- Available as PXI or PXIe Modules
- Single, Dual, Triple or Quad 2x2 Insert/Bypass Fiber Optic Switch
- Available With Optional Hardware Interlock
- High Density 1 or 2 Slot Width Modules
- FC/APC, FC/PC or SC/PC Connectors
- Small Form Factor Connectors LC or MU (mini SC)
- Single Mode & Multi-Mode Versions
- Long Operating Life, High Repeatability & Temperature Stability
- Fast Switching Time
- LED Indication Included on Specific Models
- Drivers Supplied for Windows & Linux, Plus Support for Real-time Systems
- PXI Versions Supported by PXI or LXI Chassis
- 3 Year Warranty

40-860A Dual Insert/Bypass, FC/APC Connectors, Without Hardware Interlock

40-860A Single Insert/Bypass, FC/PC Connectors, With Hardware Interlock Option

The 40-860A (PXI) and 42-860A (PXIe) are 2x2 insert/bypass MEMS fiber optic switches available in single, dual, triple or quad formats with a choice of different connector styles to suit most applications: FC/APC (for optimal performance), FC/PC and SC/PC for general applications and LC and MU for high density applications.

They use MEMS (Micro-Electro-Mechanical-Systems) based optical switches to route signals between terminals by redirecting the optical signal. This is achieved using micro-mechanical mirrors driven by a highly precise mechanism activated via an electrical control signal.

MEMS (Micro-Electro-Mechanical-Systems) technology offers many advantages over traditional Optical Prism Technology as used in module types 40-810/815/820. MEMS offer similar optical performance but with lower price, higher packing density, faster operate time and much longer operating life.

Pickering can construct custom optical systems to customers precise requirements. We have a large range of electrical switching modules which can form a complete PXI based telecom switching solution.

Applications for these switches can be found in fiber network configuration, fiber optic component test or where optical signal routing is required.

Alternative Optical Switching Products

We also offer larger switching populations and alternative architectures in plug-in module format hosted by our LXI Scalable Chassis. The 65-280 range includes 2x2, 4x4, 5x5, 8x8 and 16x16 optical matrices, and the 65-281 range includes SPST, 2:1, 4:1, 8:1 16:1 and 32:1 optical multiplexers. All configurations are available with single or multi-mode fibre and a choice of connectors.
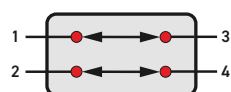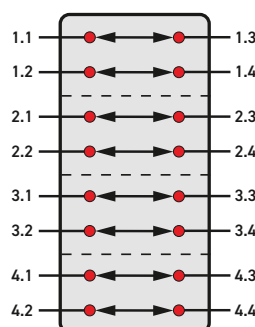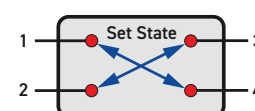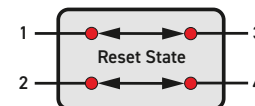
Single
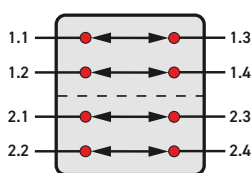
Dual
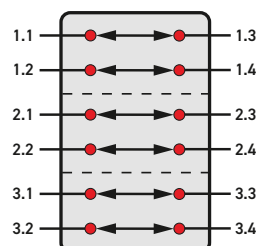
Triple

40/42-860A 2x2 Insert/Bypass Fiber Optic Switch

Quad

Reset State

Set State

Switching Diagram of 2x2 Insert/ Bypass Fiber Optic Switch Showing Set & Reset States

Hardware Interlock

The 40/42-860A modules are available with an optional hardware interlock. The interlock, when activated, will return all optical switches to their default unpowered state (assuming the switches are fully functional) and also provide error notification via the software interface. The interlock feature can be daisy-chained between additional hardware interlock enabled modules for example to allow one signal to disable multiple cards. For further details please refer to the Hardware Interlock section within the user manual.

The hardware interlock feature is not available on 40/42-860A-4xx modules due to the size of the LC connectors.

Note: LED indication is not available for modules with the hardware interlock feature.

