

ARTISAN®
TECHNOLOGY GROUP

Your **definitive** source for quality pre-owned equipment.

Artisan Technology Group
(217) 352-9330 | sales@artisantg.com | artisantg.com

Full-service, independent repair center
with experienced engineers and technicians on staff.

We buy your excess, underutilized, and idle equipment
along with credit for buybacks and trade-ins.

Custom engineering
so your equipment works exactly as you specify.

- Critical and expedited services
- In stock / Ready-to-ship
- Leasing / Rentals / Demos
- ITAR-certified secure asset solutions

Expert team | Trust guarantee | 100% satisfaction

All trademarks, brand names, and brands appearing herein are the property of their respective owners.

Visit our website - *Click HERE*

GETTING STARTED GUIDE

NI PXI-5695

8 GHz RF Attenuator

Note Before you begin, install and configure your chassis and controller.

This document explains how to install, configure, and test the NI PXI-5695 (NI 5695). The NI 5695 is an RF attenuator that provides fixed attenuation and programmable attenuation in a single-slot PXI module. The NI 5695 signal conditioning device ships with the NI-5690 instrument driver, which you can use to program the device.

To access NI 5695 documentation, navigate to **Start»All Programs»National Instruments»NI-5690»Documentation**.

Contents

Electromagnetic Compatibility Guidelines....2
Unpacking the Kit....2
Preparing the Environment....3
Verifying the System Requirements....3
Verifying the Kit Contents....3
    Other Equipment....4
Installing the Software....4
Installing the NI 5695....4
Connecting Signals....6
    Direct Connections to the NI 5695....6
    Torquing SMA Connections....6
    Hardware Front Panel Connectors and Indicators....8
Configuring the NI 5695 in MAX....9
Programming the Device....10
    NI-5690 Instrument Driver Examples....10
    Making Your First Measurement....10
Troubleshooting....11
    NI 5695 Does Not Appear in MAX....11
    Module Fails the Self-Test....11
    Why Is the ACCESS LED Off When the Chassis is On?....11
    Device Is Too Hot....12
    Performance Issues Using an MXI Connection....12
Where to Go Next....13
Worldwide Support and Services....13

NATIONAL INSTRUMENTS

Electromagnetic Compatibility Guidelines

This product was tested and complies with the regulatory requirements and limits for electromagnetic compatibility (EMC) stated in the product specifications. These requirements and limits provide reasonable protection against harmful interference when the product is operated in the intended operational electromagnetic environment.

This product is intended for use in industrial locations. However, harmful interference may occur in some installations, when the product is connected to a peripheral device or test object, or if the product is used in residential or commercial areas. To minimize interference with radio and television reception and prevent unacceptable performance degradation, install and use this product in strict accordance with the instructions in the product documentation.

Furthermore, any changes or modifications to the product not expressly approved by National Instruments could void your authority to operate it under your local regulatory rules.

Caution To ensure the specified EMC performance, operate this product only with shielded cables and accessories.

Caution To ensure the specified EMC performance, the length of all I/O cables except for that connected to the GPS antenna input must be no longer than 3 m (10 ft).

Unpacking the Kit

Caution To prevent electrostatic discharge from damaging the device, ground yourself using a grounding strap or by holding a grounded object, such as your computer chassis.

1. Touch the antistatic package to a metal part of the computer chassis.
2. Remove the device from the package and inspect the device for loose components or any other sign of damage.

   Caution Never touch the exposed pins of connectors.

   Notify NI if the device appears damaged in any way. Do not install a damaged device.
3. Unpack any other items and documentation from the kit.

Store the device in the antistatic package when the device is not in use.

Preparing the Environment

Ensure that the environment you are using the NI 5695 in meets the following specifications.

Operating temperature.....0 to 55 °C

Operating humidity.....10% to 90% RH, noncondensing

Pollution Degree.....2

Maximum altitude.....2,000 m

Indoor use only.

Note Refer to the device specifications on *ni.com/manuals* for complete specifications.

Note Do not operate the device in a manner not specified in this document. Product misuse can result in a hazard. You can compromise the safety protection built into the product if the product is damaged in any way. If the product is damaged, return it to National Instruments for repair.

