

# Keysight Technologies

## PXI Matrix Switch Modules

M9120A, M9121A, M9122A

Data Sheet



## Overview

### Product Description

The Keysight Technologies, Inc. PXI matrix switch modules activate multiple channels in a single instance. Select a switch row to connect to any column and create routing for multiple signals between instruments and the device under test. Choose from high-speed, long-life reed relays capable of switching up to 100 Vrms with up to 20 W of power, or the higher power armature relays capable of switching up to 60W of power. Multiple switch matrices offer a variety of power and switch density options.

Installation and configuration is fast and easy with standard cable connections or an optional connector block, soft front panels, and Keysight Connection Expert. In addition, software drivers support the most common programming environments such as Visual Studio, C, C++, Visual Basic, MATLAB, and LabVIEW.

### Applications

- Aerospace and defense
- Automotive
- Electronic test
- Medical
- Semiconductor

### Features

- Quickly connect multiple high-voltage points
- High-density modules provide more connections in a smaller area
- Up to 256 2-wire crosspoints
- High-speed, long-life reed relays or higher power armature relays
- Software drivers support the most common programming environment
- Optional connector blocks offer reliable measurement from robust, high-pincount interconnects
- Easy programming and control with soft front panels and Keysight Command Expert

### Customer Values

- Connect multiple points for high-pin-count applications
- Get the performance you need with high-speed 1000  $\mu$ s reed relay switches or up to 60 W per channel
- Work in your programming environment of choice and reduce development time
- Fast and easy module installation and configuration

## Easy Setup ... Test ... and Maintenance

### Hardware Platform

#### Compliance

The matrix switch modules are PXI compliant with a J1 connector and can be used in PXI chassis with cPCI (J1), PXI-1 (J1 only), or PXIe hybrid slot connectors.

The PXI format offers high performance in a small, rugged package. It is an ideal deployment platform for many automated test systems. In addition, a wide array of complementary PXI products are currently available, such as multimeters, waveform generators, local oscillators, digitizers, and RF switch modules.

### Software Platform

#### IO Libraries

Keysight IO Libraries Suite offers fast and easy instrument connections and now extends to modular instruments. IO Libraries Suite 16 adds support for PXI, helping you display all of the modules in your system, whether they are PXI, PXIe, or AXIe, as well as view information about installed software. In addition, the new version allows you to more easily find the right driver and start module soft front panels directly with Keysight Connection Expert.

#### Drivers

Keysight provides instrument drivers that work with your choice of software, saving time and preserving software and hardware investments. Keysight modular instruments come with IVI-COM, IVI-C, and LabVIEW software drivers that work in the most popular test and measurement development environments including LabVIEW, MATLAB, LabWindows/CVI, Visual Studio C, C++, C#, VEE, and Visual Basic.

With a broad selection of drivers already included, any Keysight PXI matrix switch can be swapped out, replaced, or upgraded with the latest version, requiring only minimal software adjustments.

### Easy software integration

In addition, application code examples are included for LabVIEW, LabWindows/CVI, Visual Studio C, C++, C#, Visual Basic, and MATLAB, providing switch set-up and basic functionality. These application code examples are easily modified to quickly integrate the switch module into your measurement system.

### Software Applications

Keysight soft front panels provide easy-to-use instrument communications. The PXI matrix switch graphical user interface guides developers through module setup so users can quickly configure the switch states. Switch control is also possible through the wide selection of instrument program interfaces.

