

- Modular Matrix Design
- Switched Guard for Maximum Isolation Resistance - up to $10^{12} \Omega$
- Scalable in X and Y Using Loop-Thru Connectivity
- Uses Custom High Quality Pickering Ruthenium Reed Relays
- Built-In Scan List Sequence Stores With Triggering Capability
- Fully Compliant to 1.5 LXI Standard
- 3 Year Warranty



The 65-290 is a modular matrix platform that provides a switched guard relay matrix solution with up to $10^{12} \Omega$ channel to channel and channel to ground isolation.

Matrices are created by populating a 65-200 chassis with plug-in modules that provide access to the X and Y axis on MMCX jacks. Users can specify as many or as few plug-in modules as they require and can field upgrade the chassis to extend the matrix. Larger matrices are formed by utilising the front panel loop-thru connectors for expansion in both the X and Y axis.

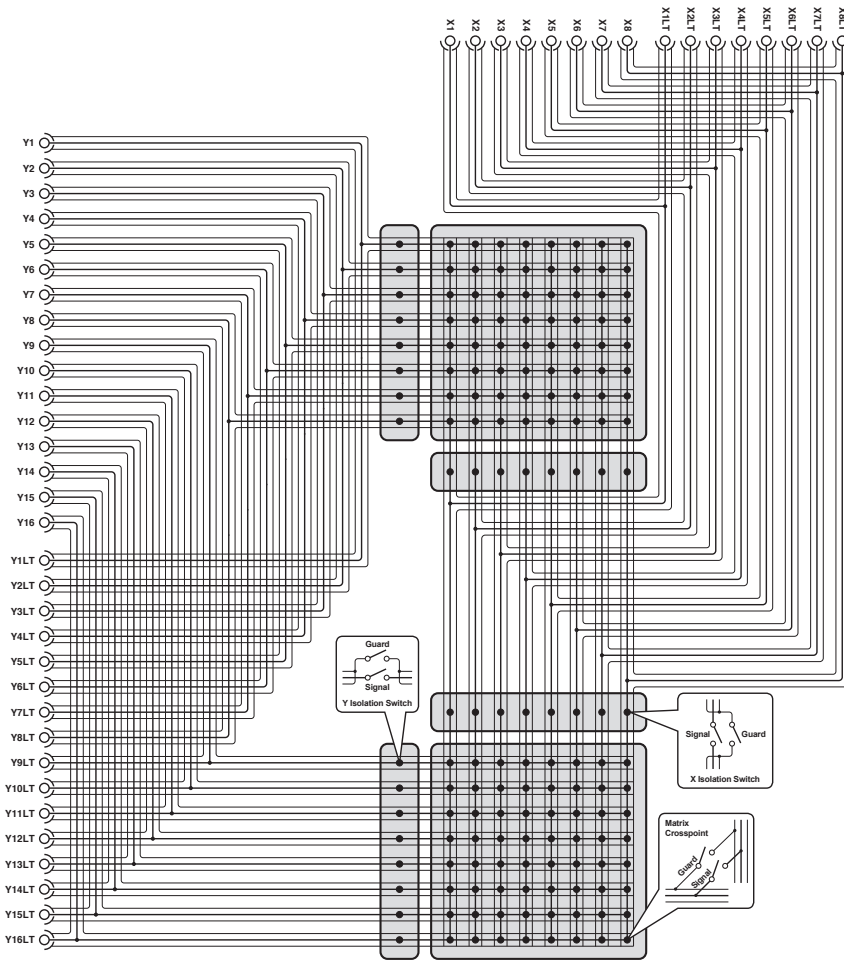
The chassis supports up to 6 plug-in modules which are loaded into the chassis via the front panel, greatly improving flexibility and ease of maintenance.

Cooling for the 65-200 is provided by rear fans and front air intakes ensuring no wasted space when the chassis is rack mounted. The cooling system is adaptive, ensuring the acoustic noise is minimised when used in quiet laboratory environments and low load conditions.

