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TECHNOLOGY GROUP

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PXI 2A Fault Insertion Switch 40-190B

- 74, 64 or 32 Fault Insertion Channels
- Choice of Normally Closed or Normally Open Through Relays
- Choice of 1 or 2 Fault Insertion Buses
- Choose From 12 Configurations!
- Suitable for Automotive/Avionics ECU Burn-in/ Endurance Test Applications
- High Density Low Cost Solution
- Simulation of Various Types of Electrical Fault, Enabling Rigorous Fault Testing
- Fault Bus MUX For Selecting External Fault Conditions
- High Simultaneous Relay Drive
- 2A Hot or Cold Switching with 60W Max Power
- Switch up to 165VDC/115VAC (NC Through Relay Versions) or 200VDC/240VAC (NO Through Relay Versions)
- VISA, IVI & Kernel Drivers Supplied for Windows
- Supported by PXI or LXI Chassis
- Supported by *eBIRST* ™
- 3 Year Warranty



The 40-190B is a Fault Insertion switch available with 74, 64 or 32 channels. It is primarily designed for the simulation of fault conditions in automotive & avionics applications involving the reliability testing of safety critical controllers.

It has the ablity to insert 3 different fault conditions between the test fixture and the equipment under test:

- Open-Circuit
- Short-Circuit between UUT connections
- Short-Circuit to other signals such as Power, Ignition and Ground via a Fault Insertion Bus

Through relays on each channel enable signals to the UUT to be held open-circuit. Fault Insertion Buses allow any channel to be shorted to any other channel also enabling connection to an external fault condition. The module is available with either 1 or 2 fault buses. A four channel multiplexer on each bus allows an external signal such as Power, Ignition or Ground to be selected as the fault condition. Additionally, switched signal lines (Monitor1 & Monitor2) allow direct monitoring of the fault buses with a DMM.

The modules in the 40-190B range are available in two versions with different default (power off) states:

- **Normally Closed Through Relays** and all fault insertion relays open, giving an un-interrupted path between the test fixture and the equipment under test.
- **Normally Open Through Relays** and all fault insertion relays open with no default path between the test fixture and the equipment under test.

Pickering's Range of PXI Fault Insertion Switches

Model No.	Signal Channels	Fault Buses	Fault Inputs	Max Voltage	Max Current or Bus Type
40-190B	74, 64 or 32	1 or 2	4 or 8	165V	2A
40-191A	6	2	2	40V	30A
40-192	6	2	2	200V	10A
40-193	7	1 or 2	1 or 2	16V	20A, 1A min
40-194	7	1 or 2	1 or 2	16V	20A, no min
40-195	22 or 11 pairs	—	8 or 4	150V	1A
40-196	10 or 5 pairs	—	10 or 5	110V	5A
40-197A	34 or 16	4	8	300V	2A
40-198	20	1 or 2	3 or 6	250V	5A
40-199	10	1 or 2	2	250V	10A
40-200	4 or 8 differential	4	8	100V	CAN, FlexRay
40-201	4 or 8 differential	2	4	100V	Ethernet/AFDX /BroadR-Reach
40-202	22 or 11 pairs	—	22 or 11	150V	2A

High Simultaneous Drive

Any combination of relays may be operated (providing the maximum total card switch current is not exceeded), enabling maximum flexibility for fault selection.