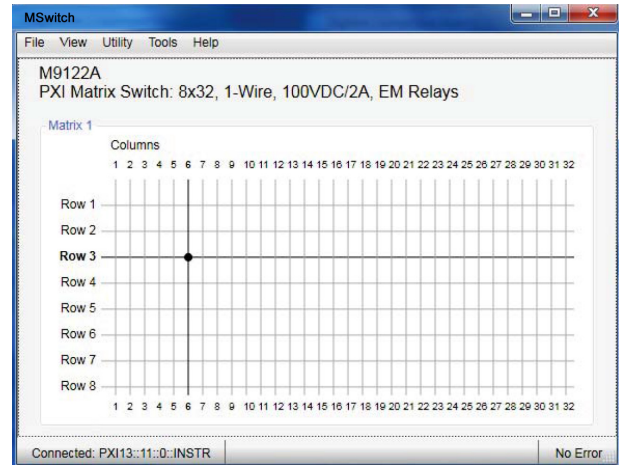


Figure 1. Matrix switch soft front panel

## Specifications and Characteristics



### Specification and Characteristic Summary

Following is a summary of specifications and characteristics for the Keysight PXI matrix switches. More detailed specifications and characteristics for each module are featured later in this document.

#### Matrix switch specification and characteristic summary

| Multiplexer switches | Description                | Type # slots | Channels     | Switch speed (typical) | Max voltage           | Current switch and carry | Relay type  | Connectors                       |
|----------------------|----------------------------|--------------|--------------|------------------------|-----------------------|--------------------------|-------------|----------------------------------|
| M9120A               | Matrix switch              | PXI 1-slot   | 4x32, 2-wire | 3 msec                 | 100 Vrms <sup>1</sup> | 2 A/2 A                  | Armature    | 78 Dsub connector block or cable |
| M9121A               | High density matrix switch | PXI 1-slot   | 4x64, 2-wire | < 1 msec <sup>2</sup>  | 100 Vrms <sup>1</sup> | 0.5 A/0.5 A              | 0.5 A/0.5 A | 200 LFH connector block or cable |
| M9122A               | Matrix switch              | PXI 1-slot   | 8x32, 1-wire | 3 msec                 | 100 Vrms <sup>1</sup> | 2 A/2 A                  | Armature    | 50 Dsub connector block or cable |

1. Not for connection to mains

## Specifications and Characteristics (continued)

### M9120A 4x32, 2-wire PXI matrix switch

The M9120A high-density matrix is designed to switch medium voltage/power signals. The 128, 2-wire armature relays offer higher voltage switching and up to 60W per channel. This module is ideal for telecom applications that need to simultaneously send and return signals.

The matrix module includes a 4-wire-wide bus to route signals between test instruments and your device under test. To create larger matrices, multiple modules can be linked together, for example, four rows of two M9120A modules can be joined to create a 4x64 matrix. Easily connect to the matrix with a 78-pin Dsub female connector or cable.

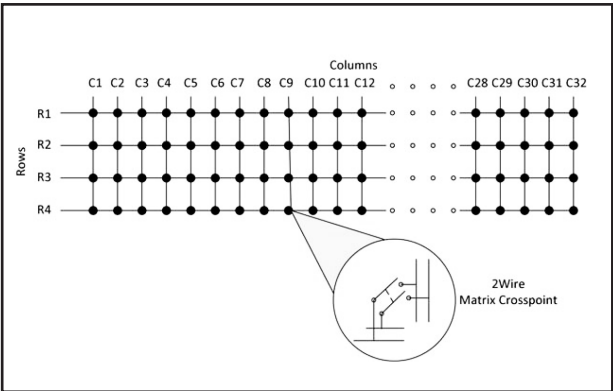


Figure 2. M9120A 4x32, 2-wire, armature relays

### M9120A specifications and characteristics

| General specifications                          |                                  |
|-------------------------------------------------|----------------------------------|
| Channels                                        | 4x32                             |
| Switch type                                     | Medium power, 2-wire armature    |
| Max volts <sup>1</sup>                          | 100 Vrms                         |
| Max switch rating/carry rating                  | 2.0 A                            |
| Switching characteristics (nominal)             |                                  |
| Max power                                       | 60 W                             |
| Switch speed (typical)                          | 3 msec                           |
| Initial path resistance, differential (typical) | 500 mΩ                           |
| Connectors                                      | 78 Dsub connector block or cable |
| Bandwidth                                       | 7.5 MHz                          |
| DC isolation, Ch-Ch, Ch-Gnd                     |                                  |
| 25C / 40%RH (typical)                           | 1x10 <sup>10</sup> Ω             |
| 25C / 80%RH (typical)                           | 1x10 <sup>8</sup> Ω              |
| 40C / 80%RH (typical)                           | 1x10 <sup>7</sup> Ω              |
| Thermal offset, single-ended (typical)          | 8 μV                             |
| Relay life, operations <sup>2</sup>             |                                  |
| Low power load (typical)                        | > 1x10 <sup>7</sup>              |
| Rated power load (typical)                      | > 1x10 <sup>5</sup>              |

