

**Agilent Technologies**  
**PXI 6½ Digit Multimeters**  
**M9181A, M9182A, M9183A**

**Startup Guide**



**Agilent Technologies**

# Notices

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# Safety Information

The following general safety precautions must be observed during all phases of operation of this instrument. Failure to comply with these precautions or with specific warnings or operating instructions in the product manuals violates safety standards of design, manufacture, and intended use of the instrument. Agilent Technologies assumes no liability for the customer's failure to comply with these requirements.

## General

Do not use this product in any manner not specified by the manufacturer. The protective features of this product must not be impaired if it is used in a manner specified in the operation instructions.

## Before Applying Power

Verify that all safety precautions are taken. Make all connections to the unit before applying power. Note the instrument's external markings described under "Safety Symbols".

## Ground the Instrument

PXI chassis are provided with a grounding-type power plug. The instrument chassis and cover must be connected to an electrical ground to minimize shock hazard. The ground pin must be firmly connected to an electrical ground (safety ground) terminal at the power outlet. Any interruption of the protective (grounding) conductor or disconnection of the protective earth terminal will cause a potential shock hazard that could result in personal injury.

## Do Not Operate in an Explosive Atmosphere

Do not operate the Agilent module/chassis in the presence of flammable gases or fumes.

## Do Not Operate Near Flammable Liquids

Do not operate the Agilent module/chassis in the presence of flammable liquids or near containers of such liquids.

## Do Not Remove Instrument Cover

Only qualified, service-trained personnel who are aware of the hazards involved should remove instrument covers.

Always disconnect the power cable and any external circuits before removing the instrument cover.

## Cleaning

Clean the outside of the Agilent module, chassis, or accessory with a soft, lint-free, slightly dampened cloth. Do not use detergent or chemical solvents.

## Keep away from live circuits

Operating personnel must not remove equipment covers or shields. Procedures involving the removal of covers and shields are for use by service-trained personnel only. Under certain conditions, dangerous voltages may exist even with the equipment switched off. To avoid dangerous electrical shock, DO NOT perform procedures involving cover or shield removal unless you are qualified to do so.

## DO NOT operate damaged equipment

Whenever it is possible that the safety protection features built into this product have been impaired, either through physical damage, excessive moisture, or any other reason, REMOVE POWER and do not use the product until safe operation can be verified by service-trained personnel. If necessary, return the product to an Agilent Technologies Sales and Service Office for service and repair to ensure the safety features are maintained.

## DO NOT block the primary disconnect

The primary disconnect device is the appliance connector/power cord when a chassis used by itself, but when installed into a rack or system the disconnect may be impaired and must be considered part of the installation.

## Do Not Modify the Instrument

Do not install substitute parts or perform any unauthorized modification to the product. Return the product to an Agilent Sales and Service Office to ensure that safety features are maintained.

## In Case of Damage

Instruments that appear damaged or defective should be made inoperative and secured against unintended operation until they can be repaired by qualified service personnel.

## CAUTION

A CAUTION notice denotes a hazard. It calls attention to an operating procedure or practice that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a CAUTION notice until the indicated conditions are fully understood and met.

## WARNING

A WARNING notice denotes a hazard. It calls attention to an operating procedure or practice, that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a WARNING notice until the indicated conditions are fully understood and met.

## WARNING

**IEC Measurement Category II. The HI and LO input terminals may be connected to mains in IEC Category II installations for line voltages up to 300 VAC. To avoid the danger of electric shock, do not connect the inputs to mains for line voltages above 300 VAC. The M9181A DMM is limited to 240 VAC. See "IEC Measurement Category II Overvoltage Protection" below for further information.**

**The DMM comes installed with four shields (bottom, top and two edge strips). These shields must be in place for performance and safety reasons. Removal or improper assembly of these shields can result in lethal voltages occurring within your PC. Be sure to check your installation before closing the cover on your chassis.**

**During and after installing your DMM, verify that no loose wires or ribbon cables infringe upon any of the internal circuits of the DMM, as this may apply measurement voltages to your chassis, causing electrocution and/or damage to your chassis!**

**To avoid shock hazard, install the DMM only into a chassis that has its power connector connected to a power receptacle with an earth safety ground.**

**When making any measurements above 50 VDC or 40 VAC, only use safety test leads, such as Agilent test leads.**

## IEC Measurement Category II Overvoltage Protection

To protect against the danger of electric shock, the Agilent M918x Series digital multimeters (DMMs) provide overvoltage protection for line-voltage mains connections meeting both of the following conditions:

The HI and LO input terminals are connected to the mains under Measurement Category II conditions, defined below,

and

The mains are limited to a maximum line voltage of 300 VAC (240 VAC for the M9181A).