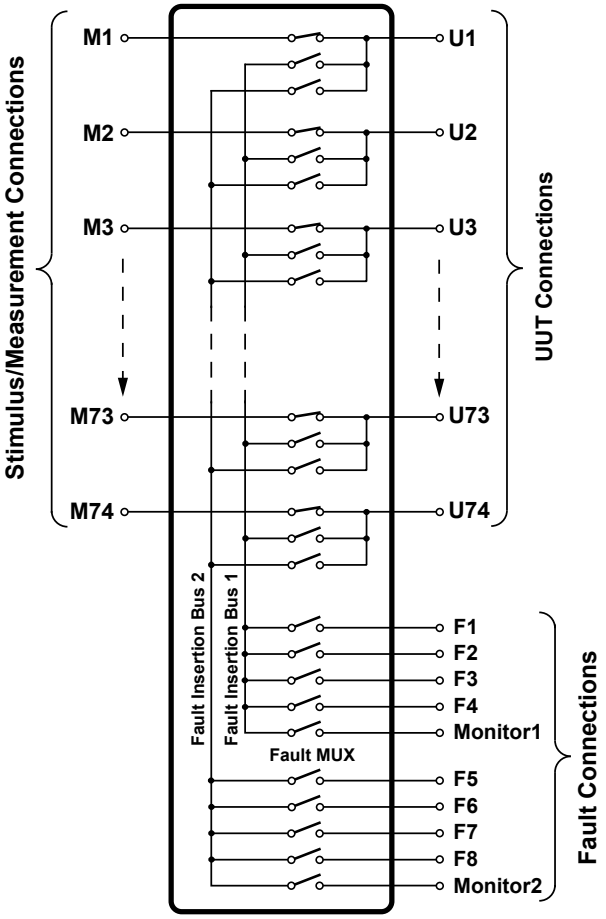
Supported by *eBIRST*

eBIRST switching system test tools simplify switching system fault-finding by quickly testing the system and graphically identifying the faulty relay.

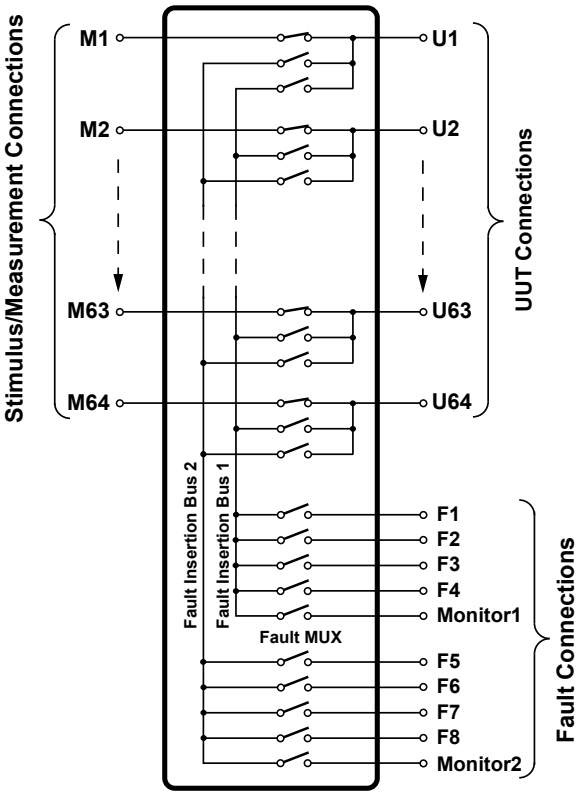
For more information go to: pickeringtest.com/ebirst

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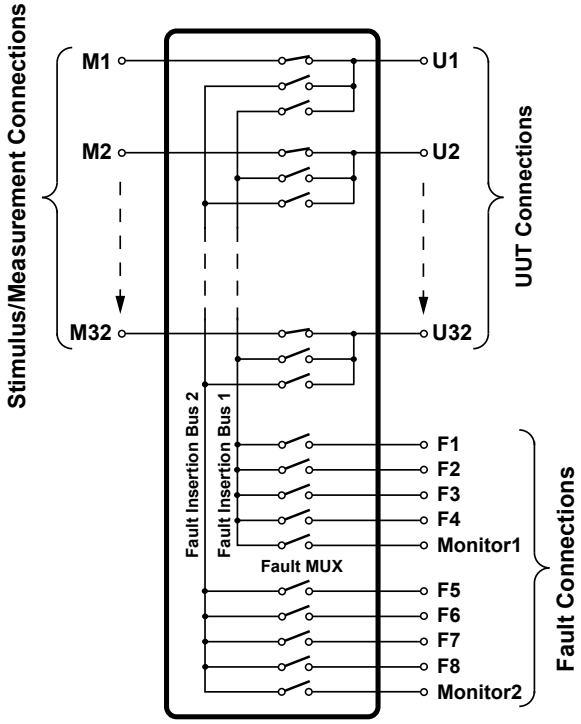
Versions With Normally Closed Through Relays



40-190B-002 Dual Bus, 74-Channel Fault Insertion Switch Schematic (40-190B-001 Has 1 Fault Bus)