Interlock Connector
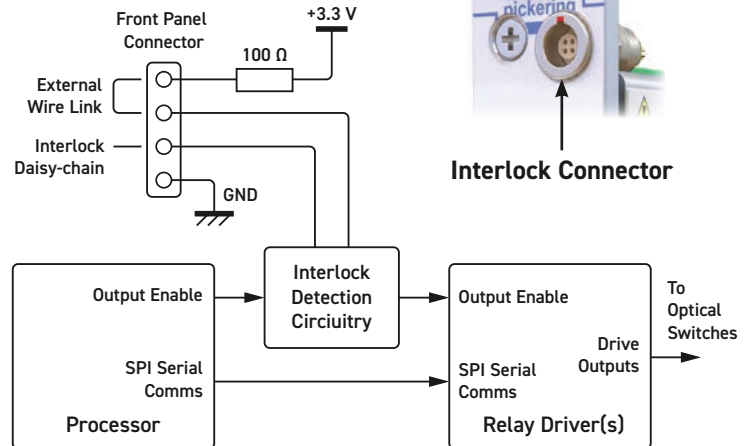
Interlock Signal Routing Diagram for 40/42-860A Versions With Hardware Interlock Option

General Specification (All versions)

Fiber Switch Type:	MEMS
Internal Fiber Type:	SM 9/125
Wavelength:	1240 to 1640 nm
Insertion loss:	0.8 dB Typ
Return loss (APC version):	60 dB Min
Return loss (other versions):	55 dB Min
Polarization dependent loss (PDL):	0.05 dB Max
Repeatability:	±0.01 dB Max
Crosstalk:	-60 dB Max
Optical Input Power:	300 mW Max
Thermal Stability: (-10 to 75 °C insertion loss variation)	0.2 dB Max
Expected Life:	>>10^9 operations
Maximum Switching Time:	1 ms
Cycle Rate:	500/sec

Additional Specification (MM versions)

Fiber Switch Type:	MEMS
Internal Fiber Type:	MM 62.5/125
Wavelength:	700 to 1700 nm
Insertion loss:	0.8 dB Typ
Return loss:	55 dB Min
Polarization dependent loss (PDL):	0.05 dB Max

Power Requirements - 40-860A

+3.3 V	+5 V	+12 V	-12 V
150 mA	300 mA (typ 220 mA)	0	0

Power Requirements - 42-860A

+3.3 V	+12 V
150 mA	TBD

Connectors

40-860A - PXI bus via 32-bit P1/J1 backplane connector.

42-860A - PXIe bus via XJ3 and XJ4 backplane connectors.

Signals via front panel connectors, for connector positions please refer to the operating manual:

- 40/42-860A-0x2   FC/APC connectors
- 40/42-860A-1x2   FC/PC connectors
- 40/42-860A-2x2   SC/PC connectors
- 40/42-860A-3x2   MU (mini SC) connectors
- 40/42-860A-4x2   LC connectors
- 40/42-860A-2x2-M62.5   SC connectors
- 40/42-860A-5x2-M62.5   ST connectors
- Interlock: 1 x 4-pin female 00 series connector* (40/42-860A versions with hardware interlock option)

*Mating half supplied when hardware interlock option ordered.

Other Connector Types

Pickering can manufacture fiber optic switch modules with other connector types, please contact sales office for further information.

Mechanical Characteristics

40-860A - 3 U PXI (CompactPCI card). Single or dual slot as indicated in Product Order Codes.

42-860A - 3 U PXIe, compatible with PXIe hybrid slot. Single or dual slot as indicated in Product Order Codes.

Module weight: 420 g (40-860A-222).

3D models for all versions in a variety of popular file formats are available on request.

PXI & CompactPCI Compliance - 40-860A

The module is compliant with the PXI Specification 2.2. Local Bus, Trigger Bus & Star Trigger are not implemented. Uses a 33 MHz 32-bit backplane interface.

PXIe Compliance - 42-860A

The module is compliant with the PXIe Specification 1.0. Local Bus, Trigger Bus & Star Trigger are not implemented.

Safety & CE Compliance

All modules are fully CE compliant and meet applicable EU directives: Low-voltage safety EN61010-1:2010, EMC Immunity EN61326-1:2013, Emissions EN55011:2009+A1:2010.

Operating/Storage Conditions

Operating Conditions

Operating Temperature:	0 °C to +55 °C
Humidity:	Up to 90 % non-condensing
Altitude:	5000 m

Storage and Transport Conditions

Storage Temperature:	-20 °C to +75 °C
Humidity:	Up to 90 % non-condensing
Altitude:	15000 m

Product Order Codes - 2x2 Insert/Bypass Fiber Optic Switches Without Hardware Interlock

