



FX82052 Unmanaged Ethernet Switch



**Five 10BASE-T/100BASE-TX Ports and
Two 100BASE-FX Fiber Ports**

C2607M (2/07)

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Important Safety Instructions

1. Read these instructions.
2. Keep these instructions.
3. Heed all warnings.
4. Follow all instructions.
5. Do not use this apparatus near water.
6. Clean only with dry cloth.
7. Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.
8. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
9. Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet consult an electrician for replacement of the obsolete outlet.
10. Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the points where they exit from the apparatus.
11. Only use attachments/accessories specified by the manufacturer.
12. Use only with the cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.
13. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.
14. Apparatus shall not be exposed to dripping or splashing and that no objects filled with liquids, such as vases shall be placed on the apparatus.
15. **WARNING:** To reduce the risk of fire or electric shock, do not expose this apparatus to rain or moisture.
16. Installation should be done only by qualified personnel and conform to all local codes.
17. Use only installation methods and materials capable of supporting four times the maximum specified load.
18. A CCC-approved power cord must be used to power this equipment when used in China.
19. **CAUTION:** These servicing instructions are for use by qualified service personnel only. To reduce the risk of electric shock do not perform any servicing other than that contained in the operating instructions unless you are qualified to do so.

The product and/or manual may bear the following marks:



This symbol indicates that dangerous voltage constituting a risk of electric shock is present within this unit.



This symbol indicates that there are important operating and maintenance instructions in the literature accompanying this unit.

CAUTION:
RISK OF ELECTRIC SHOCK. DO NOT OPEN.

Regulatory Notices

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

RADIO AND TELEVISION INTERFERENCE

This equipment has been tested and found to comply with the limits of a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Changes and Modifications not expressly approved by the manufacturer or registrant of this equipment can void your authority to operate this equipment under Federal Communications Commission's rules.

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

Product Overview

DESCRIPTION

The FX82052 unmanaged Ethernet switch provides five 10BASE-T/100BASE-TX ports and two 100BASE-FX fiber ports for the transport of bidirectional Ethernet data. The FX82052 switch is available in versions that accept one or two multimode or single-mode fibers per fiber port.

The FX82052 switch can be used in point-to-point and drop-and-repeat applications:

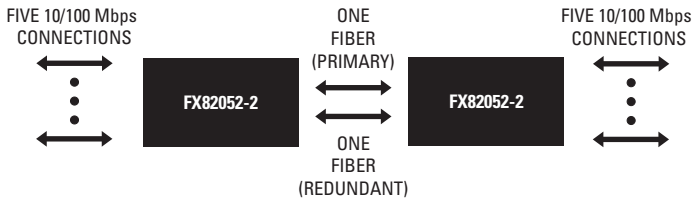
- In point-to-point applications, a second fiber port provides an optional redundant fiber link. Using the fiber redundancy option, the second fiber port—which is idle during regular operation—becomes operational if the primary fiber port fails.
- In drop-and-repeat applications, two fiber ports allow one or more Ethernet devices to be connected into a fiber optic daisy chain.

Refer to Figure 1 for illustrations of point-to-point and drop-and-repeat applications using FX82052 versions that accept one fiber per fiber port. Using wavelength division multiplexing (WDM) technology, bidirectional data is transported in one fiber.

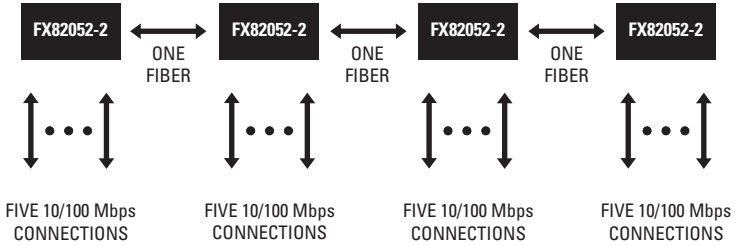
NOTE: In Figure 1, the FX82052 switch is referred to as the FX82052-2 to represent module versions that accept one fiber per port (total of two fibers). For a listing of the exact model names, refer to *Models* on page 10.

Refer to Figure 2 for illustrations of point-to-point and drop-and-repeat applications using FX82052 versions that accept two fibers per fiber port. Two fibers are required to transport bidirectional data over a fiber port.

NOTE: In Figure 2, the FX82052 switch is referred to as the FX82052-4 to represent module versions that accept two fibers per port (total of four fibers). For a listing of the exact model names, refer to *Models* on page 10.

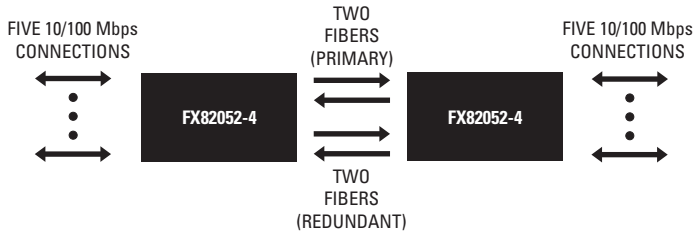


POINT-TO-POINT APPLICATION WITH FIBER REDUNDANCY

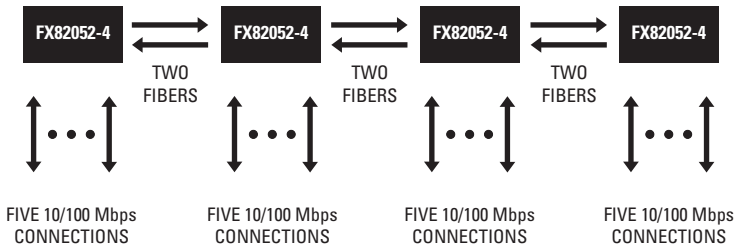


SAMPLE DROP-AND-REPEAT APPLICATION

Figure 1. Point-to-Point and Drop-and-Repeat Applications (One Fiber per Fiber Port)



POINT-TO-POINT APPLICATION WITH FIBER REDUNDANCY



SAMPLE DROP-AND-REPEAT APPLICATION

Figure 2. Point-to-Point and Drop-and-Repeat Applications (Two Fibers per Fiber Port)

Features of the FX82052 Ethernet switch include the following:

- User-selectable networking functions for each 10BASE-T/100BASE-TX port:
 - Autonegotiation between 10 Mbps and 100 Mbps data rates and between full-duplex and half-duplex modes
 - 10 Mbps or 100 Mbps selectable
 - Full-duplex or half-duplex mode selectable
 - Enabling/disabling of flow control

NOTE: The 100BASE-FX fiber ports are automatically forced to full-duplex 100 Mbps operation.

- Auto MDI/MDI-X (Medium Dependent Interface/Medium Dependent Interface Crossover) operation
- Compliant with IEEE 802.3, 802.3u, and 802.3x standards
- Multimode fiber support for distances up to 2 km (applicable to FX82052 versions using one fiber per fiber port) or up to 6 km (applicable to FX82052 versions using two fibers per fiber port)
- Single-mode fiber support for distances up to 46 km
- Integrated wavelength division multiplexing (WDM), which allows bidirectional data to be transmitted in one fiber (applicable to FX82052 versions using one fiber per fiber port)
- Compatible with other Ethernet equipment:
 - 10BASE-T/100BASE-TX compatibility with all Pelco® and third-party 10BASE-T/100BASE-TX Ethernet devices
 - Fiber optic compatibility with all Pelco Ethernet devices that support WDM (applicable to FX82052 versions using one fiber per fiber port)
 - Fiber optic compatibility with all Pelco Ethernet devices that do not support WDM (applicable to FX82052 versions using two fibers per fiber port)
 - Fiber optic compatibility with third-party 100BASE-FX Ethernet devices (applicable to FX82052 multimode ST and SC versions using two fibers per fiber port)
- Laser diode for transmission of optical signals

NOTE: The FX82052 switch is a Class 1 laser product that complies with FDA radiation performance standard 21CFR Subchapter J and with IEC 60825-1 Edition 1.2, 2001-08.

- Environmentally hardened
- Designed to meet NEMA TS 2 and Caltrans traffic signal control equipment standards for ambient operating temperature, mechanical shock and vibration, humidity with condensation, high-line/low-line voltage conditions, and transient voltage protection

NOTE: Conformal coating is required for operation in environments with relative humidity above 95 percent (condensing).