IEC Measurement Category II includes electrical devices connected to mains at an outlet on a branch circuit. Such devices include most small appliances,

test equipment, and other devices that plug into a branch outlet or socket. The M918x Series DMMs may be used to make measurements with the HI and LO inputs connected to mains in such devices, or to the branch outlet itself (up to 300 VAC, or 240 VAC for the M9181A). However, the DMMs may not be used with their HI and LO inputs connected to mains in permanently installed electrical devices such as the main circuit-breaker panel, sub-panel disconnect boxes, or permanently wired motors. Such devices and circuits are subject to overvoltages that may exceed the protection limits of the M918x Series.

**Note:** The M9182A and M9183 can measure voltages up to 330 VAC in circuits that are isolated from mains (CAT I).

## Safety Symbols

Products display the following symbols:



Refer to manual for additional safety information.



Earth Ground.



Chassis Ground.



Alternating Current (AC).



Direct Current (DC).



Standby Power. Unit is not completely disconnected from AC mains when power switch is in standby position



Indicates that antistatic precautions should be taken.



Notice for European Community: This product complies with the relevant European legal Directives: EMC Directive (2004/108/EC) and Low Voltage Directive (2006/95/EC).



This is the symbol for an Industrial, Scientific, and Medical Group 1 Class A product.



N10149

The C-tick mark is a registered trademark of the Spectrum Management Agency of Australia. This signifies compliance with the Australia EMC Framework regulations under the terms of the Radio Communication Act of 1992.

## ICES/NMB-001

ICES/NMB-001 indicates that this ISM device complies with the Canadian ICES-001.



## Waste Electrical and Electronic Equipment (WEEE) Directive 2002/96/EC

This product complies with the WEEE Directive (2002/96/EC) marking requirement. The affixed product label (see below) indicates that you must not discard this electrical/electronic product in domestic household waste.

**Product Category:** With reference to the equipment types in the WEEE directive Annex 1, this product is classified as a "Monitoring and Control instrumentation" product.

Do not dispose in domestic household waste.

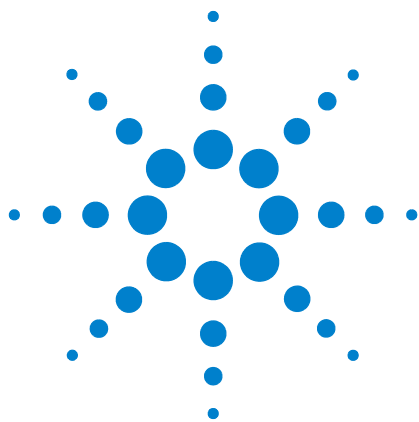
To return unwanted products, contact your local Agilent office, or see [www.agilent.com/environment/product](http://www.agilent.com/environment/product) for more information.



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## Introduction

The Agilent M918x Series digital multimeters (DMM) deliver high-performance measurement with fast, easy installation and configuration via the Agilent Connection Expert and a soft front panel (SFP).

### Agilent PXI 6 1/2 digit DMM Modules

- M9181A, PXI 6½ digit Digital Multimeter, basic features
- M9182A, PXI 6½ digit Digital Multimeter, high performance
- M9183A, PXI 6½ digit Digital Multimeter, enhanced high performance

Agilent also supplies software drivers that allow you to support the modules in many popular PXI chassis and programming environments. The soft front panel allows you to exercise the DMMs.

## Related documentation

This Startup Guide, and the documentation listed below, can be found on the *Agilent M9180 Series PXI Digital Multimeters Software and Product Information* CD that came with your module.

- Help file for the Agilent PXI DMM Modules Soft Front Panel
- Help file for the Agilent PXI DMM Modules IVI-C/IVI-COM device drivers
- Help file for the Agilent PXI DMM Modules LabVIEW G device drivers
- Agilent M9182A/M9183 PXI DMM Modules data sheet

**For the latest specifications, software, and example programs, please see the Agilent web site at: [www.agilent.com/find/pxi-dmm](http://www.agilent.com/find/pxi-dmm).**





## Step 1: Unpack and Inspect the Module

### CAUTION

Agilent's PXI DMMs are shipped in materials which prevent static electricity damage. The modules should only be removed from the packaging in an anti-static area ensuring that correct anti-static precautions are taken. Store all modules in anti-static envelopes when not in use.