		Connector Type	PXI/PXIe Slots	Fiber Type	
				Single-Mode 9/125	Multi-Mode 62.5/125
Single 2 Channel MUX	PXI	FC/APC	1	40-860A-012	—
		FC/PC	1	40-860A-112	—
		SC/PC	1	40-860A-212	—
		MU (mini SC)	1	40-860A-312	—
		LC	1	40-860A-412	—
		SC	1	—	40-860A-212-M62.5
		ST	1	—	40-860A-512-M62.5
	PXIe	FC/APC	1	42-860A-212	—
		FC/PC	1	42-860A-112	—
		SC/PC	1	42-860A-212	—
		MU (mini SC)	1	42-860A-312	—
		LC	1	42-860A-412	—
		SC	1	—	42-860A-212-M62.5
		ST	1	—	42-860A-512-M62.5
Dual 2 Channel MUX	PXI	FC/APC	2	40-860A-022	—
		FC/PC	2	40-860A-122	—
		SC/PC	2	40-860A-222	—
		MU (mini SC)	1	40-860A-322	—
		LC	1	40-860A-422	—
		SC	2	—	40-860A-222-M62.5
		ST	2	—	40-860A-522-M62.5
	PXIe	FC/APC	2	42-860A-222	—
		FC/PC	2	42-860A-122	—
		SC/PC	2	42-860A-222	—
		MU (mini SC)	1	42-860A-322	—
		LC	1	42-860A-422	—
		SC	2	—	42-860A-222-M62.5
		ST	2	—	42-860A-522-M62.5
Triple 2 Channel MUX	PXI	MU (mini SC)	2	40-860A-332	—
		LC	2	40-860A-432	—
	PXIe	MU (mini SC)	2	42-860A-332	—
		LC	2	42-860A-432	—
Quad 2 Channel MUX	PXI	MU (mini SC)	2	40-860A-342	—
		LC	2	40-860A-442	—
	PXIe	MU (mini SC)	2	42-860A-342	—
		LC	2	42-860A-442	—

Product Order Codes - 2x2 Insert/Bypass Fiber Optic Switches With Hardware Interlock

		Connector Type	PXI/PXIe Slots	Fiber Type Single-Mode 9/125	Multi-Mode 62.5/125
Single 2 Channel MUX	PXI	FC/APC	1	40-860A-012-HI	—
		FC/PC	1	40-860A-112-HI	—
		SC/PC	1	40-860A-212-HI	—
		MU (mini SC)	1	40-860A-312-HI	—
		SC	1	—	40-860A-212-M62.5-HI
		ST	1	—	40-860A-512-M62.5-HI
	PXIe	FC/APC	1	42-860A-212-HI	—
		FC/PC	1	42-860A-112-HI	—
		SC/PC	1	42-860A-212-HI	—
		MU (mini SC)	1	42-860A-312-HI	—
		SC	1	—	42-860A-212-M62.5-HI
		ST	1	—	42-860A-512-M62.5-HI
Dual 2 Channel MUX	PXI	FC/APC	2	40-860A-022-HI	—
		FC/PC	2	40-860A-122-HI	—
		SC/PC	2	40-860A-222-HI	—
		MU (mini SC)	1	40-860A-322-HI	—
		SC	2	—	40-860A-222-M62.5-HI
		ST	2	—	40-860A-522-M62.5-HI
	PXIe	FC/APC	2	42-860A-222-HI	—
		FC/PC	2	42-860A-122-HI	—
		SC/PC	2	42-860A-222-HI	—
		MU (mini SC)	1	42-860A-322-HI	—
		SC	2	—	42-860A-222-M62.5-HI
		ST	2	—	42-860A-522-M62.5-HI
Triple 2 Channel MUX	PXI	MU (mini SC)	2	40-860A-332-HI	—
	PXIe	MU (mini SC)	2	42-860A-332-HI	—
Quad 2 Channel MUX	PXI	MU (mini SC)	2	40-860A-342-HI	—
	PXIe	MU (mini SC)	2	42-860A-342-HI	—

Product Customization

Pickering modules are designed and manufactured on our own flexible manufacturing lines, giving complete product control and enabling simple customization to meet very specific requirements.

Customization can include:

- Alternative fiber types
- Alternative connector types
- Alternative number of channels
- Different performance specifications

All customized products are given a unique part number, fully documented and may be ordered at any time in the future. Please contact your local sales office to discuss.

Support Products

Interlock Connectors

For modules with the hardware interlock option (40/42-860A-xx2-HI) spare/replacement connectors can be ordered.

Product	Description
44-961-040	Connector with internal link (replacing that supplied with the module).
44-960-040	Connector only, no internal wiring.