Configuring the Matrix

To select the parts that you need to create a matrix simply:

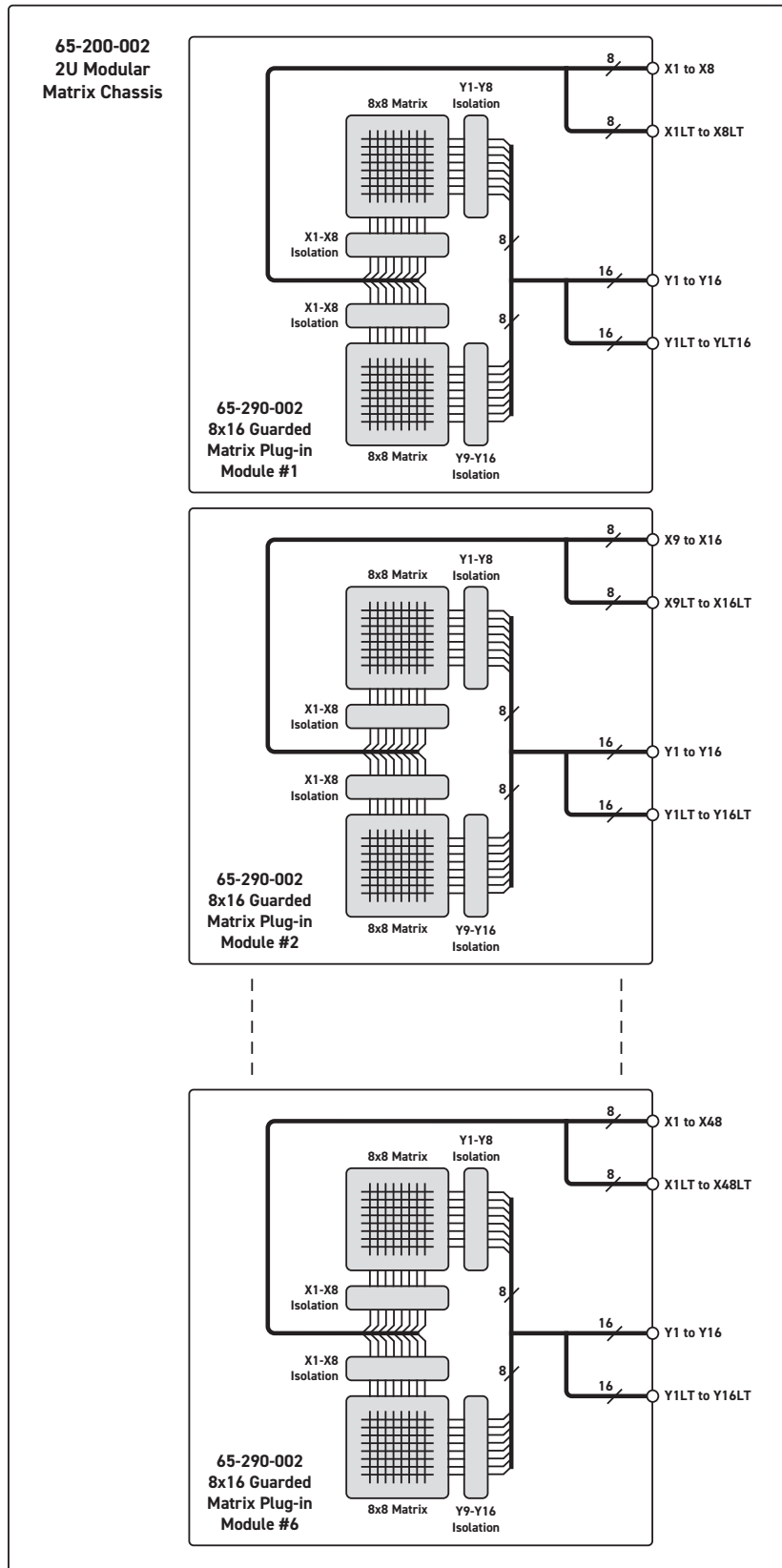
- Specify a 65-200-002 Scalable Chassis.
- Add Matrix 65-290-002 Switched Guard 8x16 Matrix Plug-in Modules as required.



Switching Diagram: 65-290-002 Switched Guard Matrix 8x16 Plug-in Module

Pickering's Range of Switched Guard Modules:	
40-121-001	26 x SPST Switches
40-121-002	13 x SPST Switches
40-121-011	16 x 2:1 Multiplexers
40-121-012	8 x 2:1 Multiplexers
4x-590-101	16x4 Matrix
4x-590-102	8x4 Matrix
65-290-002	8x16 Matrix (plug-in module for 65-200 LXI Scalable Chassis)