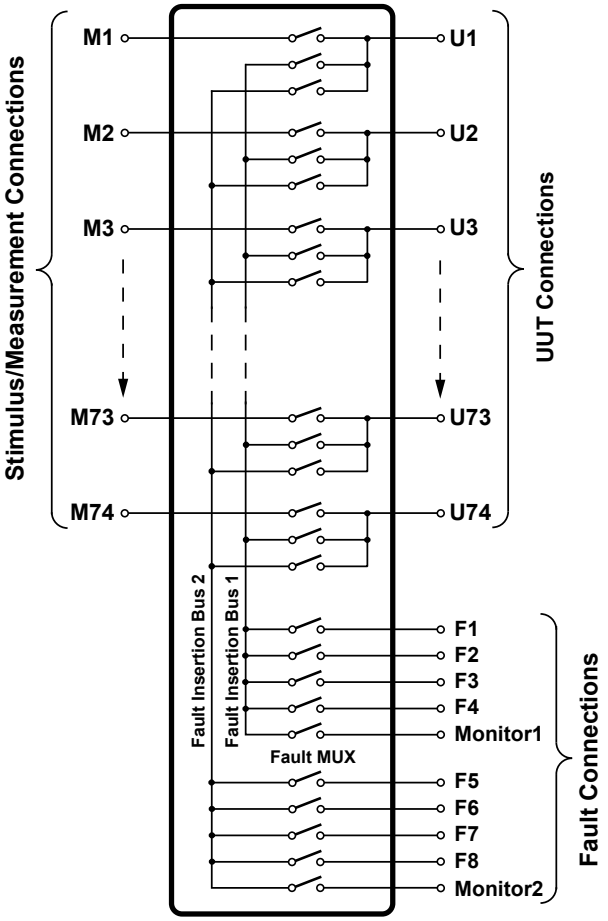


40-190B-102 Dual Bus, 64-Channel Fault Insertion Switch Schematic (40-190B-101 Has 1 Fault Bus)

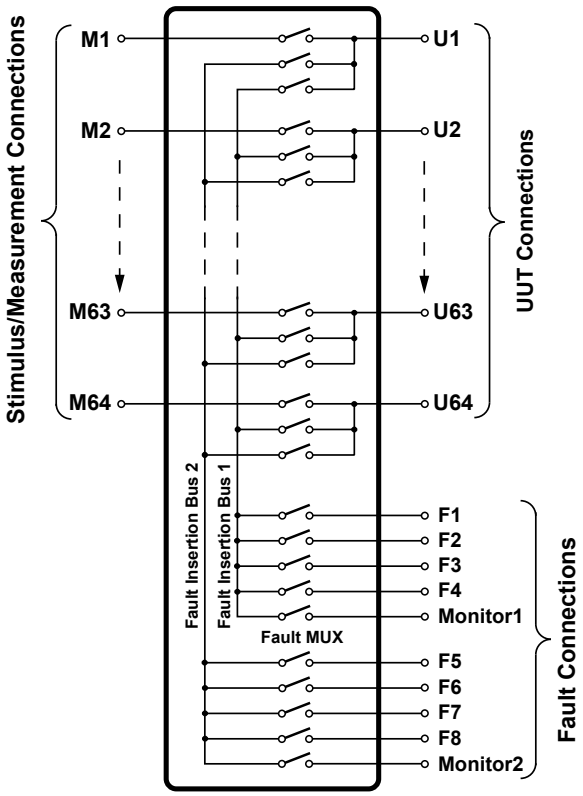


40-190B-202 Dual Bus, 32-Channel Fault Insertion Switch Schematic (40-190B-201 Has 1 Fault Bus)

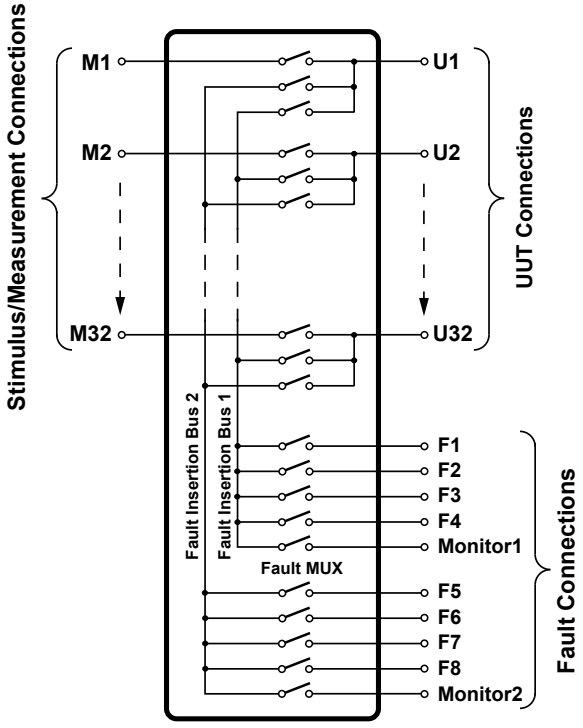
Versions With Normally Open Through Relays