- No performance adjustments required
- 12 VDC or 24 VAC power supply
- Stand-alone and rack-mountable modular design
- LED indicators for monitoring of fiber redundancy mode status, optic signal/laser status, 100BASE-FX port status including far end fault indication (FEFI), 10BASE-T/100BASE-TX port status, and operating power

MODELS

The FX82052 module consists of the following series of models:

FX82052, -2 MODELS*

Multimode Models

- FX82052MSTR-2 Unmanaged Ethernet switch, five 10BASE-T/100BASE-TX ports, two multimode ST fiber ports, one fiber per port (total of two fibers)
- FX82052MSCR-2 Unmanaged Ethernet switch, five 10BASE-T/100BASE-TX ports, two multimode SC fiber ports, one fiber per port (total of two fibers)

Single-Mode Models†

- FX82052SSSTR-2 Unmanaged Ethernet switch, five 10BASE-T/100BASE-TX ports, two single-mode ST fiber ports, one fiber per port (total of two fibers)
- FX82052SSSCR-2 Unmanaged Ethernet switch, five 10BASE-T/100BASE-TX ports, two single-mode SC fiber ports, one fiber per port (total of two fibers)

FX82052, -4 MODELS*

Multimode Models

- FX82052MSTR-4 Unmanaged Ethernet switch, five 10BASE-T/100BASE-TX ports, two multimode ST fiber ports, two fibers per port (total of four fibers)
- FX82052MSCR-4 Unmanaged Ethernet switch, five 10BASE-T/100BASE-TX ports, two multimode SC fiber ports, two fibers per port (total of four fibers)

Single-Mode Models†

- FX82052SSSTR-4 Unmanaged Ethernet switch, five 10BASE-T/100BASE-TX ports, two single-mode ST fiber ports, two fibers per port (total of four fibers)
- FX82052SSSCR-4 Unmanaged Ethernet switch, five 10BASE-T/100BASE-TX ports, two single-mode SC fiber ports, two fibers per port (total of four fibers)

*For conformal coated models, replace the first letter *F* in the model number with the letter *C*.

The conformal coated version of FX82052MSTR-2, for example, is CX82052MSTR-2.

†Single-mode FC connectors are available upon request. Contact the factory for additional information.

OPTIONAL ACCESSORIES

The following optional accessories are available:

- WM5002-3U Wall mount base kit for double-width module
- WM5002-3UEXP Wall mount expansion kit for double-width module
- RK5000-3U 19-inch rack mount chassis for 14 slots (no power), 3 RUs
- RK5000PS-3U 19-inch rack mount chassis for 12 slots with power, 3 RUs
- EPS5000-120 External rack power supply, 1 RU, dual 120 W power outputs
- RK5001B-3U Blank filler panel, single width
- RK5002B-3U Blank filler panel, double width
- RK5002-1UEXP Adapter kit that allows a 3 RU double-width fiber module to be used in RK5000PS-5U rack mount chassis

FRONT PANEL

Figure 3 illustrates the front panel of the FX82052 module.

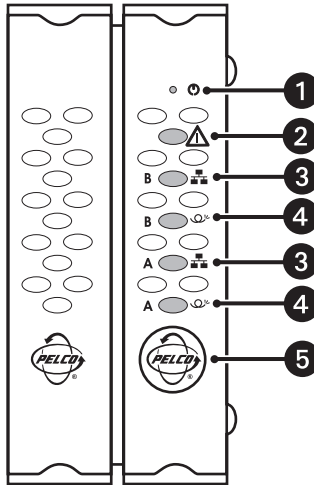


Figure 3. Front Panel of FX82052 Module

- ❶ **Reset Button:** Restarts the unit
- ❷ **Fiber Failover:** Fiber Redundancy Mode LED
- ❸ **100BASE-FX Status LED:** Per fiber port A and B
- ❹ **Optic Fault LED:** Optical signal status/laser status indicator per fiber port A and B
- ❺ **Power LED:** Pelco badge

For detailed information about the front-panel LEDs, refer to *Troubleshooting* on page 26.

REAR PANEL

FX82052 REAR PANEL, -2 MODELS

Figure 4 illustrates the rear panel of the FX82052 module containing five 10BASE-T/100BASE-TX ports and two 100BASE-FX fiber ports and two 100BASE-FX fiber ports that each accept one fiber (-2 models).

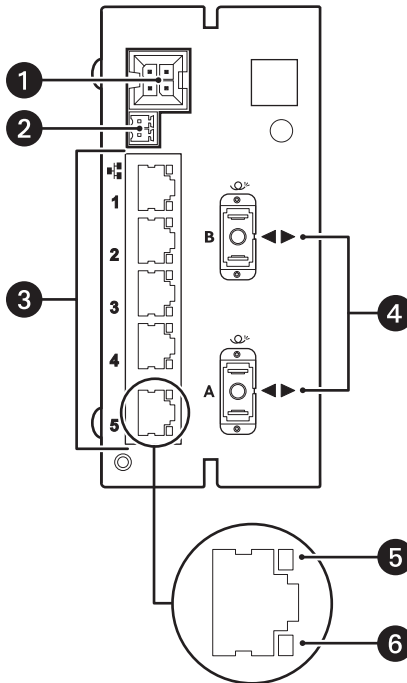


Figure 4. Rear Panel of FX82052 Module, -2 Models (SC Fiber Connectors Shown)

- ❶ **Rack Power/Alarm Connector:** 4-pin connector for power/alarm connection of rack-mounted module
- ❷ **Stand-Alone Power Connector:** 2-pin connector for power connection of stand-alone module; removable mating connector with screw terminals (not shown)
- ❸ **10BASE-T/100BASE-TX Ports:** 1-5, RJ-45 connectors
- ❹ **Fiber Optic Ports A and B:** Single-fiber ST or SC connectors (dependent on FX82052 model)
- ❺ **RJ-45 10BASE-T/100BASE-TX Port Status LED, Left:** Link/activity status indicator
- ❻ **RJ-45 10BASE-T/100BASE-TX Port Status LED, Right:** Duplex mode/collision indicator

For additional information about rear-panel connections, refer to *Installation* on page 14. For detailed information about the RJ-45 LEDs, refer to *Troubleshooting* on page 26.

FX82052 REAR PANEL, -4 MODELS

Figure 5 illustrates the rear panel of the FX82052 module containing five 10BASE-T/100BASE-TX ports and two 100BASE-FX fiber ports that each accept two fibers (-4 models).

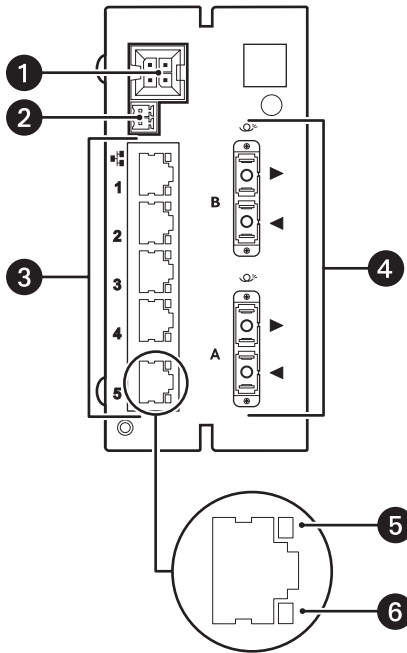


Figure 5. Rear Panel of FX82052 Module, -4 Models (SC Fiber Connectors Shown)

- ❶ **Rack Power/Alarm Connector:** 4-pin connector for power/alarm connection of rack-mounted module
- ❷ **Stand-Alone Power Connector:** 2-pin connector for power connection of stand-alone module; removable mating connector with screw terminals (not shown)
- ❸ **10BASE-T/100BASE-TX Ports 1-5:** RJ-45 connectors
- ❹ **Fiber Optic Ports A and B:** Dual-fiber ST or SC connectors (dependent on FX82052 model)
- ❺ **RJ-45 10BASE-T/100BASE-TX Port Status LED, Left:** Link/activity status indicator
- ❻ **RJ-45 10BASE-T/100BASE-TX Port Status LED, Right:** Duplex mode/collision indicator

For additional information about rear-panel connections, refer to *Connections* on page 20. For detailed information about the RJ-45 LEDs, refer to *Troubleshooting* on page 26.

