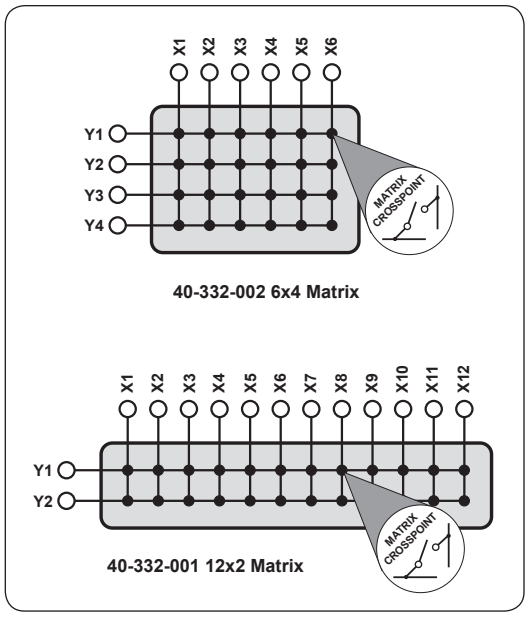
- Multiplexer With Single 24:1, Dual 12:1, Quad 6:1, Hex 4:1, Octal 3:1 or Twelve 2:1 Formats
- Matrix With 12x2 or 6x4 Configurations
- Cold Switch up to 750VDC/750VAC peak Working Voltage (1000VDC/1000VAC peak Typical)
- Hot Switch up to 110VDC/250VAC
- 5A Hot Switching Current
- Maximum Power 150W/1250VA
- VISA, IVI & Kernel Drivers Supplied for Windows
- Supported by PXI or LXI Chassis
- 3 Year Warranty

The 40-331/332 multiplexer and matrix modules are suitable for applications requiring high voltage power switching with high density.

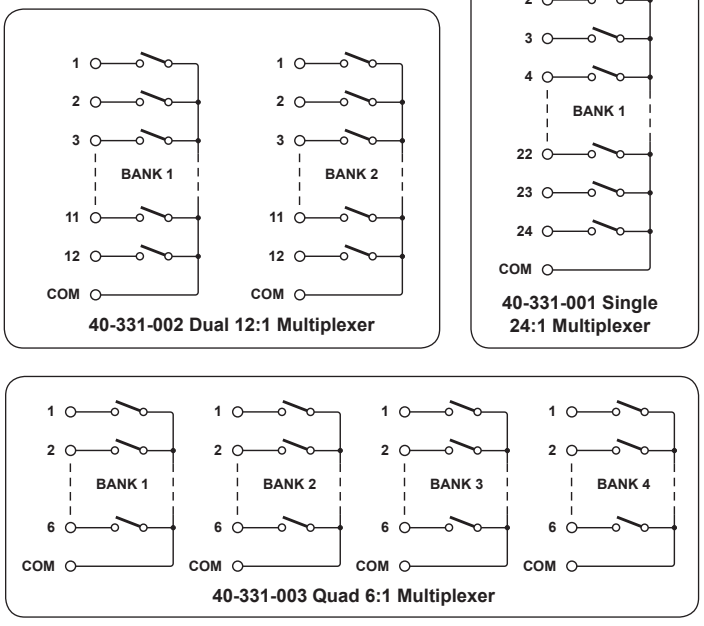
They feature current handling up to 5A, 1000VDC/1000VDC peak cold switching and 110VDC/250VAC hot switching. The 40-331 is available as a single 24:1, dual 12:1, quad 6:1, hex 4:1, octal 3:1 or twelve 2:1 multiplexer, and the 40-332 is available in 12x2 or 6x4 matrix configurations. Connections are made via a front panel mounted 37-pin high voltage D-type connector.

The 40-331 multiplexer allows multiple channels to be simultaneously selected. Alternatively, product variants can be supplied that operate as a conventional multiplexer with break-before-make action when a new channel is selected.

Typical applications will be found in automotive, aerospace and power cell testing.



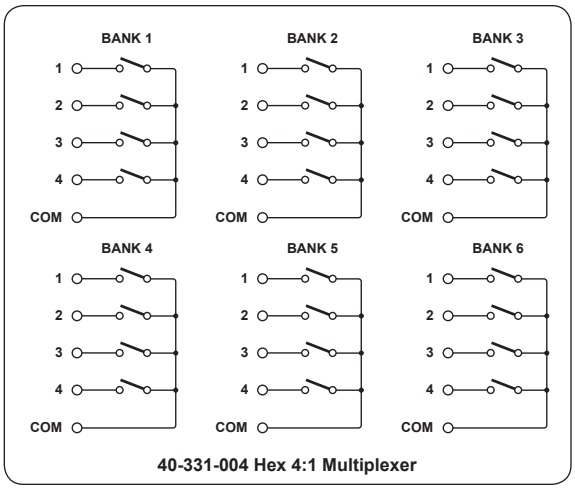
Switching Diagrams for the 40-332 High Voltage Power Matrix