40-190B-302 Dual Bus, 74-Channel Fault Insertion Switch Schematic (40-190B-301 Has 1 Fault Bus)



40-190B-402 Dual Bus, 64-Channel Fault Insertion Switch Schematic (40-190B-401 Has 1 Fault Bus)



40-190B-502 Dual Bus, 32-Channel Fault Insertion Switch Schematic (40-190B-501 Has 1 Fault Bus)

Relay Type

The 40-190B is fitted with high quality electro-mechanical relays with palladium-ruthenium gold covered contacts. A spare relay is built onto the circuit board to allow easy maintenance with minimum downtime.

Switching Specification - Versions With Normally Closed Through Relays

Switch Type	Electro-mechanical
Contact Type:	Palladium-Ruthenium, Gold Covered Bifurcated
Max Switch Voltage:	165VDC/115VAC*
Max Power:	60W
Max Switch Current:	2A
Max Continuous Carry Current:	2A
Max Pulsed Carry Current (for a single switch path):	6A for 100ms (up to 10% duty cycle)
Max Total Card Switch Current:	64A †
Max number of simultaneously operated relays:	No Limit
Initial On Path Resistance:	150mΩ typical
Off Path Resistance:	$>10^9\Omega$
Thermal Offset:	<5µV per relay
Operate Time:	<3ms
Expected Life (operations)	
Very low power signal load:	$>1x10^8$
Low power load (2W):	$>1.5x10^7$ (0.1A 20VDC)
Medium power load (30W):	$>5x10^6$ (1A 30VDC)
Full power load (60W):	$>1x10^5$ (2A 30VDC)

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

† Applies to PXI chassis installation (please contact sales office for use in alternative platforms).

Bandwidth Specification - Versions With Normally Closed Through Relays

M to U path:	>35MHz typical at 50Ω impedance
Fault path:	>7MHz typical at 50Ω impedance

Switching Specification - Versions With Normally Open Through Relays

Switch Type	Electro-mechanical
Contact Type:	Palladium-Ruthenium, Gold Covered Bifurcated
Max Switch Voltage:	200VDC/240VAC*
Max Power:	60W
Max Switch Current:	2A
Max Continuous Carry Current:	2A
Max Pulsed Carry Current (for a single switch path):	6A for 100ms (up to 10% duty cycle)
Max Total Card Switch Current:	64A †
Max number of simultaneously operated relays:	No Limit
Initial On Path Resistance:	300mΩ typical
Off Path Resistance:	$>10^9\Omega$
Thermal Offset:	<5µV per relay
Operate Time:	<3ms
Expected Life (operations)	
Very low power signal load:	$>1x10^8$
Low power load (2W):	$>1.5x10^7$ (0.1A 20VDC)
Medium power load (30W):	$>5x10^6$ (1A 30VDC)
Full power load (60W):	$>1x10^5$ (2A 30VDC)

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

† Applies to PXI chassis installation (please contact sales office for use in alternative platforms).

RF Specification - Versions With Normally Open Through Relays

Bandwidth (-3dB):	M to U Path:	20MHz (typical)
	Fault Path:	6MHz (typical)
Bandwidth (VSWR 1.5:1):	M to U Path:	6MHz (typical)
	Fault Path:	1MHz (typical)
Crosstalk (typical):	10kHz:	-80dB
	100kHz:	-60dB
	1MHz:	-40dB
	10MHz:	-20dB
Isolation (typical):	10kHz:	70dB
	100kHz:	65dB
	1MHz:	60dB
	10MHz:	40dB

Note: The 40-190B is suitable for carrying signals such as CAN to 1Mbps & FlexRay to 20Mbps (10Mbps per channel path)

Power Requirements

+3.3V	+5V	+12V	-12V
0	<2A	0	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
Module weight: 380g (40-190B-002).

