CYTEC CORP.

BULLETIN
FX/FO-2

2555 Baird Road, Penfield, New York 14526 (716) 381-4740 FAX (716) 381-0475

FX and FO SERIES

FIBER OPTIC SWITCHING SYSTEMS

CYTEC's FX Series of Fiberoptic Switching Systems are nonblocking, full fan-out optoelectrical switch matrices available in configurations from 8x8 to 64x64. Different Transmitter/Receiver Module combinations provide for 820, 1310 or 1550 nanometer wavelengths, with data rates to 622 Mb (OC-12/STM-4).

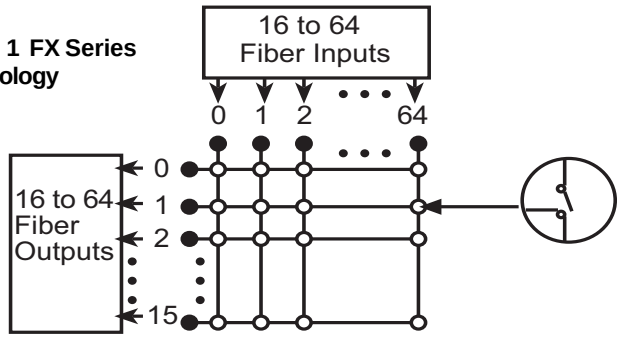
The FO Series are passive, optical systems that use mechanical fiberoptic relays. Individual switches, 1xN Multiplexers or NxM Matrices can be supplied. Many connector types and both single and multimode fiber options can be specified. Control options include RS232, IEEE488 and Ethernet LAN. Manual Control is also available.

FX/16x16 and FX/64x64 CHASSIS

At the heart of the FX Chassis is a differential ECL Solid State Matrix routing data at rates up to 1.2 Gbs in both a nonblocking (any input to any output) and full fan-out (one input to many or all outputs) arrangement. The FX/16x16 is used for 8x8 and 16x16 matrices, while the larger FX/64x64 can supply up to 64 individual inputs and outputs. See **Fig 1.** The Chassis also holds, as needed, the Fiberoptic Receiver and Transmitter Modules. The user then specifies the Control Module and optionally a Manual Control. This modularized design allows systems to be configured according to the end user's specific design requirements.

FX/16x16-820-100 Mainframe

Fig. 1 FX Series Topology



STANDARD CONFIGURATIONS

FX/16X16 CHASSIS

Matrices available in 8x8, 8x16, 16x8 or 16x16 configurations. One Input can connect to any, several or all Outputs.

FX/64X64 CHASSIS

Matrices with 16, 32, 48 and 64 Inputs are possible. Output numbers of 16, 32, 48 and 64 are also possible. Any combination of Inputs and Outputs and be provided, for example a 16x64 or 48x32. One Input can connect to any, several or all Outputs.

CUSTOM CONFIGURATIONS

Custom systems are available upon request. Please contact one of our Applications Engineers for assistance.

OPTOELECTRICAL SWITCHING'S ADVANTAGES:

- It is cost effective.
- One input can be distributed to many or all outputs.
- Modal dispersion is minimized.
- Amplitude restored on weak signals.
- No mechanical mirrors or switches to fail.

TYPICAL APPLICATIONS INCLUDE:

- Programmable Routing in Fiber Wiring Closets.
- Multiport Protocol Analysis for Networks and Test.
- Signal Distribution for Communications and Test.
- Automated Patch Panels.

FX SERIES TRANSMITTER & RECEIVER MODULES

FX/100-820 & -1310-MM MULTIMODE SERIES

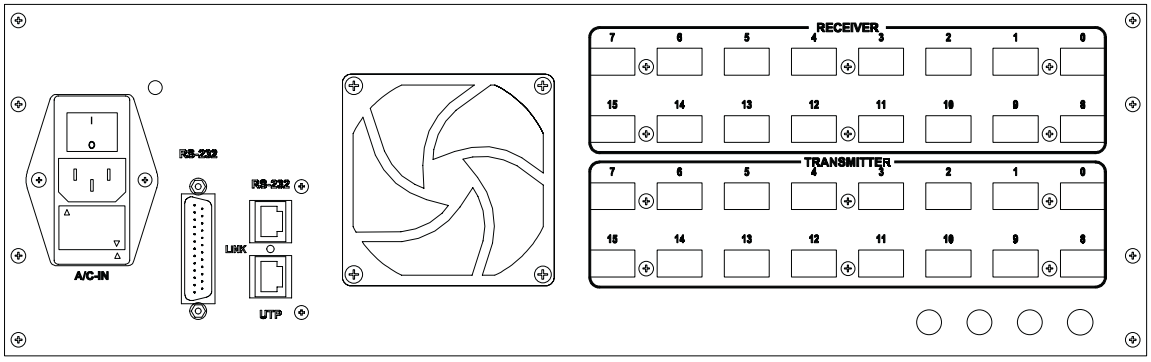
These low cost Transmitter and Receiver Modules are designed to switch either 820 nm or 1310 nm signals into multimode 50/125 or 62.5/125 um fiberoptic cables. Data rates up to 155 Mb/sec (NRZ) are handled.