Installation

PACKAGE CONTENTS

The following items are supplied:

- 1 FX82052 module
- 1 Regulated switching power supply with four plug adapters (North American, Australian, U.K., and European configurations); 100-240 VAC, 50-60 Hz input, 12 VDC output
- 1 Wall clip with two 4-40 x 0.250-inch Phillips pan head screws with lock washers (for attachment of single module to wall)
- 1 FX82052 Unmanaged Ethernet Switch Installation manual

SETTING 10BASE-T/100BASE-TX PORT MODES OF OPERATION

NOTE: As a matter of convenience, it is recommended that you verify the modes of operation for each 10BASE-T/100BASE-TX port and then change the mode settings—if necessary—before mounting the FX82052 module into a rack or onto a wall.

The FX82052 module provides various configuration options that allow you to select the desired modes of operation for each 10BASE-T/100BASE-TX port (ports 1-5). You can select the desired modes of operation by means of a TX Mode switch that is provided on the bottom of the module for each port (refer to Figure 6).

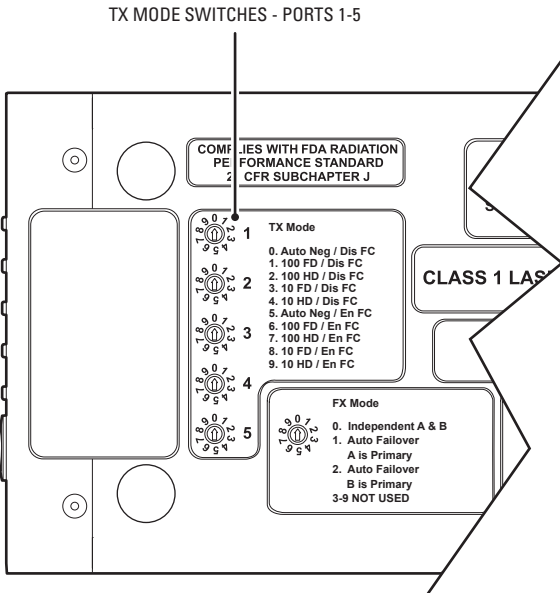


Figure 6. TX Mode Switches for 10BASE-T/100BASE-TX Ports 1-5

Using the TX Mode switch for a particular port, you can do the following:

- Enable autonegotiation or select (force) a specific data rate and duplex mode:
 - Enabling autonegotiation allows the FX82052 module to automatically negotiate with the device to which the port is connected for data rate and duplex modes of operation: 10 Mbps or 100 Mbps data rate and half-duplex or full-duplex mode. The highest common denominator of operational modes is automatically selected.
Autonegotiation is enabled by default.
 - If autonegotiation is not desired, you can select a specific data rate and duplex mode:
 - Data rate configuration allows you to select 10 Mbps or 100 Mbps.
 - Duplex mode configuration allows you to select half-duplex mode or full-duplex mode.
- Enable or disable flow control. Flow control controls data transmission at the sending device to avoid overfilling buffers and losing data at the receiving device. When the buffers on the receiving device are full, a message is sent to the sending device to suspend the transmission until the data in the buffers has been processed.

NOTE: For time-sensitive data applications (for example, video and audio applications), it is recommended that flow control be disabled.

Flow control is disabled by default.

With the FX82052 module powered off, set each TX Mode switch to the desired modes of operation.

NOTE: TX Mode configuration must be set when the module is powered off. If you wish to change a TX Mode switch setting after the module has been powered on, power off the module, change the TX Mode switch setting, and then power on the module again.

Refer to Table A for TX Mode switch settings and corresponding 10BASE-T/100BASE-TX port modes of operation. Note that each 10BASE-T/100BASE-TX port operates independently of one another; therefore, each port can be set to different modes of operation as appropriate.

Table A. TX Mode Switch Settings

TX Mode Switch Position	10BASE-T/100BASE-TX Modes of Operation
0	Auto Neg/Dis FC: Enables autonegotiation between 10 Mbps and 100 Mbps and between half-duplex and full-duplex modes, disables flow control (default setting)
1	100 FD/Dis FC: Selects 100 Mbps full-duplex, disables flow control
2	100 HD/Dis FC: Selects 100 Mbps half-duplex, disables flow control
3	10 FD/Dis FC: Selects 10 Mbps full-duplex, disables flow control
4	10 HD/Dis FC: Selects 10 Mbps half-duplex, disables flow control
5	Auto Neg/En FC: Enables autonegotiation between 10 and 100 Mbps and between half-duplex and full-duplex modes, enables flow control
6	100 FD/En FC: Selects 100 Mbps full-duplex, enables flow control
7	100 HD/En FC: Selects 100 Mbps half-duplex, enables flow control
8	10 FD/En FC: Selects 10 Mbps full-duplex, enables flow control
9	10 HD/En FC: Selects 10 Mbps half-duplex, enables flow control
NOTE: Switch positions 0-4 disable flow control. Positions 5-9 enable flow control.	

SETTING FIBER FAILOVER MODE

NOTE: As a matter of convenience, it is recommended that you set fiber failover (redundancy) mode—if required—before mounting the FX82052 module into a rack or onto a wall. Fiber failover mode is disabled by default.

The FX82052 module can operate in fiber failover mode to allow automatic fiber redundancy operation. If the primary fiber link fails, the secondary (backup) fiber link becomes operational. Note that fiber failover mode can be used in point-to-point applications only.

To allow you to set fiber failover mode, an FX Mode switch is provided on the bottom of the module (refer to Figure 7 and to Table B).

NOTES:

- FX Mode configuration must be set when the module is powered off. If you wish to change the FX Mode switch setting after the module has been powered on, power off the module, change the FX Mode switch setting, and then power on the module again.
- The Fiber Failover LED on the front of the module indicates the status of fiber failover mode. For detailed information, refer to *Troubleshooting* on page 26.

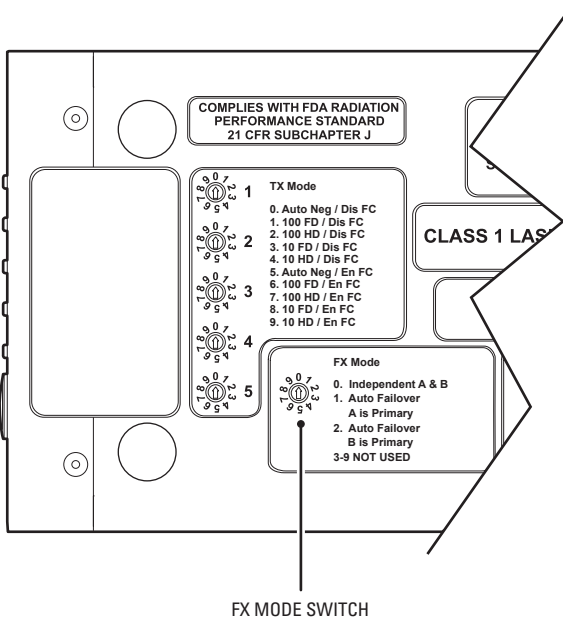


Figure 7. FX Mode Switch

Table B. FX Mode Switch Settings

FX Mode Switch Position	Mode of Operation
0	Independent A & B: Sets fiber ports A and B in nonredundant mode (default setting).
1	Auto Failover, A is Primary: Sets fiber ports A and B in redundant mode. Port A connects to the primary fiber link, and Port B connects to the secondary fiber link.
2	Auto Failover, B is Primary: Sets fiber ports A and B in redundant mode. Port B connects to the primary fiber link, and Port A connects to the secondary fiber link.
3-9	Not used

MOUNTING

The FX82052 module can be mounted into a rack or can be used as a stand-alone module. As a stand-alone module, the unit can be placed on a desktop or can be mounted to a wall.

NOTE: As a matter of convenience, it is recommended that you set the modes of operation for each 10BASE-T/100BASE-TX port and the fiber failover mode—if required—before mounting the FX82052 module into a rack or onto a wall. For information about setting the 10BASE-T/100BASE-TX port modes of operation, refer to *Setting 10BASE-T/100BASE-TX Port Modes of Operation* on page 14. For information about setting the fiber failover mode, refer to *Setting Fiber Failover Mode* on page 16.

