![Phase Matrix, Inc.™ logo]

PXI MICROWAVE

Model PXI-1420

MW DOWNCONVERTER MODULE

Quick Start Guide

PXI-1420 CCN 12801
Manual Assy Part Number 5585112-01
Manual Text Part Number 5580112-01 Rev A

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CAUTION

A **CAUTION** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like 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.

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Introducing the PXI-1420 MW Downconverter Module

Congratulations on purchasing a
Phase Matrix PXI-1420 MW Downconverter Module!

To get the most out of your purchase, it is recommended that this
Quick Start Guide be read carefully and completely.

In this document...

The scope of this document is to describe the installation process of the
stand-alone hardware and software for the PXI-1420 and to confirm
basic module operation.

This document describes information for the PXI-1420 when used in a
PXI system with an embedded controller or a PXI remote controller.

Step 1. Confirm Module Operating Requirements

Table 1   Module Operating Requirements When Used in a PXI System

Operating System

- Windows 7 (32- and 64-bit versions)
- Windows XP (32-bit version)
- LabVIEW Real-Time (Version 8.2.1 and later)

BIOS - computers manufactured prior to 2008 require *NI MXI-Express BIOS Compatibility Software*.

This BIOS software is available on the Internet at: <u>NI > Support > Drivers and Software > MXI-Express BIOS Compatibility Software - Windows Vista x86/XP</u>

RAM - minimum of 256 MB required by LabVIEW.

CD Drive - used to install PXI device driver software and Soft Front Panel from an optional CD

PXI device driver software and Soft Front Panels are available from an optional CD or from the Phase Matrix web site at: <u>www.phasematrix.com</u>

Screen Resolution - at least 1024 × 768 pixels, recommended.

Adobe Reader - 6.0.1 or later to view or search PDF versions of manuals.

Interface/Controller - select either an embedded controller or a PXI remote controller.

Embedded Controller

NI PXI-8106 2.16 GHz Dual-Core PXI Embedded Controller
or NI PXIe-8106 2.16 GHz Dual-Core PXI Express Embedded Controller
or equivalent embedded controller running Windows 7/XP

PXI Remote Controller

NI PXI-CardBus8310 Laptop Control of PXI with PCMCIA CardBus
or NI PXIe-ExpressCard8360 Laptop Control of PXI Express with ExpressCard
or equivalent PXI remote controller running Windows 7/XP

NOTE	LabVIEW does not support Windows NT/Me/98/95, any of the Windows Server editions, or Windows XP x64.

LabVIEW does support Windows 7 (64-bit version).

LabVIEW or the LabVIEW Run-Time Engine does support Windows 2000 with Service Pack 3 or later.

Phase Matrix, Inc.™

Step 2. Perform Hardware Installation/Configuration

CAUTION

PXI hardware does not support "hot-swap" capabilities!

Before installing the PXI-1420 MW Downconverter Module, the PXI chassis must be powered off and unplugged to prevent damage to PXI modules.

3 The PXI-1420 can be installed in any standard-PXI slot marked with a peripheral slot compatibility image (a circle containing the slot number).

H 7 The PXI-1420 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).

Do not install the PXI-1420 into a slot for PXI Express (PXIe) modules.

NOTE

A PXI-1420 can be used in a PXI or PXIe chassis, with either a PXI or PXIe remote controller, but the PXI-1420 must only be installed into a standard-PXI slot or a hybrid-PXI slot.

Step 2-1. Unpack Hardware

Each PXI-1420 ships in an antistatic package to prevent damage from electrostatic discharge (ESD). Because ESD can damage several components of a hardware module, store all modules in antistatic envelopes when not in use.

CAUTION

- To avoid damage when handling a module, do not touch exposed connector pins.
- Before touching or handling a module, use a grounding strap or touch a grounded object to ground yourself.
- Before touching or removing a module from its package, touch the antistatic package to a metal part of your computer chassis.
- Remove each module from its package and inspect it for loose components or any signs of damage. Notify Phase Matrix if any module appears damaged in any way.
- Do not install damaged modules into a system.

Unpack the contents of the box and verify that everything is included:

- PXI-1420 MW Downconverter Module
- Optional CD (included if specifically ordered; otherwise, PXI device driver software and Soft Front Panels are available the Phase Matrix web site at: www.phasematrix.com).

