



Installation/Operation Instructions

Fiber Optic Video, CC & Data Transmission System

Part Number:

DT/DR-4V(W)4C2F/4C2F-x Series

(1 to 4-Channel Video Tx/Rx, 1 to 4-Channel BI-DI Contact Closure & 1 to 2-Channel BI-DI RS-422 Data)

Part Number Variations:

DT/DR-1V(W)4C2F/4C2F-x, DT/DR-1V(W)2C2F/2C2F-x
DT/DR-2V(W)1C2F/1C2F-x, DT/DR-2V(W)1C1F/1C1F-x
DT/DR-2V(W)2C2F/2C2F-x, DT/DR-2V(W)2C1F/2C1F-x
DT/DR-2V(W)4C2F/4C2F-x, DT/DR-2V(W)4C1F/4C1F-x
DT/DR-4V(W)1C2F/1C2F-x, DT/DR-4V(W)1C1F/1C1F-x
DT/DR-4V(W)2C2F/2C2F-x, DT/DR-4V(W)2C1F/2C1F-x
DT/DR-4V(W)3C2F/3C2F-x, DT/DR-4V(W)4C1F/4C1F-x

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1.0 Product Description

Meridian's product series DT-4V(W)4C2F/4C2F and DR-4V(W)4C2F/4C2F are fiber optic modems that transmit one to four channels of uni-directional digitized video, one to four channels of bi-directional contact closure and one to two channels of bi-directional RS-422 data signals over one optical fiber using digital-encoding transmission techniques. This product series uses Meridian's standard 2-slot wide chassis mount card assembly and plugs into the following Meridian chassis: SR-1002/S, SR-1600/S and SR-2001 & SR-2000 series 19" equipment chassis.

The digital modules consist of various plug-in personality function cards or SIMs. The top card is the optical card that contains the fiber optic interface. The optical input & output connectors are located on the right side of the module. The second and third SIMs contains the video coaxial interface (ether one, two or four channels of uni-directional video). The fourth SIM card contains the bi-directional Contact Closure. The bottom SIM card contains the bi-directional RS-422 data signals.

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 DT-4V(W)4C2F/4C2F and DR-4V(W)4C2F/4C2F products are two-slot wide cards and, as such, occupy two slots in Meridian's standard chassis. To install in the 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 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 DT & DR-4V(W)4C2F/4C2F-x series products transmit and receive the following signals:

Signal Type	Channels	DT	DR
NTSC/PAL video	4	Transmit	Receive
Dry contact closure	4/4	Transmit / Receive	Receive / Transmit
RS-422	2/2	Transmit / Receive	Receive / Transmit

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

Video		
	(V) 8-bit Video	(W) 10-bit Video
Format	NTSC, PAL, SECAM	NTSC, PAL, SECAM
Voltage/Impedance	1Vp-p, 75 Ohm, 1.5Vp-p (max)	1Vp-p, 75 Ohm, 1.5Vp-p (max)
Differential Gain	<0.6%	<0.6%
Differential Phase	<0.3°	<0.3°
SNR	>60dB (weighted)	>67dB (weighted)
Return Loss	>30dB	>30dB
Field Tilt	<0.5%	<0.5%

Contact Mapping	
Input	Contact closure to ground
Output	Isolated contact closure outputs
Output Contact Rating	0.3A @ 30VAC/DC
Contact bounce time	5msec
Connectors	High Density DB15 Female

Data	
Formats	RS-422
Data Rate	DC to 1Mb/s
Bit Error Rate (BER)	Better than 10^{-9}

Connectors	
Video	75 Ohm BNC w/gold center pin
Dry contact closure	HD DB15 Female
Data	DB9 Female
Optical	Singlemode – ST or FC Multimode – ST

3.1 Optical Specifications

Optical parameters will depend on number of transmitted video channels. Please select table below accordingly to your system configuration.

