

Startup Guide

M9019A

Keysight PXIe Chassis Family



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Fountaingrove Parkway Santa Rosa, CA
95403 USA

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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. Keysight 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 external markings described under "Safety Symbols".

Ground the Instrument

Keysight 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 module/chassis in the presence of flammable gases or fumes.

Do Not Operate Near Flammable Liquids

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

Cleaning

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

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.

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 Keysight 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 Keysight 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

Do NOT block vents and fan exhaust: To ensure adequate cooling and ventilation, leave a gap of at least 50mm (2") around vent holes on both sides of the chassis.

Do NOT operate with empty slots: To ensure proper cooling and avoid damaging equipment, fill each empty slot with an AXle filler panel module.

Do NOT stack free-standing chassis: Stacked chassis should be rack-mounted.

All modules are grounded through the chassis: During installation, tighten each module's retaining screws to secure the module to the chassis and to make the ground connection.

WARNING

Operator is responsible to maintain safe operating conditions. To ensure safe operating conditions, modules should not be operated beyond the full temperature range specified in the Environmental and physical specification. Exceeding safe operating conditions can result in shorter lifespan, improper module performance and user safety issues. When the modules are in use and operation within the specified full temperature range is not maintained, module surface temperatures may exceed safe handling conditions which can cause discomfort or burns if touched. In the event of a module exceeding the full temperature range, always allow the module to cool before touching or removing modules from the chassis.

Safety Symbols

CAUTION

A CAUTION 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 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.

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.



Operate the PXIe chassis in the horizontal orientation. Do NOT operate this chassis in the vertical orientation.



The CSA mark is a registered trademark of the Canadian Standards Association and indicates compliance to the standards laid out by them. Refer to the product Declaration of Conformity for details.



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).



The Regulatory Compliance Mark (RCM) mark is a registered trademark. 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.



This symbol represents the time period during which no hazardous or toxic substance elements are expected to leak or deteriorate during normal use. Forty years is the expected useful life of this product.



South Korean Class A EMC Declaration. This equipment is Class A suitable for professional use and is for use in electromagnetic environments outside of the home.

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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 Keysight office, or see www.keysight.com/environment/product for more information.



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1. Introduction

The PXle chassis is the backbone of a PXle system. It contains a high performance backplane giving the cards in the system the ability to communicate rapidly with one another. It also provides power and cooling.

Keysight provides two 18-slot PXle chassis:

- M9018A
- M9019A

NOTE

For more information on M9018A, refer to the M9018A user documentation available at www.keysight.com/find/M9018A. This guide provides detailed information on using the M9019A.

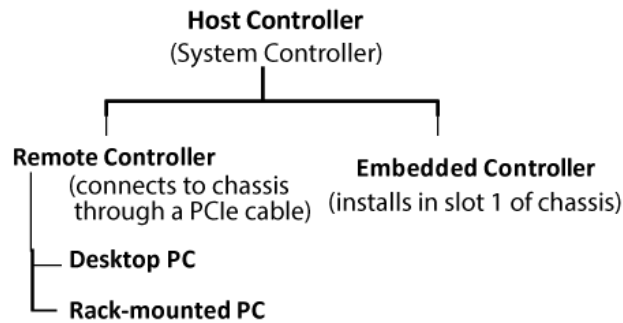
About this guide

The *Keysight PXle Chassis Family Startup Guide* describes how to connect the chassis to a host PC, power-up the chassis and verify basic operation, including the following:

- The features and capabilities of PXle chassis
- How a chassis system is shipped and what is included with the chassis itself
- Computer hardware and software requirements, installation of an embedded controller, connection of a remote controller, and software installation on the controller
- How to use Connection Expert and the chassis soft front panel (SFP) to verify operation of the chassis
- Overview of installing and verifying Keysight modules in the chassis, and is intended to supplement your module documentation

Terminologies

Before continuing, some important terminology is presented. The computer that controls the chassis is known as the host controller or system controller, and is shown at the top of the hierarchy in the following figure.



The host controller can either be a remote controller or an embedded controller. A remote controller is a Windows-based PC, and can be a desktop PC, or a rack mounted PC. The remote controller interfaces to the chassis through a PCIe cable.

An embedded controller, such as the Keysight M9037A Embedded Controller, is a small form factor, Windows-based PC that is designed for installation in the system controller slot (slot 1) of the chassis. An embedded controller also consumes two or three expansion slots to the left of slot 1.

The combination of the chassis, the host controller (and a PCIe cable if the host controller is a remote controller), and the chassis I/O software running on the host controller is referred to as a chassis system.

NOTE

In order for a PC to serve as a remote controller, its BIOS must support enumeration of the PCIe slots in the chassis; many computers are not capable of enumerating a sufficient number of PCIe slots to ensure that slots in an external chassis are enumerated.

Keysight provides the document *PC Tested Configurations with PXI/AXIe Chassis - Technical Overview*, which lists the embedded, desktop, laptop, and rack-mounted PCs that have been verified to enumerate the PCIe slots in the PXIe chassis. Use this document, available under the **Document Library** tab at www.keysight.com/find/pxi-chassis, to guide your selection of remote controller PCs.

M9019A key features

The Keysight Technologies M9019A PXIe chassis is designed for easy integration into large systems containing multiple PXIe chassis and other non-PXI instrumentation. It has 16 PXIe hybrid slots, which allows the system designer to mix and match the number and location of PXIe and hybrid-compatible modules. Its ultra-high performing PCIe switch fabric can operate up to Gen 3 providing up to 24 GB/s of system data bandwidth. The innovative cooling design allows the chassis to fit into 4U of rack space, in most cases.

The Keysight M9019A PXIe chassis has these key features:

- 16 PXIe hybrid slots, 1 PXIe timing slot, and 1 PXIe system slot
- 4U chassis with innovative cooling design
- Ultra-high performance Gen 3 PCIe switching with a two-link (x8, x16) system slot and x8 links to the hybrid/timing slots
- High data bandwidth (maximum 24 GB/s system and 8 GB/s slot-to-slot)
- Multi-chassis power-sequencing and front panel external trigger inputs /outputs
- Specified up to 55 °C and 10,000 ft operating conditions

The following image shows a front view of the M9019A chassis.