Example Configuration

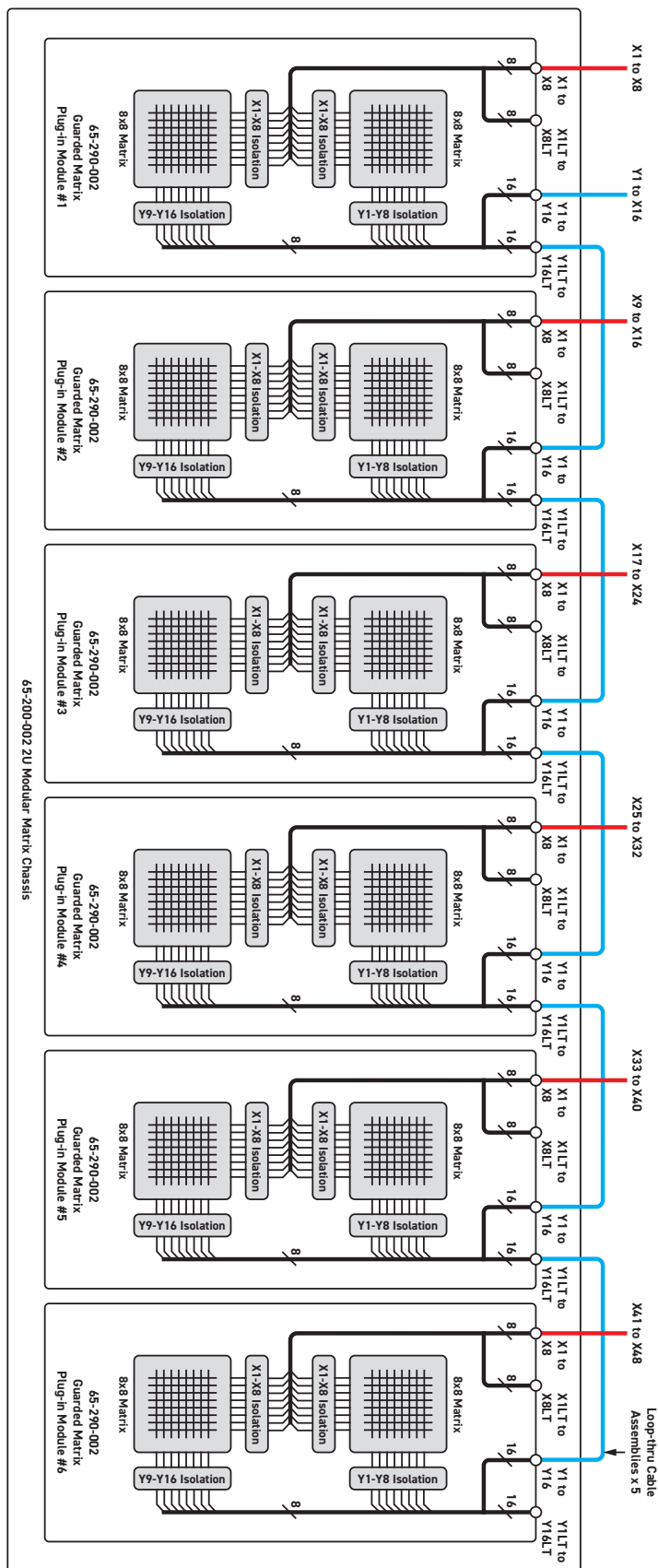


65-290 Configured as a 48x16 switched guard matrix with separate 8x16 sub-matrices using:

- 65-200-002 2U Scalable Switching Chassis
- 6 off 65-290-002 8x16 Matrix Plug-in Modules

Note: External cabling Required

Example Application



Example Application Diagram for the 65-290 Configured as a Single 48x16 Switched Guard Matrix Using External Loop-thru Cables

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.

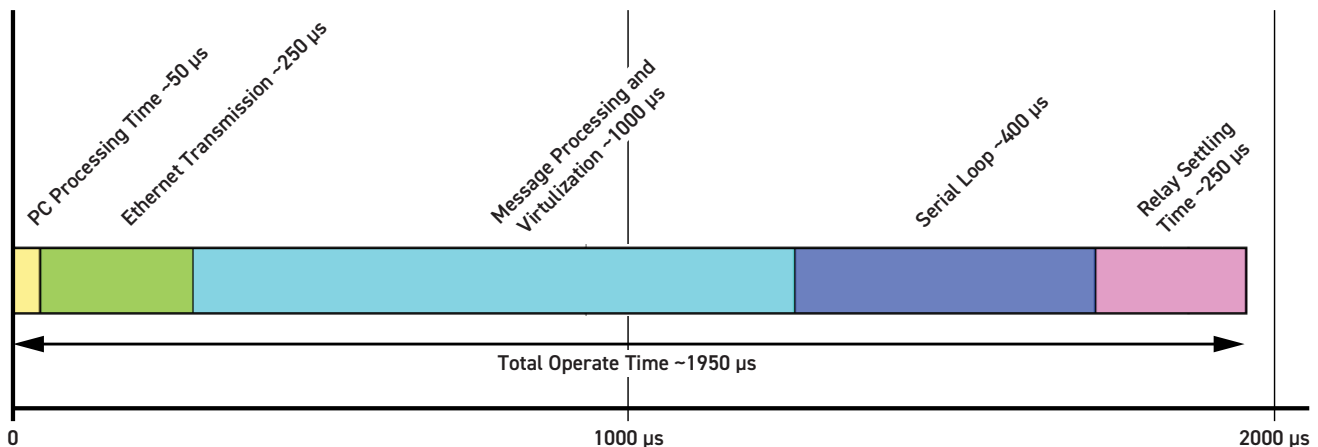
Speed of Operation

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.