- 1. Not for connection to mains
- 2. Relay life is defined as path resistance <1.4 Ω

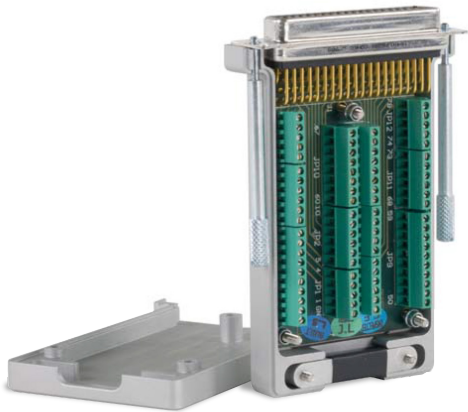


Figure 3. 78-pin Dsub connector block

## Specifications and Characteristics (continued)

### M9121A 4x64, 2-wire PXI high-density matrix switch

The M9121A ultra-high-density 4x64, full-crosspoint switch matrix, offers high-speed reed relay signal switching in a single PXI module. The crosspoints of the high-speed, 2-wire, long-life reed switches can be rapidly activated to route signals in your test system. The matrix relays support signal switching up to 100 Vrms with 10 W maximum power. The module includes a 4-wire-wide bus to route signals between test instruments and your device under test. To create larger matrices, multiple modules can be linked together. For example, four rows of two M9121A modules can be joined to create a 4x128 matrix. Easily connect to the matrix with a high-density, 200-pin low force helix (LFH) connector or cable.

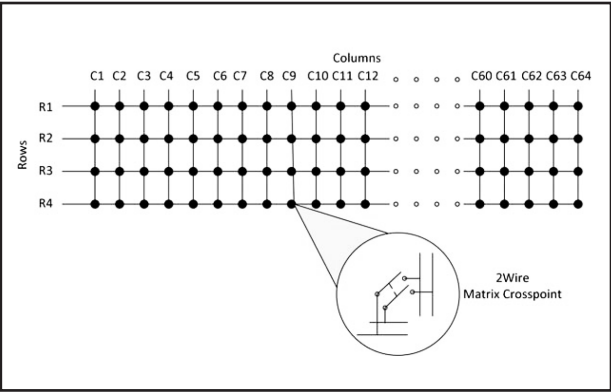


Figure 4. M9121A 4x64, 2-wire, reed relays

### M9121A specifications and characteristics

| General specifications                           |                                  |
|--------------------------------------------------|----------------------------------|
| Channels                                         | 4x64                             |
| Switch type                                      | Ultra-high-density, 2-wire reed  |
| Max volts <sup>1</sup>                           | 100 Vrms                         |
| Max switch rating/carry rating                   | 0.5 A                            |
| Switching characteristics (nominal)              |                                  |
| Max power                                        | 10 W                             |
| Switch speed (typical)                           | < 1 ms                           |
| Initial path resistance, differential (typical)  | 900 mΩ                           |
| Connectors                                       | 200 LFH connector block or cable |
| Bandwidth                                        | 10 MHz                           |
| DC isolation, Ch-Ch, Ch-Gnd, typical per channel |                                  |
| 25C / 40%RH                                      | 1x10 <sup>10</sup> Ω             |
| 25C / 80%RH                                      | 1x10 <sup>7</sup> Ω              |
| 40C / 80%RH                                      | 1x10 <sup>6</sup> Ω              |
| Thermal offset, differential (typical)           | 6 μV                             |
| Relay life, operations <sup>2</sup>              |                                  |
| Low power load (< 10 V) load (typical)           | 1x10 <sup>9</sup>                |
| Up to 100 V (typical)                            | 1x10 <sup>6</sup>                |

