

- Matrix, SPST, Multiplexer or Insert/Bypass Options
- FC/APC, FC/PC, SC/PC, ST or LC Connectors
- Single Mode & Multi-Mode Versions
- Long Operating Life, High Repeatability & Temperature Stability
- Fast Switching Time
- Built-In Scan List Sequence Stores With Triggering Capability
- Fully Compliant to 1.5 LXI Standard
- 3 Year Warranty



The 65-280 and 65-281 ranges offer matrix & insert/bypass or multiplexer & SPST topologies respectively with all models based on MEMS fiber optic switches and available in various populations per plugin. In addition, a choice of different connector styles to suit most applications is offered: FC/APC (for optimal performance), FC/PC, SC/PC and ST for general applications and LC 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 micromechanical mirrors driven by a highly precise mechanism activated via an electrical control signal.

To provide further flexibility, options using single mode (9/125 μm) and multimode (62.5/125 μm & 50/125 μm) fibre are available.

MEMS (Micro-Electro-Mechanical-Systems) technology offers many advantages over traditional Optical Prism Technology but with lower price, higher packing density, faster operate time and much longer operating life.

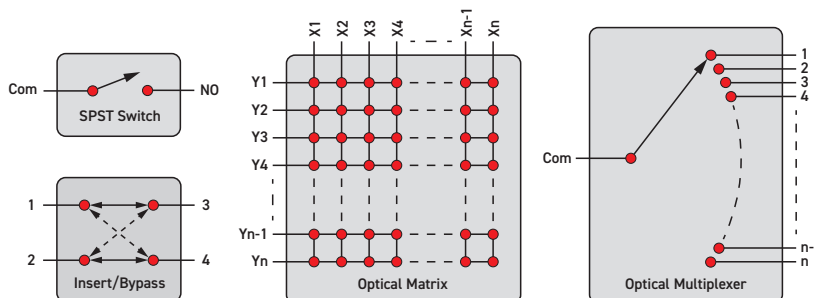
Pickering can construct custom optical systems to customers precise requirements. We have a large range of electrical switching modules which can form a complete PXI/PXIe or LXI based switching solution.

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

### Configuring the System

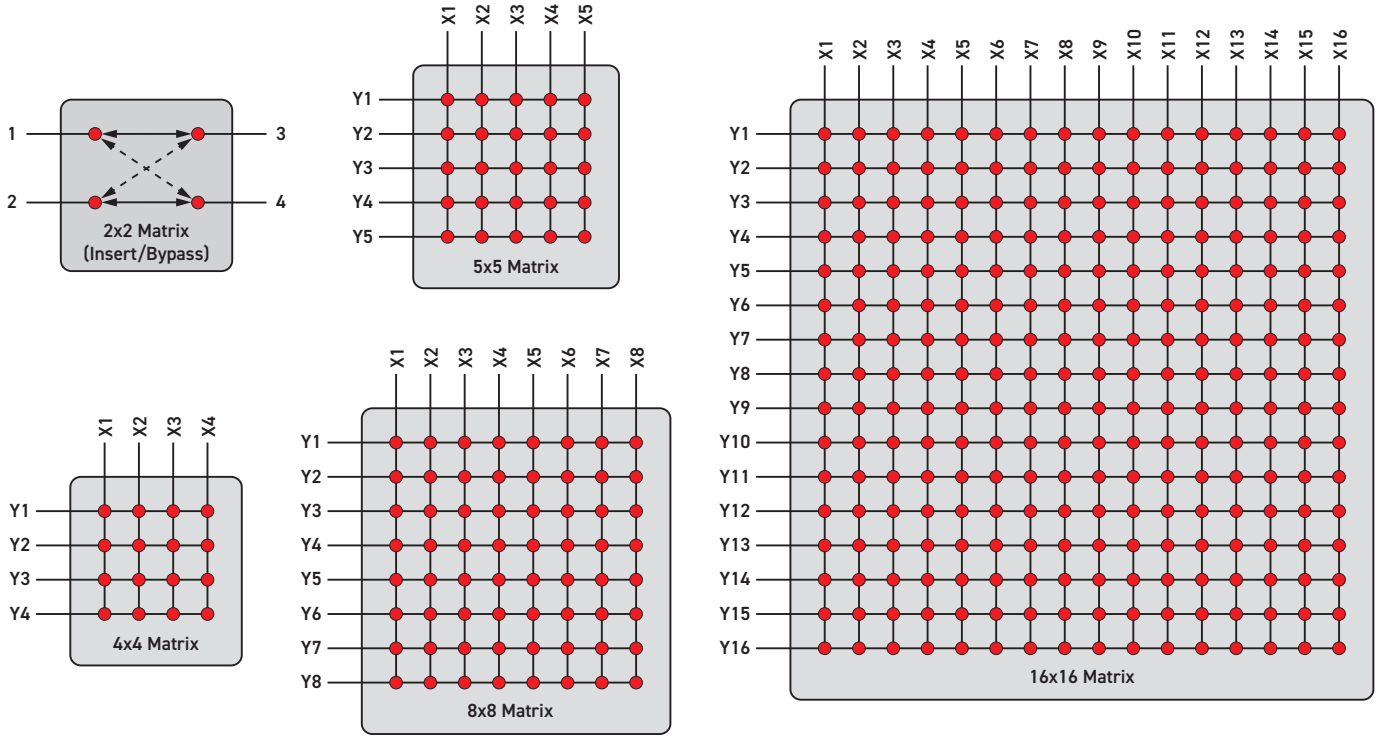
To select the parts to create a switching solution simply:

- Specify a 65-200-002 LXI Scalable Chassis.
- Add matrix or multiplexer Plugin Modules with a mix of sizes as required for your application.

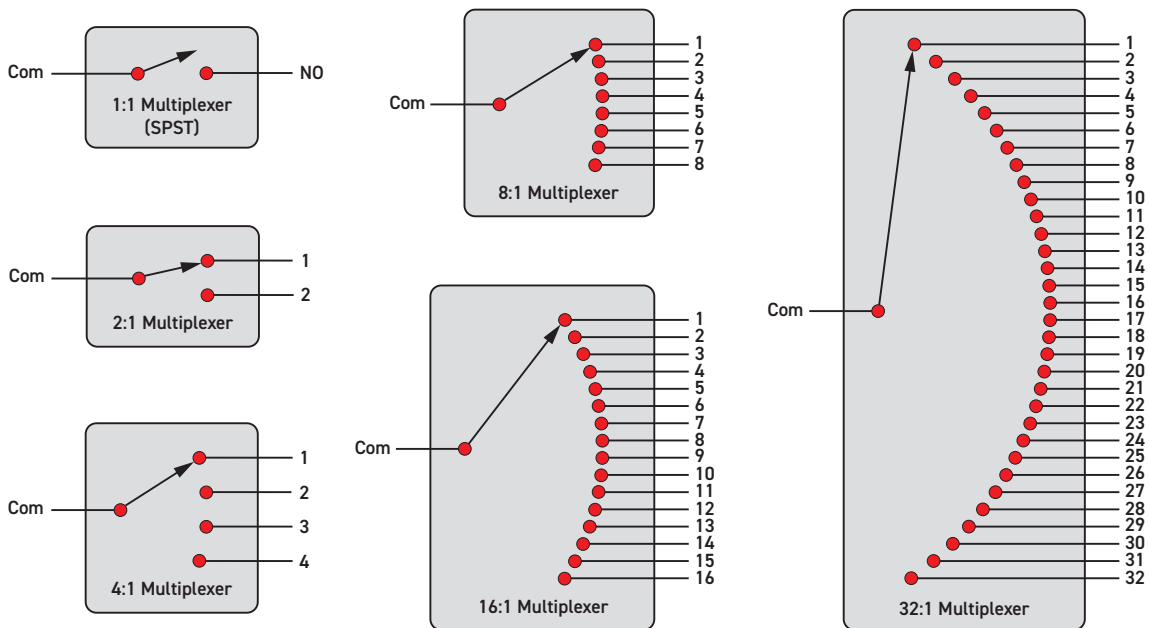


The 65-280/281 Range is Available as Insert/Bypass Switches & Matrix Configurations up to 16x16 or SPST Switches & Multiplexers up to 32:1