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### ESD

Electrostatic discharge (ESD) can damage or destroy electronic components. All work on electronic assemblies should be performed at a static-safe work station. Purchase acceptable ESD accessories from your local supplier.

- Conductive table-mat and wrist-strap combination.
- Conductive floor-mat and heel-strap combination.

Both types, when used together, provide a significant level of ESD protection. Of the two, only the table-mat and wrist-strap combination provides adequate ESD protection when used alone. To ensure user safety, the static-safe accessories must provide at least 1 M $\Omega$  of isolation from ground.

### Inspect for damage

After unpacking the DMM, carefully inspect it for any shipping damage. Report any damage to the shipping agent immediately, as such damage is not covered by the warranty.

### CAUTION

To avoid damage when handling a module; do not touch exposed connector pins.

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### NOTE

Information on preventing damage to your Agilent equipment can be found at [www.agilent.com/find/tips](http://www.agilent.com/find/tips).

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## Step 1: Unpack and Inspect the Module

### Return the module for service

Should it become necessary to return an Agilent DMM for repair or service, follow the steps below:

- 1 Review the warranty information shipped with your product.
- 2 Contact Agilent to obtain a Return Material Authorization (RMA) and return address. For assistance finding Agilent contact information go to [www.agilent.com/find/assist](http://www.agilent.com/find/assist) (worldwide contact information for repair and service) or refer to the **Support** information on the product web page at: [www.agilent.com/find/pxi-dmm](http://www.agilent.com/find/pxi-dmm).
- 3 Write the following information on a tag and attach it to the malfunctioning equipment.
  - Name and address of owner. A Post Office box is not acceptable as a return address.
  - Product model number (for example, M9182A)
  - Product serial number (for example, MYXXXXXXXXX). The serial number label is located on the side of the module.
  - A description of failure or service required.
- 4 Carefully pack the module in its original ESD bag and packing carton. If the original carton is not available, use bubble wrap or packing peanuts and place the instrument in a sealed container and mark the container “FRAGILE.”
- 5 On the shipping label, write ATTENTION REPAIR DEPARTMENT and the RMA number.

#### NOTE

If any correspondence is required, refer to the product by serial number and model number.

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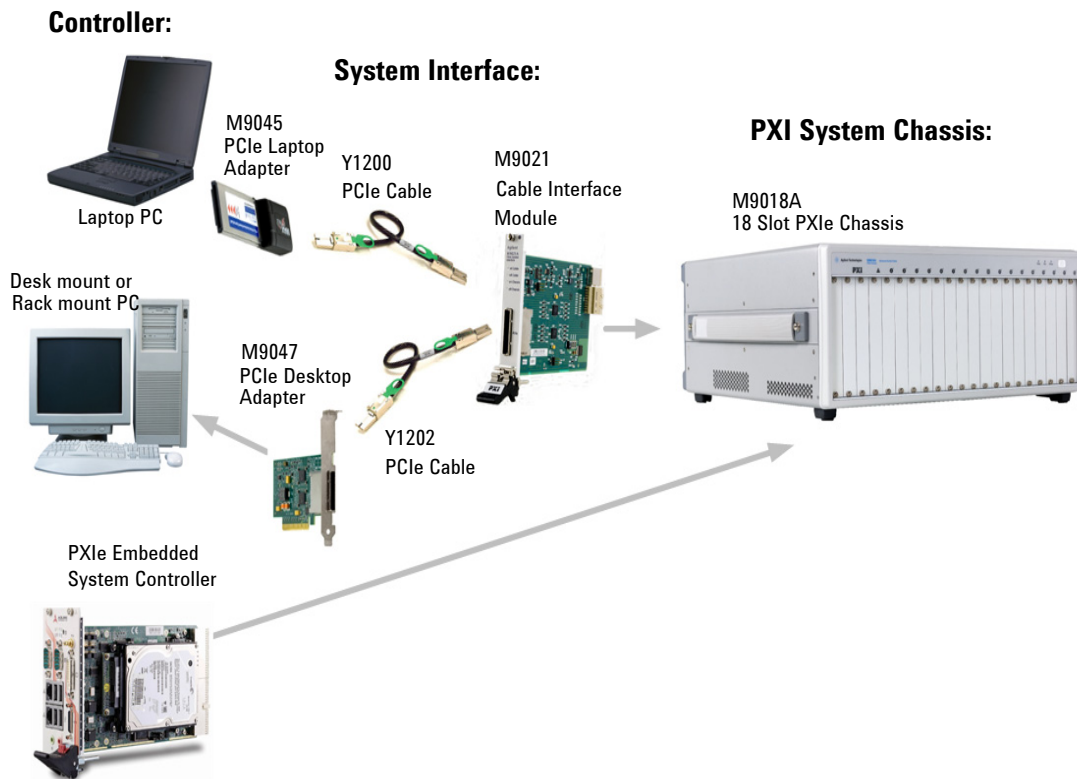
## Step 2: Verify Shipment Contents