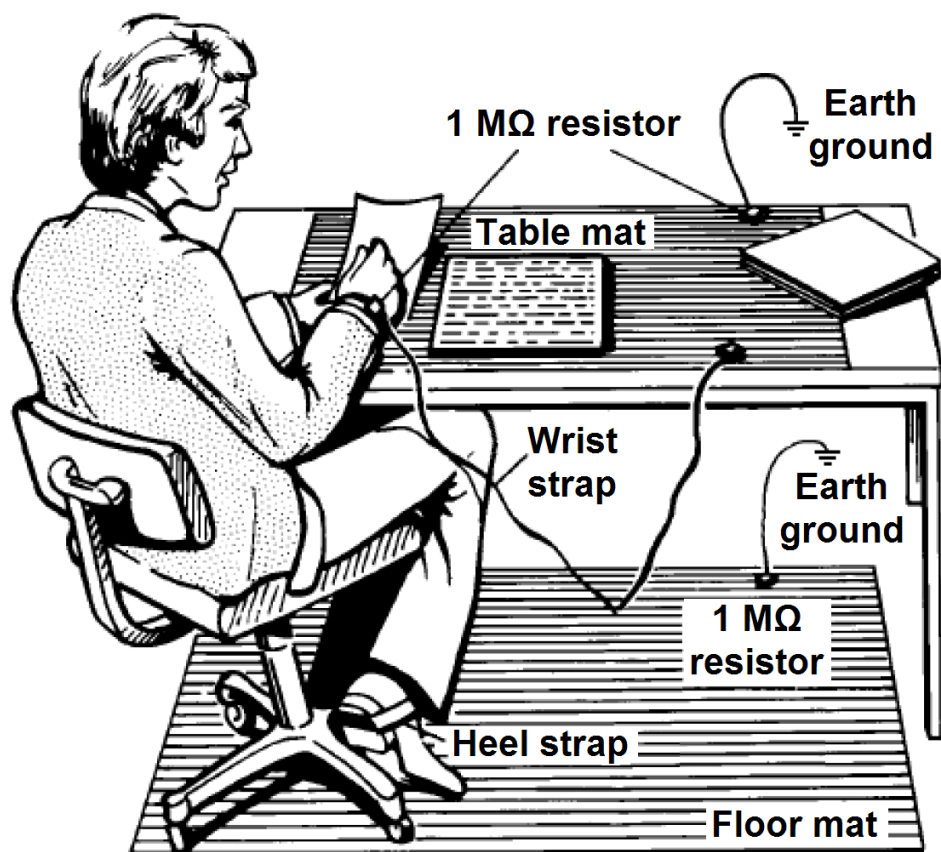
Interactive Block Diagram

View the complete interactive block diagram from the Windows **Start** button:

Start > All Programs > Keysight > PXIe Chassis Family > Interactive Block Diagram

You can also download the block diagram from www.keysight.com/find/M9019A.

Static-safe handling procedures



Electrostatic discharge (ESD) can damage or destroy electronic components. Use a static-safe work station to perform all work on electronic assemblies. The figure (left) shows a static-safe work station using two types of ESD protection:

- 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 MΩ of isolation from ground.

WARNING DO NOT use these techniques for a static-safe work station when working on circuitry with a voltage potential greater than 500 volts.

Related documentation

The documentation listed below can be found on the Software and Product Information CD (M9019-10001) that came with your chassis.

- *Keysight PXIe Chassis Family Startup Guide*
- *Keysight PXIe Chassis Family User Guide*

For the latest versions of the above documents, visit the Keysight website at www.keysight.com/find/M9019A. The following documents are also available on this website:

- *Keysight M9019A PXIe Chassis Data Sheet*
- *Keysight M9022A/ M9023A/ M9024A PXIe system module Data Sheet*
- *PC Tested Configuration with PXI/AXIe Chassis Technical Overview* – This document lists the PCs that have been verified to work with the M9019A chassis.
- Multiple PXIe and AXIe Chassis System Configuration Tool

To assist you in locating the documentation that will best meet your needs, the following table lists the recommended chassis documents by audience. Also listed are the key topics covered in each group of documents.

Product specifications, available accessories, firmware and software may change over time. Check the Keysight website at www.keysight.com/find/pxi-chassis for the latest updates to the product software, guides, help files and data sheets.

For more information on Multiple PXIe and AXIe Chassis System Configuration Tool, check the Keysight website at www.keysight.com/find/pxie-multichassis.

Audience	Recommended Documents	Key Topics
First-time users of the PXIe chassis	<ul style="list-style-type: none"> - <i>PXIe Chassis Family Startup Guide</i> - <i>M9019A Data Sheet</i> - <i>M9022A/ M9023A/ M9024A/ M9048B/ M9049A Data Sheet</i> - <i>PC Tested Configuration with PXIe/AXIe Chassis Technical Overview</i> - Documentation for each module - SFP Help - Interactive Block diagram - Multiple PXIe and AXIe Chassis System Configuration Tool 	<ul style="list-style-type: none"> - PXIe chassis architecture and capabilities - Selection of the host controller PC - Connecting the chassis to a computer and powering up the system - Using Connection Expert and the soft front panel (SFP) to verify chassis operation - Installing Keysight modules in the chassis - Using the SFP to configure the chassis

2. Step1: Verify the Shipment Contents

Depending on your order, your shipment may arrive in separate boxes. For example, if you order the M9019A chassis, the M9022A PXIe system module, and the Y1202A cable, your order will arrive in three separate boxes.

Carefully inspect your shipment for any shipping damage. Report any damage to the shipping agent immediately, as such damage is not covered by warranty.

NOTE

Keysight suggests that you save the chassis shipping container in case it ever becomes necessary to return the chassis to Keysight for service. See the *How to Return the Chassis to Keysight* section in the *Keysight PXIe Chassis Family Service Guide* describes how to return the chassis to Keysight for service.

M9019A chassis shipment verification

Verify that your chassis shipment contains the following items:

- Keysight M9019A PXIe Chassis
- Power cord
- This document in hard copy
- Software and Product Information CD (M9019-10001) – This CD contains software and product documentation in PDF format for the M9019A chassis.

CAUTION

The weight of an empty M9019A PXIe chassis (no modules installed in the chassis) is approximately 29.8 lbs (13.5 kg). Lift the chassis using a single side handle only when the total chassis weight (chassis plus installed modules) does not exceed 75 lbs (34.0 kg). Otherwise use both side handles to lift the chassis.

Installing modules in the chassis may increase its weight to a point where two people are required to lift the chassis. If two people are not available, use a mechanical lift to lift the chassis. The chassis should be transported using a rolling cart.

3. Step 2: Prepare the hardware

CAUTION

The following procedures should be followed to ensure safety and to minimize the possibility of damaging electrical components:

- This product is designed for use in Installation Category II and Pollution Degree 2, per IEC 61010 Second Edition and 664 respectively.
- Mains wiring and connectors shall be compatible with the connector used in the premise electrical system. Failure to ensure adequate earth grounding by not using correct components may cause product damage and serious injury.
- Use only the power cord supplied with the chassis. Keysight power cords ensure continuity between the chassis grounding-type power plug and the safety ground terminal at the power outlet.
- Install the chassis so that the detachable power cord is readily identifiable and is easily reached by the operator. The detachable power cord is the chassis disconnecting device. It disconnects the mains circuits from the mains supply to the chassis before other parts of the chassis. The front panel switch is only a standby switch and is not a LINE switch. Alternatively, an externally installed switch or circuit breaker (which is readily identifiable and is easily reached by the operator) may be used as a disconnecting device.
- The chassis does not support hot-swapping of modules; i.e., inserting and removing modules with the chassis powered up. Before installing modules in the chassis, powered down the chassis and disconnected from AC power.
- To minimize the possibility of electrostatic discharge (ESD) damage to a module while installing it, follow the handling procedures described in [Static-safe handling procedures on page 11](#).

Host controller hardware and software requirements

The Keysight IO Libraries Suite is the largest software component in the chassis software installation, and its performance is the biggest contributor to system performance. Therefore, the host controller requirements in the following are based on optimizing the installation and performance of the IO Libraries Suite.