MOUNTING THE FX82052 MODULE INTO A RACK

The FX82052 module can be installed into an RK5000 Series rack mount chassis, which can be mounted into an industry-standard 19-inch (48.26 cm) equipment rack. The RK5000 Series rack mount chassis includes the following models:

- **RK5000PS-3U and RK5000-3U:** Designed to accommodate fiber optic modules as follows:
 - The RK5000PS-3U rack mount chassis provides 12 single-width module slots and a power supply.
 - The RK5000-3U rack mount chassis provides 14 single-width module slots (a power supply is not included). Power to the modules can be supplied using the optional external power supply (EPS5000-120).

For additional information, refer to the RK5000PS-3U/RK5000-3U Fiber Rack Mount Chassis Installation manual.

- **RK5000PS-5U:** Designed to accommodate Endura™ modules but can also accommodate fiber optic modules with the use of the appropriate adapter kit. The RK5002-1UEXP adapter kit is required for installation of the FX82052 module into the RK5000PS-5U chassis.

For information about the RK5000PS-5U chassis, refer to the RK5000PS-5U Rack Mount Chassis Installation manual.

NOTE: The FX82052 module is a double-width fiber optic module that occupies two slots in the RK5000PS-3U, RK5000-3U, and RK5000PS-5U chassis.

MOUNTING THE FX82052 MODULE TO A WALL

The FX82052 module can be mounted to a wall in the following ways:

- Using the supplied wall clip for attachment of a single module to a wall. For installation instructions, refer to *Mounting the FX82052 Module Using the Wall Clip* on page 19.
- Using the optional WM5002 wall mount kits, which are designed for mounting of double-width fiber optic modules. The WM5002-3U base kit allows mounting of a single module to a wall. The WM5002-3UEXP expansion kit allows mounting of an additional module. It is recommended that a maximum of one expansion kit be used with the base kit, allowing a maximum of two double-width modules to be mounted to a wall.

NOTE: The WM5002 wall mount kits can be used with the WM5001 wall mount kits, which are designed for mounting of single-width fiber optic modules. If mounting a mix of single-width and double-width modules is desired, it is recommended that a maximum of two single-width modules and one double-width module be mounted in combination with one another.

For mounting instructions using the wall mount kits, refer to the WM5000 Series Wall Mount Kit Installation manual.

Mounting the FX82052 Module Using the Wall Clip

NOTE: Before mounting the FX82052 module to a wall, ensure that there is adequate space at both ends for viewing the front-panel LEDs and for making the various rear-panel cable connections.

To attach the FX82052 module to a wall using the supplied wall clip, refer to Figure 8 and do the following:

1. Using the two vertical or horizontal wall-mounting holes, attach the wall clip to a wall using two screws (not provided).
2. Slide the module into the clip until the two holes on the bottom of the module align with the two holes on the lower flange of the clip.
3. Attach the module to the clip using the two Phillips pan head screws provided for the clip.

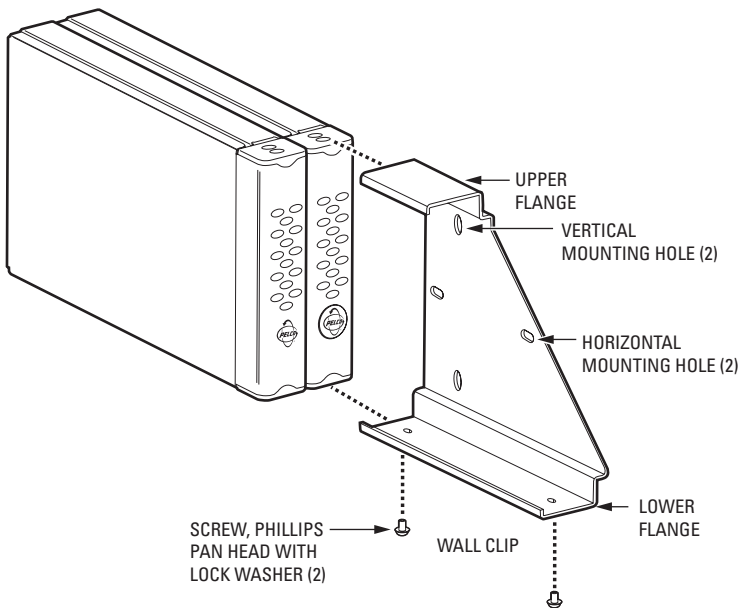


Figure 8. Mounting the FX82052 Module Using the Wall Clip

CONNECTIONS

Connections to the FX82052 module are made on the rear panel of the module. Refer to Figure 9 and to Figure 10 for illustrations of connections to FX82052, -2 models and FX82052, -4 models, respectively.

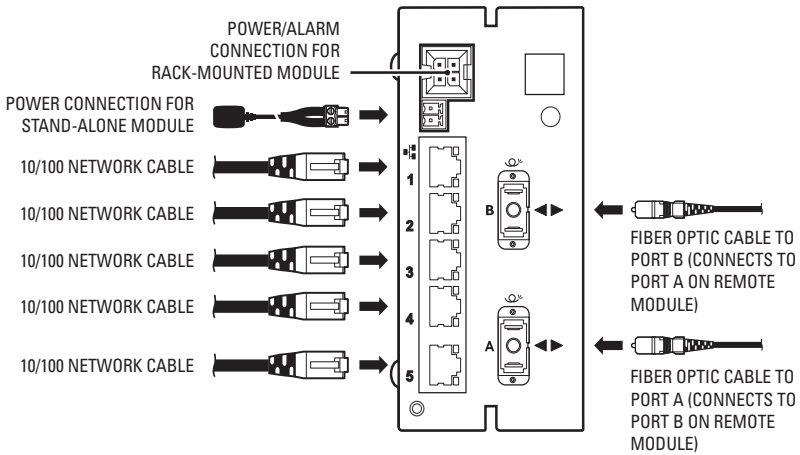


Figure 9. FX82052 Connections, -2 Models (SC Fiber Connectors Shown)

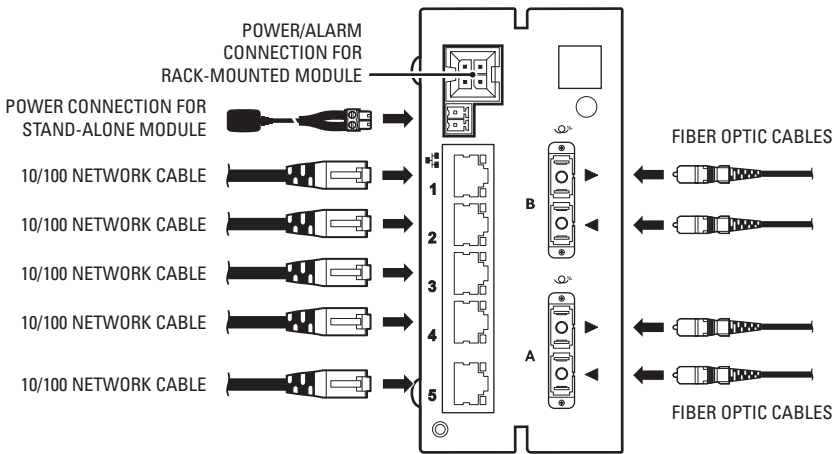


Figure 10. FX82052 Connections, -4 Models (SC Fiber Connectors Shown)

As illustrated in Figure 9 and in Figure 10, FX82052 connections consist of the following:

- Power connection
 - A 12 VDC or 24 VAC power supply can be used to power the module when used as a stand-alone unit. A 12 VDC power supply is provided. If a 24 VAC power supply is used, the power supply must be a Listed Direct Plug-In Power Unit marked as Class 2 and rated as 24 VAC, 0.50 A (minimum output).
 - In extreme temperature conditions, it is recommended that an industrial-rated outdoor power supply such as the Pelco WCS1-4 power supply be used.
- 10BASE-T/100BASE-TX connections
 - Use Category 5e or a higher category of cable to connect to a 10BASE-T/100BASE-TX port. Cable length must not exceed 328 feet (100 meters).
 - The 10BASE-T/100BASE-TX ports are auto MDI/MDI-X ports; therefore, either a straight-through or crossover cable can be used. The ports automatically detect the cable type that is used. Refer to the *Appendix. RJ-45 Connector Pinouts* on page 38 for RJ-45 MDI/MDI-X pinout information.
- Fiber connections
 - FX82052, -2 models: When connecting fiber between FX82052, -2 models, connect fiber port A of one module to fiber port B of another module. Similarly, connect fiber port B of one module to fiber port A of another module. Note that ports A and B connect fiber between FX82052, -2 models because of fiber wavelength compatibility:
 - Multimode fiber port A transmits data at 1310 nm and receives data at 850 nm. Multimode fiber port B transmits data at 850 nm and receives data at 1310 nm.
 - Single-mode fiber port A transmits data at 1310 nm and receives data at 1550 nm. Single-mode fiber port B transmits data at 1550 nm and receives data at 1310 nm.