Your shipment should have included the following:

- The Agilent PXI DMM module that you ordered.
- This document (*Agilent Technologies PXI 6½ Digit Multimeters Startup Guide*) in hard copy.
- The *Agilent M9180 Series PXI Digital Multimeters Software and Product Information CD* (M9182-10001). This CD contains software, drivers and all product printed documentation in PDF format for the PXI DMMs.
- An *Automation-Ready CD with Agilent IO Libraries Suite* (version 16 or later).
- Any other accessories that you ordered (cables, connectors, etc.).

## Step 3: Install the Software on the Controller

The following illustration shows typical installations.



### Step 3: Install the Software on the Controller

#### NOTE

Do not install the PXI modules in the PXI chassis yet! You must install the software prior to installing the modules in the chassis so that Agilent IO Libraries Connection Expert finds them.

## System requirements

The following table lists the minimum system requirements for Agilent IO Libraries v16. In general, any x86 or x64 (except Itanium) should work but there may be a significant decrease in performance.

<b>Operating System</b>	Windows XP Service Pack 2 or later	Windows Vista SP1 and SP2 (32-bit and 64-bit), Business, Ultimate, Enterprise, Home Basic, and Home Premium	Windows 7 (32- and 64-bit) Starter, Home Basic, Home Premium, Professional, Ultimate, Enterprise
<b>Processor Speed</b>	600 MHz or higher required, 800 MHz recommended	1Ghz 32-bit (x86), 1GHz 64-bit (x64), no support for Itanium64	1Ghz 32-bit (x86), 1GHz 64-bit (x64), no support for Itanium64
<b>Available memory</b>	256 MB minimum (1 GB or greater recommended)	1 GB minimum	1 GB minimum
<b>Available hard disk space*</b>	1.5 GB available hard disk space, includes: <ul style="list-style-type: none"> <li>• 1GB available for Microsoft .NET Framework 2.0 SP2</li> <li>• 65MB for Agilent IO Libraries Suite</li> </ul>	1.5 GB available hard disk space, includes: <ul style="list-style-type: none"> <li>• 1GB available for Microsoft .NET Framework 2.0 SP1</li> <li>• 65MB for Agilent IO Libraries Suite</li> </ul>	1.5 GB available hard disk space, includes: <ul style="list-style-type: none"> <li>• 1GB available for Microsoft .NET Framework 2.0 SP1</li> <li>• 65MB for Agilent IO Libraries Suite</li> </ul>
<b>Video</b>	Super VGA (800x600) 256 colors or more	Support for DirectX 9 graphics with 128MB graphics memory recommended (Super VGA graphics is supported)	Support for DirectX 9 graphics with 128MB graphics memory recommended (Super VGA graphics is supported)
<b>Browser</b>	Microsoft Internet Explorer 6.0 or greater	Microsoft Internet Explorer 7 or greater	Microsoft Internet Explorer 7 or greater

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

## Power the controller

- If you are using a desktop, laptop, or rack mount PC as a controller:
  - 1 Install any peripheral devices in the PC (e.g., PCIe Interface adapters, etc.). Follow the manufacturers instructions.
  - 2 Power up the computer.
  - 3 Choose the automatic option for any "Found Hardware" dialogs
- If you are using a PXI embedded computer as the controller:
  - 1 Install the embedded computer module into the PXI chassis following the manufacturer's instructions.
  - 2 Connect peripherals such as a mouse, keyboard, monitor, CD-ROM drive, etc.
  - 3 Power up the chassis.
  - 4 Choose the automatic option for any "Found Hardware" dialogs

## Install Agilent IO Libraries Suite

Install Agilent IO Library Suite (IOLS), which includes the Agilent Connection Expert, the IVI Shared Components, and the VISA Shared Components.