For more information on the [Pickering Sequence Manager](#) please refer to our website.



Speed of Operation Diagram For The 65-290

Note: These are estimated figures, PC processing and Ethernet transmission times may vary depending upon the overall system setup and load.

Matrix Switching Specification

General:	Provides 16 concurrent X to Y connections. Expandable in X and Y direction
Maximum Size:	768 crosspoints (48x16 to 8x96) using 65-200-002
Relay Type:	Pickering Reed Relay (Ruthenium Sputtered type)
Maximum Hot Switching Capacity:	250 mA, 40 V *
Maximum Guard Voltage:	100 V *
Bandwidth (-3 dB):	TBC
Operate Time, LXI:	<2 ms (per relay or relay block operation) Note: This figure may vary depending upon user setup and network load.
Settling Time	2 minutes
Initial Path Resistance:	Plug-in: <1 Ω (signal) <0.5 Ω (guard)
Offset Voltage (EMF after 5 min.):	TBC
Offset Current **:	TBC
Isolation Resistance:	Up to 10 ¹² Ω †
Capacitance, Channel Crosstalk (signal-to-signal):	TBC
Capacitance, Guard Crosstalk (signal-to-guard):	TBC
Crosspoint Closure Limit:	63 ‡
Expected Life (operations):	>1x10 ⁹ (Low Load) >1x10 ⁶ (Full Load)

* For full voltage rating, signal sources to be switched must be fully isolated from mains supply and safety earth.

** When zero voltage applied to all input & output ports.

† Point to point using driven guard, 10 V drive, 21 °C, 40 % RH.

‡ This represents an example system configured as a 48x16 matrix.

Power Source

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

Mechanical Specification

Chassis Dimensions:	2U rack mountable full width, depth 500 mm
Number of Plug-ins Supported:	6 (in 65-200-002 chassis)
Plug-in Connectors:	MMCX Jacks for X, XLT, Y & YLT
Trigger Connector:	25-pin male micro D-type
Chassis Cooling:	Front air intakes through plug-in module holes, temperature controlled speed adjustable fans

LAN Interface

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

Triggering

16x Software Configurable Bidirectional Open Collector Triggers
1x Dedicated Software Reset Line
1x Dedicated Software Fault 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 refer to our website.

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 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

Product Order Codes

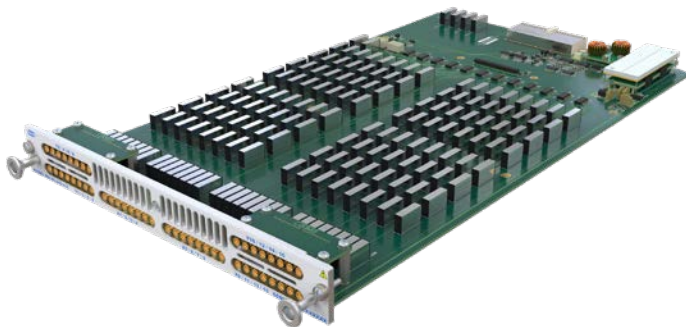
Specify which modules are required to build the matrix. Plug-in modules can be ordered for chassis already supplied.

Chassis

2U Modular Matrix Chassis, 6-Slot	65-200-002
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Matrix Plug-in Module

8x16 Switched Guard Matrix	65-290-002
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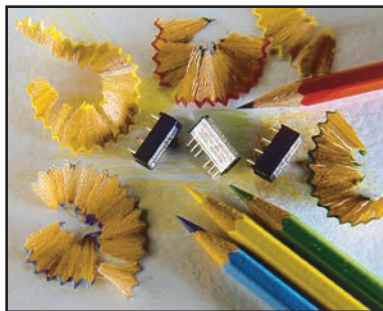
65-290-002 Switched Guard 8x16 Matrix Plug-in Module

Pickering Electronics State-Of-The-Art Reed Relays

This matrix is constructed using very high density Reed Relays manufactured by Relay Division.

