error: will display – "No Optical Fiber"

7.0 Product Part Numbers

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

Product Part Number Guide			
Part Number	Matching Part #	Fiber Interface	Optical Connector
FT-2W2G/2G-2	FR-2W2G/2G-2	Multimode	ST
FT-2W2G/2G-5	FR-2W2G/2G-5	Single-mode	FC
FT-2W2G/2G-5ST	FR-2W2G/2G-5ST	Single-mode	ST
FT-2W3G/3G-2	FR-2W3G/3G-2	Multimode	ST
FT-2W3G/3G-5	FR-2W3G/3G-5	Single-mode	FC
FT-2W3G/3G-5ST	FR-2W3G/3G-5ST	Single-mode	ST

Note: This FT & FR series cards are not compatible with ST & SR series cards.

8.0 Troubleshooting

Below is a listing of several problems that may arise during the installation & operation of the modules.

Problem: *Module does not fit in chassis slots*

Action: Check module orientation. Meridian “Globe” must be oriented on the top side of the cards front panel. 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/sub-rack 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 video at output of module*

Action: Check the SpectraView display on the monitor for an indication of what the problem may be. Also, check to ensure that the video channel-specific LEDs are on (Green). Also, check to ensure that the optical LEDs are ON. If no video is still present, check to ensure that the monitor is ON and the video cable is connected to the correct video port on the Rx module.

Problem: *Video image is dark*

Action: Check the iris control on the camera to ensure that it is open to the proper amount for the conditions.

Problem: *Video image is too bright and appears overexposed*

Action: Check the Video overload indicator on the Rx module. If it is Red, the video signal level is too high and the CCTV iris should be checked to ensure that it is open properly for the conditions.

Problem: *No Data*

Action: Check that both transmit and receive modules is set to transmit/receive the same data format (see section 5.0 for data settings). Confirm that the data connections are correct (see section 4.0 for data pinout connections). Check to ensure that the data source is operating properly.

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



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