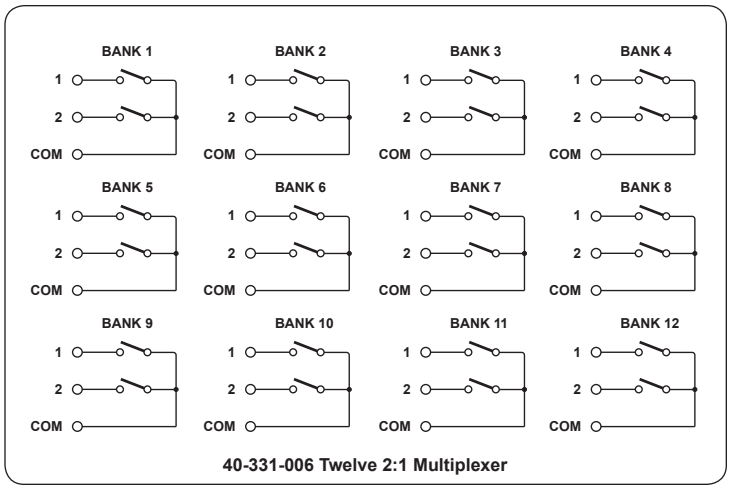
Switching Diagrams for the 40-331-001/002/003 High Voltage Power Multiplexers

ISSUE 7.0 DEC 2018

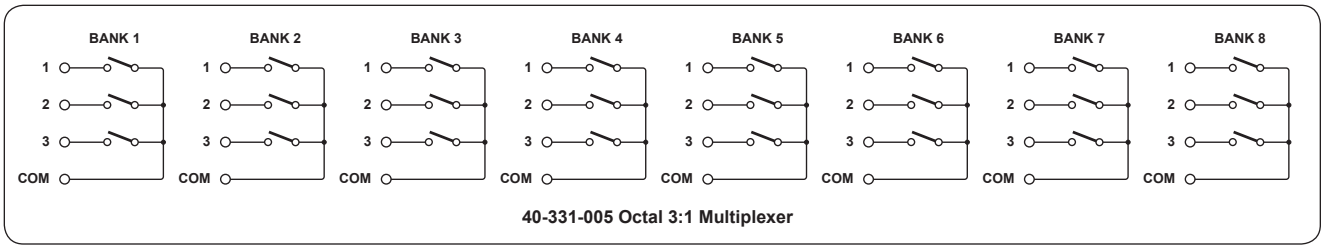
(ES) Equipements Scientifiques SA - Département Tests & Mesures - 127 rue de Buzenval BP 26 - 92380 Garches
Tél. 01 47 95 99 45 - Fax. 01 47 01 16 22 - e-mail: tem@es-france.com - Site Web: www.es-france.com



40-331-004 Hex 4:1 Multiplexer



40-331-006 Twelve 2:1 Multiplexer



40-331-005 Octal 3:1 Multiplexer

Switching Diagrams for the 40-331-004/005/006 High Voltage Power Multiplexers

Overview of "Hot" & "Cold" Switching Techniques

"Hot" Switching

This is when the load is switched with the high voltage source applied. Hot switching may generate considerable RFI, both within the switching module and on interconnecting wiring. Care must be taken to suppress or shield all cabling.

Note that any precaution which adds extra capacitance to a cable should be taken with great care, even a very small capacitance at high voltages can cause very large inrush current through the module resulting in possible switch weld and excessive RFI.

The 40-331/332 modules include extensive built-in RFI suppression circuits that minimize RFI and surge problems.

"Cold" Switching – The Preferred Option for Reliability & Long Life.

With cold switching, the relay is operated before the high voltage source is applied. In this case the maximum carry current is much greater, also there will be much less stress on the reed relays, resulting in improved reliability and life.

Most high voltage sources include a soft start facility which reduces the likelihood of generating RFI or temporary over-voltage.

High voltage switching modules are often used for isolation testing applications (e.g. cable, transformer or semiconductor isolation tests), in these cases, cold switching is nearly always the preferred option to reduce the risk of high voltage transients that may cause premature breakdown.

Power Relay Type

The 40-331/332 is fitted with electro-mechanical power relays with gold clad silver alloy contacts. A spare relay is built onto the circuit board to allow easy maintenance with minimum downtime.

Switching Specification

Contact Type:	Gold clad silver alloy
Cold Switching Capacity	
Maximum Current:	5A
Maximum Voltage:	750VDC/750VAC peak working*
	(1000VDC/1000VAC peak typical*)
Hot Switching Capacity	
Maximum Current:	5A
Maximum Voltage:	110VDC/250VAC*
Maximum Power:†	150W/1250VA
Min. Switching Capacity:	10mA, 5VDC
Initial Path Resistance, On:	<200mΩ
Path Resistance, Off:	$>10^9\Omega$
Bandwidth:‡	5MHz
Operate Time - 40-331:	21ms typical, 10.5ms for multichannel mode
Operate Time - 40-332:	10.5ms typical
Expected Life (operations) - resistive load	
Mechanical Life:	$>2x10^7$
At Max. Switch Capacity:	$>5x10^4$ (5A 250VAC, 5A 30VDC) $>1x10^5$ (3A 250VAC, 3A 30VDC)

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

† For variation of maximum hot switching capacity of voltage with current refer to plot.