1. Not for connection to mains  
2. Relay life is defined as path resistance <1.4 Ω



Figure 5. 200-pin LFH connector block

## M9122A 8x32, 1-wire, PXI Matrix Switch

The M9122A high-density, full 8x32 crosspoint switch matrix offers high-voltage switching in a PXI module. The matrix is designed with durable electromechanical switches that are capable of switching up to 100 Vrms, with up to 60 W of power.

Choose from crosspoints arranged in eight rows and 32 columns that can be activated instantaneously to route signals in your test system. The module includes an 8-wire-wide bus to easily route signals between test instruments and the device under test. To create larger matrices, multiple modules can be linked together. For example, create a larger matrix by joining eight rows of two M9122A modules to create a 16x32 matrix. Easily connect to the matrix with a 50-pin Dsub connector or cable.

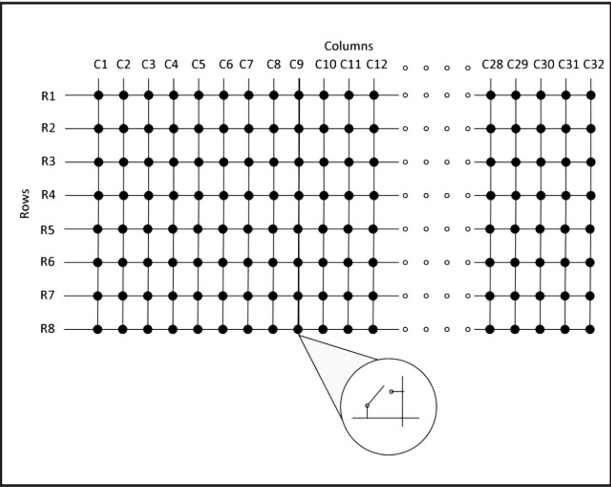


Figure 6. M9122A 8x32, 1-wire, armature relays

### M9122A specifications and characteristics

| General specifications                          |                                  |
|-------------------------------------------------|----------------------------------|
| Channels                                        | 8x32                             |
| Switch type                                     | 1-wire, armature                 |
| Max volts <sup>1</sup>                          | 100 Vrms                         |
| Max switch rating/carry rating                  | 2.0 A                            |
| Switching characteristics (nominal)             |                                  |
| Max power                                       | 60 W                             |
| Switch speed (typical)                          | 3 msec                           |
| Initial path resistance, single ended (typical) | 250 mΩ                           |
| Connectors                                      | 50 Dsub connector block or cable |
| Bandwidth                                       | 5 MHz                            |
| DC isolation, Ch-Ch, Ch-Gnd                     |                                  |
| 25C / 40%RH (typical)                           | 1x10 <sup>10</sup> Ω             |
| 25C / 80%RH (typical)                           | 1x10 <sup>8</sup> Ω              |
| 40C / 80%RH (typical)                           | 1x10 <sup>7</sup> Ω              |
| Thermal offset, single-ended (typical)          | 6 μV                             |
| Relay life, operations <sup>2</sup>             |                                  |
| Low power load (typical)                        | 1x10 <sup>7</sup>                |
| Rated power load (typical)                      | 1x10 <sup>5</sup>                |