### NOTE

Agilent IO Libraries must be installed prior to installing and running any other software and prior to powering up the chassis.

- 1 Insert the *Automation-Ready CD with Agilent IO Libraries Suite* into the CD-ROM drive of your controller.
  - Wait a few seconds for the auto-run window to appear.
  - If the auto-run window does not appear automatically:
    - Click **Start > Run...**
    - Type:  
`<drive>:Autorun\IOLibraries.hta`  
where <drive> is your CD drive letter.
- 2 Follow the installation instructions that came with the Agilent IO Libraries Suite.

### NOTE

If the **IVI Shared Components** and **VISA Shared Components** are not already installed on your PC, Agilent IO Libraries Suite installs them in the standard, default locations. If the **IVI Shared Components** and **VISA Shared Components** are already installed, the Agilent IO Libraries Suite installer will upgrade them to the latest version, using the same installation location used by the older version. If this is a first-time installation, you will be able to select installation locations for these components by choosing a Custom Installation.

## Install instrument drivers and Soft Front Panel

- 1 Insert the *Agilent M9180 Series PXI Digital Multimeters Software and Product Information* CD into the CD-ROM drive of your PC.

Wait a few seconds for the auto-run window to appear. If the auto-run window does not appear automatically:

- Click **Start > Run...**
  - Type: <drive>:Autorun.exe where <drive> is your CD drive letter.
- 2 Select the **Install Driver Software** link. Follow the installer prompts. Accept all of the default directories specified during installation if prompted.
  - 3 After the Welcome screen, you will be prompted three times for license agreements. The software installer installs the following drivers:
    - **Agilent Modular Software License Agreement.** The installer program installs the Soft Front Panel (SFP) application and other object code to connect to the switches. Accept the license terms and click **Next**.
    - **Agilent IVI Driver Source Code License Agreement.** The Interchangeable Virtual Instrument (IVI) driver is available for programming the Agilent switch modules using Microsoft® development environments (e.g., Visual Studio®, C, C++, C#, Visual Basic), Agilent VEE, MATLAB®, or National Instruments® Labview™. Accept the license terms and click **Next**.
    - **Agilent Software License Agreement for drivers for use with LabVIEW Software.** The LABVIEW driver provides access to the functionality of the switches through LabVIEW VIs. This driver works in National Instruments LabVIEW development environments. Before this driver can be installed, your computer must already have the IVI Shared Components installed. Accept the license terms and click **Next**.

### NOTE

Installing Agilent IO Libraries also installs the IVI Shared Components. The IVI Shared Components are required before IVI drivers (e.g., IVI-COM, IVI-C) can be installed from the product reference CD.

- 4 Next, the installer indicates the LabVIEW installations found on your host computer. Click **Next**
- 5 After accepting the licenses, the driver software is ready to be installed on your host computer. Click **Install**.
- 6 The installation program will take several minutes to finish the installation; do not cancel the installation process. When the installation wizard is finished, you will be prompted to reboot your host computer. Do not reboot the host computer at this time! Select **“No, I will restart my computer later.”** Power down the host computer.