FX/600-1310 & -1550-SM SINGLEMODE SERIES

These Modules are designed to be used with single mode fiberoptic cables. Wavelengths of either 1310 nm or 1550 nm are switched. Data rates of 50 Mb/sec to 700 Mb/sec are handled.

CONTACT 1-800-346-3117 OR WWW.CYTEC-ATE.COM FOR TECHNICAL ASSISTANCE

Figure 2 FX/16x16-600-1310 Mainframe Rear View:



TRANSCEIVER MODULE OPTIONS

FX/100-820-MM and FX/100-1310-MM

Includes the FXR-100-820 Receiver and FXT-100-820 Transmitter Modules for 820 nm wavelengths as well as the FXT-100-1310 Transmitter and FXR/100-1310 Receiver Modules for 1310 nm. Eight individual input or output channels are supplied by each Receiver or Transmitter module. Multimode cables at data rates up to 155 Mb/sec (NRZ) are supported. Transmitters are ALGaAs LEDs, Receivers are PIN Photododes.

SPECIFICATIONS:

	FXT/100-820	FXT/100-1310
Connectors	SMA or ST	ST or SC
Wavelength Range	795 - 860	1270 - 1370
Typical (nm)	820	1310
Glass Fiber Types	50/125	50/125
(Core/Cladding, um)	62.5/125	62.5/125
	100/140	
Data Rates Min.	5 Kb/sec	5 Kb/sec
(NRZ) Max.	155 Mb/sec	155 Mb/sec
FXR Input Power Min.	-20 dBm	-28 dBm
Overload @ Max.	-8 dBm	-11 dBm
FXT Output Power		
Into 62.5/125 um fiber	-15 dBm	-14 dBm
Into 50/125 um fiber	-17 dBm	-17 dBm
Bit Error Rate:	1×10^{-9}	1×10^{-9}

FX/600-1310 and FX/600-1550 SERIES

Includes the FXR-600-1310/1550 Receiver and either the FXT-600-1310 or FXT-600-1550 Transmitter Modules. Transmitter and Receiver Modules are each eight channels. Transmitters Modules transmit at the single wavelength of either 1310 nm or 1550 nm and data rates of 50 Mb to 700 Mb/sec (NRZ, nominal) with Laser Diodes (Class 1 Safety Compliant). Receiver Modules support 1100 nm thru 1600 nm.

SPECIFICATIONS:

	FXT/600-1310	FXT/600-1550
Connectors	ST, SC, FC	ST, SC, FC
Wavelength Range	1261 - 1360	1480 - 1580
Typical (nm)	1310	1550
	[short reach]	[long reach]
Glass Fiber Types	Single Mode	Single Mode
Data Rates Min.	50 Mb	50 Mb/sec
Max.	700 Mb/sec	700 Mb/sec
(NRZ, 25 MHz - 350 MHz)		
FXR Input Power Min.	-29 dBm	-29 dBm
Overload @ Max.	-6 dBm	-6dBm
(FXR Input Signal 1100 - 1600 nm)		
FXT Output Power	-11 dBm	-11dBm
(Higher Powers Available)		
Bit Error Rate:	1×10^{-10}	1×10^{-10}

FX/16X16 & FX/64X64 SPECIFICATIONS

Physical
19" Rack Mounting
Depth 20"
Height / Weight
FX/16x16 5.25" (3U) < 25 lbs.
FX/64x64 Consult Factory

Operating Temp. 0° to 55° C
Storage Temp. 0° to 70° C
Humidity 95% RH non-condensing to 30° C

Connections
Fiber connectors (SMA, ST, SC, FC), AC Mains Power and Remote Control Interface are on rear panel.

ENVIRONMENTAL

AC Input Selectable 100-130 or 200-240 Volts AC, 50-60 Hz.

Max. AC Power 100 Watts for FX/16x16 Matrix
400 watts for FX/64x64

PRICING AND AVAILABILITY

Assemble systems by selecting the appropriate FX Chassis, the desired Control Module and input Receiver and output Transmitter Modules as needed.
See Published Price List for current pricing on all FX Products.