65-280/281 Fiber Optic Matrix/ Multiplexer Plugin Module Range:		
Configuration	Size	No. of Banks
Insert/Bypass	2x2	1 to 6
Matrix	4x4	1 or 2
Matrix	5x5	1 or 2
Matrix	8x8	1
Matrix	16x16	1
SPST	1:1	1 to 8
Multiplexer	2:1	1 to 8
Multiplexer	4:1	1 to 4
Multiplexer	8:1	1 or 2
Multiplexer	16:1	1
Multiplexer	32:1	1



65-280 Fiber Optic Matrix Configurations



65-281 Fiber Optic Multiplexer Configurations

## General Specification - Insert/Bypass Switch

<b>Single-Mode Versions:</b>	
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 <sup>9</sup> operations
Maximum Switching Time:	1 ms
Cycle Rate:	500/sec
<b>Additional Specification Multi-Mode Versions:</b>	
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

## General Specification - Matrix

<b>Single-Mode Versions:</b>	
Fiber Switch Type:	MEMS
Internal Fiber Type:	SM 9/125
Wavelength:	1240 to 1640 nm
Insertion loss:	1.5 dB Typ (4x4) 1.8 dB Typ (5x5) 1.8 dB Typ (8x8) 3.7 dB Typ (16x16)
Return loss (APC version):	60 dB Min
Return loss (other versions):	55 dB Min
Polarization dependent loss (PDL):	0.2 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 <sup>9</sup> operations
Maximum Switching Time:	10 ms
Cycle Rate:	500/sec
<b>Additional Specification Multi-Mode Versions:</b>	
Fiber Switch Type:	MEMS
Internal Fiber Type:	MM 62.5/125
Wavelength:	700 to 1700 nm
Insertion loss:	1.5 dB Typ (4x4) 1.8 dB Typ (5x5) 1.8 dB Typ (8x8) 3.7 dB Typ (16x16)
Return loss:	55 dB Min
Polarization dependent loss (PDL):	0.2 dB Max

## General Specification - SPST & Multiplexer

<b>Single-Mode Versions:</b>	
Fiber Switch Type:	MEMS
Internal Fiber Type:	SM 9/125
Wavelength:	1240 to 1640 nm
Insertion loss:	0.5 dB Typ (SPST) 0.8 dB Typ (2:1) 1 dB Typ (4:1) 1.5 dB Typ (8:1) 1.9 dB Typ (16:1) 2.8 dB Typ (32:1)
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 <sup>9</sup> operations
Maximum Switching Time:	1 ms
Cycle Rate:	500/sec
<b>Additional Specification Multi-Mode Versions:</b>	
Fiber Switch Type:	MEMS
Internal Fiber Type:	MM 62.5/125 or 50/125
Wavelength:	700 to 1700 nm
Insertion loss:	0.5 dB Typ (SPST) 0.8 dB Typ (2:1) 1 dB Typ (4:1) 1.5 dB Typ (8:1) 1.9 dB Typ (16:1) 2.8 dB Typ (32:1)
Return loss:	55 dB Min
Polarization dependent loss (PDL):	0.05 dB Max