Operating System	Windows 7 SP1	Windows 8.1 Update 1	Windows 10
OS versions	32-bit ¹ and 64-bit.	32-bit ¹ and 64-bit.	32-bit ¹ and 64-bit.
Processor Speed	1Ghz 32-bit (x86), 1GHz 64-bit (x64), Itanium64 not supported	1Ghz 32-bit (x86), 1GHz 64-bit (x64), Itanium64 not supported	1Ghz 32-bit (x86), 1GHz 64-bit (x64), Itanium64 not supported
Available computer memory	1 GB minimum	1 GB minimum	1 GB minimum
Available hard disk space ²	1.5 GB available hard disk space, includes: <ul style="list-style-type: none"> - 1GB available for Microsoft .NET - Framework 3.5 SP1 - 100 MB for Keysight IO Libraries Suite 	1.5 GB available hard disk space, includes: <ul style="list-style-type: none"> - 1GB available for Microsoft .NET - Framework 3.5 SP1 - 100 MB for Keysight IO Libraries Suite 	1.5 GB available hard disk space, includes: <ul style="list-style-type: none"> - 1GB available for Microsoft .NET - Framework 3.5 SP1 - 100 MB for Keysight IO Libraries Suite
Video	Support for DirectX 9 graphics with 128 MB graphics memory recommended (Super VGA graphics is supported)	Support for DirectX 9 graphics with 128 MB graphics memory recommended (Super VGA graphics is supported)	Support for DirectX 9 graphics with 128 MB graphics memory recommended (Super VGA graphics is supported)
Browser	Microsoft Internet Explorer 7 or greater	Microsoft Internet Explorer 7 or greater	Microsoft Internet Explorer 7 or greater

¹ 32-bit operating systems do not support large multi-chassis systems. For details, refer to Keysight's Multiple PXIe and AXIe Chassis Configuration tool. This tool is available online at: www.keysight.com/find/pxie-multichassis. [a b c]

² Because of the installation procedure, less memory may be required for operation than is required for installation.

Refer to the *Keysight M9037A PXIe Embedded Controller User Guide* for supported operating systems on the M9037A.

Setting up the chassis on a bench

NOTE

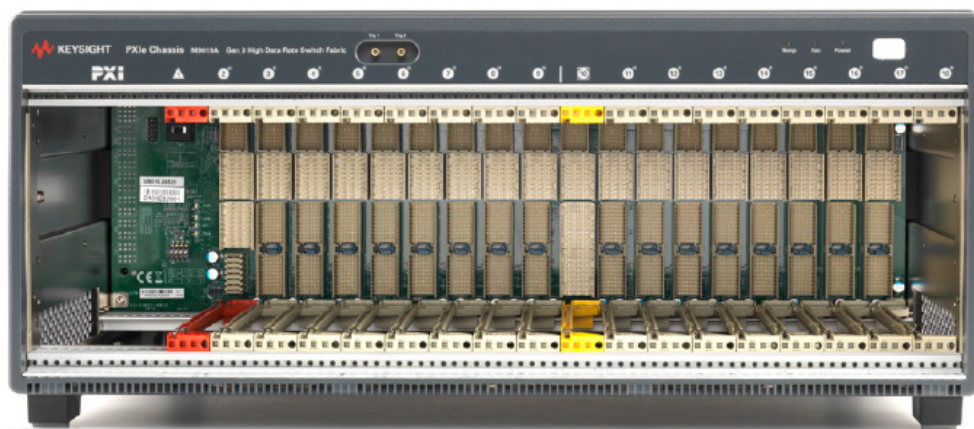
This guide assumes that chassis preparation, turn-on and verification are performed on the bench prior to installing the chassis in a rack. If you prefer to install the chassis in a rack first, see the *Keysight PXIe Chassis Family User Guide* on the Software and Product Information CD for rack mounting instructions.

The primary consideration in using the chassis on a bench is ensuring adequate ventilation for cooling. Cooling air enters through the vent holes on the bottom, sides, and front of the chassis, and exits through the rear of the chassis. For bench use, ensure that the feet are installed on the chassis so that air can enter through the bottom of the chassis. Also ensure that there is at least 50 mm (2 inches) of clearance on the sides, front, and rear of the chassis.

Removing and installing filler panels

The chassis is shipped from the factory with all filler panels installed. For the 18 slots, the filler panels are 20.32 mm (.8 inches) wide; these are referred to as narrow filler panels. The expansion slot to the left of slot 1 is three slots wide; hence, the filler panel for the expansion slot is 60.96 mm (2.4 inches) wide and is referred to as a wide filler panel.

The filler panels are held in place by captive screws (two screws for narrow filler panels and four screws for wide filler panels). When installing a filler panel, the captive screws should be tightened securely to ensure the filler panel is well-grounded to the chassis.



Ensure that filler panels are installed in all empty slots. Missing filler panels will impact cooling of the chassis and may cause RFI (radio frequency interference) with other devices.

NOTE

- In addition to installing modules and filler panels in chassis slots, air inlet modules can also be installed in chassis slots. These modules contain holes in their face plates, and can be placed adjacent to high power modules for additional cooling. Keysight provides an air inlet module kit as listed in *Keysight PXIe Chassis Family Specification Guide*. For information on using air inlet modules, see the *Keysight PXIe Chassis Family User Guide*.
- Do not install modules in the peripheral slots yet. In this step, only slot 1, the system controller slot, will have a module installed. Deferring the installation of other modules until later will allow the chassis to be turned on and verified in its simplest configuration.

To prepare the hardware, either an embedded controller or a PXIe system module will be installed in slot 1, depending on your configuration. Both of these installations are described in this step.

Connecting a remote controller PC to the chassis

A remote controller is an external, Windows-based PC that connects to the chassis through a PCIe cable. The remote controller can be a desktop PC, a laptop PC, or a rack-mounted PC.

NOTE

In order for a PC to serve as a remote controller, its BIOS must support enumeration of the PCIe slots in the chassis; many computers are not capable of enumerating a sufficient number of PCIe slots to ensure that slots in an external chassis are enumerated.

Keysight provides the document *PC Tested Configurations with PXI/AXIe Chassis Technical Overview* which lists the embedded, desktop, laptop, and rack-mounted PCs that have been verified to enumerate the PCIe slots in the PXIe chassis. Use this document, available under the Document Library tab at www.keysight.com/find/M9019A, to guide your selection of remote controller PCs. For general controller requirements, such as RAM and hard disk requirements, see the [Host controller hardware and software requirements on page 14](#) section.

To connect a remote controller PC to the chassis, perform the three steps listed below. When handling PC adapter cards and chassis modules, be sure to follow the static-safe procedures described in [Static-safe handling procedures on page 11](#).

Step 1. Install a PXIe system module in the chassis

The first step is to install a PXIe system module, such as the Keysight M9022A/M9023A/M9024A PXIe system module, in the chassis system controller slot (slot 1). PXIe system modules contain a PCIe cable connector that permits a PCIe cable to be connected between the module and the remote controller. To install the PXIe system module in slot 1, follow the instructions provided with the module as you perform the following steps:

1. Turn the chassis off and unplug the chassis from AC power.

NOTE

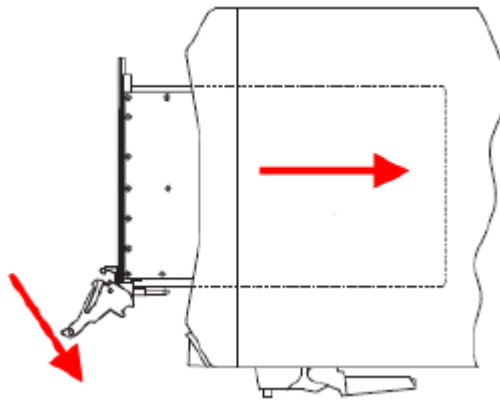
Before inserting the module, inspect the chassis slot to ensure there are no bent pins on the slot connectors.

2. Insert the module in the chassis slot by placing the module card edges into the top and bottom module guides.

CAUTION

- To avoid damaging the module, do not touch exposed connectors or components on the printed circuit board as you install the module.
- Modules are usually shipped with thread protectors on the mounting screw threads. These protectors must be removed before installing modules in the chassis.
- Take care to ensure that the module is aligned perpendicularly to the chassis as you begin sliding it in. Otherwise, it is possible for components on the module (or on adjacent modules) to be damaged by contact between modules.