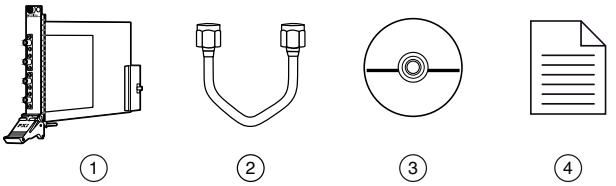
Verifying the System Requirements

To use the NI-5690 instrument driver, your system must meet certain requirements.

For more information about minimum system requirements, recommended system, and supported application development environments (ADEs), refer to the product readme, which is available on the driver software media or online at *ni.com/updates*.

Verifying the Kit Contents

Figure 1. NI 5695 Kit Contents



1. NI 5690 Module
2. SMA Cable
3. NI-5690 Driver Software Media
4. NI PXI-5695 Getting Started Guide (this document)

Other Equipment

There are several required items not included in your device kit that you need to install or operate the NI 5695.

Required Items

- A PXI chassis and chassis documentation. The NI PXI-1045 chassis is one available option for your device. For more information about compatible chassis options, refer to *ni.com*.
- A PXI embedded controller or MXI controller system that meets the system requirements specified in this guide and chassis documentation.

Optional Items

- A 1 N · m standard SMA torque wrench (NI part number 780487-01).

Installing the Software

You must be an Administrator to install NI software on your computer.

1. Install an ADE, such as LabVIEW or LabWindows™/CVI™.
2. Insert the driver software media into your computer. The installer should open automatically.

   If the installation window does not appear, navigate to the drive, double-click it, and double-click `autorun.exe`.
3. Follow the instructions in the installation prompts.

   Note Windows users may see access and security messages during installation. Accept the prompts to complete the installation.
4. When the installer completes, select **Restart** in the dialog box that prompts you to restart, shut down, or restart later.

Installing the NI 5695

Caution To prevent damage to the device caused by ESD or contamination, handle the device using the edges or the metal bracket.

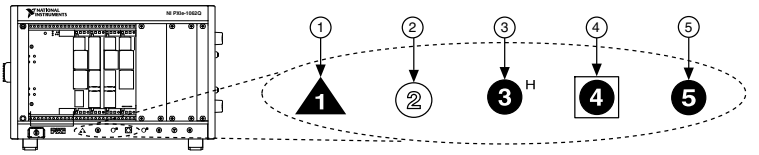
Note Ground yourself with a resistor-isolated wrist strap before installing the module, before touching the center pin of any connector, and before removing or adjusting any connections to the module.

1. Ensure the AC power source is connected to the chassis before installing the modules.

   The AC power cord grounds the chassis and protects it from electrical damage while you install the modules.
2. Power off the chassis.

3. Inspect the slot pins on the chassis backplane for any bends or damage prior to installation. Do not install a module if the backplane is damaged.
4. Remove the black plastic connectors from all the captive screws on the module front panel.
5. Identify a supported slot in the chassis. The following figure shows the symbols that indicate the slot types.

Figure 2. Chassis Compatibility Symbols

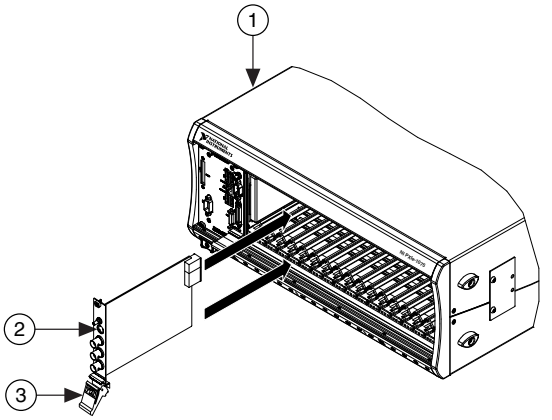


1. PXI Express System Controller Slot
2. PXI Peripheral Slot
3. PXI Express Hybrid Peripheral Slot
4. PXI Express System Timing Slot
5. PXI Express Peripheral Slot

NI 5695 modules can be placed only in PXI peripheral slots.