42-860A Fiber Optic Multiplexer Module in PXIe Format

Chassis Compatibility

The PXI versions of this module must be used in a suitable chassis. They are compatible with the following chassis types:

- All chassis conforming to the 3U PXI and 3U Compact PCI (cPCI) specification
- Legacy and Hybrid Peripheral slots in a 3U PXI Express (PXIe) chassis
- Pickering Interfaces LXI or LXI/USB Modular Chassis

The PXIe versions of this module are compatible with the following chassis types:

- All chassis conforming to the 3U PXIe specification
- PXIe and Hybrid Peripheral slots in a 3U PXI Express (PXIe) chassis

Chassis Selection Guide

Standard PXI or hybrid PXIe Chassis from any Vendor:

- Mix our 1000+ PXI switching & simulation modules with any vendor's PXI instrumentation
- Embedded or remote Windows PC control
- Real-time Operating System Support
- High data bandwidths, especially with PXI Express
- Integrated module timing and synchronization

Pickering LXI or LXI/USB Modular Chassis—only accept our 1000+ PXI Switching & Simulation Modules:

- Ethernet or USB control enables remote operation
- Low-cost control from practically any controller
- LXI provides manual control via Web browsers
- Driverless software support
- Power sequencing immunity
- Ethernet provides chassis/controller voltage isolation
- Independence from Windows operating system
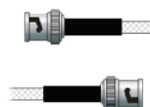
Connectivity Solutions

We provide a full range of supporting cable and connector solutions for all our switching products—20 connector families with 1200+ products. We offer everything from simple mating connectors to complex cables assemblies and terminal blocks. All assemblies are manufactured by Pickering and are guaranteed to mechanically and electrically mate to our modules.

Connectors & Backshells   **Multiway Cable Assemblies**   **RF Cable Assemblies**   **Connector Blocks**

We also offer customized cabling and have a free online **Cable Design Tool** that can be used to create custom cable solutions for many applications. Visit: pickeringtest.com/cdt to start your design.

Mass Interconnect

We recommend the use of a mass interconnect solution when an Interchangeable Test Adapter (ITA) is required for a PXI or LXI based test system. Our modules are fully supported by both Virginia Panel and MacPanel.

Pickering Reed Relays

We are the only switch provider with in-house reed relay manufacturing capability via our Relay Division. These instrument grade reed relays feature *SoftCenter™* technology, ensuring long service life and repeatable contact performance. To learn more, please go to: pickeringrelay.com

pickering

pickeringtest.com

Programming

Pickering provide kernel, IVI and VISA (NI & Keysight) drivers which are compatible with all Microsoft supported versions of Windows and popular older versions. For a list of all supporting operating systems, please see: pickeringtest.com/os

The VISA driver support is provided for LabVIEW Real Time Operating Systems (Pharlap and Linux-RT). For other RTOS support contact Pickering. These drivers may be used with a variety of programming environments and applications including:

- **Pickering Interfaces Switch Path Manager**
- **National Instruments** products (LabVIEW, LabWindows/CVI, Switch Executive, MAX, TestStand, VeriStand, etc.)
- **Microsoft Visual Studio** products (Visual Basic, Visual C++)
- **Programming Languages** C, C++, C#, Python
- **Keysight** VEE and OpenTAP
- **Mathworks** Matlab
- **Marvin** ATEasy
- **MTQ Testsolutions** Tecap Test & Measurement Suite

Drivers for popular Linux distributions are available, other environments are also supported, please contact Pickering with specific enquiries. We provide Soft Front Panels (SFPs) for our products for familiarity and manual control, as well as comprehensive documentation and example programs to help you develop test routines with ease.

To learn more about software drivers and development environments, please go to: pickeringtest.com/software

Signal Routing Software

Our signal routing software, Switch Path Manager, automatically selects and energizes switch paths through Pickering switching systems. Signal routing is performed by simply defining test system endpoints to be connected together, greatly accelerating Test System software development. To learn more, please go to: pickeringtest.com/spm
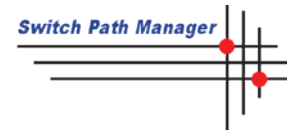
Diagnostic Relay Test Tools

eBIRST Switching System Test Tools are designed specifically for our PXI, PCI or LXI products, these tools simplify switching system fault-finding by quickly testing the system and graphically identifying the faulty relay.

To learn more, please go to: pickeringtest.com/ebirst

Three Year Warranty & Guaranteed Long-Term Support

All standard products manufactured by Pickering Interfaces are warranted against defective materials and workmanship for a period of three years from the date of delivery to the original purchaser. Extended warranty and service agreements are available for all our modules and systems with various levels to suit your requirements. Although we offer a 3-year warranty as standard, we also include guaranteed long-term support—with a history of supporting our products for typically 15-20 years. To learn more, please go to: pickeringtest.com/support

Available Product Resources

We have a large library of product resources including success stories, product and support videos, articles and white papers as well as application specific product brochures to assist when looking for the switching, simulation and connection solutions you need. We also have handy reference books on Switching Technology and for the PXI and LXI standards.

To view, download or request any of our product resources, please visit: pickeringtest.com/resources