Step 2-2. Install PXI Modules into a PXI Chassis

Figure 1   Install PXI Modules into a PXI Chassis
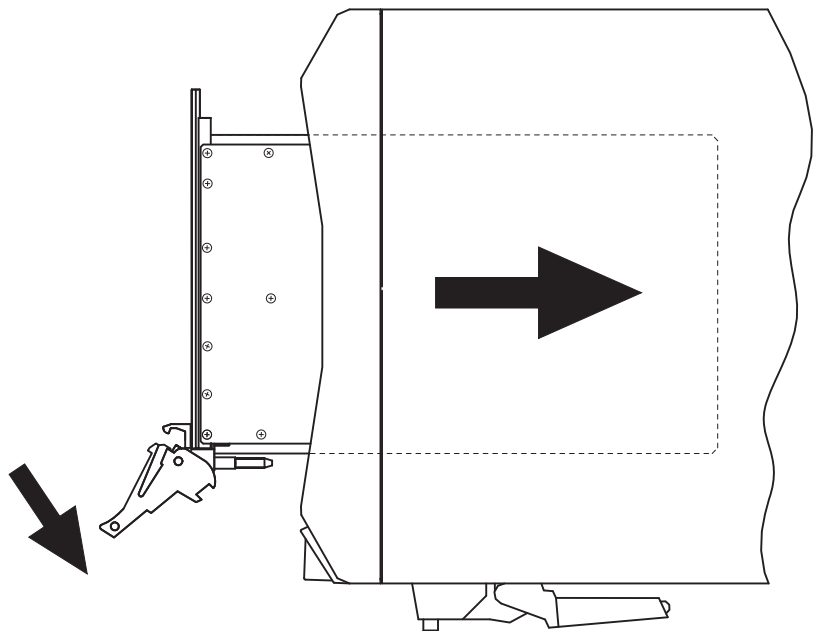
Phase Matrix PXI modules are sensitive instruments that should be handled carefully. Do not expose modules to temperatures or humidity beyond their rated maximums.

CAUTION

- For information about the rated maximums, refer to each module's specifications document available at: www.phasematrix.com
- Keep the module free of dust by cleaning only with compressed air.
- Do not clean the module with any solvents or liquids.
- To prevent damage to the module caused by ESD or contamination, handle the module using the edges or the metal bracket.

1 Assure that the power switch is in the Off (Standby) position and unplug the PXI chassis.

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 it 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-1420 by the injector/ejector handle, slide it into an available PXI (or hybrid) slot, as shown in Figure 1.

   a Install the PXI-1420 into the PXI (or hybrid) slot of the chassis by placing the module card edges into the front module guides (top and bottom).

   b Slide the PXI-1420 to the rear of the chassis and assure that the injector/ejector handle is pushed down in the unlatched (downward) position.

   c Slide the module completely into the chassis. When you begin to feel resistance, push up on the injector/ejector handle to fully inject the module into the chassis frame.

5 Latch the PXI-1420 by pulling up on the injector/ejector handle and secure the module front panel to the chassis using the module front-panel mounting screws.

6 Tighten the screws on the PXI-1420 front panel. Performance may suffer if the screws are not tightened properly.

7 Verify that the PXI chassis fans are operable and free of dust and other contaminants that may restrict airflow.

8 Install all chassis covers and filler panels after installing the PXI-1420. Missing filler panels disrupt necessary air circulation in the chassis.

NOTE Phase Matrix recommends installing slot blockers in adjacent vacant PXI slots to maximize cooling air flow to the PXI modules.

A PXI Chassis Slot Blocker Kit (National Instruments part number 778678-01) is available for purchase at www.ni.com.

9 Plug-in and power-on the PXI chassis.

Step 2-3. Connect to the Host Computer and Power Source

Embedded Controller

1 Connect the keyboard, mouse, monitor and any other external devices to the PXI embedded controller.

2 Connect the chassis' AC or DC inlet to the power source using an appropriate power cable.

3 When the power switch is in the ON position, observe that fans become operational.

4 If the power outlet does not have an appropriate ground connection, connect the premise safety ground to the chassis grounding screw. Refer to the chassis' user manual at ni.com/manual for instructions.

PXI Remote Controller

PXI systems can be controlled from a PC or laptop computer through a software transparent link using National Instruments' PXI Remote Controllers.

- PC control of PXI consists of a PCI/PCI Express board in the computer and a PXI/PXI Express module in slot 1 of the PXI system, connected by a copper or fiber-optic cable.

- Laptop computer control of PXI consists of an ExpressCard/PCMCIA CardBus card in the laptop and a PXI/PXI Express module in slot 1 of the PXI system, connected by a copper cable.

1 Install the PCI/PCI Express board in a PC or insert the ExpressCard/PCMCIA CardBus card in a laptop computer.

2 Connect the chassis' AC or DC inlet to the power source using an appropriate power cable.

3 When the power switch is in the ON position, observe that fans become operational.

4 If the power outlet does not have an appropriate ground connection, connect the premise safety ground to the chassis grounding screw. Refer to the chassis' user manual at ni.com/manual for instructions.