‡ Bandwidth represents 3dB insertion loss in a 50Ω system

Power Requirements

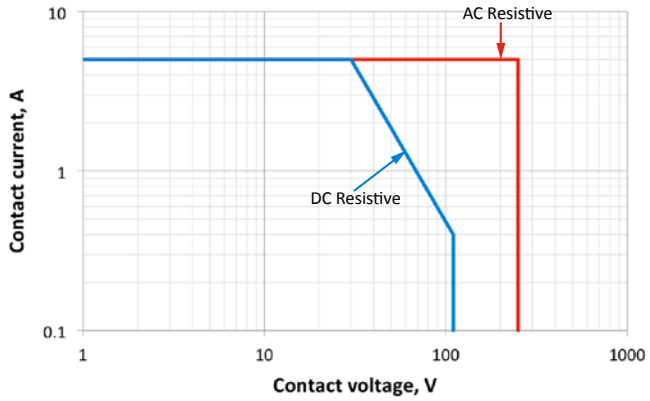
+3.3V	+5V	+12V	-12V
0	0.75A	0	0

Mechanical Characteristics

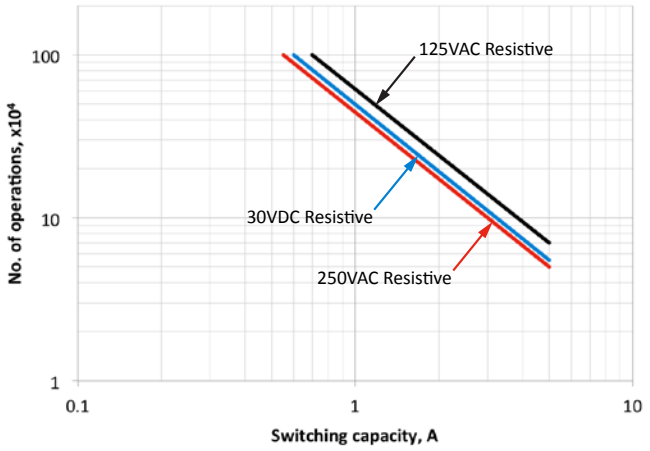
Single slot 3U PXI (CompactPCI card).
3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.
Signals via front panel 37-pin male D-type, high voltage connector, for pin outs please refer to the operating manual.



Current/Voltage Curve



Current/Operating Life Curve

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 - Multiplexer

Channel Selection	Model Variant	Order Code
Multiple	**Single 24:1 High Voltage MUX**	**40-331-001**
Multiple	**Dual 12:1 High Voltage MUX**	**40-331-002**
Multiple	**Quad 6:1 High Voltage MUX**	**40-331-003**
Multiple	**Hex 4:1 High Voltage MUX**	**40-331-004**
Multiple	**Octal 3:1 Voltage MUX**	**40-331-005**
Multiple	**Twelve 2:1 Voltage MUX**	**40-331-006**

Note: Contact factory if the above modules are required in single channel selection mode.

Product Order Codes - Matrix

12x2 High Voltage Matrix	**40-332-001**
6x4 High Voltage Matrix	**40-332-002**

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

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
40-331-001/002/003/004/005/006	**91-100-020**
40-332-001/002	**91-100-020**

For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-331/332 please refer to the 90-007HVD High Voltage 37-pin D-type Connector Accessories data sheets 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:

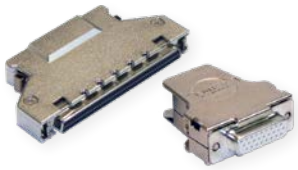
- Mix our 1000+ PXI switching & simulation modules with any vendor's PXI instrumentation
- Embedded or remote Windows PC control
- Real-time Operating System Support
- High data bandwidths, especially with PXI Express
- Integrated module timing and synchronization

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

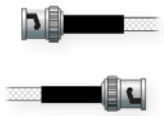
Connectivity Solutions

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.

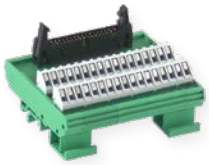


Connectors & Backshells

Multiway Cable Assemblies



RF Cable Assemblies



Connector Blocks

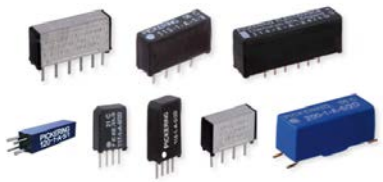
We also offer customized cabling and have a free online Cable Design Tool that can be used to create custom cable solutions for many applications.

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 sister company, Pickering Electronics. These instrument grade reed relays feature ***SoftCenter***® technology, ensuring long service life and repeatable contact performance



Programming

Pickering provide kernel, IVI and VISA (NI & Keysight) drivers which are compatible with all Microsoft supported versions of Windows and popular older versions.

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
- **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.

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.

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.

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.

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 for the PXI and LXI standards.