## Step 4. Connect the PC to the PXI Chassis

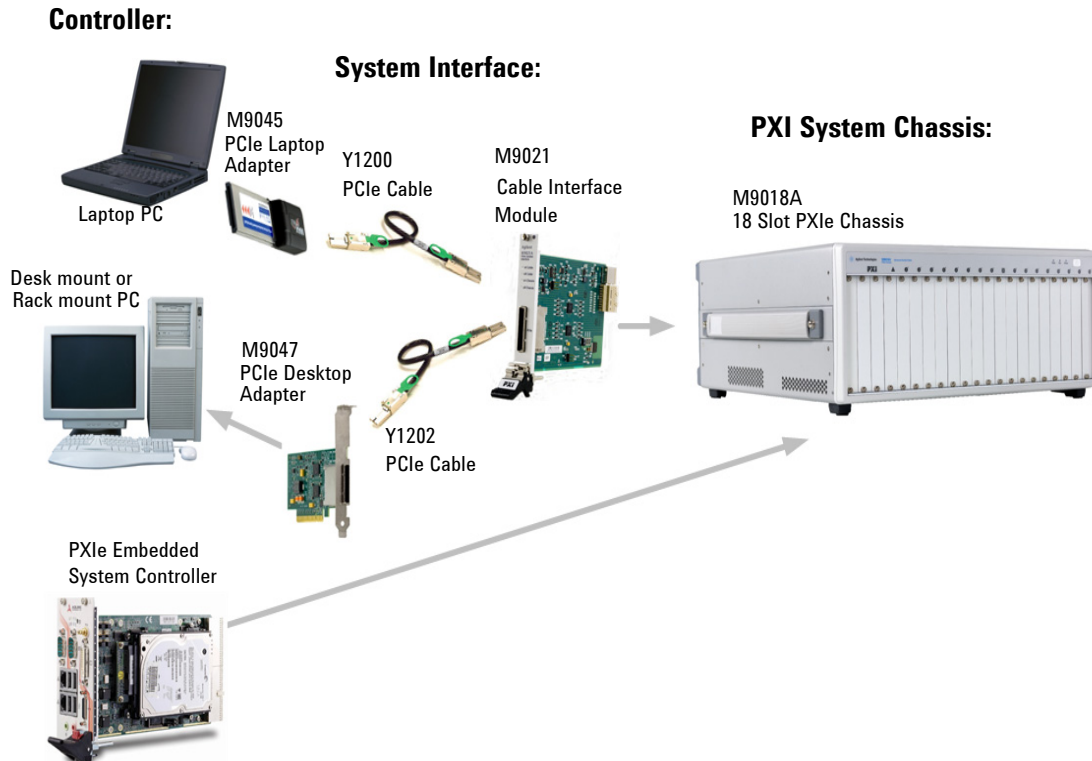
### NOTE

To ensure proper operation and the PC's ability to enumerate all of the PXI modules, you must use an approved embedded PC, desktop PC, or laptop PC along with approved PCIe adaptor and cable.

### Using a remote PC

Refer to the following figure. Make certain that both the PC and the PXI chassis are turned off. If you are using the M9018A 18 Slot PXIe chassis, install the Agilent M9021 System Interface Module in the chassis.

- If you are using a desktop or rackmount PC, install the M9047 PCIe Desktop Adapter in the PC. With an Agilent Y1202 cable, connect the adapter to the System Interface module.
- If you are using a laptop PC then install the M9045 PCIe ExpressCard Adapter in the laptop PC. With an Agilent Y1200 cable, connect the adapter to the System Interface module or the embedded computer on the PXI chassis



## Step 4. Connect the PC to the PXI Chassis

### Using an embedded computer

Refer to the figure above. If you are using an embedded controller in the PXI chassis, you should have installed it prior to installing the Agilent IO Libraries and instrument drivers. No cables or other adapters are required. After installation, proceed to [“Step 5: Install the DMM Modules in the PXI Chassis”](#)



## Step 5: Install the DMM Modules in the PXI Chassis

### CAUTION

- PXI hardware does not support "hot-swap" capabilities (changing modules while power is applied to the chassis).
- Before installing Agilent PXI Modules into the chassis, the chassis must be powered off and unplugged to prevent damage to the PXI module.

### NOTE

These modules can be used in a chassis with a cPCI, PXI-1, or PXIh chassis peripheral slot.

**3**

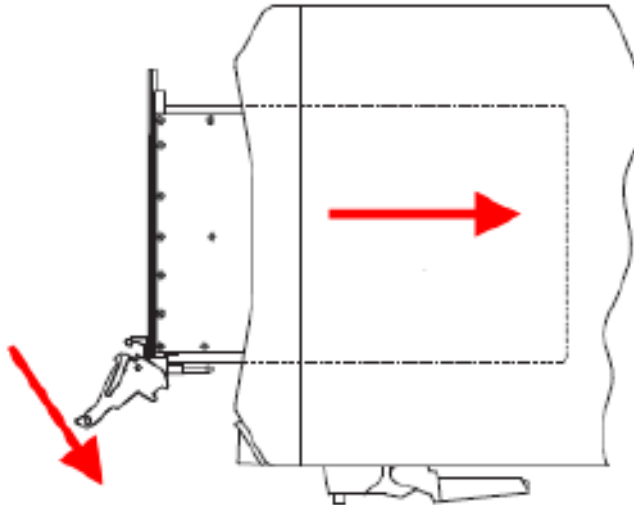
The module can be installed in any standard PXI slot marked with a peripheral slot compatibility image (a circle containing the slot number).