3. With the injector/ejector handle in the down position, carefully slide the module to the rear of the chassis. When you begin to feel resistance from the backplane connectors, push up on the injector/ejector handle to complete insertion of the module and latch it into place.



4. Secure the module front panel to the chassis using the captive front panel mounting screws. All modules have two captive mounting screws. Tighten the screws for both mechanical security and to ensure proper grounding of the front panel.

NOTE

Ensure that all empty chassis slots are covered by filler panels or air inlet modules.

5. Plug in and power up the chassis. Verify that the chassis fans are operating and free of obstructions that may restrict airflow.

Step 2. Install a PCIe host adapter in the remote controller PC

Keysight offers the M9048B (x8)/ M9049A (x16). PCIe host adapter for desktop and rack-mounted PCs. To install an adapter in your remote controller PC, follow the instructions provided with your adapter.

Step 3. Connect a PCIe cable between the remote controller PC and the chassis

Connect the appropriate PCIe cable between the remote controller PCIe host adapter and the chassis PXIe system module.

NOTE

All PCIe cable connector components, including the connectors on the cables and the receptacles on the M9022A/ M9023A/ M9024A/ M9048B/ M9049A interface products, are limited to 250 mating cycles. Beyond this, signal integrity will be impaired. Therefore, the chassis and its accessories should not be used in applications where the number of connector mating cycles will exceed 250 cycles.

Installing an embedded controller in the chassis

An embedded controller, such as the Keysight M9037A Embedded Controller, is a small form factor, Windows-based PC that is designed to be installed in the system controller slot (slot 1) of the chassis. The embedded controller also occupies the two or three expansion slots to the left of slot 1; the expansion slot does not contain a connector.

CAUTION

Before installing an embedded controller, turn the chassis off and unplug it from AC power.

To install an embedded controller in the chassis, remove the filler panel in slot 1 and the three-wide filler panel to the left of slot 1. Keysight recommends that you retain these filler panels for future use—for example, if you later replace the embedded controller with a PXIe system module to interface to a remote controller. Because the PXIe system module only consumes one slot, the expansion slot must be covered with the three-wide filler panel to maintain proper airflow and RFI shielding.

CAUTION

To avoid damaging the embedded controller during installation, do not touch exposed connector pins or components on the printed circuit boards.

To install your embedded controller, follow the instructions provided earlier for the PXIe system module as well as the instructions provided with your controller.

Once the embedded controller is installed in the chassis, you can interface to the controller by connecting a keyboard, mouse, and monitor to it; alternatively, you can interface to the controller through its network port using software such as Microsoft Remote Desktop.

NOTE

Keysight IO Libraries Suite and the PXIe chassis drivers are pre-installed on the M9037A Embedded Controller. If you are using this embedded controller, you can skip the remainder of this step, and proceed to **STEP 3: Turn On Chassis and Verify Operation on page 23**.

Installation of Keysight software on the embedded controller is described in the next section. However, because the software is provided on CDs and because embedded controllers typically do not have optical drives, you should determine which software installation option will work best for you. The installation options include:

- Obtain a USB interface optical drive and connect it to one of the embedded controller USB ports.
- Copy the CD software to the embedded controller hard drive, and then execute the installation process from the hard drive. To do this, the CD software can be read on a PC optical drive, and then copied to the embedded controller over the network or by using a USB flash drive.
- If the embedded controller is connected to the network, you can download the required software from www.keysight.com/find/M9019A, and not use the CDs supplied with the chassis.

Installing software on the host controller

This section describes how to install the host controller software, and applies to both remote controllers and embedded controllers. To install the software, you must have administrator privileges on the host controller, and the software must be installed in the following order:

1. **Keysight IO Libraries Suite** - This is a collection of libraries and utilities that enable you to connect your chassis to the host controller and run programs on the host controller that interact with the chassis. The IO Libraries Suite is used with all Keysight instruments, and is not specific to the PXIe chassis. Keysight recommends using the latest version of IO Libraries Suite available.
2. **PXIe chassis drivers** - This software consists of the chassis soft front panel (SFP) and the I.VI.NET, I.VI-C, LabVIEW, and MATLAB drivers for the PXIe chassis. These drivers each provide an API (application programming interface) that can be used to develop programs that interface to the chassis.

NOTE

- The software installation process is based on using the CDs that are shipped with the chassis. However, as noted in the previous section, you will need to adapt the installation process if you have an embedded controller.
- It is recommended to use the latest version of Keysight IO Libraries Suite.

Installing the Keysight IO Libraries Suite

This section describes installation of the Keysight IO Libraries Suite. Note that it is recommended to use the latest version of the IO Libraries Suite .

NOTE

- Only one installation of the Keysight IO Libraries Suite is required on the host controller PC. This installation is used by both the PXIe Chassis drivers that are installed in the next section and the drivers associated with each module that you install in the chassis.
- Two libraries, IVI Shared Components and VISA Shared Components, are required by the IO Libraries Suite. If these libraries are not already installed on your controller, the IO Libraries Suite installer will install them. If IVI Shared Components and VISA Shared Components are already installed, the IO Libraries Suite installer will upgrade these libraries to the latest version, if necessary, using the same installation location used by the previous version.

For information on Keysight IO Libraries Suite and to get the latest version, go to www.keysight.com/find/iosuite.

Installing the PXIe chassis software

The PXIe chassis software consist of the chassis soft front panel (SFP) and the IVI-C, IVI.NET, LabVIEW, and MATLAB drivers for the PXIe chassis.

You can install the software from the M9019A Software and Product Information CD. Alternatively, you can download and install the software. The software is available online at www.keysight.com/M9019A.

Installing the chassis software from M9019A Software and Product Information CD

To install the M9019A software, perform the following steps:

1. Insert the M9019A Software and Product Information CD into your optical drive. This should automatically display a browser window. If this window is not displayed, use Windows Explorer to locate autorun.exe at the root level of the CD and then execute that program.
2. Click the **Install M9019 Software** link, which will bring up the Keysight M9019A InstallShield Wizard.
3. Click **Next** and follow the prompts to install the M9019A software. The final dialog prompts you to restart your computer to complete the installation.

Installing the chassis software online

To install the M9019A software, perform the following steps:

1. Browse to www.keysight.com/M9019A .
2. Click on **Visit Technical Support**.
3. Click the **Drivers, Firmware & Software** tab.
4. Select **Keysight PXIe Chassis Software**.
5. Click the **Download** button.
6. Select the appropriate executable file.
7. Choose **Run**.

Using the SFP is described in [Using the soft front panel to monitor the chassis on page 29](#). The PXIe chassis drivers are used to develop host controller programs to interface to the chassis, and are described in the *Keysight PXIe Chassis Family User Guide*.

4. STEP 3: Turn On Chassis and Verify Operation

NOTE

- Do not install modules in the peripheral slots yet—this is done in STEP 4. The only module that should be installed in the chassis at this time is either an embedded controller or a PXIe system module in slot 1 as described in [STEP 2 on page 14](#).
- This guide assumes that chassis preparation, turn-on and verification are performed on the bench prior to installing the chassis in a rack. If you prefer to install the chassis in a rack first, see the *Keysight PXIe Chassis Family User Guide* on the Software and Product Information CD for rack mounting information.
- If you encounter difficulty in turning on the chassis system, see the troubleshooting information in the *Keysight PXIe Chassis Family User Guide*.

CAUTION

This instrument has auto-ranging power supplies, meaning that the chassis does not have a voltage selector switch. Ensure that the AC supply line voltage is within the range of 100-120 VAC or 220-240 VAC, and 50/60 Hz frequency.