6. Touch any metal part of the chassis to discharge static electricity.
7. Ensure that the ejector handle is in the unlatched (downward) position.
8. Place the module edges into the module guides at the top and bottom of the chassis. Slide the device into the slot until it is fully inserted.

Figure 3. Module Installation



1. Chassis
2. Hardware Module
3. Ejector Handle in Down (Unlatched Position)

9. Latch the module in place by pulling up on the ejector handle.
10. Secure the device front panel to the chassis using the front-panel mounting screws.

11. Cover all empty slots using filler panels or slot blockers to maximize cooling air flow.
12. Power on the chassis.

Connecting Signals

Direct Connections to the NI 5695

The NI 5695 is a precision RF instrument that is sensitive to ESD and transients. Ensure you are making proper direct connections to the NI 5695 to avoid damaging the device.

Caution Apply external signals only while the NI 5695 is powered on. Applying external signals while the device is powered off may cause damage.

To prevent possible damage to the device, use caution when connecting signal sources and RF antennas directly to the IN connectors of the NI 5695. Operators, technicians, and all other users should ensure they are properly grounded when manipulating cables or antennas connected to the NI 5695 IN connectors.

If you are using noninsulated devices, such as a noninsulated RF antenna, ensure the devices are maintained in a static-free environment. If you are using an active device, such as a preamplifier or switch routed to the NI 5695 IN connectors, ensure that there are no signal transients greater than the RF and DC specifications for the device that are being generated and sourced to the NI 5695 IN connectors.

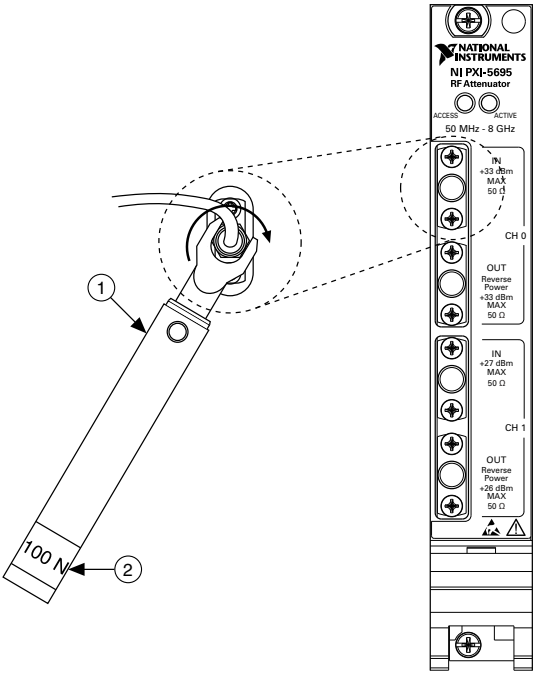
Torquing SMA Connections

Note A coaxial cable with open ends can function as a capacitor. Before connecting any open-ended cable to the NI 5695, momentarily short the center and outer connectors of the cable together.

Note For best results when connecting signals to the NI 5695 front panel SMA connectors, use shielded low-loss coaxial cables.

Torque all connections to 100 N · cm using a standard SMA torque wrench. Apply force until the wrench clicks.

Figure 4. Using the Standard SMA Torque Wrench



1. 100 N · cm SMA Torque Wrench
2. Apply Force Here Until Wrench Clicks

Hardware Front Panel Connectors and Indicators

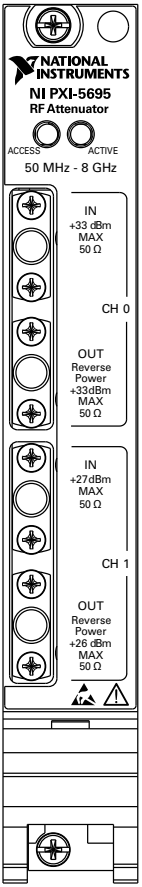


Table 1. NI 5695 Front Panel Connectors

Connector	Access	Function
CH 0 IN	Input	CH 0 IN and CH 0 OUT each function as a fixed attenuator with switchable main and direct paths. The main path offers fixed attenuation with high input power capability. The direct path bypasses the programmable circuitry and routes the signal directly to the output. The direct path passes DC level to output, and the main path is DC-coupled.
CH 0 OUT	Output	