1. Not for connection to mains  
2. Relay life is defined as path resistance <1.4 Ω

## Specifications and Characteristics

| General specifications |                                  |                                  |                                  |
|------------------------|----------------------------------|----------------------------------|----------------------------------|
| Slot type              | PXI 1-slot                       |                                  |                                  |
| Connector type         | M9120A                           | M9121A                           | M9122A                           |
|                        | 78 Dsub connector block or cable | 200 LFH connector block or cable | 50 Dsub connector block or cable |

| Environmental characteristics <sup>1,2</sup> |                                                                                                                                                                 |
|----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Temperature                                  | Operating: 0° to 55°C<br>Non-operating: -40° to +70°C                                                                                                           |
| Relative humidity                            | Relative humidity: Up to 95% R.H. at 40° C, non-condensing, pollution degree 1                                                                                  |
| EMC                                          | European EMC Directive 2004/108/EC<br>– IEC/EN 61326-1<br>– CISPR Pub 11 Group 1, Class A<br>– AS/NZS CISPR 11<br>– ICES/NMB-001<br>Canadian ISM device ICS-001 |
| Safety                                       | European Low Voltage Directive 2006/95/EC<br>– ETL, UL/IEC/EN 61010-1, 2nd Edition                                                                              |
| Altitude under relative humidity             | Altitude: up to 4.6 km (15,000 ft)                                                                                                                              |
| Warm-up time                                 | 15 minutes, max                                                                                                                                                 |

1. Samples of this product have been type tested in accordance with the Keysight Environmental Test Manual and verified to be robust against the environmental stresses of storage, transportation, and end-use; those stresses include, but are not limited to temperature, humidity, shock, vibration, altitude, and power line conditions.
2. Test methods are aligned with IEC 60068-2 and levels are similar to MIL-PRF-28800F class 3

| Physical characteristics |                                                                                                                                                                                                                                                 |                    |                    |
|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|--------------------|
| Dimensions               | <ul style="list-style-type: none"> <li>– 3U/1-slot PXI/CompactPCI standard</li> <li>– Connector slot compatibility: cPCI (J1), PXI-1, PXIe hybrid slot</li> <li>– Front panel complies with IEEE1101.10 certification and compliance</li> </ul> |                    |                    |
| Weight                   | M9120A                                                                                                                                                                                                                                          | M9121A             | M9122A             |
|                          | 260 g<br>(.57 lbs)                                                                                                                                                                                                                              | 400 g<br>(.88 lbs) | 380 g<br>(.87 lbs) |

| Power requirements |              |                       |                         |
|--------------------|--------------|-----------------------|-------------------------|
|                    | M9120A       | M9121A                | M9122A                  |
| +3.3V              | 0            | 0                     | 100 mA (typ)            |
| +5V                | 400 mA (typ) | 400 mA (280 mA) (typ) | 400 mA (typ), 1.3 A max |
| +12V               | 0            | 0                     | 50 mA (typ)             |

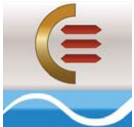
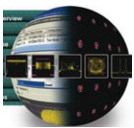
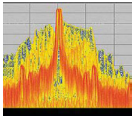
## Specifications and Characteristics (continued)

| System requirements                                                   |                                                                                                                                                               |                                                                                                                                                               |
|-----------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Topic                                                                 | Windows 7 and Vista Requirements                                                                                                                              | Windows XP Requirements                                                                                                                                       |
| Operating systems                                                     | Windows 7 (32-bit and 64-bit)<br>Windows Vista, SP1 and SP2 (32-bit and 64-bit)                                                                               | Windows XP, Service Pack 3                                                                                                                                    |
| 1 GHz 32-bit (x86), 1 GHz 64-bit (x64)<br>(no support for Itanium 64) | 1 GHz 32-bit (x86), 1 GHz 64-bit (x64)<br>(no support for Itanium 64)                                                                                         | 600 MHz or higher required<br>800 MHz recommended                                                                                                             |
| Available disk space <sup>1</sup>                                     | 1.5 GB available hard disk space, includes:<br>– 1 GB available for Microsoft .NET Framework 3.5 SP1 <sup>2</sup><br>– 100 MB for Keysight IO Libraries Suite | 1.5 GB available hard disk space, includes:<br>– 1 GB available for Microsoft .NET Framework 3.5 SP1 <sup>2</sup><br>– 100 MB for Keysight IO Libraries Suite |
| Video                                                                 | Support for DirectX 9 graphics with 128 MB graphics memory recommended<br>(Super VGA graphics is supported)                                                   | Super VGA (800 x 600) 256 colors or more                                                                                                                      |
| Browser                                                               | Microsoft Internet Explorer 7.0 or greater                                                                                                                    | Microsoft Internet Explorer 6.0 or greater                                                                                                                    |