Refer to Figure 11 for an illustration of fiber port connections in point-to-point applications with redundancy. Note that the FX Mode switch is set on one module to position 1 (fiber port A connects to the primary fiber link) and is set on the other module to position 2 (fiber port B connects to the primary fiber link).

Refer to Figure 12 for an illustration of fiber port connections in drop-and-repeat applications. Note that the FX Mode switch is set to position 0 on all modules.

- FX82052, -4 models: When connecting fiber between FX82052, -4 models, connect fiber port A of one module to fiber port B of another module. Similarly, connect fiber port B of one module to fiber port A of another module.

Refer to Figure 13 for an illustration of fiber port connections in point-to-point applications with redundancy. Note that the FX Mode switch is set on one module to position 1 (fiber port A connects to the primary fiber link) and is set on the other module to position 2 (fiber port B connects to the primary fiber link).

Refer to Figure 14 for an illustration of fiber port connections in drop-and-repeat applications. Note that the FX Mode switch is set to position 0 on all modules.

NOTE: On FX82052, -4 models, you can also connect fiber port A of one module to fiber port A of another module. Similarly, you can connect fiber port B of one module to fiber port B of another module. Note that in point-to-point applications with redundancy, you must then set the FX Mode switch as follows. If fiber port A connects to the primary fiber link, set the FX Mode switch to position 1 on both modules. If fiber port B connects to the primary fiber link, set the FX Mode switch to position 2 on both modules. In drop-and-repeat applications, the FX Mode switch is set to position 0 on all modules.

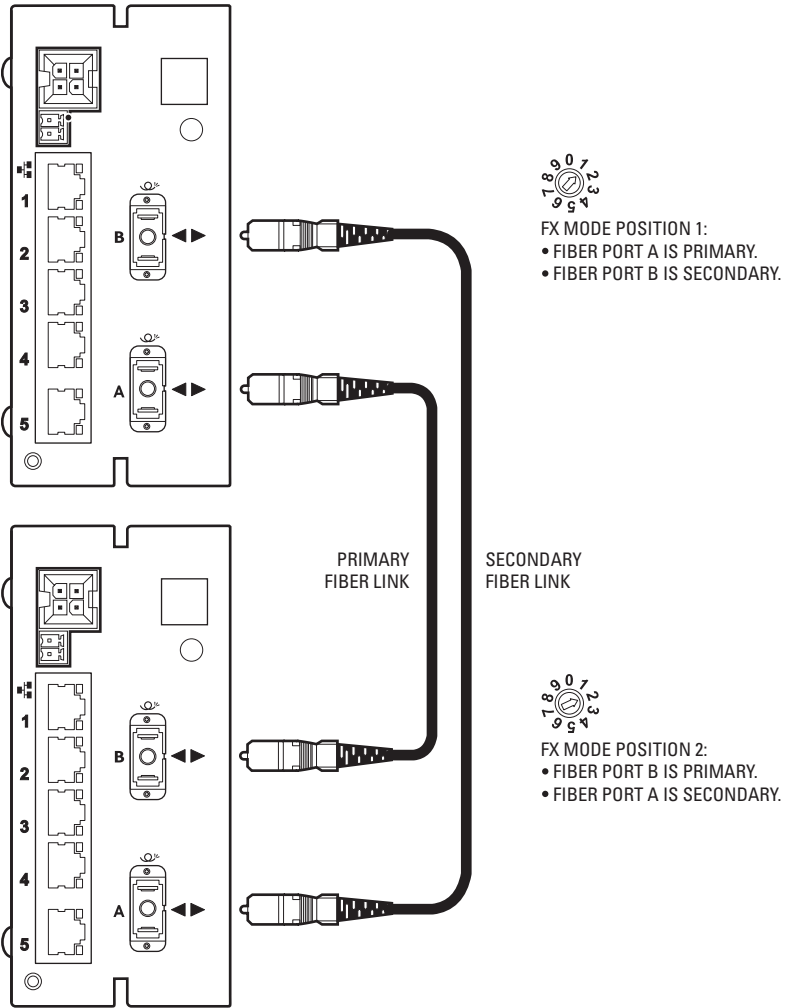


Figure 11. Fiber Port Connections in Point-to-Point Application with Redundancy, -2 Models

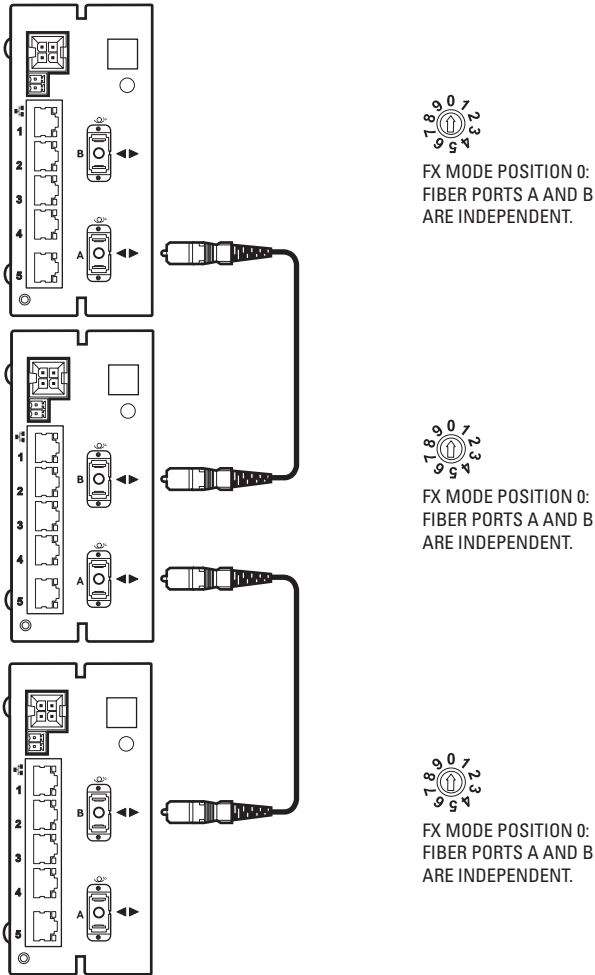


Figure 12. Fiber Port Connections in Sample Drop-and-Repeat Application, -2 Models

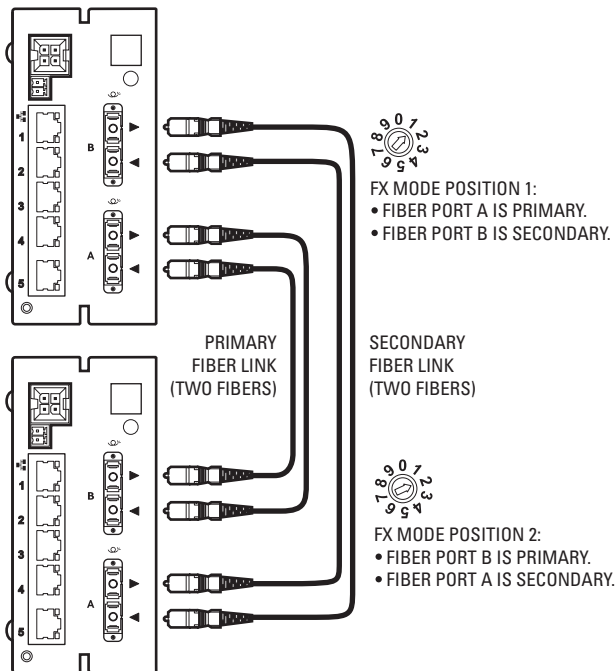


Figure 13. Fiber Port Connections in Point-to-Point Application with Redundancy, -4 Models