Most systems available 30 - 60 days ARO

FO SERIES

PASSIVE FIBER OPTIC SWITCHING SYSTEMS

CYTEC's new FO Series Passive Fiberoptic Switching Systems are computer controlled chassis that are designed to switch standard fiberoptic wavelengths of 850 nm, 1310 nm and 1550 nm. Multimode 62.5/125 um switches are available for 850 nm and 1310 nm wavelengths, while Singlemode 9/125 um switches are available for 1310 nm and 1550 nm. Passive, bidirectional Moving Fiberoptic Switches are used that show insertion losses as low as 0.10 dB for Multimode and 0.25 dB for Singlemode switches. Three configurations are available: Individual Switches, Nx1 Multiplexers and NxM nonblocking (but not full fan-out) Matrices. Control options include RS232, IEEE488 and TCP/IP Ethernet LAN. Manual Control is optionally available.

FO CHASSIS

The FO Series are all 19" rack mounting chassis and are available either as Mainframes or Expansion Chassis. Standard chassis provide from eight to 32 individual switch points. All chassis have front panel LEDs for a visual indication of switch point status. Input and output signal connectors protrude from the chassis rear. FC, SC and ST fiberoptic connectors are standard.

STANDARD CHASSIS

Standard units are built with the required power supplies, a user specified Control Module and optionally a Manual Control. Control Module selections are shown on the last page of this bulletin. The system is completed by specifying the number and type of FO Series Fiberoptic Switches described below.

FO/8, FO/16 & FO/32 CHASSIS

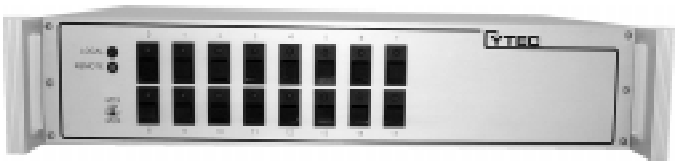
These chassis furnish 8, 16 or 32 individual switch points. One front panel LED is assigned to each switch point and displays status.

CUSTOM CHASSIS

Custom configurations are available on request. As examples, switch modules can be wired out to nonstandard rear panel fiberoptic connectors; switch modules can also be wired together with fiberoptic interconnects to furnish small nonblocking matrices (2x2, 2x4, 4x4, etc.)

FO SERIES PASSIVE SWITCH MODULES

The FO Fiber Optic Switches utilizes a “moving fiber” design concept to achieve highly accurate direct fiber to fiber connections. Currently available in **1x2, dual 1x2 and dual 1x2 nonblocking** configurations. Also available in both **Single** and **Multimode versions** as well as **Normal** and **Low Loss types.** Insertion Loss is as low as 0.25 for Singlemode and 0.10 dB for Multimode switches.



FO/16 with Pushbutton Manual Control

FO SERIES SWITCH SPECIFICATIONS

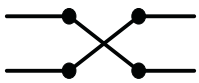
(Individual Modules without connectors) :

Connectors	ST, SC, FC Standard (others available on request)
Wavelength Range (nominal)	850 nm, 1310 nm Singlemode 1310 nm, 1550 nm Multimode
Glass Fiber Types	9/125 um Singlemode 62.5/125 um Multimode
Insertion Loss Low Loss Type, typ. Insertion Loss Normal Loss Type, typ. Back Reflection Crosstalk Repeatablility Switch Time Optical Power	0.25 dB Singlemode 0.10 dB Multimode 0.8 dB Singlemode 0.6 dB Multimode -60 dB Typical -70 dB Maximum 0.01 dB 10 milliseconds Typical +20 dBm max. Singlemode + 23 dBm max. Multimode