1. Because of the installation procedure, less memory may be required for operation than is required for installation.

2. .NET Framework Runtime Components are installed by default with Windows Vista and Windows 7. Therefore, you may not need this amount of available disk space.

## Specifications and Characteristics (continued)

| Instrument Connection Software                                                      |                             |                                                                                                                                                                                                                                                                                                               |                                                                                                                                    |
|-------------------------------------------------------------------------------------|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|
|    | Keysight IO Library         | Keysight IO Libraries Suite offers a single entry point for a connection to modular and traditional instruments. It automatically discovers interfaces, chassis, instruments, and identifies updates to IVI instrument drivers. IO Libraries Suite safely installs in side-by-side mode with NI I/O software. | Free software<br>Download from A.com<br>( <a href="http://www.keysight.com/find/iosuite">www.keysight.com/find/iosuite</a> )       |
| Module Management                                                                   |                             |                                                                                                                                                                                                                                                                                                               |                                                                                                                                    |
|    | Keysight Connection Expert  | The Keysight Connection Expert is the Graphical User interface included in the IO Libraries Suite that allows you to search for, verify and update IVI instrument and soft front panel drivers for modular and traditional instruments.                                                                       | Free software<br>Included in the IO Libraries ( <a href="http://www.keysight.com/find/iosuite">www.keysight.com/find/iosuite</a> ) |
| Module Setup and Usage                                                              |                             |                                                                                                                                                                                                                                                                                                               |                                                                                                                                    |
|    | Keysight Soft Front Panel   | The PXI module includes a Soft Front Panel (SFP), a software-based Graphical User Interface (GUI) which enables the instrument's capabilities from your PC.                                                                                                                                                   | Included on CD-Rom with module                                                                                                     |
| Programming                                                                         |                             |                                                                                                                                                                                                                                                                                                               |                                                                                                                                    |
|                                                                                     | Driver                      | Development environments                                                                                                                                                                                                                                                                                      |                                                                                                                                    |
| Drivers                                                                             | IVI-COM<br>IVI-C<br>LabVIEW | Visual Basic<br>Visual Studio (VB.NET, C#, C/C++)<br>VEE<br>LabVIEW, LabWindows/CVI, MATLAB                                                                                                                                                                                                                   | Included on CD-Rom with module or<br>Download from <a href="http://www.keysight.com">www.keysight.com</a>                          |
| Programming Assistance                                                              |                             |                                                                                                                                                                                                                                                                                                               |                                                                                                                                    |
|  | Command Expert              | Assists in finding the right instrument commands and setting correct parameters. A simple interface includes documentation, examples, syntax checking, command execution and debug tools to build sequences for integration in Excel, MATLAB, Visual Studio, LabVIEW, VEE, SystemVue.                         | Free software<br>Download from <a href="http://www.keysight.com/find/commandexpert">www.keysight.com/find/commandexpert</a>        |
| Programming examples                                                                |                             | Each module includes programming Program examples available for LabVIEW, LabWindows/CVI, Visual Studio C, C++, C#, Visual Basic, and MATLAB                                                                                                                                                                   | Download from <a href="http://www.keysight.com">www.keysight.com</a>                                                               |
| Signal Generation Software                                                          |                             |                                                                                                                                                                                                                                                                                                               |                                                                                                                                    |
|  | Signal Studio               | Suite of signal-creation tools which provides performance optimized reference signals for: W-CDMA/HSPA+, cdma2000/1xEV-DO, GSM/EDGE/Evo, LTE/LTE-Advanced FDD, LTE/LTE-Advanced TDD, TD-SCDMA/HSDPA, WLAN 802.11a/b/g/n/ac, and Bluetooth.                                                                    | Licensed software<br>( <a href="http://www.keysight.com/find/signalstudio">www.keysight.com/find/signalstudio</a> )                |
|  | System View                 | A system-level EDA that accelerates design and verification at the physical layer where advanced digital signal processing meets RF.                                                                                                                                                                          | Licensed software<br>( <a href="http://www.keysight.com/find/eesof-systemvue">www.keysight.com/find/eesof-systemvue</a> )          |
| MATLAB                                                                              |                             | Interactive tools and command-line functions for instrument control and data analysis tasks such as signal processing, signal modulation, digital filtering, and curve fitting.                                                                                                                               | Licensed software                                                                                                                  |
| Signal Analysis Software                                                            |                             |                                                                                                                                                                                                                                                                                                               |                                                                                                                                    |
|  | Vector Signal Analysis      | 89600 VSA software sees through the complexity of emerging and existing industry standards serving as your window into complex signal interactions                                                                                                                                                            | Licensed software<br>( <a href="http://www.keysight.com/find/vsa">www.keysight.com/find/vsa</a> )                                  |