## Mechanical Specification

Chassis Dimensions:	2 U rack mountable full width, depth 500 mm.
Number of Plugins Supported:	6 in 65-200-002 chassis Note: Chassis loading is dependent on mux/matrix size and connector type, refer to selection tables for details.
<b>Plugin Weight</b>	
Plugin (unloaded):	465 g
1:1 MUX plus 2 Connectors:	32 g
2:1 MUX plus 3 Connectors:	43 g
4:1 MUX plus 5 Connectors:	110 g
8:1 MUX plus 9 Connectors:	280 g
16:1 MUX plus 17 Connectors:	470 g
32:1 MUX plus 33 Connectors:	820 g
2x2 Matrix plus 4 Connectors:	53 g
4x4 Matrix plus 8 Connectors:	290 g
5x5 Matrix plus 10 Connectors:	310 g
8x8 Matrix plus 16 Connectors:	380 g
16x16 Matrix plus 32 Connectors:	750 g
Plugin Connectors:	FC/APC, FC/PC, SC/PC, ST or LC optical connectors*
Trigger Connector:	25-pin male micro D-type
Cooling:	Front air intakes through plugin module holes, temperature controlled speed adjustable fans.

\* Not all connector combinations are available for every switch topology, please contact your local sales office to review your requirements.

## Power Source - Chassis

Universal AC mains supply, 90-120/200-240 V 50-60 Hz.

Power Inlet:	Male IEC connector
Power Rating:	100 VA maximum
Fuse Rating:	(F) 5 A 250 V

## LAN Interface - Chassis

1000Base-T Ethernet Interface with a standard RJ-45 connector mounted on the rear panel. Compliant to LXI Standard 1.5

## LXI Status Indicators - Chassis

Front panel mounted LEDs:

- Power
- Ready
- Error
- LAN
- Active

## Cooling - Chassis

Fan assisted cooling, front air intakes and rear exhaust.

## Triggering

- 16x Software Configurable Bidirectional Open Collector Triggers
- 1x Dedicated Software Reset Line
- 1x Dedicated Software Fault Line
- 1x Dedicated Interlock Line

## Scan List Sequencing

Capable of storing 5000 predefined test sequences, loaded from the host Controller to the LXI unit at process initialization, with the ability to be triggered through software or from any of the sixteen software configurable triggers.

For more information on the Pickering Sequence Manager, please go to: [pickering-sequence-manager](#)

## Operating/Storage Conditions

Operating Temperature:	0 °C to +55 °C
Humidity:	Up to 90 % non-condensing
Altitude:	5000 m
Storage Temperature:	-20 °C to +75 °C
Humidity:	Up to 90 % non-condensing
Altitude:	15000 m

## 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.

## Product Order Codes

Specify which modules are required to build the matrix, Pickering Interfaces will supply the chassis with the modules installed if ordered at the same time. Plugin modules can be ordered for chassis already supplied.

### Chassis

2U LXI Scalable Chassis, 6-Slot	65-200-002
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### Plugin Modules

(see order code breakdown on the following page)

MEMS Fiber Optical Matrix	65-280-ABC-DEF
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MEMS Fiber Optical Multiplexer	65-281-ABC-DEF
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The 65-280/281 range is part of a growing family of Scalable Switching systems available from Pickering Interfaces. Illustrated is the LXI 65-219 Modular 2 Amp Matrix, available in sizes up to 60x40.

## Product Customization

Pickering products 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 relay types
- Mixture of relay types
- Alternative number of relays
- 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.