**7**

<sup>H</sup> The module can also be installed in any hybrid PXI slot marked with a peripheral slot compatibility image (the letter "H" and a solid circle containing the slot number).

- 1 Make sure the PXI chassis power is turned off.
- 2 If the chassis has multiple fan speed settings, ensure that the fans are set to automatic. Do not set the fan speed to low or turn them off.
- 3 Position the chassis so that there is ample space between the chassis fan intake and exhaust vents. Blockage by walls or obstructions affects the air flow needed for cooling. (Refer to the chassis documentation for more information about cooling).
- 4 Holding the PXI module by the injector/ejector handle, slide it into an available PXI (or hybrid) slot, as shown in the following figure.
  - Install the module into the PXI slot of the chassis by placing the module card edges into the front module guides (top and bottom).
  - Slide the module to the rear of the chassis and assure that the injector/ejector handle is pushed down in the unlatched (downward) position.
  - Slide the module completely into the chassis. When you begin to feel resistance, push up on the injector/ejector handle to fully seat the module into the chassis.

### Step 5: Install the DMM Modules in the PXI Chassis




- 5 Latch the module by pulling up on the injector/ejector handle and secure the front panel to the chassis using the module front-panel mounting screws.
- 6 Tighten the screws on the module (or remote controller) front panel. Performance may suffer if the screws are not securely tightened.
- 7 Install all chassis covers, filler panels, and air scoops after installing the module. Missing filler panels may disrupt necessary air circulation in the chassis.
- 8 If you are using a remote controller, connect the Cable Interface Card in the chassis to host computer.
- 9 Plug in and power up the PXI chassis. Verify that the chassis fans are operating and free of obstructions that may restrict airflow.
- 10 If you are using a remote controller (rackmount, desktop, or laptop PC), reboot the controller.

## Step 6. Verify Operation of the DMM

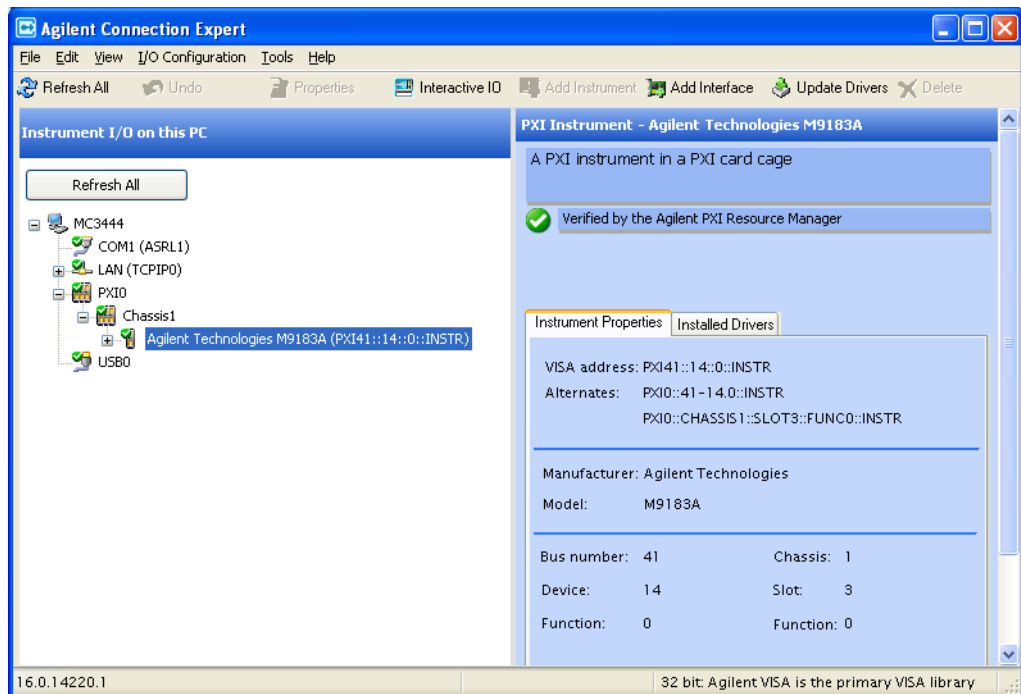
### Run Agilent IO Libraries Connection Expert

If Agilent Connection Expert is already running on the controller, click the **Refresh All** button to identify any hardware you have just installed or re-connected.