1 Video Channel - Fiber Data Rate 250Mb/s							
Fiber Type/Size (um)	Optical Output (dBm)	Rx Sensitivity (dBm)	Optical Budget (dB)	Wavelength (nm)	Optical connector	Optical Dynamic Range (dB)	Max Distance (Km)
Multimode (Laser) 62.5/125	-3	-25	22	1300/850	ST	25	4
Singlemode (FP Laser) 9/125	-3	-25	22	1310/1550	ST, FC	25	62
Singlemode (CWDM-DFB Laser) 9/125	+3	-25	28	1270-1610	ST, FC	25	80

2 Video Channel - Fiber Data Rate 500Mb/s							
Fiber Type/Size (um)	Optical Output (dBm)	Rx Sensitivity (dBm)	Optical Budget (dB)	Wavelength (nm)	Optical connector	Optical Dynamic Range (dB)	Max Distance (Km)
Multimode (Laser) 62.5/125	-3	-24	21	1300/850	ST	24	2
Singlemode (FP Laser) 9/125	-3	-24	21	1310/1550	ST, FC	24	60
Singlemode (CWDM-DFB Laser) 9/125	+3	-24	27	1270-1610	ST, FC	24	77

4 Video Channel - Fiber Data Rate 1Gb/s							
Fiber Type/Size (um)	Optical Output (dBm)	Rx Sensitivity (dBm)	Optical Budget (dB)	Wavelength (nm)	Optical connector	Optical Dynamic Range (dB)	Max Distance (Km)
Multimode (Laser) 62.5/125	-3	-23	20	1300/850	ST	23	1
Singlemode (FP Laser) 9/125	-3	-23	20	1310/1550	ST, FC	23	55
Singlemode (CWDM-DFB Laser) 9/125	+3	-23	26	1270-1610	ST, FC	23	75



Compliant with Class 1 Laser Safety Rating.

4.0 Operating

Video – Each of the BNC video connectors accepts a standard NTSC/PAL video input signal (DT module) and transmits these signals to the receive unit (DR module). The respective video output signal is located on the same channel (location) as the input video signal. Connect the input video signal to the appropriate BNC video input connector on the transmitter module and the output video connector on the associated port on the receiver module.

Data – Connect the data for each of the data channels to the appropriate data Tx/Rx pins on the connector as shown in section 4.2 & 4.3

4.1 Video Status indicators

The figures at the end of this document show the connector and LED indicator locations for the various video & data status indicators on the transmitter and receiver modules. There are a number of diagnostic indicators on the front panel of each module. In addition, each of the video input/output channels has indicators associated with them to provide quick visual indications of the channel activity. The indicators for optical signals and each of the video channels are listed below:

LED Status Indicators		
Indicator	Location	Function
Power	Left side of module	Green – ON
Card Diagnostic*	Left side of module	Green – OK, Red - Alarm
Tx carrier	Under optical output connector	Optical output (Green – OK, Red – error)
Rx Optical signal	Under optical input connector	Optical input (Green – OK, Red – error)
Rx Carrier	Under optical input connector	Optical Carrier input (Green – OK, Red – error)
Video Input/Output	Under each video in/out connector	Green – Sync received
Video Input/Output	Under each video in/out connector	Video signal – Green OK, Red – video overload

*Note: The Card Diagnostic is optional and LED present only if applied.

4.2 Contact Mapping SIM Signal Assignment (Pinouts) & Indicator Lights

The tables below identify the input/output functions, associated connector pinouts and LED status indicators for contact SIM card. Not all of the signals and LEDs apply to all versions of these modules.

Pin #	Contact Mapping Connector Pinout Assignment (PORT 3)	LED #	Contact Mapping LED Status Indicators (PORT 3)
1	Ch1 INPUT	1	Ch1 INPUT PRESENT
2	Ch2 INPUT	2	Ch1 OUTPUT PRESENT
3	Ch3 INPUT	3	Ch2 INPUT PRESENT
4	Ch4 INPUT	4	Ch2 OUTPUT PRESENT
5	GND	5	Ch3 INPUT PRESENT
6	Ch1 OUTPUT	6	Ch3 OUTPUT PRESENT
7	Ch1 OUTPUT	7	Ch4 INPUT PRESENT
8	Ch2 OUTPUT	8	Ch4 OUTPUT PRESENT
9	Ch2 OUTPUT		
10	Ch3 OUTPUT		
11	Ch3 OUTPUT		
12	Ch4 OUTPUT		
13	Ch4 OUTPUT		
14	NA		
15	NA		

There are four jumpers for the user to configure the input/output Contact Mapping settings for Normally-Open or Normally-Clouse contacts, see section 5.0

4.3 RS-422 SIM Signal Assignment (Pinouts) & Indicator Lights

There are one data SIM cards that transmit & receive one to two RS-422 data channels. The data SIM has a DB9 female connector. The table below shows the appropriate pinout for each of the connectors.