## Setup and Calibration Services

| <b>Assistance</b>                   |                                                                                                                                                                                                                                                                                                      |                                                                                                          |
|-------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|
| On day startup assistance           | An Keysight Technologies applications engineer will help you get started and install the modules in a chassis, configure the controller, load software and make first measurements.                                                                                                                  | Included in base configuration                                                                           |
| <b>Calibration and Traceability</b> |                                                                                                                                                                                                                                                                                                      |                                                                                                          |
| Factory Calibration                 | Keysight's modular products M9120A, M9121A, M9122A are factory calibrated and shipped with an ISO-9002, NIST-traceable calibration certificate.                                                                                                                                                      | Included in base configuration                                                                           |
| Calibration Cycle                   | A one year calibration cycle is recommended                                                                                                                                                                                                                                                          | Included in base configuration                                                                           |
| Calibration Sites                   | <ul style="list-style-type: none"> <li>– At Keysight Worldwide Service Centers</li> <li>– On-site by Keysight</li> <li>– By self-maintainers</li> </ul>                                                                                                                                              | More information on <a href="http://www.keysight.com/find/info-line">www.keysight.com/find/info-line</a> |
| R1282A Annual Calibration Service   | <ul style="list-style-type: none"> <li>– Keysight Calibration</li> <li>– Keysight Calibration + Uncertainties</li> <li>– Keysight Calibration + Uncertainties + Guardbanding</li> <li>– Standards Compliance</li> <li>– ANSI Z540.3-2006, ISO 17025:2005, ANSI Z540-1-1994, ISO 9001:2008</li> </ul> |                                                                                                          |

## Configuration and Ordering

### Hardware

| Model                 | Description                                                          |
|-----------------------|----------------------------------------------------------------------|
| Each switch includes: | Getting started guide, software drivers, and Keysight I/O libraries  |
| M9120A                | PXI matrix switch: 4x32, 2-wire, 100V/2A, EM relays                  |
| M9121A                | PXI high-density matrix switch: 4x64, 2-wire, 100V/0.5A, reed relays |
| M9122A                | PXI matrix switch: 8x32, 1-wire, 100V/2A, armature relays            |

### Accessories

| M9120A | Description                                          |
|--------|------------------------------------------------------|
| Y1181A | PXI connector block: 78-pin, shielded, female DSub   |
| Y1187A | PXI connector cable: 78-pin, male-to female, 1 meter |
| Y1188A | PXI connector cable: 78-pin, male-to female, 2 meter |

| M9121A | Description                                                                            |
|--------|----------------------------------------------------------------------------------------|
| Y1182A | PXI connector block: 200-pin, shielded, male                                           |
| Y1189A | PXI connector cable: 200-pin, LFH male to four 50 pin Dtype female connectors, 1 meter |
| Y1190A | PXI connector cable: 200-pin, LFH male to four 50 pin Dtype female connectors, 2 meter |

| M9122A | Description                                         |
|--------|-----------------------------------------------------|
| Y1180A | PXI connector block: 50-pin, female DSub            |
| Y1185A | PXI connector cable: 50-pin, male-tofemale, 1 meter |
| Y1186A | PXI connector cable: 50 pin, male-tofemale, 2 meter |