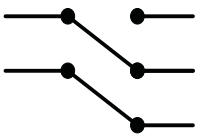
FO Series Switch Module

FO/1x2 Switch Module

FO/2x2 Crossover Module



FO/2(1x2) Blocking Switch Module



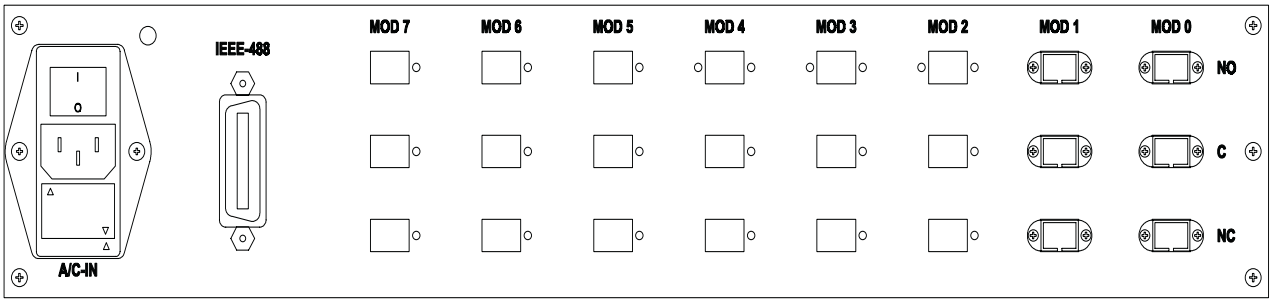


Fig. 4 FO/8 Mainframe with two FO/2x1 Switches Installed

FO SERIES MULTIPLEXERS

Bidirectional Nx1 Multiplexers are assembled from standard FO Chassis by interconnecting Fiberoptic Switch Modules as shown schematically in **Fig. 5**. The interconnects are fiberoptic cables and are usually wired externally, on the rear panel. Internally wired systems may be ordered as an option.

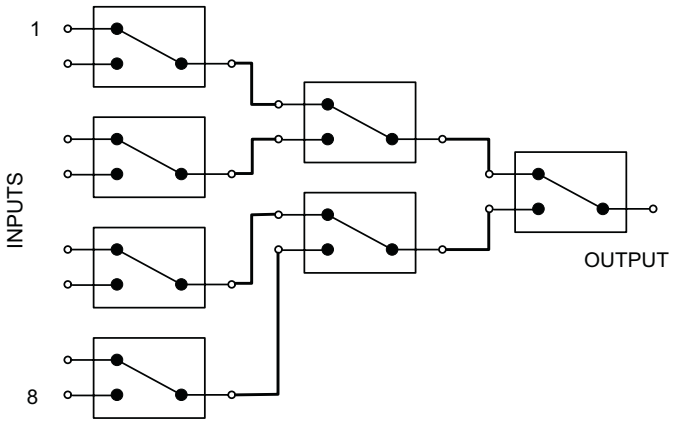


Fig. 5 8x1 Multiplexer using Seven FO/2x1 Switches

FO SERIES MATRICES

Bidirectional NxM Matrices are assembled by interconnecting the required number of individual FO Series fiberoptic switches as shown in **Fig. 6**. The Matrix is non-blocking (but not full fan-out) and any input can connect to any single output. The switches and interconnects are placed inside the chassis, while the input and output fiberoptic connectors are mounted on the rear panel.

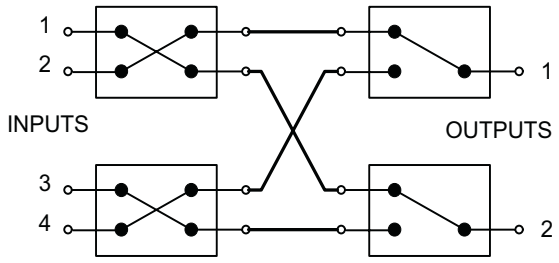


Fig. 6 4x2 Matrix using four two FO/2x1 and two FO/Crossover Switches.

LED DISPLAYS

FO/8, FO/16 and FO/32 Chassis are built with individual, discrete front panel LEDs that show switchpoint status. These LEDs are an invaluable aid in program debugging and system troubleshooting.

CONTROL MODULES

IF-3C RS232 SERIAL

This module has all the RS232 features detailed in Applications Bulletin AP-5.

IF-4C IEEE488 BUS (TALK/LISTEN)

This control module has all the IEEE488 features detailed in Applications Bulletin AP-5

IF-5C IEEE488/RS232 COMBINED CONTROL

This module has both the IEEE488 (Talk/Listen) and the RS232 features detailed in Applications Bulletin AP-5.

IF-6 LAN INTERFACE

This module uses TCP/IP protocols to allow control from an Ethernet LAN as described in Bulletin AP-5.

MANUAL CONTROL

VMCS SOFTWARE

This Virtual Manual Control Software gives the operator the ability to remotely Open and Close switches as well as observe system Status. Control is via a full Graphical User Interface (GUI).

MC/8 & MC/16 PUSHBUTTON

Individual Pushbuttons select and control mainframes holding either eight or 16 individual switchpoints.

MC/32-TW THUMBWHEEL

Mainframe chassis holding 32 switchpoints are built with optional Thumbwheel Manual Controls.

AVAILABILITY

Most systems are available 30 - 45 Days ARO.

WARRANTY

CYTEC Corp. warrants that all products are free from defects in Materials and Workmanship for a period of 5 years and that all switches are guaranteed for their rated Operational Lifetime.

SOFTWARE

Example and Driver Programs are available for most common Windows-based programming languages, including LabView, LabWindows and Visual Basic.