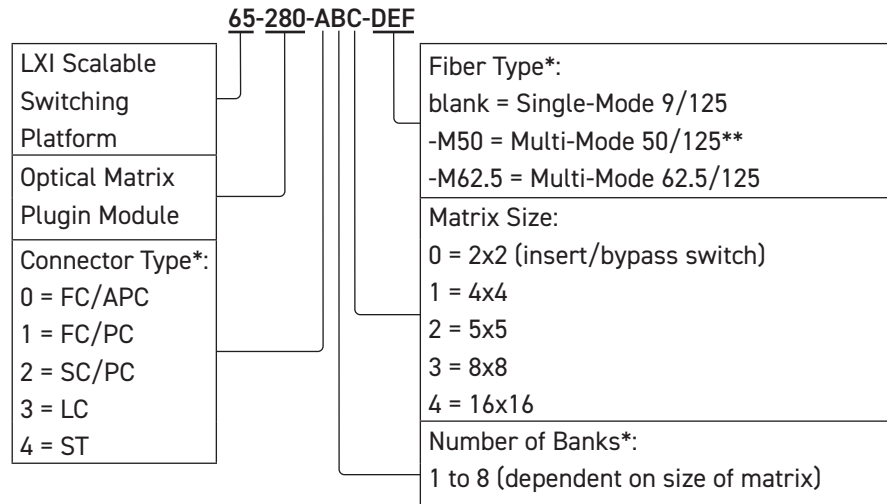


Available from Pickering are the 60-102C and 60-103B 7 & 18 slot LXI Modular Chassis. These are capable of hosting any of our range of PXI switching and programmable resistor modules under LXI control via a Gigabit Ethernet interface. Also available are the 60-104, 60-105 & 60-106 USB/LXI Modular Chassis with 2, 4 & 6 slots which include USB as well as Ethernet control.



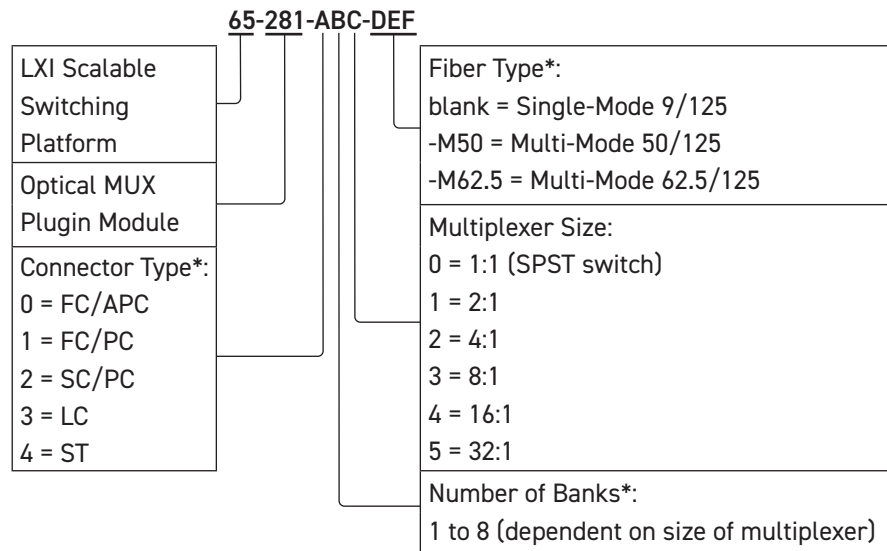
**65-280-322 Optical Plugin Module  
(Dual 5x5 Matrix With LC Connectors)**

## Order Code Breakdown - Matrix



Example: **65-280-322-M62.5** (dual 5x5 optical matrix plugin with LC connectors and multi-mode 62.5/125 fiber).

## Order Code Breakdown - Multiplexer



Example: **65-281-014** (single 16:1 optical multiplexer plugin module with FC/APC connectors and single-mode 9/125 fiber).

\* Not all combinations are available for every switch topology, please refer to the following tables or contact your local sales office to review your requirements.

\*\* Not available for 2x2 variants.

## Matrices - Permissible Connector Type / Maximum Bank Combinations

Due to the varying sizes of the available fiber connector options, maximum matrix bank counts apply for a given connector. This is outlined in the following tables as well as the slot size for each connector / bank combination

### 2x2 Matrix (Insert/Bypass)

Connector Type	Plugin Height	Maximum No. of Banks	No. of Connectors	Part Number
FC/APC	One Slot	4	16	65-280-040
FC/PC		4	16	65-280-140
SC/PC		3	12	65-280-230
LC		6	24	65-280-360
ST		3	12	65-280-430

### 4x4 Matrix

Connector Type	Plugin Height	Maximum No. of Banks	No. of Connectors	Part Number
FC/APC	One Slot	2	16	65-280-021
FC/PC		2	16	65-280-121
SC/PC		1	8	65-280-211
LC		2	16	65-280-321
ST		1	8	65-280-411