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

Connectors

PXI bus via 32-bit P1/J1 backplane connector.
Signals via front panel 160-pin male DIN 41612 connector, for pin outs please refer to the operating manual.
We recommend that Pickering mating connectors are used with this module. They are designed to ensure there are no mechanical interference problems when used in a PXI chassis.

Note: The pinout of the 40-190B is not compatible with the pinout of the earlier 40-190 Fault Insertion Switch.

Operating/Storage Conditions

Operating Conditions

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

Storage and Transport Conditions

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

PXI & CompactPCI Compliance

The module is compliant with the PXI Specification 2.2. Local Bus, Trigger Bus and Star Trigger are not implemented.

Uses a 33MHz 32-bit backplane interface.

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

Fault Insertion Switches With Normally Closed Through Relays

Single Bus 74-Channel 2A:	40-190B-001
Dual Bus 74-Channel 2A:	40-190B-002
Single Bus 64-Channel 2A:	40-190B-101
Dual Bus 64-Channel 2A:	40-190B-102
Single Bus 32-Channel 2A:	40-190B-201
Dual Bus 32-Channel 2A:	40-190B-202

Fault Insertion Switches With Normally Open Through Relays

Single Bus 74-Channel 2A:	40-190B-301
Dual Bus 74-Channel 2A:	40-190B-302
Single Bus 64-Channel 2A:	40-190B-401
Dual Bus 64-Channel 2A:	40-190B-402
Single Bus 32-Channel 2A:	40-190B-501
Dual Bus 32-Channel 2A:	40-190B-502

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 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.

Support Products

eBIRST Switching System Test Tool

This product is supported by the *eBIRST* test tools which simplify the identification of failed relays, the required *eBIRST* tools are below. For more information go to: pickeringtest.com/ebirst

Product	Test Tool	Adaptor
40-190B	93-002-001	93-002-410

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching products, simplifying servicing and reducing down-time.

Product	Relay Kit
40-190B (All versions)	91-100-001

For further assistance, please contact the Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-190B series please refer to the 90-001D 160-pin DIN 41612 Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

Chassis Compatibility

This PXI module must be used in a suitable chassis. It is 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



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

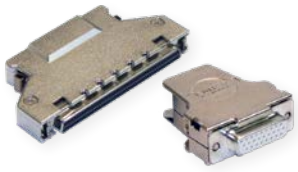


Pickering LXI or LXI/USB Modular Chassis—only accept our 1000+ PXI Switching & Simulation Modules:

- 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

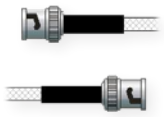
We provide a full range of supporting cable and connector solutions for all our switching products—20 connector families with 1200+ products. We offer everything from simple mating connectors to complex cables assemblies and terminal blocks. All assemblies are manufactured by Pickering and are guaranteed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



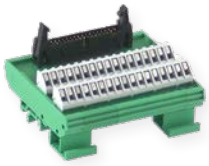
Connectors & Backshells



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



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 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
- **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



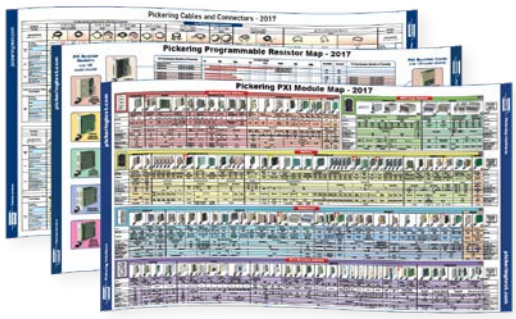
Three Year Warranty & Guaranteed Long-Term Support

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, as well as complete product catalogs and product reference maps to assist when looking for the switching, simulation and cable and connector solutions you need. We have also published 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

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Pickering Interfaces maintains a commitment to continuous product development, consequently we reserve the right to vary from the description given in this data sheet.

Artisan Technology Group is an independent supplier of quality pre-owned equipment

Gold-standard solutions

Extend the life of your critical industrial, commercial, and military systems with our superior service and support.

We buy equipment

Planning to upgrade your current equipment? Have surplus equipment taking up shelf space? We'll give it a new home.

Learn more!

Visit us at **artisantg.com** for more info on price quotes, drivers, technical specifications, manuals, and documentation.

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We're here to make your life easier. How can we help you today?

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