Table 1. NI 5695 Front Panel Connectors (Continued)

Connector	Access	Function
CH 1 IN	Input	CH 1 IN and CH 1 OUT each function as a programmable attenuator. These channels offer attenuation that is adjustable in 0.5 dB nominal steps.[1] CH 1 IN and CH 1 OUT are AC-coupled.
CH 1 OUT	Output	

Table 2. NI 5695 Front Panel LED Indicators

LED	Indications
ACCESS	Indicates the basic hardware status of the NI RF signal conditioning module. OFF—The module is not yet functional, or has detected a problem with a PXI power rail. AMBER—The module is being accessed. GREEN—The module is ready to be programmed.
ACTIVE	Indicates the operational status of the NI RF signal conditioning module. OFF—The module is in an uninitialized state. GREEN—The module is in a ready state or in use.

Related Information

Refer to the Devices book in the NI RF Signal Conditioning Devices Help for more information about using channels and paths.

Configuring the NI 5695 in MAX

Use Measurement & Automation Explorer (MAX) to configure your National Instruments hardware. MAX informs other programs about which devices reside in the system and how they are configured. MAX is automatically installed with the NI-5690 instrument driver.

1. Launch Measurement & Automation Explorer (MAX).

   MAX should automatically detect the device you installed.

2. In the Configuration pane, double-click **Devices and Interfaces** to see the list of installed devices. Installed devices appear under the name of their associated chassis.

Note If you are using the NI 5695 with the LabVIEW Real-Time Module, expand **Remote Systems**. Find your target IP address or name, expand it, and then expand **Devices and Interfaces**.

[1] Refer to the *NI PXI-5695 Specifications* for detailed attenuation specifications.

3. Expand your **Chassis** tree item. MAX lists all devices installed in the chassis. Your default device names may vary.

   Note If you do not see your hardware listed, press <F5> to refresh the list of installed devices. If the device is still not listed, power off the system, ensure the device is correctly installed, and restart.

4. Record the device identifier MAX assigns to the hardware. Use this identifier when programming the NI 5695.
5. The MAX self-test performs a basic verification of hardware resources. To self-test a module in MAX, right click the module and select **Self-Test**.

Programming the Device

You can use the NI-5690 instrument driver to program the NI 5695 in the supported ADE of your choice.

NI-5690 Instrument Driver Examples

Examples demonstrate the functionality of the device and serve as programming models and building blocks for your own applications. The NI Example Finder is a utility available for some ADEs that organizes examples into categories and allows you to easily browse and search installed examples. You can see descriptions and compatible hardware models for each example, or see all the examples compatible with one particular hardware model.

To locate examples, refer to the following table.

Table 3. Locating NI-5690 Examples

Application Development Environment (ADE)	Locating Examples
LabVIEW or LabWindows/CVI	Locate examples with the NI Example Finder. Within LabVIEW or LabWindows/CVI, select **Help»Find Examples**, and navigate to **Hardware Input and Output»Modular Instruments»NI-5690 (RF Preamplifier)**.
LabVIEW, LabWindows/CVI, or C	Locate examples[2] from the Start menu by navigating to **Start»All Programs»National Instruments»NI-5690»Examples**.

Making Your First Measurement

To begin making measurements with the NI 5695, complete the following steps:

1. Launch your ADE.
2. Navigate to **Start»All Programs»National Instruments»NI-5690»Examples** and open one of the examples.

[2] You can modify an NI-5690 C example to create an application with Microsoft Visual C/C++, and all required include and library files are automatically added to the project.

3. Select your device from the resource name control.
4. Run the example.

Troubleshooting

If an issue persists after you complete a troubleshooting procedure, contact NI technical support or visit *ni.com/support*.