WARNING

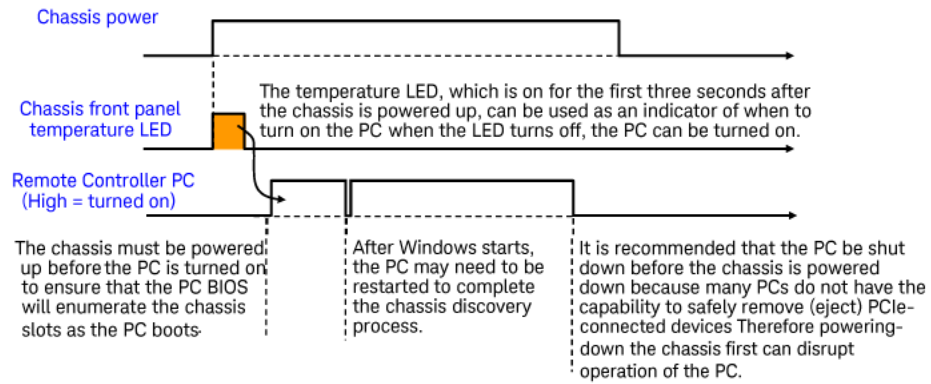
If this product is not used as specified, the protection provided by the equipment could be impaired. This product must be used in a normal condition (in which all means for protection are intact) only.

NOTE

When you press the chassis power-on button, if the chassis does not power up and the front panel LEDs do not light, it is possible for the chassis to be in a safety shutdown state. Remove the chassis AC power cord from the chassis for one minute. Reconnect the power cord and turn on the chassis again. If it still does not power on, refer to the troubleshooting information in the *Keysight PXIe Chassis Family User Guide*.

Power sequencing of the chassis

When powering up the system, the chassis should be powered up first. After powering up the chassis, you should wait at least three seconds before turning on the PC. The chassis front panel temperature LED, which is on for three seconds after the chassis is powered up, provides a convenient way to measure this delay, as shown below.



The PC should be shut down before the chassis is powered down. This will prevent the chassis, as it is being powered down, from disrupting operation of the PC.

In brief, the PC should be off whenever the chassis is powered up or down. Because chassis modules are not hot-swappable, chassis modules should only be added or removed when the chassis is powered down.

The above power sequence does not apply to an embedded controller installed in the chassis because the embedded controller and chassis are powered together.

Methods of powering up the chassis

The method of powering up the chassis depends on the position of the INHIBIT rear panel switch, which can be set to the DEF (default) position or to the MAN (manual) position). These two methods are shown on the interactive block diagram and work as follows:

- INHIBIT switch in the DEF position – In this position, the front panel power push button is used to switch the chassis between ON and Standby—hence, this push button is known as the ON/Standby push button. Using this push button requires that a module is installed in the system controller slot (slot 1). This can be a module such as the Keysight M9022A/ M9023A/ M9024A PXIe system module or an embedded controller.
- INHIBIT switch in the MAN position – In this position, the Inhibit signal on the rear panel DB-9 connector controls chassis power. The chassis is powered up by applying a logic high signal to the Inhibit signal. When the Inhibit signal is low, the chassis is in Standby (off except for 5Vaux, an auxiliary power supply).

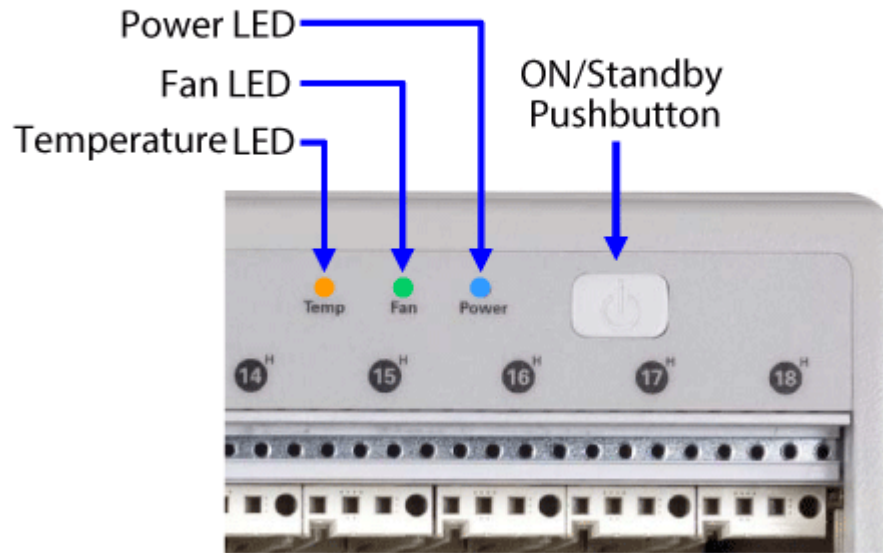
Keysight recommends leaving the INHIBIT switch in the DEF position when connecting the AC power cord to the chassis. After inserting the power AC power cord, then move the INHIBIT switch to the MAN position.

Use of the ON/Standby push button to power up the chassis is assumed unless otherwise noted.

For information on using the Inhibit signal on the rear panel DB-9 connector to power the chassis up and down, see the *Keysight PXIe Chassis Family User Guide*.

Chassis front panel LEDs

The chassis contains three LEDs on its front panel to the left of the ON/Standby (power) push button, as shown in the following figure.



The front panel LEDs, depending on whether they are off, on continuously, or flashing, provide important information on the status of the chassis, and should be monitored regularly. The following table lists each LED and describes the information it provides.

LED	Off	On continuously	Flashing	All three LEDs on for 10 seconds and off for 1 second
Power LED (blue)	Indicates that the chassis is turned off. If you attempt to turn the chassis on but the Power LED remains off, this can indicate several possible problems	Indicates that the four main supply voltages (3.3V, 5V, 12V, and -12V) plus 5Vaux are within their respective limits. The factory default limits are plus and minus 10% for 3.3V and plus and minus 5% around the nominal values for the other power supply voltages.	Indicates that one or more of the four supply voltages are outside of their limits, either the 5% factory default limits or, if changed, the user set limits. Refer to the <i>Keysight PXIe Chassis Family Service Guide</i> for troubleshooting suggestions.	This indicates that the Monitor Processor, which controls flashing of the LEDs, has been unable to communicate to the Chassis Manager.

LED	Off	On continuously	Flashing	All three LEDs on for 10 seconds and off for 1 second
	See the <i>Keysight PXIe Chassis Family Service Guide</i> for details.	The 3.3V, 5V, 12V, and -12V plus 5Vaux limits can be individually changed for each supply using the SFP and programmatically changing the limits. The limits, if changed, are reset to 5% at the next chassis power cycle.	If the power supply condition causing the flashing to occur is no longer present, the Power LED will return to on continuously, i.e. the flashing state is not latched.	
Fan LED (green)	Typically indicates that the chassis is turned off. This could also indicate a failed LED or a failure of the LED drive circuitry. See the <i>Keysight PXIe Chassis Family Service Guide</i> for details.	Indicates that all three fans are operating above 1200 RPM, the factory default lower limit. The fan speed limit can be changed using the SFP or programmatically. The limit, if changed, is reset back to 1200 RPM at the next chassis power cycle.	Indicates that one or more of the three fans are operating below the limit, either the 1200 RPM factory default limit or, if changed, the user set limit. If the fan speed condition causing the flashing to occur is no longer present, the Fan LED will return to on continuously, i.e. the flashing state is not latched.	
Temp (Temperature) LED (amber)	To avoid this amber LED being interpreted as indicating a temperature problem in the on state, this LED is off if the chassis temperatures are OK. To allow you to validate that this LED is working, the LED is turned on for the first three seconds after the chassis is powered up	This LED is never on continuously. It will either be off if the temperatures reported by the air flow exit temperature sensors are all below the limit (see left column), or it will be flashing if one or more of the temperature sensors are reporting a temperature above the limit (see right column).	Indicates that at least one of the air flow exit temperature sensors is reporting a temperature above the limit, either the 70°C factory default limit or, if changed, the user set limit. The limit, if changed, is reset back to 70°C at the next chassis power cycle. If the temperature condition causing the flashing to occur is no longer present, the Temperature LED will turn off, indicating that the chassis temperatures are OK.	