RS-422 Data Connector Pinout Assignment (PORT 4)		
Pin #	DT-4V4C2F/4C2F (PORT 4)	DR-4V4C2F/4C2F (PORT 4)
1	Ch1 IN (+)	Ch1 OUT (+)
2	Ch1 IN (-)	Ch1 OUT (-)
3	Ch2 IN (+)	Ch2 OUT (+)
4	Ch2 IN (-)	Ch2 OUT (-)
5	Gnd	Gnd
6	Ch1 OUT (+)	Ch1 IN (+)
7	Ch1 OUT (-)	Ch1 IN (-)
8	Ch2 OUT (+)	Ch2 IN (+)
9	Ch2 OUT (-)	Ch2 IN (-)

Each data input/output channel has two LED status indicators located under the associated data I/O connector. One LED is associated with each data input channel on the DR unit while the second LED is associated with the respective data output channel on the DT unit. The table below shows the relationship between the connectors (I/O channels) and LEDs.

RS-422 Data Connector Status Indicators (PORT 4)		
LED #	DT-4V4C2F/4C2F (PORT 4)	DR-4V4C2F/4C2F (PORT 4)
1	Ch1 Data Input	N/A
2	N/A	Ch 1 Data Output
3	Ch2 Data Input	N/A
4	N/A	Ch2 Data Output
5	N/A	Ch 1 Data Input
6	Ch1 Data Output	N/A
7	N/A	Ch2 Data Input
8	Ch2 Data Output	N/A

There are no jumpers or switches for the user to configure for this data card.

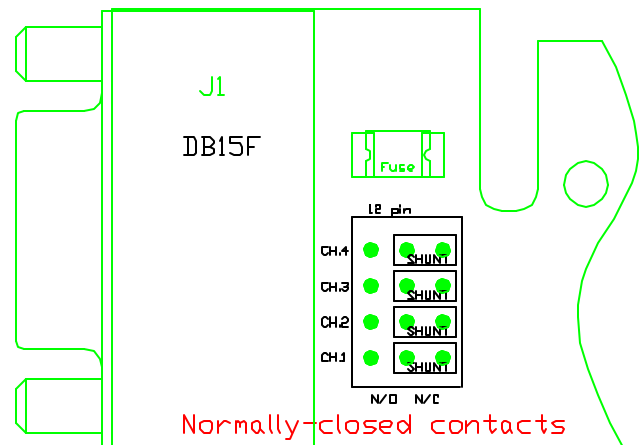
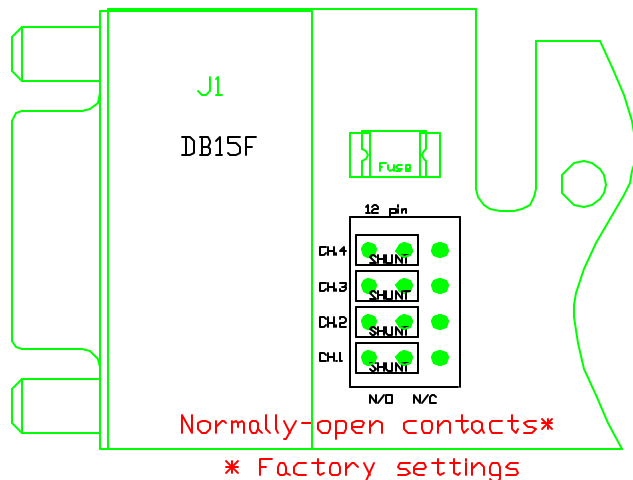
5.0 Contact Mapping SIM Jumper Settings

The Contact Closure SIM has 4 jumpers on it (located directly behind the DB15 connector), one for each channel. These jumpers are used to set the input/output Contact Mapping settings for Normally-Open or Normally-Close contacts.

The default setting is Normally-Open.