NI 5695 Does Not Appear in MAX

1. In the MAX Configuration pane, click **Devices and Interfaces**.
2. Expand the **Chassis** tree to see the list of installed devices, and press <F5> to refresh the list.
3. If the module is still not listed, power off the system, ensure that all hardware is correctly installed, and restart the system.
4. Navigate to the Device Manager.

Option	Description
Windows 8	Right-click the Start screen, and select **All apps»Control Panel» Hardware and Sound»Device Manager**.
Windows 7	Select **Start»Control Panel»Device Manager**.
Windows Vista	Select **Start»Control Panel»System and Maintenance»Device Manager**.
Windows XP	Select **Start»Control Panel»System»Hardware»Device Manager**.

5. If you are using a PXI controller, verify that a **National Instruments** entry appears in the system device list. Reinstall the NI-5690 instrument driver and the device if error conditions appear in the list. If you are using a MXI controller, right-click **PCI-to-PCI Bridge**, and select **Properties** from the shortcut menu to verify that the bridge is enabled.

Module Fails the Self-Test

1. Restart the system.
2. Launch MAX, and perform the self-test again.
3. Power off the PXI chassis.
4. Reinstall the failed module in a different PXI slot.
5. Power on the PXI chassis.
6. Perform the self-test again.

Why Is the ACCESS LED Off When the Chassis is On?

The LEDs may not illuminate until the device has been configured in MAX. Before proceeding, verify that the NI 5695 appears in MAX.

If the ACCESS LED fails to illuminate after you power on the chassis, a problem may exist with the chassis power rails, a hardware module, or the LED.

Caution Apply external signals only while the NI 5695 is powered on. Applying external signals while the device is powered off may cause damage.

1. Disconnect any signals from the module front panels.
2. Power off the chassis.
3. Remove the module from the chassis and inspect it for damage. Do not reinstall a damaged device.
4. Install the module in a different chassis slot from which you removed it.
5. Power on the chassis.
6. Verify that the device appears in MAX.
7. Reset the device in MAX and perform a self-test.

Device Is Too Hot

NI 5695 devices have onboard sensors that monitor the device operating temperature. When running at room temperature (25 °C), the sensor typically reads a temperature of 30 °C ± 5 °C, depending on the module and what other devices are installed in the chassis.

Access the onboard sensor using the ni5690 Get Temperature VI or the ni5690_getTemperature function.

Performance Issues Using an MXI Connection

When you use an MXI-3 connection to control the PXI chassis, you must run the MXI Optimization Application prior to using the NI 5695. By default, this application runs automatically when Windows starts. Using an MXI connection without running this application may result in a **`time exceeded`** or **`internal software error`**, an initialization timeout, or a performance issue when using the NI 5695.

1. Ensure the MXI software is installed. If the MXI software is not installed, refer to the setup instructions included with the MXI kit.

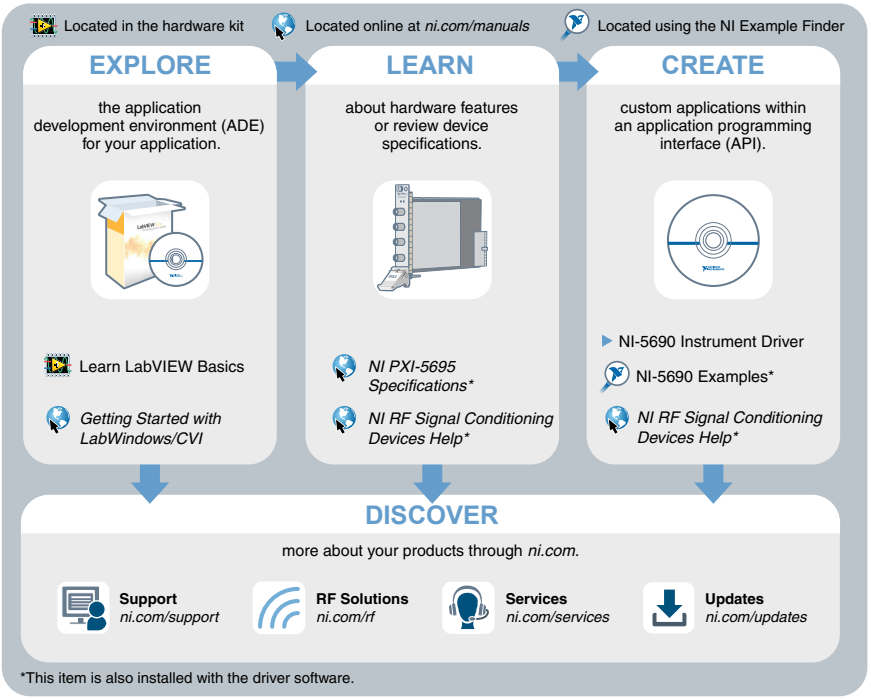
   After installation, you may be required to restart your computer before using the MXI application.
2. For MXI-3 optimization, select **Start»All Programs»National Instruments MXI-3»MXI-3 Optimization**.