### 5x5 Matrix

Connector Type	Plugin Height	Maximum No. of Banks	No. of Connectors	Part Number
FC/APC	One Slot	1	10	65-280-012
FC/PC		1	10	65-280-112
SC/PC		1	10	65-280-212
LC		2	20	65-280-322
ST		1	10	65-280-412

### 8x8 Matrix

Connector Type	Plugin Height	Maximum No. of Banks	No. of Connectors	Part Number
FC/APC	One Slot	1	16	65-280-013
FC/PC		1	16	65-280-113
SC/PC	Two Slots	1	16	65-280-213
LC	One Slot	1	16	65-280-313
ST	Two Slots	2	32	65-280-423

### 16x16 Matrix

Connector Type	Plugin Height	Maximum No. of Banks	No. of Connectors	Part Number
FC/APC	Two Slots	1	32	65-280-014
FC/PC		1	32	65-280-114
SC/PC	Three Slots	1	32	65-280-214
LC	Two Slots	1	32	65-280-314
ST		1	32	65-280-414



## Multiplexers - Permissible Connector Type / Maximum Bank Combinations

Due to the varying sizes of the available fiber connector options, maximum multiplexer bank counts apply for a given connector. This is outlined in the following tables as well as the slot size for each connector / bank combination

### 1:1 Multiplexer (SPST)

Connector Type	Plugin Height	Maximum No. of Banks	No. of Connectors	Part Number
FC/APC	One Slot	8	16	65-281-080
FC/PC		8	16	65-281-180
SC/PC		6	12	65-281-260
LC		8	16	65-281-380
ST		6	12	65-281-460

### 2:1 Multiplexer

Connector Type	Plugin Height	Maximum No. of Banks	No. of Connectors	Part Number
FC/APC	One Slot	6	18	65-281-061
FC/PC		6	18	65-281-161
SC/PC		4	12	65-281-241
LC		8	24	65-281-381
ST		4	12	65-281-441

### 4:1 Multiplexer

Connector Type	Plugin Height	Maximum No. of Banks	No. of Connectors	Part Number
FC/APC	One Slot	3	15	65-281-032
FC/PC		3	15	65-281-132
SC/PC		2	10	65-281-222
LC		4	20	65-281-342
ST		2	10	65-281-422

### 8:1 Multiplexer

Connector Type	Plugin Height	Maximum No. of Banks	No. of Connectors	Part Number
FC/APC	One Slot	2	18	65-281-023
FC/PC		2	18	65-281-123
SC/PC		1	9	65-281-213
LC		2	18	65-281-323
ST		1	9	65-281-413

### 16:1 Multiplexer

Connector Type	Plugin Height	Maximum No. of Banks	No. of Connectors	Part Number
FC/APC	One Slot	1	17	65-281-014
FC/PC		1	17	65-281-114
SC/PC	Two Slots	1	17	65-281-214
LC	One Slot	1	17	65-281-314
ST	Two Slots	1	17	65-281-414

### 32:1 Multiplexer

Connector Type	Plugin Height	Maximum No. of Banks	No. of Connectors	Part Number
FC/APC	Two Slots	1	33	65-281-015
FC/PC		1	33	65-281-115
SC/PC	Three Slots	1	33	65-281-215
LC	Two Slots	1	33	65-281-315
ST	Three Slots	1	33	65-281-415

## Sequencing Service and Triggering

The Sequencing service provides the user with the ability to set a series of pre-determined sequences on an LXI instrument. These sequences can be triggered by software or one of the sixteen software configurable open collector triggers.

As the operations are grouped together, it will minimize the number of control transactions required to achieve a composite change of target switch state, condensing multiple operations in a single sub unit into a single operation, thus reducing the overall system switch settling time.

For example, if a user wants to operate X1-Y1, X4-Y1, X2-Y2, in the first sequence, only one operation, and so delay, will be used.