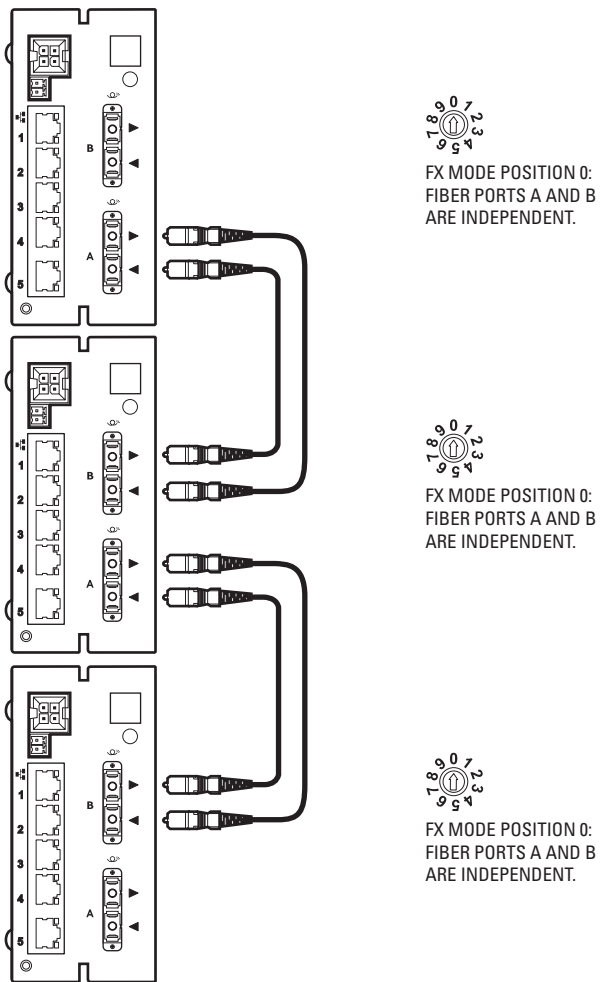


Figure 14. Fiber Port Connections in Sample Drop-and-Repeat Application, -4 Models

Troubleshooting

LED indicators on the front and rear panels of the FX82052 module allow you to monitor operational status:


- LED indicators on the front panel allow you to monitor operating power, fiber redundancy mode status, 100BASE-FX port status, and optic signal/laser status. Refer to Table C for information about the front-panel indicators and associated troubleshooting guidelines.
- LED indicators on the rear panel allow you to monitor RJ-45 10BASE-T/100BASE-TX port status. Refer to Table D for information about the rear-panel indicators and associated troubleshooting guidelines.

Table C. Troubleshooting with Front-Panel Indicators

Indicator Color	Meaning	Possible Cause	Corrective Action
Power LED (Pelco badge)			
Blue	Power is being applied to the module.	—	No action required.
Not lit	Power is not being applied to the module.	Power connection is faulty.	Check power connection. If module is rack mounted, reseal module or power supply as necessary.
		Power supply has failed.	Replace power supply.
		Loss of power occurs due to tripped circuit breakers, blown fuses, or faulty electrical service.	Check circuit breakers, fuses, or electrical service as necessary.


(Continued on next page)

Table C. Troubleshooting with Front-Panel Indicators (Continued)

Indicator Color	Meaning	Possible Cause	Corrective Action
Fiber Failover Mode LED ()			
Not lit	The module is not in fiber redundancy mode.	The FX Mode switch is set to position 0.	If fiber redundancy is not required, no action is required. If fiber redundancy is required, power off the module, set the FX Mode switch to position 1 or 2 as appropriate, and then power on the module. For detailed information, refer to <i>Setting Fiber Failover Mode</i> on page 16.
Green	The module is in fiber redundancy mode. The primary fiber link is operational. The secondary fiber link is idle.	The FX Mode switch is set to position 1 (port A connects to the primary fiber link) or to position 2 (port B connects to the primary fiber link).	If fiber redundancy is required, no action is required. If fiber redundancy is not required, power off the module, set the FX Mode switch to position 0, and then power on the module.
Amber	The module is in fiber redundancy mode. The primary fiber link is operational. The secondary fiber link is down.	A problem exists with the secondary fiber link. The Optic Fault LED or the 100BASE-FX Status LED for port A or port B is red.	Refer to the <i>Optic Fault LED</i> section or to the <i>100BASE-FX Status LED</i> section in this table as appropriate.
Flashing amber	The module is in fiber redundancy mode. The primary fiber link is down. The secondary fiber link is operational.	A problem exists with the primary fiber link. The Optic Fault LED or the 100BASE-FX Status LED for port A or port B is red.	Refer to the <i>Optic Fault LED</i> section or to the <i>100BASE-FX Status LED</i> section in this table as appropriate.
Red	The module is in fiber redundancy mode; however, both primary and secondary fiber links are down.	A problem exists with the primary and backup fiber links. The Optic Fault LEDs or the 100BASE-FX Status LEDs for ports A and B are red.	Refer to the <i>Optic Fault LED</i> section or to the <i>100BASE-FX Status LED</i> section in this table as appropriate.

(Continued on next page)

Table C. Troubleshooting with Front-Panel Indicators (Continued)

Indicator Color	Meaning	Possible Cause	Corrective Action
100BASE-FX Status LED ()			
Green	A fiber link is established.	—	No action required.
Flashing green	Data activity is occurring on the fiber link; data is being transmitted or received.	—	No action required.
Red	Far end fault indication (FEFI). The optical signal transmitted from this port is not detected by the remote link partner.	Defective fiber transmit port on local module	Replace local module.
		Laser fault on local module (Optic Fault LED on local module flashes red).	Refer to the <i>Optic Fault LED</i> section in this table.
		Defective fiber receive port on remote module	Replace remote module.
NOTE: The Optic Fault LED on the <i>remote</i> module is red. Refer to the <i>Optic Fault LED</i> section in this table for additional information.			

(Continued on next page)

Table C. Troubleshooting with Front-Panel Indicators (Continued)


Indicator Color	Meaning	Possible Cause	Corrective Action
Optic Fault LED ()			
Green	The optical signal is being received and laser is operating properly.	—	No action required.
Red	The optical signal is not being received.	Remote module is not powered on.	Check power connections. Replace power supply if necessary.
		Fiber optic cable is not connected.	Check fiber optic connections.
		Fiber optic cable connectors are dirty or are damaged.	Clean, polish, or replace fiber optic cable connectors as necessary.
		Fiber optic cable is defective.	Replace cable.
		Optical dB losses in the fiber optic installation exceed the optical power budget specification stated in <i>Specifications</i> on page 35.	Check for problems with the fiber optic installation, for example, excessive dB losses in connectors, splices, patch panels, cables, and so on.
		Optical dB losses in the fiber optic installation meet the optical power budget specification stated in <i>Specifications</i> on page 35; however, a module is defective.	Contact Product Support at 1-559-292-1981.
Flashing red	Laser has shut down.	Module is operating in extreme environmental conditions; for example, operating temperature is below or above recommended range as stated in the <i>Specifications</i> on page 35.	Ensure that module operates according to operating conditions stated in <i>Specifications</i> on page 35, and then cycle the power. If problem persists, contact Product Support at 1-559-292-1981.
		Laser has reached end of life.	Cycle the power. If problem persists, contact Product Support at 1-559-292-1981.

Table D. Troubleshooting with Rear-Panel Indicators

Indicator Color	Meaning	Possible Cause	Corrective Action
RJ-45 10BASE-T/100BASE-TX Port Status LED - Left (Link/Activity)			
Amber	A 10BASE-T link is established.	—	If 10BASE-T operation is desired, no action is required. If 10BASE-T operation is not desired, refer to <i>Setting 10BASE-T/100BASE-TX Port Modes of Operation</i> on page 14 for information.
Flashing amber	Data activity is occurring on the 10BASE-T link; data is being transmitted or received.	—	If 10BASE-T operation is desired, no action is required. If 10BASE-T operation is not desired, refer to <i>Setting 10BASE-T/100BASE-TX Port Modes of Operation</i> on page 14 for information.
Green	A 100BASE-TX link is established.	—	If 100BASE-TX operation is desired, no action is required. If 100BASE-TX operation is not desired, refer to <i>Setting 10BASE-T/100BASE-TX Port Modes of Operation</i> on page 14 for information.
Flashing green	Data activity is occurring on the 100BASE-TX link; data is being transmitted or received.	—	If 100BASE-TX operation is desired, no action is required. If 100BASE-TX operation is not desired, refer to <i>Setting 10BASE-T/100BASE-TX Port Modes of Operation</i> on page 14 for information.