The chassis will not intentionally modify its operation because of conditions that cause one or more LEDs to flash. In other words, the chassis will attempt to continue normal operation despite flashing LED(s). However, a flashing LED may indicate a condition that will prevent the chassis from operating correctly. For example, a flashing Fan LED indicates that one or more rear panel fans are under speed, which may cause the temperature of the chassis to rise and exceed specifications. This, in turn, may cause a thermal shutdown of the power supply.

Therefore, flashing LEDs should be tended to promptly. See the *Keysight PXIe Chassis Family Service Guide* for further information.

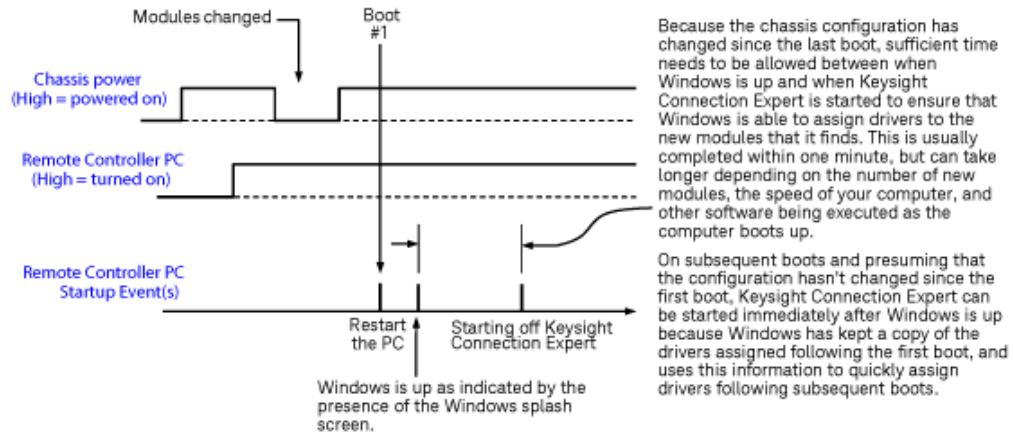
PC startup requirements for Keysight IO Libraries Suite

This section describes the PC startup events for Keysight IO Libraries Suite. Improvements have been made in Keysight IO Libraries Suite that considerably simplify the PC startup process. Keysight recommends use of latest version Keysight IO Libraries Suite.

Before describing the PC startup events for each version, two situations are described where Connection Expert, which is part of Keysight IO Libraries Suite, will not display a PCIe device, be it the chassis or a module in the chassis.

1. If Windows can not find a driver for a device, Windows will not be able to identify the device and therefore Connection Expert will not be able to display it. If this occurs, you will typically be presented with the Windows New Hardware Found Wizard, which will give you the opportunity to assist Windows in finding a driver. If a driver is found, you should restart the PC and verify that Windows identifies the device (which will be evident by the lack of the New Hardware Found Wizard for that device).
2. The other situation where Connection Expert will not display a PCIe device is in the event that, when Connection Expert is started, Windows has not yet completed assigning drivers to the devices (the chassis or modules in the chassis) found during enumeration. Connection Expert will not display modules that it cannot identify. In this situation, however, the driver exists but it has not yet been assigned to the device by the time Connection Expert is started.

This situation should be very rare; if it occurs, it would be expected to occur with slower PCs. The solution for this situation depends on which version of IO Libraries Suite you have installed and is described below. For the first-ever connection of the chassis to the PC, or after changing the chassis configuration, only a single boot of the PC is needed. However, sufficient time needs to be allowed between when Windows is up and when Keysight Connection is started in the following figure.



The two cases described above where Connection Expert does not display the chassis or a module in the chassis can occur with Connection Expert. If the New Hardware Found Wizard is displayed, follow the steps in the Using Connection Expert to connect to the chassis section in the *Keysight PXIe Chassis Family Startup Guide* to associate a driver with the device. If Connection Expert does not display a particular device, click the Rescan button to see if Windows has now assigned a driver to the device, which will allow Connection Expert to display the device.

In general, if it ever appears that your chassis configuration as displayed by Connection Expert differs from your actual configuration, click the Rescan button. This should align the displayed configuration to the actual configuration.

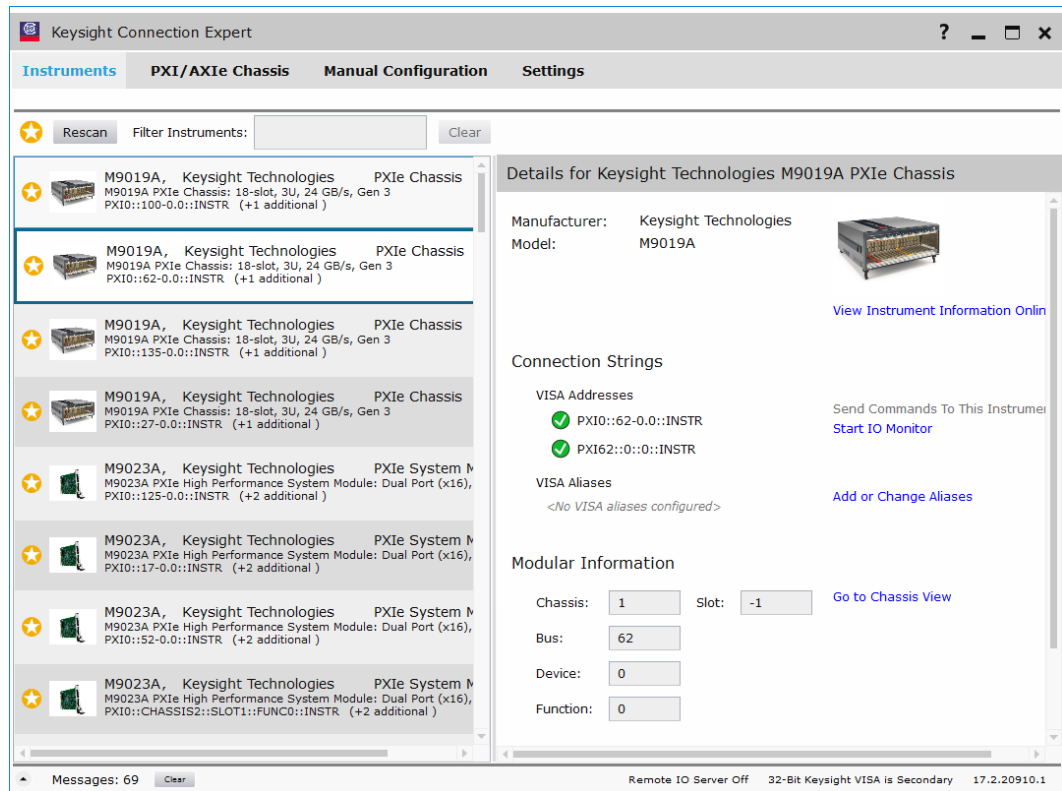
NOTE Even with the latest version of IO Libraries, it is always advisable to boot the PC a second time to ensure that the PC properly enumerates all of the modules within the chassis.