   MXI-4 optimization is performed automatically by the MXI-4 hardware.

If you continue to have initialization or performance issues, refer to the MXI documentation included in your MXI kit, contact NI technical support, or visit *ni.com/support*.

Where to Go Next

Refer to the following figure for information about other product tasks and associated resources for those tasks.



Tip The *NI RF Signal Conditioning Devices Help* is an HTML version of a traditional user manual that includes detailed information about RF fundamentals, device features, and programming with the NI-5690 instrument driver.

Worldwide Support and Services

The National Instruments website is your complete resource for technical support. At *ni.com/support*, you have access to everything from troubleshooting and application development self-help resources to email and phone assistance from NI Application Engineers.

Visit *ni.com/services* for NI Factory Installation Services, repairs, extended warranty, and other services.

Visit *ni.com/register* to register your National Instruments product. Product registration facilitates technical support and ensures that you receive important information updates from NI.

A Declaration of Conformity (DoC) is our claim of compliance with the Council of the European Communities using the manufacturer's declaration of conformity. This system affords the user protection for electromagnetic compatibility (EMC) and product safety. You can obtain the DoC for your product by visiting *ni.com/certification*. If your product supports calibration, you can obtain the calibration certificate for your product at *ni.com/calibration*.

National Instruments corporate headquarters is located at 11500 North Mopac Expressway, Austin, Texas, 78759-3504. National Instruments also has offices located around the world. For telephone support in the United States, create your service request at *ni.com/support* or dial 1 866 ASK MYNI (275 6964). For telephone support outside the United States, visit the *Worldwide Offices* section of *ni.com/niglobal* to access the branch office websites, which provide up-to-date contact information, support phone numbers, email addresses, and current events.

Refer to the *NI Trademarks and Logo Guidelines* at `ni.com/trademarks` for information on National Instruments trademarks. Other product and company names mentioned herein are trademarks or trade names of their respective companies. For patents covering National Instruments products/technology, refer to the appropriate location: **Help**» **Patents** in your software, the `patents.txt` file on your media, or the *National Instruments Patent Notice* at `ni.com/patents`. You can find information about end-user license agreements (EULAs) and third-party legal notices in the readme file for your NI product. Refer to the *Export Compliance Information* at `ni.com/legal/export-compliance` for the National Instruments global trade compliance policy and how to obtain relevant HTS codes, ECCNs, and other import/export data. NI MAKES NO EXPRESS OR IMPLIED WARRANTIES AS TO THE ACCURACY OF THE INFORMATION CONTAINED HEREIN AND SHALL NOT BE LIABLE FOR ANY ERRORS. U.S. Government Customers: The data contained in this manual was developed at private expense and is subject to the applicable limited rights and restricted data rights as set forth in FAR 52.227-14, DFAR 252.227-7014, and DFAR 252.227-7015.

© 2014 National Instruments. All rights reserved.

376268A-01 Jul14

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

Gold-standard solutions

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

We buy equipment

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

Learn more!

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

Artisan Scientific Corporation dba Artisan Technology Group is not an affiliate, representative, or authorized distributor for any manufacturer listed herein.

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

(217) 352-9330 | sales@artisantg.com | artisantg.com

ARTISAN® TECHNOLOGY GROUP