#### NOTE

If Connection Expert is not already running, run it now to verify your I/O configuration: In the Windows Notification area, click the **IO** icon (  ), then click **Agilent Connection Expert**.

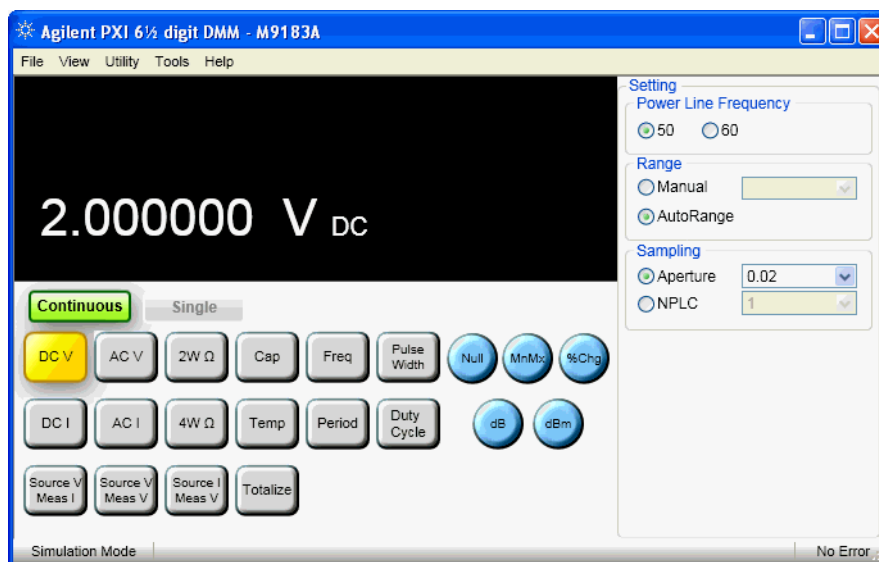
Locate your interfaces and instruments in the Agilent Connection Expert Explorer Pane. Click on them to see their properties (displayed in the right-hand pane). Observe their state, also displayed in the right-hand pane -- if communication to the interface or instrument has been successfully established, it will be in the Verified state, denoted by a green check mark. The following illustration shows the Agilent Connection Expert.



You can use the Soft Front Panel (SFP) software to open and close the relays and verify operation of the PXI DMM modules. The Soft Front Panel Software was installed as part of the Software installation process.

## Step 6. Verify Operation of the DMM

Refer to the SFP help file on the *Agilent M9180 Series PXI Digital Multimeters Software and Product Information CD* for specific detailed information on using the SFP. The following graphic shows an example of the SFP for the DMM modules.

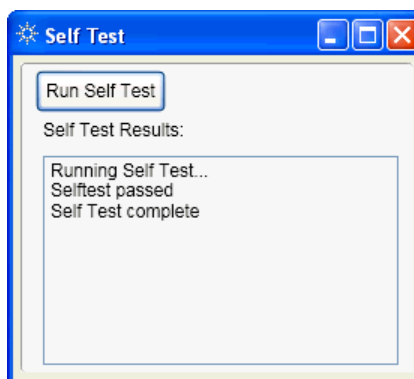


### Verify operation

To verify basic operational readiness, use the Soft Front Panel software to configure and take a few basic measurements. For example, you could apply a short across the input terminals and take a DCV measurement or 2W  $\Omega$  measurement. Both measurements should report values near zero. Module specifications are guaranteed by design.

### Conduct self test.

Use the Utility menu on the Soft Front Panel software to run a module self test.



## Module Functional Description

The Agilent M918x Series DMM modules conform to the single slot, 3U height (128mm) Eurocard standard. These modules meet PXI Specification 2.2. Local bus, trigger bus, and star trigger are not included. The modules also include:

- CPCI Ejector Handle
- Front panel SMB connectors
- The front panel secures to the chassis by two M2.5 x 6mm pan-head Posi-drive screws.

There are no user serviceable or field replaceable components on these modules.

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