The figures below illustrate these jumpers and how they are configured:

Jumper Setting For Contact Closure BI-DI



Contact Mapping jumper
settings for Normally-Open
contacts Input/Output
***Factory Settings**

Contact Mapping jumper
settings for Normally-Closed
contacts Input/Output

5.1 Changing the SIM jumpers

The jumpers to change the data from Normally-Open to Normally-Closed format can be easily changed as follows:

1. Lay the module on its side with the front panel facing to the left.
2. On the module, remove the screws in each of the 4 corners of the side cover and carefully remove the cover.
3. The Contact Closure (C) card is located on the bottom of the module in port 3.
4. Refer to the above drawing to locate the 4 jumpers that are located near the DB-15 connector.
5. Using a small tool, carefully remove the jumper and place it on the appropriate pins to properly select the data format (see table above)
6. Carefully replace the side cover and secure with the screws.
7. Repeat this process for the other module. The jumper selection needs to be the same for both the DT and DR units.

6.0 Front Panel Pinout Assignment Diagram

Figures 6.1 and 6.2 below show the front panel layout, connector location and pinout assignment for both the DT & DR modules. Not all of the signals and LEDs apply to all versions of these modules. Please refer to the module's part number for the appropriate signal description.

DT-4V4C2F/4C2F-XD DT-4W4C2F/4C2F-XD PINOUT DIAGRAM

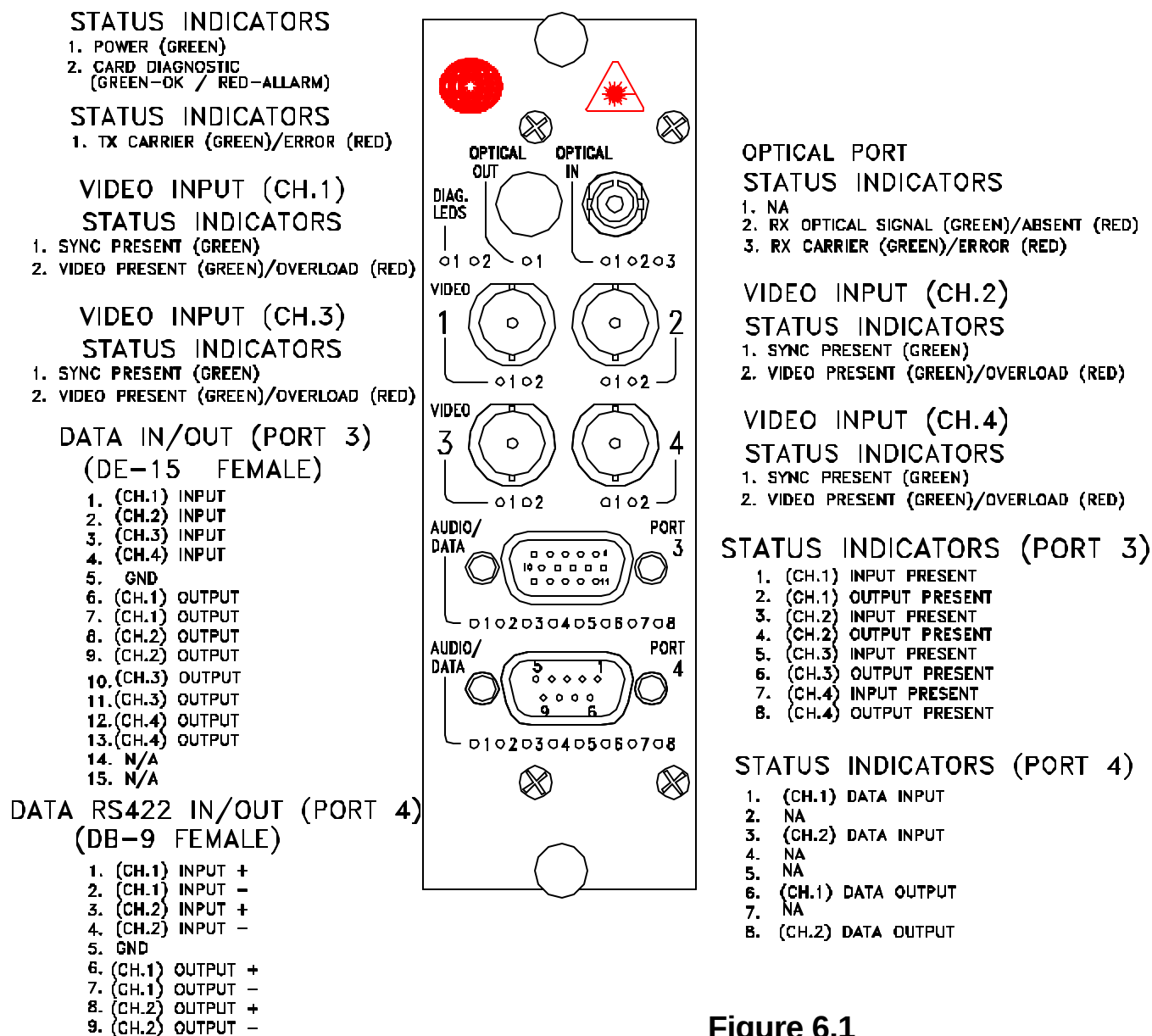


Figure 6.1
DT-4V(W)4C2F/4C2F-x Front Panel Layout Diagram

DR-4V4C2F/4C2F-XD DR-4W4C2F/4C2F-XD

PINOUT DIAGRAM

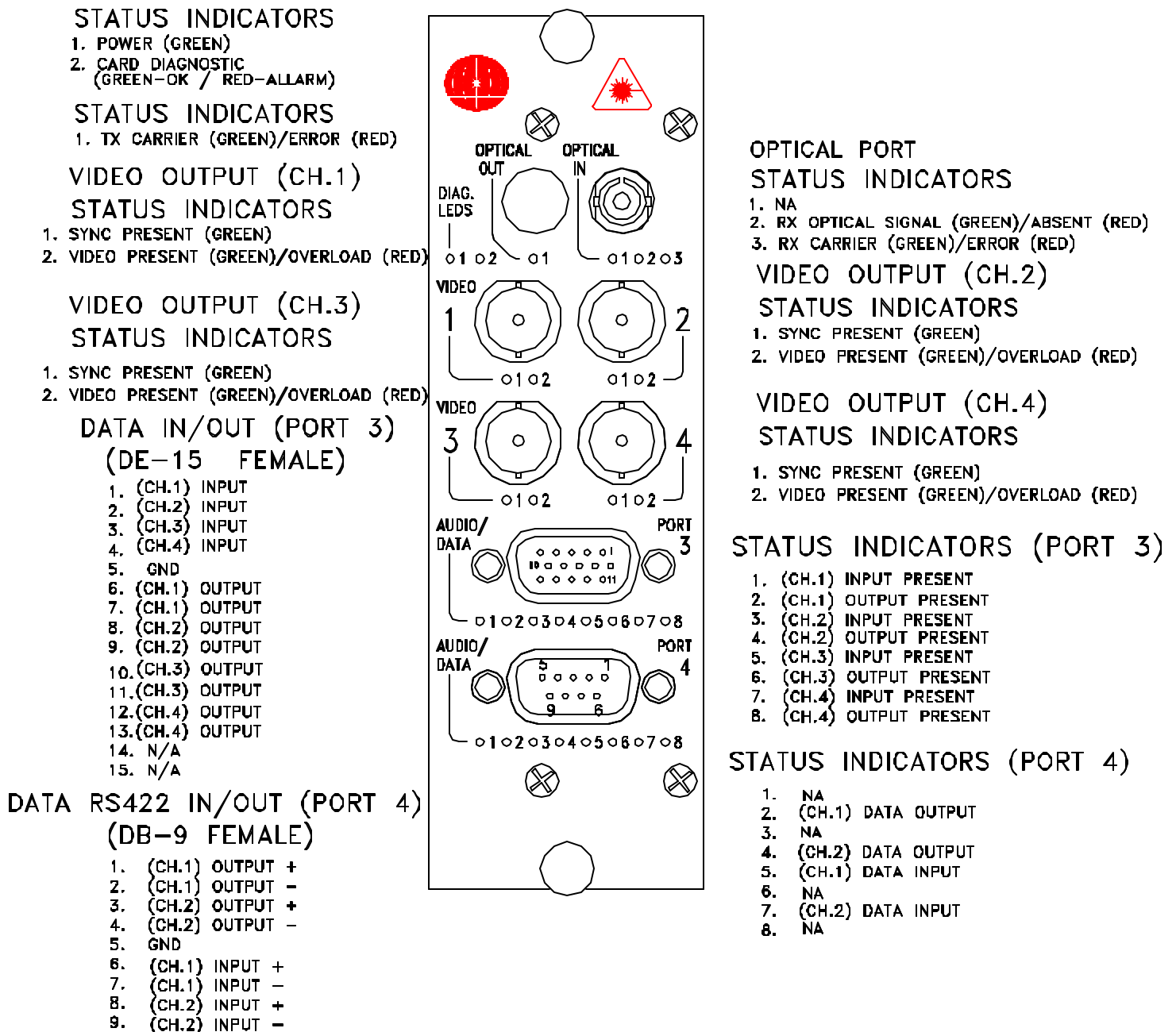


Figure 6.2
DR-4V(W)4C2F/4C2F-x Front Panel Layout Diagram

7.0 2-Fiber, CWDM Option

These cards are also available with a 2-fiber, CWDM option. In this configuration, 2 fibers on each unit are used for transmission of the bi-directional signals. The DT unit will transmit on one unique CWDM wavelength and DR unit will transmit on the complementary wavelength. The optical input connector will be located on the right side of the module and the output will be on the left.

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.

Transmitter Part #	Receiver Part #	Transmit Wavelength
DT-4V(W)4C2F/4C2F-27	DR-4V(W)4C2F/4C2F-27	1270nm
DT-4V(W)4C2F/4C2F-29	DR-4V(W)4C2F/4C2F-29	1290nm
DT-4V(W)4C2F/4C2F-31	DR-4V(W)4C2F/4C2F-31	1310nm
DT-4V(W)4C2F/4C2F-33	DR-4V(W)4C2F/4C2F-33	1330nm
DT-4V(W)4C2F/4C2F-35	DR-4V(W)4C2F/4C2F-35	1350nm