Using Connection Expert to connect to the chassis

Use Connection Expert to confirm that the host controller can connect to the chassis.

1. Start Connection Expert on the host controller.
2. Click the **PXI/AXIe Chassis** tab.
3. Click the **Chassis Content** tab.

The list of connected chassis appears on the right hand pane as shown in the following image. The chassis indicator is Chassis 2. When you click on Chassis 2, the contents of each slot in the PXIe chassis are displayed in the right pane.



If Connection Expert successfully displays the chassis slots, continue to the next section, and verify that the soft front panel can interface to the chassis. If Connection Expert fails to display the chassis slots, see the *Keysight PXIe Chassis Family Service Guide* for troubleshooting suggestions.

Using the soft front panel to monitor the chassis

PXIe chassis soft front panel (SFP) can be used both to monitor the status of the chassis as well as configure various chassis parameters, such as the maximum temperature threshold for the temperature alarm. This section describes how to use the SFP to monitor the status of the chassis; configuring chassis parameters is described in the *Keysight PXIe Chassis Family User Guide*.

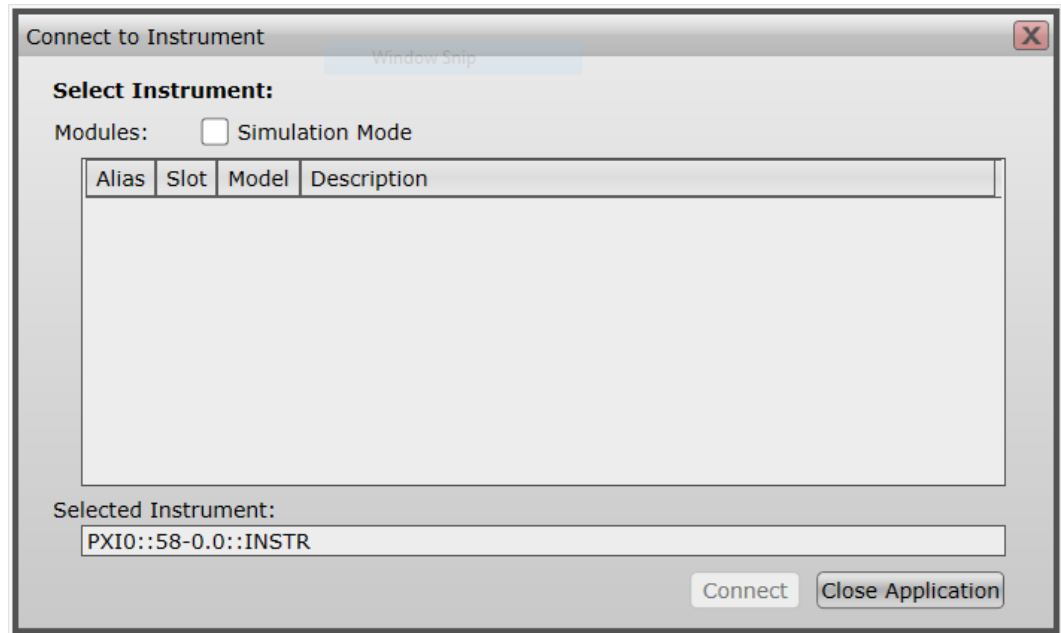
Starting the SFP and selecting Hardware Mode or Simulation Mode

The SFP runs in two modes, hardware mode and simulation mode. In hardware mode, the SFP interacts with the chassis itself. The SFP displays chassis information and allow you to set chassis parameters such as temperature thresholds and voltage alarms.

In simulation mode, the SFP simulates chassis operation and does not communicate with the chassis. Simulation mode is useful to learn the capabilities of the SFP and the chassis. In simulation mode, the alarms are not active. Independent of whether you plan to run the SFP in hardware mode or simulation mode, the SFP is started from the Start menu as follows:

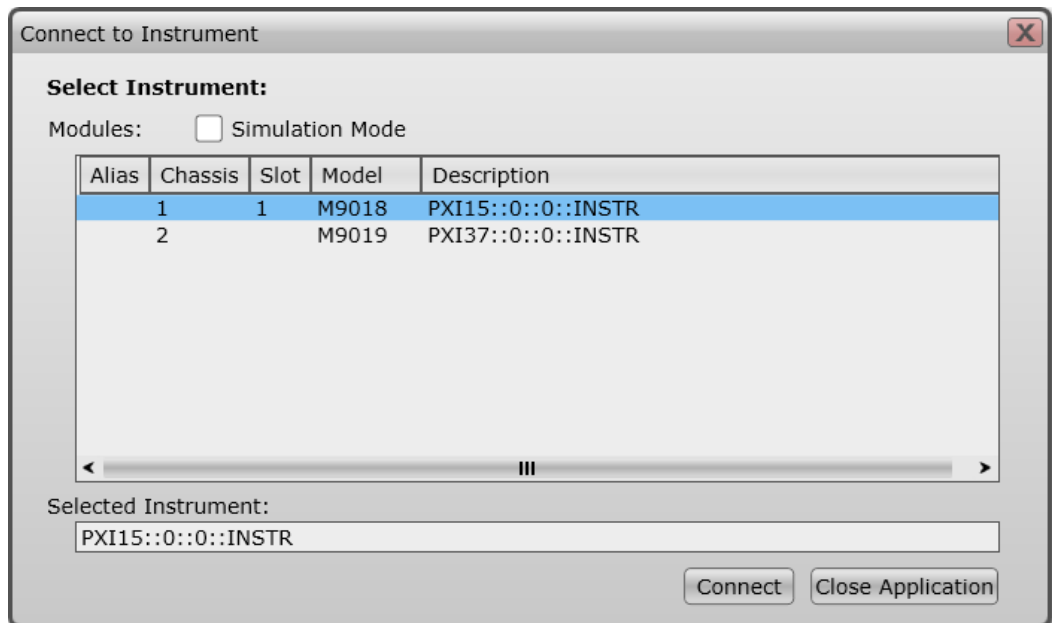
Start > All Programs > Keysight > PXIe Chassis Family > Chassis Family SFP

If no chassis has been detected by Connection Expert, the **SFP startup** dialog appears as shown in the following image. The absence of a chassis listed under Modules indicates that no chassis has been detected; therefore, the SFP can only be run in simulation mode.



To run in simulation mode, select the **Simulation Mode** check box in the above image. This displays M9019A in the Modules list. Then click **M9019A** in the Modules list to select it, which displays M9019A in the **Selected Instrument** field. Click **Connect** to start the SFP in simulation mode.

If a chassis has been detected, M9019A and the address of the chassis is listed under **Modules**, as shown in the following image.



Click the chassis entry under **Modules** to select it, which will display the chassis entry in the Selected Instrument field. Click Connect to start the SFP in hardware mode.

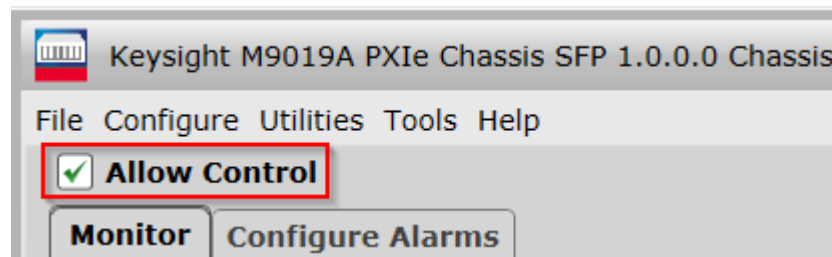
Note that multiple instance of the SFP can be run at one time on the host controller PC.