### Related Products

| Model  | Description                                                          |
|--------|----------------------------------------------------------------------|
| M9018A | Getting started guide, software drivers, and Keysight I/O libraries  |
| M9021A | PXI matrix switch: 4x32, 2-wire, 100V/2A, EM relays                  |
| M9045B | PXI high-density matrix switch: 4x64, 2-wire, 100V/0.5A, reed relays |
| Y1200B | PXI matrix switch: 8x32, 1-wire, 100V/2A, armature relays            |
| M9048A | PCIe PC adapter                                                      |
| Y1202A | PCIe cable: x8, 2.0m (used with M9047B)                              |

### Software

| Model                                                | Description                                                                                         |
|------------------------------------------------------|-----------------------------------------------------------------------------------------------------|
| Supported operating systems                          | Microsoft Windows XP (32-bit), Microsoft Windows Vista (32/64-bit), Microsoft Windows 7 (32/64-bit) |
| Standard compliant drivers                           | IVI-COM, IVI-C, LabVIEW, MATLAB                                                                     |
| Supported application development environments (ADE) | VisualStudio (VB.NET, C#, C/C++), LabVIEW, LabWindows/CVI, MATLAB                                   |
| Keysight IO Libraries                                | Includes: VISA Libraries, Keysight Connection Expert, IO Monitor                                    |

### Recommended Chassis Configuration

For the ultimate in speed and flexibility, combine your switches with other PXI modules in the Keysight M9018A PXIe chassis as follows:

- Select a PXIe system module, PCIe cable interface, or embedded controller (the Keysight M9021A is recommended)
- If an external computer is being used, select an appropriate PC interface card (the Keysight M9047A is recommended with an external PC)
- Select an appropriate cable to connect the computer interface board to the system module (the Y1202A is recommended to connect the M9047A and M9021A)
- Select rack mount and EMC filler panel kits as required

## Definitions for specifications

Specifications describe the warranted performance of calibrated instruments that have been stored for a minimum of 2 hours within the operating temperature range of 0 to 55°C, unless otherwise stated, and after a 45 minute warm-up period. Data represented in this document are specifications unless otherwise noted.

Characteristics describe product performance that is useful in the application of the product. Characteristics are often referred to as Typical or Nominal values.

- Typical describes characteristic performance, which 80% of the instruments will meet when operated over a 20 to 30°C temperature range. Typical performance is not warranted.
- Nominal describes representative performance that is useful in the application of the product when operated over a 20 to 30°C temperature range. Nominal performance is not warranted.

Note: All graphs contain measured data from several units at room temperature unless otherwise noted.

## Calibration

### Advantage Services: Calibration

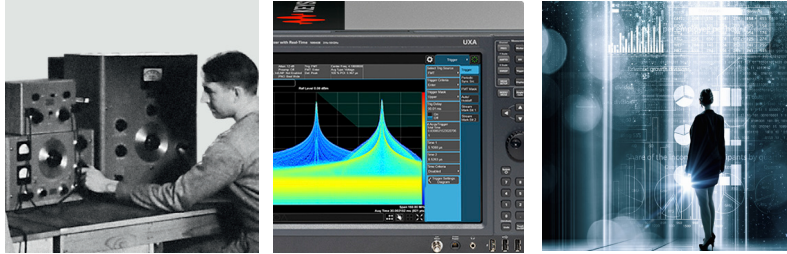
Keysight Advantage Services is committed to your success throughout your equipment's lifetime

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## Evolving Since 1939

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