Additionally, as the switch state sequences are stored within the LXI controller itself, the burden on the Host CPU and Ethernet traffic is greatly reduced, and so the overall system latency is also reduced.

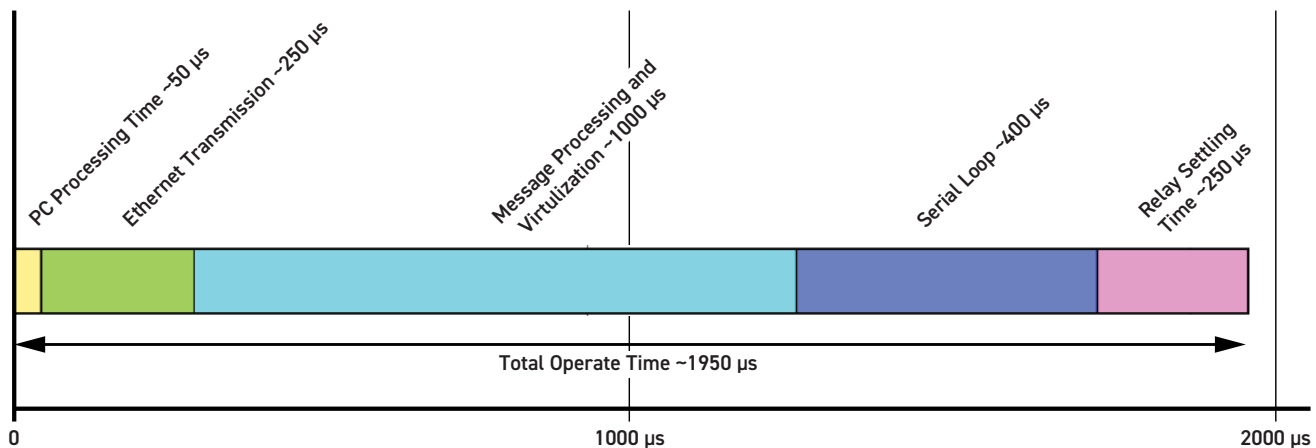
This unit features a software reset line which provides the ability for a user supplied reset to be applied to the unit, triggering a software reset of the relays, returning all relays in the unit to their default state. There is also a software fault line available that will be triggered if there is any error detected within the unit. Please note that while these reset and fault lines use dedicated physical connections to the unit, they are software control lines and as such should not be used for safety interlocks etc.

## Speed of Operation

Speed of Operation can be important when defining systems for test applications, therefore it can be beneficial to understand all the necessary overhead delays associated with a switch operation.

If we consider a single relay / block relay operation, it can be considered to be a combination of five discrete operations: PC Processing, Ethernet Latency, LXI Processing / Virtualisation, Serial Loop Transmission and Relay Settling.

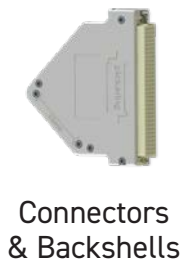
A representation of these processes can be seen in the diagram below.



**Example Speed of Operation Diagram For Reed Relay Based Solution**  
 Note: These are estimated figures, PC processing and Ethernet transmission times may vary depending upon the overall system setup and load.

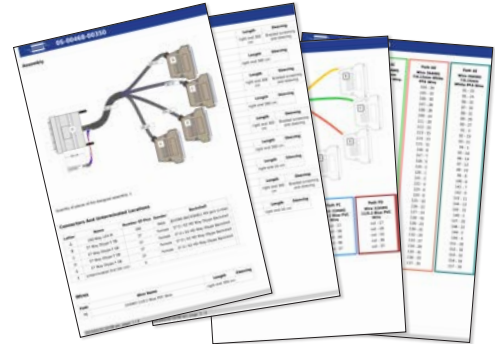
## Connectivity Solutions

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. These accessories are detailed in Connector Accessories data sheets, where a complete list and documentation can be found for each accessory.



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.