DT-4V(W)4C2F/4C2F-37	DR-4V(W)4C2F/4C2F-37	1370nm
DT-4V(W)4C2F/4C2F-39	DR-4V(W)4C2F/4C2F-39	1390nm
DT-4V(W)4C2F/4C2F-41	DR-4V(W)4C2F/4C2F-41	1410nm
DT-4V(W)4C2F/4C2F-47	DR-4V(W)4C2F/4C2F-47	1470nm
DT-4V(W)4C2F/4C2F-49	DR-4V(W)4C2F/4C2F-49	1490nm
DT-4V(W)4C2F/4C2F-51	DR-4V(W)4C2F/4C2F-51	1510nm
DT-4V(W)4C2F/4C2F-53	DR-4V(W)4C2F/4C2F-53	1530nm
DT-4V(W)4C2F/4C2F-55	DR-4V(W)4C2F/4C2F-55	1550nm
DT-4V(W)4C2F/4C2F-57	DR-4V(W)4C2F/4C2F-57	1570nm
DT-4V(W)4C2F/4C2F-59	DR-4V(W)4C2F/4C2F-59	1590nm
DT-4V(W)4C2F/4C2F-61	DR-4V(W)4C2F/4C2F-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 Product Part Number Variations

The table below lists the various part numbers associated with different module types:
Basic module description:

Video: 1 to 4-channels, one way
Contact Closure: 1 to 4-channel bi-directional
Data: 1 to 2-channel, bi-directional RS-422 data

The pinout diagram in section 7.0 shows the connectors pinout (input/output connections) for the all-inclusive product. The appropriate modules consist of various combinations of uni-directional video and bi-directional Data SIMs. Please use this table to determine the exact pinout of the particular model of interest. Note that if there is only one data channel, the pinouts for “Ch1” are used.