Using the SFP to monitor the chassis

This section describes how to use the SFP to monitor the chassis in Hardware Mode.

NOTE

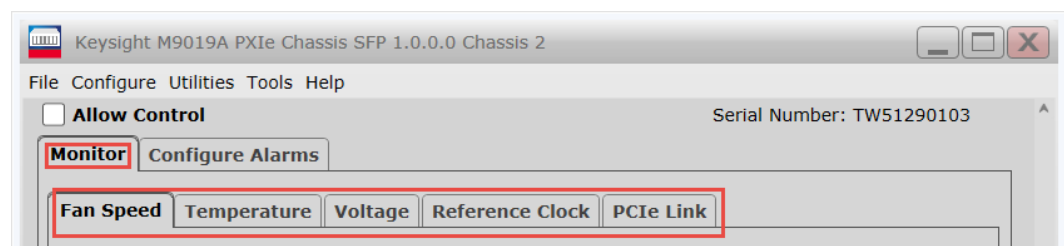
To prevent inadvertently changing parameters such as the chassis temperature alarm, the SFP includes an **Allow Control** check box that is unchecked by default as shown below. The unchecked box prevents any configuration change from being made. In the *Keysight PXIe Chassis Family User Guide*, which describes how to use the SFP to configure the chassis, this check box will be checked.



The image below shows the Monitor screen of the SFP. This screen has five tabs:

- Fan speed
- Temperature
- Voltage
- Reference clock
- PCIe link

These tabs display the speed of the three fans, the temperatures reported by the eight backplane temperature sensors, and the four main power supply voltages respectively. This screen also displays the source of the 10 MHz reference clock and the current PCIe link configuration. For more information, see the *Keysight PXIe Chassis Family User Guide*.



As you can see, there are Alarm Occurred indicators on the right side of the Monitor screen. These alarms are enabled by default and operate as described in the following table. If the chassis is operating normally and is using the default alarm thresholds, none of the alarms should be set. For information on configuring these alarms to other than their default thresholds, see the *Keysight PXIe Chassis Family User Guide*.

Tab	Alarm	Description
Fan speed tab	Fan speed alarm	The fan speed alarm is illuminated if the speed of any of the three fans drops below 1200 RPM. The alarm is latched and will persist even if all fans resume operation above 1200 RPM. The fan speed alarm can be cleared using its Clear button; however, if any of the three fans are still operating below 1200 RPM when the Clear button is clicked, the fan speed alarm will remain illuminated.
Temperature tab	Temperature alarm	The temperature alarm is illuminated if the temperature reported by any of the eight temperature sensors is above 70 °C. The alarm is latched and will persist even if all temperature sensors subsequently report temperatures below 70 °C. The temperature alarm can be cleared using its Clear button; however, if any of the temperature sensors are still reporting a temperature above 70 °C when the Clear button is clicked, the temperature alarm will remain illuminated.
Voltage tab	3.3V alarm 5V alarm 5Vaux alarm 12V alarm 12V alarm	For 3.3V alarm, the factory default limits are plus and minus 10% around the nominal values. Each of the other four voltage alarms has upper and lower voltage limits of 5% about the nominal voltage. For example, the 12V alarm has an upper voltage limit of 12.6V and a lower voltage limit of 11.4V. A particular voltage alarm is illuminated if that voltage falls outside of the range specified by the upper and lower voltage limits. The alarm signal is latched and will persist even if the voltage subsequently returns to within the specified range. The voltage alarm can be cleared using the Clear button; however, if the voltage is still outside of the specified range when the Clear button is clicked, the voltage alarm will remain illuminated.
Reference clock tab	10 MHz reference clock source changed alarm	This alarm is illuminated if the 10 MHz reference clock source changes. The chassis reference clock can originate in three different places: - Internal: Electronics within the chassis source the clock. - External: The clock arrives from outside the chassis at the rear panel. - System Time Slot: The reference clock is sourced by a timing module within the chassis. The Alarm indicator on this screen indicates whether or not a change in clock source has occurred since the last time the chassis was booted up, or the alarm condition was cleared. This alarm, like the other alarms, is latched and can be cleared using its Clear button.
PCIe Link tab		The PCIe link configuration can be viewed from the Monitor tab of the SFP. The PCIe link configuration can be viewed from the Monitor tab of the SFP.

5. STEP 4: Overview of Installing and Verifying Keysight Modules

NOTE

Installation of Keysight modules should only be performed if you have been able to successfully view the chassis slots with Keysight Connection Expert as described in the [Using Connection Expert to connect to the chassis on page 27](#) section. Preferably you have also been able to use the PXIe chassis soft front panel with the chassis as well.

CAUTION

This sequencing is important both when powering up the chassis and powering down the chassis.

Installing modules

If you plan to install multiple high power Keysight modules in the chassis, see the *Keysight PXIe Chassis Family User Guide* for information on power planning and chassis cooling. Prior to installing your modules, review the installation instructions for the PXIe system module in the [Step 1. Install a PXIe system module in the chassis on page 17](#) section. The instructions for this module are applicable to all modules installed in the chassis.

Installing the module software

NOTE

The PXIe chassis drivers that you installed in the [Installing the PXIe chassis software on page 21](#) section are completely separate from your module software. The chassis drivers permit interfacing to chassis functionality such as temperature sensors and fan speeds, while your module software is required to interface to your particular module.

The documentation for your Keysight module will indicate that Keysight IO Library Suite should be installed. However, only one installation of IO Library Suite is required on the host controller PC. Presuming that you installed IO Libraries Suite as described in the [Installing the Keysight IO Libraries Suite on page 21](#) section, it does not need to be installed again when installing software for Keysight modules. If you did not install IO Libraries Suite earlier, it must be installed before you install your module-specific software.

After ensuring that IO Libraries Suite is installed, follow the instructions provided with your module to install its software.

Verifying your module

Follow the instructions provided with your Keysight module to verify its operation. Module verification typically includes the following steps:

1. Verify that your module is displayed within the chassis in Keysight Connection Expert as described in the [Using Connection Expert to connect to the chassis on page 28](#) section, and as described in your module documentation.
2. Bring up the soft front panel (SFP) for your module, if available, and verify that the SFP can interface correctly to the module.

6. Chassis and Accessory Model Numbers

The following table lists the model number of the chassis, its accessories, and related products. Information on these parts can be found by starting at www.keysight.com/find/pxi-chassis.

M9019A		PXIe Chassis: 18 slot, 3U, 24 GB/s
Related Products	M9037A	PXIe embedded controller: Intel i7, 4 GB RAM, 240 GB SSD
	M9048B	PCIe host adapter: single port (x8), Gen 3
	M9049A	PCIe host adapter: dual port (16), Gen 3
	M9022A	PXIe system module: single port (x8), Gen 3
	M9023A	PXIe high performance system module: dual port (x16) Gen 3
	M9024A	PXIe high performance system module with connectivity expansion: two gigabit LAN, two USB 3.0, four USB 2.0, GPIB
Accessories	Y1212A	Slot Blocker Kit
	Y1213A	PXI EMI Filler Panel Kit: 5 single-slot
	Y1214A	Air Inlet Module Kit
	Y1215C	Flush mount rack kit
	Y1216B	Recess mount rack kit
	Y1217B	Rack mount rail kit
	Y1218A	Cable tray kit
	Y1270A	Front panel interfacing kit for 18-slot PXIe chassis



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without notice.

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