- Fully supported on modern browsers and tablet operating systems.
- Built-in tutorials and videos allow you to get quickly up to speed.
- Store cable assemblies in the Cloud and develop over time.
- Each cable design has a downloadable PDF documentation file detailing all specifications



Start designing your custom cabling, go to [pickeringtest.com/cdt](http://pickeringtest.com/cdt)

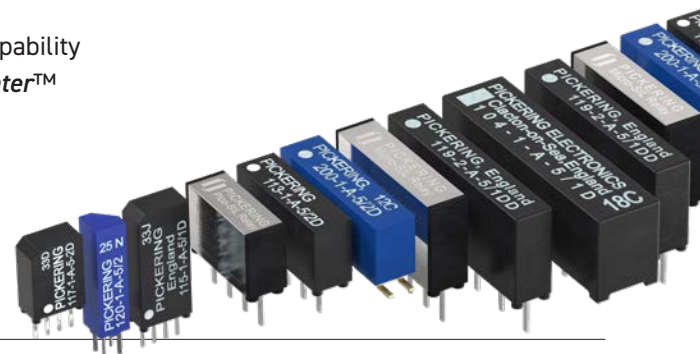
## Mass Interconnect

We recommend the use of a mass interconnect solution when an Interchangeable Test Adapter (ITA) is required for PXI/LXI based test systems. Our modules are fully supported by 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 go to [pickeringrelay.com](http://pickeringrelay.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 more information go to [pickeringtest.com/os](http://pickeringtest.com/os)

The VISA driver is also compatible with Real-Time Operating Systems such as LabVIEW 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++)
- Keysight VEE and OpenTAP
- Mathworks MATLAB, Simulink
- Marvin ATEasy
- MTQ Testsolutions Tecap Test & Measurement Suite
- Python

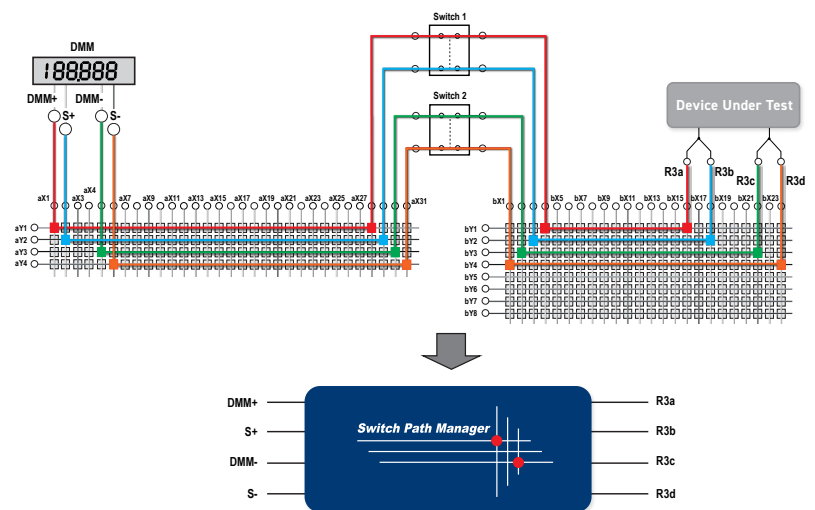
Drivers for popular Linux distributions are available, other environments are also supported, please contact Pickering with specific enquiries. We provide Soft Front Panels (SFPs) for our products for familiarity and manual control, as well as comprehensive documentation and example programs to help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

To learn more about software drivers and development environments go to [pickeringtest.com/software](http://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 go to [pickeringtest.com/spm](http://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 go to [pickeringtest.com/ebirst](http://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 three years from the date of delivery to the original purchaser. Extended warranty and service agreements are available with various levels for 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 go to [pickeringtest.com/support](http://pickeringtest.com/support)

## Available Product Resources

We have a library of resources including success stories, product and support videos, articles and white papers as well as application-specific brochures to assist you. We have also published reference books on switching technology and the PXI and LXI standards.

To view, download or request any of our product resources go to [pickeringtest.com/resources](http://pickeringtest.com/resources)