(Continued on next page)

Table D. Troubleshooting with Rear-Panel Indicators (Continued)

Indicator Color	Meaning	Possible Cause	Corrective Action
RJ-45 10BASE-T/100BASE-TX Port Status LED - Left (Link/Activity) (Continued)			
Not lit	A 10BASE-T or 100BASE-TX link cannot be established.	A problem may exist with the cable: <ul style="list-style-type: none"> • Cable is not connected to the module or to the 10BASE-T/100BASE-TX compatible device. • Cable is defective. • Cable is not the proper cable type. • Cable is not the proper length. 	Do any of the following as applicable: <ul style="list-style-type: none"> • Connect the cable. • Replace the cable. Use Category 5e or higher cable. • Ensure that cable is proper length. Cable length must not exceed 128 feet (100 meters).
		Device connected to the module is not powered on.	Power on the device connected to the module.
		Duplex mode setting (half-duplex or full-duplex) does not match the duplex mode setting of the remote module.	Set the duplex mode setting on modules to match one another (autonegotiation or forced half-duplex or full-duplex). Refer to <i>Setting 10BASE-T/100BASE-TX Port Modes of Operation</i> on page 14 for information.
		Port on module is defective.	Replace the module.

(Continued on next page)

Table D. Troubleshooting with Rear-Panel Indicators (Continued)

Indicator Color	Meaning	Possible Cause	Corrective Action
RJ-45 10BASE-T/100BASE-TX Port Status LED - Right (Duplex/Collision)			
Amber	Port is set to 10BASE-T full-duplex mode.	—	If 10BASE-T full-duplex operation is desired, no action is required. If 10BASE-T full-duplex operation is not desired, refer to <i>Setting 10BASE-T/100BASE-TX Port Modes of Operation</i> on page 14 for information.
Flashing amber	Port is set to 10BASE-T half-duplex mode and network collision has occurred.*	Normal or excessive collisions occur on a half-duplex link.*	<p>If a normal collision occurs, no action is required.</p> <p>If a problem with the network exists due to excessive collisions, do any of the following as appropriate:</p> <ul style="list-style-type: none"> • If half-duplex mode is not required, set the TX Mode switch to full-duplex mode by means of autonegotiation or by forcing the mode (refer to <i>Setting 10BASE-T/100BASE-TX Port Modes of Operation</i> on page 14 for information). • If half-duplex mode is required, do any of the following as applicable: <ul style="list-style-type: none"> – Replace network cable if it is defective or if it is not the proper cable type. Use Cat5e or higher cable. – Ensure that cable is proper length. Cable length must not exceed 328 feet (100 meters). – Replace the network interface card (NIC) if it is defective or if it is incompatible. – Segment the network.

(Continued on next page)

Table D. Troubleshooting with Rear-Panel Indicators (Continued)

Indicator Color	Meaning	Possible Cause	Corrective Action
RJ-45 10BASE-T/100BASE-TX Port Status LED - Right (Duplex/Collision) (Continued)			
Green	Port is set to 100BASE-TX full-duplex mode.	—	If 100BASE-TX full-duplex operation is desired, no action is required. If 100BASE-TX full-duplex operation is not desired, refer to <i>Setting 10BASE-T/100BASE-TX Port Modes of Operation</i> on page 14 for information.
Flashing green	Port is set to 100BASE-TX half-duplex mode and network collision has occurred.*	Normal or excessive collisions occur on a half-duplex link.*	<p>If a normal collision occurs, no action is required.</p> <p>If a problem with the network exists due to excessive collisions, do any of the following as appropriate:</p> <ul style="list-style-type: none"> • If half-duplex mode is not required, set the TX Mode switch to full-duplex mode by means of auto negotiation or by manually selecting (forcing) the mode (refer to <i>Setting 10BASE-T/100BASE-TX Port Modes of Operation</i> on page 14 for information). • If half-duplex mode is required, do any of the following as applicable: <ul style="list-style-type: none"> – Replace cable if it is defective or if it is not the proper cable type. Use Cat5e or higher cable. – Ensure that cable is proper length. Cable length must not exceed 328 feet (100 meters). – Replace the network interface card (NIC) if it is defective or if it is incompatible. – Segment the network.

(Continued on next page)

Table D. Troubleshooting with Rear-Panel Indicators (Continued)

Indicator Color	Meaning	Possible Cause	Corrective Action
RJ-45 10BASE-T/100BASE-TX Port Status LED - Right (Duplex/Collision) (Continued)			
Not lit	Port is set to 10BASE-T half-duplex mode and no collisions are detected.*	—	If 10BASE-T half-duplex operation is desired, no action is required. If 10BASE-T half-duplex operation is not desired, refer to <i>Setting 10BASE-T/100BASE-TX Port Modes of Operation</i> on page 14 for information.
<p>*A collision is a normal event on a half-duplex Ethernet link. A collision occurs when two or more devices, referred to as stations, attempt to transmit at the same time on a shared physical medium.</p> <p>Ethernet uses the CSMA/CD (Carrier Sense Multiple Access/Collision Detect) media access method by which two or more stations share a common transmission medium. Using CSMA/CD, a station monitors the medium and transmits a message in bit-serial form when it senses that no other station is transmitting. If, after initiating a transmission, the message collides with that of another station, each transmitting station then intentionally transmits for an additional predefined period to ensure propagation of the collision throughout the system. To avoid another collision, each station waits a random amount of time (backoff) before attempting to transmit again.</p> <p>Excessive collisions occur when retransmission of a frame fails after 16 consecutive times and the frame is dropped. Excessive collisions may indicate that the network is becoming congested.</p>			

Specifications

PERFORMANCE

Switch Type	Unmanaged Layer 2
Switch Method	Store and forward
Switch Fabric	Non-head-of-line blocking
Data Rate	10/100 Mbps
Compliance	IEEE 802.3, 802.3u, 802.3x
Interface	Auto MDI/MDI-X
Operating Mode	Half-duplex or full-duplex
Address Table Size	1,024 MAC address entries with automatic learning and aging
Quality of Service	IEEE 802.1p priority, tag-based, 4 queues per port, weighted fair queuing scheduling
Maximum Frame Size	Untagged Ethernet frames up to 1,518 bytes Tagged Ethernet frames up to 1,522 bytes

GENERAL

Operating Temperature	-40° to 167°F (-40° to 75°C)
Input Power Requirements	12 VDC or 24 VAC, 0.50 A
LED Indicators	Power Fiber Redundancy Mode Status 100BASE-FX Port Status (link/activity, FEFL per fiber port) Optic Fault (optic signal/laser status per fiber port) 10BASE-T/100BASE-TX Port Status (2 LEDs per port: link/activity and speed, duplex/collision and speed)
Dimensions	8.75" D x 2.28" W x 4.81" H (22.23 x 5.79 x 12.22 cm)
Unit Weight	2.4 lb (1.09 kg)

MECHANICAL

Connectors	
Rack Power/Alarm	1, 4-pin connector
Stand-Alone Power	1, 2-pin connector, screw terminal
Electrical	5, RJ-45, 10BASE-T/100BASE-TX
Fiber Optic	2, single-fiber ST or SC (-2 models) 2, dual-fiber ST or SC (-4 models)

OPTICAL POWER BUDGET AND MAXIMUM TRANSMISSION DISTANCE

FX82052, -2 Models

Model Number	Number of Fibers	Wavelength (Transmit/Receive)*		Optical Power Budget	Maximum Transmission Distance
		Fiber Port A	Fiber Port B		
Multimode (62.5/125 μm)					
FX82052MSTR-2	2 (1 per port)	1310/850 nm	850/1310 nm	26 dB [†]	2 km (1.2 mi) [‡]
FX82052MSCR-2	2 (1 per port)	1310/850 nm	850/1310 nm	26 dB [†]	2 km (1.2 mi) [‡]
Single-Mode (9/125 μm)					
FX82052SSTR-2	2 (1 per port)	1310/1550 nm	1550/1310 nm	28 dB	46 km (28.6 mi) [§]
FX82052SSCR-2	2 (1 per port)	1310/1550 nm	1550/1310 nm	28 dB	46 km (28.6 mi) [§]
<p>* The FX82052 module is classified by the FDA as a Class 1 laser product. For 850 nm, the Class 1 laser limit is <0.78 mW. For 1310 nm, the Class 1 laser limit is <15.6 mW. For 1550 nm, the Class 1 laser limit is <10.0 mW.</p> <p>[†] When using 50/125 μm multimode fiber, subtract 3 dB from the optical power budget.</p> <p>[‡] Maximum transmission distance is limited by fiber bandwidth.</p> <p>[§] Maximum transmission distance is based on attenuation of 0.5 dB/km plus a 5 dB buffer for connector and splice losses.</p> <p>NOTES:</p> <ul style="list-style-type: none"> • Single-mode FC connectors are available upon request. Contact the factory for additional information. • For conformal coated models, replace the first letter <i>F</i> in the model number with the letter <i>C</i>. The conformal coated version of FX82052MSTR-2, for example, is CX82052MSTR-2. • For models with higher optical power budgets, contact the factory. 					