Sputtered Ruthenium

Reed Relays offer maximum performance, they are hermetically sealed and offer a very stable, long life relay contact (typically 10^9 operations) with very fast operate time. Alternative types such as electro-mechanical armature relays or non-instrumentation grade reed relays are lower cost but do not offer the consistent contact resistance, long life, fast switching speed and low level switching capability of a reed relay.



All of the reed relays used in our matrix switching modules are manufactured by Relay Division, these offer maximum switching performance. Please visit the Reed Relay web site at pickeringrelay.com for further information.

Product Customization

Pickering PXI 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 reed relay types
- Mixture of reed 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.

Mating Connectors & Cabling

For connection accessories for the 65-290 please refer to the [90-011D](#) RF Connector Accessories data sheet where a complete list and documentation can be found for MMCX connectors, or refer to the Connection Solutions catalog.



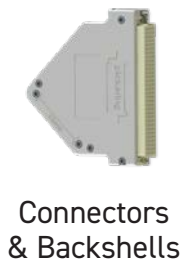
The 65-290 is part of a growing family of Scalable Switching systems available from Pickering. Illustrated is the LXI 65-219 Modular 2 Amp Matrix, available in sizes up to 60x40.



Available from Pickering are the 60-102C and 60-103B LXI Modular Chassis. These are 7 and 18 slot chassis 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 and 60-106. These are 2, 4 & 6 slot LXI/USB Modular Chassis which allow control of our PXI modules via Ethernet or USB.

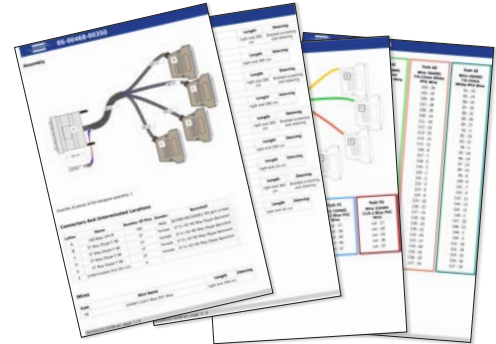
Connectivity Solutions

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

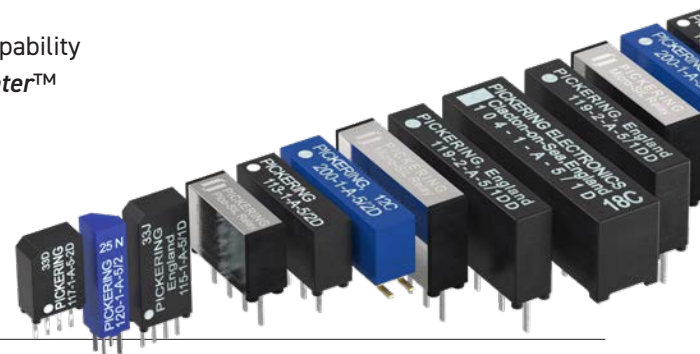
Mass Interconnect

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



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

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, Simulink
- Marvin ATEasy
- MTQ Testsolutions Tecap Test & Measurement Suite

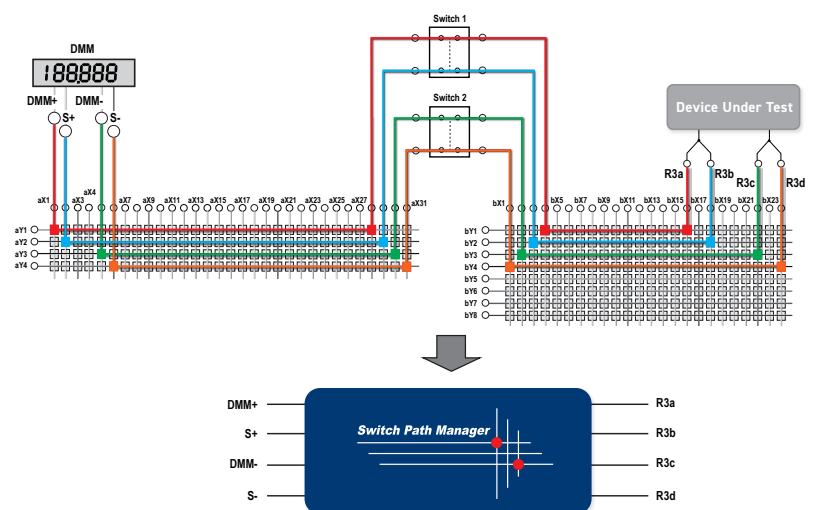
Drivers for popular Linux distributions are available, other environments are also supported, please contact Pickering with specific enquiries. We provide Soft Front Panels (SFPs) for our products for familiarity and manual control, as well as comprehensive documentation and example programs to help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

To learn more about software drivers and development environments 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 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 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 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

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