Transmitter	Receiver	Video Resolution	# Fibers & Type	Wavelength
DT-4W4C2F/4C2F-2	DR-4W4C2F/4C2F-2	10-bit	1 (MM)	850/1310nm
DT-4W4C2F/4C2F-5	DR-4W4C2F/4C2F-5	10-bit	1 (SM)	1310/1550nm
DT-4V4C2F/4C2F-2	DR-4V4C2F/4C2F-2	8-bit	1 (MM)	1310/850nm
DT-4V4C2F/4C2F-5	DR-4V4C2F/4C2F-5	8-bit	1 (SM)	1310/1550nm

For proper operation, it is necessary to match the transmitter (DT) unit with the associated receiver side (DR) unit.

Part Numbers Transmitter Side	Part Numbers Receiver Side	Description
DT-1V(W)4C2F/4C2F-x	DR-1V(W)4C2F/4C2F-x	1Ch. Video, 4Ch. bi-di CC Data, 2Ch. bi-di RS-422 Data
DT-1V(W)2C2F/2C2F-x	DR-1V(W)2C2F/2C2F-x	1Ch. Video, 2Ch. bi-di CC Data, 2Ch. bi-di RS-422 Data
DT-2V(W)1C2F/1C2F-x	DR-2V(W)1C2F/1C2F-x	2Ch. Video, 1Ch. bi-di CC Data, 2Ch. bi-di RS-422 Data
DT-2V(W)1C1F/1C1F-x	DR-2V(W)1C1F/1C1F-x	2Ch. Video, 1Ch. bi-di CC Data, 1Ch. bi-di RS-422 Data
DT-2V(W)2C2F/2C2F-x	DR-2V(W)2C2F/2C2F-x	2Ch. Video, 2Ch. bi-di CC Data, 2Ch. bi-di RS-422 Data
DT-2V(W)2C1F/2C1F-x	DR-2V(W)2C1F/2C1F-x	2Ch. Video, 2Ch. bi-di CC Data, 1Ch. bi-di RS-422 Data
DT-2V(W)4C2F/4C2F-x	DR-2V(W)4C2F/4C2F-x	2Ch. Video, 4Ch. bi-di CC Data, 2Ch. bi-di RS-422 Data
DT-2V(W)4C1F/4C1F-x	DR-2V(W)4C1F/4C1F-x	2Ch. Video, 4Ch. bi-di CC Data, 1Ch. bi-di RS-422 Data
DT-4V(W)1C2F/1C2F-x	DR-4V(W)1C2F/1C2F-x	4Ch. Video, 1Ch. bi-di CC Data, 2Ch. bi-di RS-422 Data
DT-4V(W)1C1F/1C1F-x	DR-4V(W)1C1F/1C1F-x	4Ch. Video, 1Ch. bi-di CC Data, 1Ch. bi-di RS-422 Data
DT-4V(W)2C2F/2C2F-x	DR-4V(W)2C2F/2C2F-x	4Ch. Video, 2Ch. bi-di CC Data, 2Ch. bi-di RS-422 Data
DT-4V(W)2C1F/2C1F-x	DR-4V(W)2C1F/2C1F-x	4Ch. Video, 2Ch. bi-di CC Data, 1Ch. bi-di RS-422 Data
DT-4V(W)3C2F/3C2F-x	DR-4V(W)3C2F/3C2F-x	4Ch. Video, 3Ch. bi-di CC Data, 2Ch. bi-di RS-422 Data
DT-4V(W)4C1F/4C1F-x	DR-4V(W)4C1F/4C1F-x	4Ch. Video, 4Ch. bi-di CC Data, 1Ch. bi-di RS-422 Data

9.0 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: *Tx signal light*

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

Problem: *Rx signal*

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

Problem: *No video at output of module*

Action: 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 Contact Closure transmission*

Action: Check the individual contact closure channel input status indicator lights #1 through 7 to ensure that the lights toggle on and off as the contact is closed and opened. These lights are located below the corresponding DB15. Also check the corresponding contact closure output lights (#2 through 4) on the receiver module to see if the corresponding lights are activated when the corresponding input contact is closed. If not, please check the data input/output and fiber connections.

Problem: *No Data*

Action: Check the data input status indicator light #1 on the transmit module to ensure it is on (indicating a data input signal). Also check the data output status indicator light #2 on the corresponding receiver module to ensure that the signal is being transmitted and received. If not, please check the data input/output and fiber connections.

If the problem still persists after reviewing the above items, please contact Meridian technical support : +1-516-285-0570 / support@meridian-tech.com

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