FX82052, -4 Models

Model Number	Number of Fibers	Wavelength (Transmit/Receive)*		Optical Power Budget	Maximum Transmission Distance
		Fiber Port A	Fiber Port B		
Multimode (62.5/125 μm)					
FX82052MSTR-4	4 (2 per port)	1310/1310 nm	1310/1310 nm	26 dB [†]	6 km (3.7 mi) [‡]
FX82052MSCR-4	4 (2 per port)	1310/1310 nm	1310/1310 nm	26 dB [†]	6 km (3.7 mi) [‡]
Single-Mode (9/125 μm)					
FX82052SSTR-4	4 (2 per port)	1310/1310 nm	1310/1310 nm	28 dB	46 km (28.6 mi) [§]
FX82052SSCR-4	4 (2 per port)	1310/1310 nm	1310/1310 nm	28 dB	46 km (28.6 mi) [§]
<p>* The FX82052 module is classified by the FDA as a Class 1 laser product. For 1310 nm, the Class 1 laser limit is <15.6 mW.</p> <p>[†] When using 50/125 μm multimode fiber, subtract 3 dB from the optical power budget.</p> <p>[‡] Maximum transmission distance is limited by fiber bandwidth.</p> <p>[§] Maximum transmission distance is based on attenuation of 0.5 dB/km plus a 5 dB buffer for connector and splice losses.</p> <p>NOTES:</p> <ul style="list-style-type: none"> • Single-mode FC connectors are available upon request. Contact the factory for additional information. • For conformal coated models, replace the first letter <i>F</i> in the model number with the letter <i>C</i>. The conformal coated version of FX82052MSTR-4, for example, is CX82052MSTR-4. • For models with higher optical power budgets, contact the factory. 					

Appendix. RJ-45 Connector Pinouts

Figure 15 illustrates RJ-45 MDI/MDI-X connector pinouts.

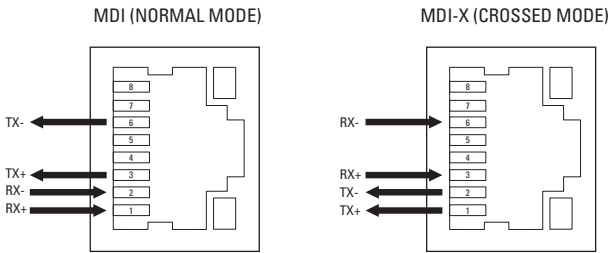



Figure 15. RJ-45 MDI/MDI-X Connector Pinouts

Table E summarizes RJ-45 MDI/MDI-X connector pinouts.

Table E. RJ-45 MDI/MDI-X Connector Pinouts

Pin Number	MDI (Normal Mode)	MDI-X (Crossed Mode)
1	RX+	TX+
2	RX-	TX-
3	TX+	RX+
4	Not used	Not used
5	Not used	Not used
6	TX-	RX-
7	Not used	Not used
8	Not used	Not used

 The materials used in the manufacture of this document and its components are compliant to the requirements of Directive 2002/95/EC.



This equipment contains electrical or electronic components that must be recycled properly to comply with Directive 2002/96/EC of the European Union regarding the disposal of waste electrical and electronic equipment (WEEE). Contact your local dealer for procedures for recycling this equipment.

PRODUCT WARRANTY AND RETURN INFORMATION

WARRANTY

Pelco will repair or replace, without charge, any merchandise proved defective in material or workmanship **for a period of one year** after the date of shipment.

Exceptions to this warranty are as noted below:

- Five years on fiber optic products and TW3000 Series unshielded twisted pair transmission products.
- Three years on Spectra® IV products.
- Three years on Genex® Series products (multiplexers, server, and keyboard).
- Three years on Camclosure® and fixed camera models, except the CC3701H-2, CC3701H-2X, CC3751H-2, CC3651H-2X, MC3651H-2, and MC3651H-2X camera models, which have a five-year warranty.
- Three years on PMCL200/300/400 Series LCD monitors.
- Two years on standard motorized or fixed focal length lenses.
- Two years on Legacy®, CM6700/CM6800/CM9700 Series matrix, and DF5/DF8 Series fixed dome products.
- Two years on Spectra III™, Esprit®, ExSite™, and PS20 scanners, including when used in continuous motion applications.
- Two years on Esprit and WW5700 Series window wiper (excluding wiper blades).
- Two years (except lamp and color wheel) on Digital Light Processing (DLP®) displays. The lamp and color wheel will be covered for a period of 90 days. The air filter is not covered under warranty.
- Eighteen months on DX Series digital video recorders, NVR300 Series network video recorders, and Endura™ Series distributed network-based video products.
- One year (except video heads) on video cassette recorders (VCRs). Video heads will be covered for a period of six months.
- Six months on all pan and tilts, scanners or preset lenses used in continuous motion applications (that is, preset scan, tour and auto scan modes).

Pelco will warrant all replacement parts and repairs for 90 days from the date of Pelco shipment. All goods requiring warranty repair shall be sent freight prepaid to Pelco, Clovis, California. Repairs made necessary by reason of misuse, alteration, normal wear, or accident are not covered under this warranty.

Pelco assumes no risk and shall be subject to no liability for damages or loss resulting from the specific use or application made of the Products. Pelco's liability for any claim, whether based on breach of contract, negligence, infringement of any rights of any party or product liability, relating to the Products shall not exceed the price paid by the Dealer to Pelco for such Products. In no event will Pelco be liable for any special, incidental or consequential damages (including loss of use, loss of profit and claims of third parties) however caused, whether by the negligence of Pelco or otherwise.

The above warranty provides the Dealer with specific legal rights. The Dealer may also have additional rights, which are subject to variation from state to state.

If a warranty repair is required, the Dealer must contact Pelco at (800) 289-9100 or (559) 292-1981 to obtain a Repair Authorization number (RA), and provide the following information:

1. Model and serial number
2. Date of shipment, P.O. number, Sales Order number, or Pelco invoice number
3. Details of the defect or problem

If there is a dispute regarding the warranty of a product which does not fall under the warranty conditions stated above, please include a written explanation with the product when returned.

Method of return shipment shall be the same or equal to the method by which the item was received by Pelco.

RETURNS

In order to expedite parts returned to the factory for repair or credit, please call the factory at (800) 289-9100 or (559) 292-1981 to obtain an authorization number (CA number if returned for credit, and RA number if returned for repair).

All merchandise returned for credit may be subject to a 20% restocking and refurbishing charge.

Goods returned for repair or credit should be clearly identified with the assigned CA or RA number and freight should be prepaid. Ship to the appropriate address below.

If you are located within the continental U.S., Alaska, Hawaii or Puerto Rico, send goods to:

Service Department
Pelco
3500 Pelco Way
Clovis, CA 93612-5699

If you are located outside the continental U.S., Alaska, Hawaii or Puerto Rico and are instructed to return goods to the USA, you may do one of the following:

If the goods are to be sent by a COURIER SERVICE, send the goods to:

Pelco
3500 Pelco Way
Clovis, CA 93612-5699 USA

If the goods are to be sent by a FREIGHT FORWARDER, send the goods to:

Pelco c/o Expeditors
473 Eccles Avenue
South San Francisco, CA 94080 USA
Phone: 650-737-1700
Fax: 650-737-0933

REVISION HISTORY

Manual #	Date	Comments
C2607M-BETA	10/06	Beta version.
C2607M	2/07	Official release.

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