(Step 2-4. Optional) Uninstall PXI Modules

Before uninstalling PXI modules, power off the PXI chassis!

When removing PXI modules from a chassis, ensure that you are grounded with a grounding strap or are touching a grounded metal surface. To avoid ESD, do not touch the exposed connector pins or any exposed circuitry on the device. When not in use, PXI modules should be stored in the original antistatic envelope to avoid damage.

Step 3. Perform Software Installation/Configuration

Complete the following steps to install the PXI device driver software and Soft Front Panel available from an optional CD or from the Phase Matrix web site at: www.phasematrix.com

NOTE Any application development environment (ADE) that is to be used (such as LabVIEW, LabWindows/CVI, or a third-party program) must be installed prior to installing the PXI device driver software or its Soft Front Panel.

Embedded Controller

1 Install the PXI device driver from the optional CD or from the Phase Matrix web site.
   See "Step 3-1. Installing the PXI Device Driver" on page 10.

2 Install the Soft Front Panel from the optional CD or from the Phase Matrix web site.
   See "Step 3-2. Installing the Soft Front Panel" on page 13.

PXI Remote Controller

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- Laptop computer control of PXI consists of an ExpressCard/PCMCIA CardBus card in the laptop and a PXI/PXI Express module in slot 1 of the PXI system, connected by a copper cable.

1 If the PXI remote controller (PC or laptop computer) being used is a Windows based operating system and was manufactured prior to 2008, install *NI MXI-Express BIOS Compatibility Software*:
   NI MXI-Express BIOS Compatibility Software

2 Install the *NI PXI Platform Services Software* that accompanies the PXI remote controller: NI PXI Platform Services Software

3 Install the PXI device driver from the optional CD or from the Phase Matrix web site.
   See "Step 3-1. Installing the PXI Device Driver" on page 10.

4 Install the Soft Front Panel from the optional CD or from the Phase Matrix web site.
   See "Step 3-2. Installing the Soft Front Panel" on page 13.

5 Connect the PXI remote controller, using the manufacture's provided cable, to the expansion card in the PXI remote controller.

6 Reboot the PXI remote controller.

Step 3-1. Installing the PXI Device Driver

This procedure is used to install the PXI-1420's device driver using the "Found New Hardware Wizard" on an embedded controller or a PXI remote controller running Windows 7/XP.

NOTE	If the embedded controller or the PXI remote controller being used has previously had a device driver of the same type installed, it must be removed before installing a new PXI-1420's device driver. Refer to "(Step 3-3. Optional) Uninstalling the PXI Device Driver" on page 17 for further details.

NOTE	Any application development environment (ADE) that is to be used (such as LabVIEW, LabWindows/CVI, or a third-party program) must be installed prior to installing the PXI device driver software or its Soft Front Panel.

NOTE	The following procedure is shown for systems running Windows 7 and may vary slightly for systems running Windows XP.

NOTE	Anti-virus software may prevent the PXI device driver installer from executing.

1   Install PXI device drivers using one of the following methods:

- Insert the optional CD containing the device driver.

- Download the latest available PXI device driver from the Phase Matrix web site and unzip it to a location on the embedded controller or the PXI remote controller.

  Device drivers are available at: www.phasematrix.com

CAUTION	PXI hardware does not support "hot-swap" capabilities! Before installing the PXI-1420 MW Downconverter Module, the PXI chassis must be powered off and unplugged to prevent damage to PXI modules.

2 Install PXI modules into the PXI chassis and turn on power.

3 Launch the PXI-14XX Series Device Driver Installer, "PXI-14XX Driver (32 bit).exe" or "PXI-14XX Driver (64 bit).exe."

The PXI-14XX Series Device Driver Installer, will open with a welcome window like the one shown in Figure 2.

Figure 2 Example Welcome Window
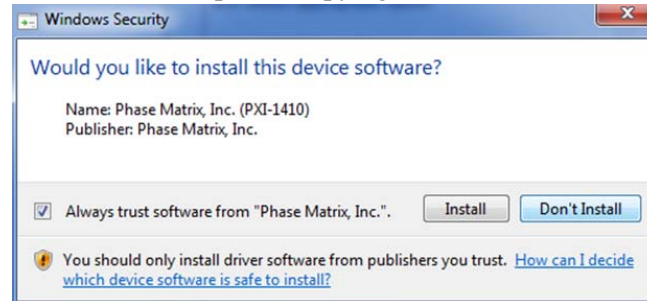

4 Select **Next** to continue.

Figure 3 Example of Software User License Agreement

5 Carfully read through the End User License Agreement (EULA).

• If you accept the terms of the EULA, select "I accept this Agreement" and select **Next** to continue.

• If you do not accept the agreement, you will not be able to install the software.
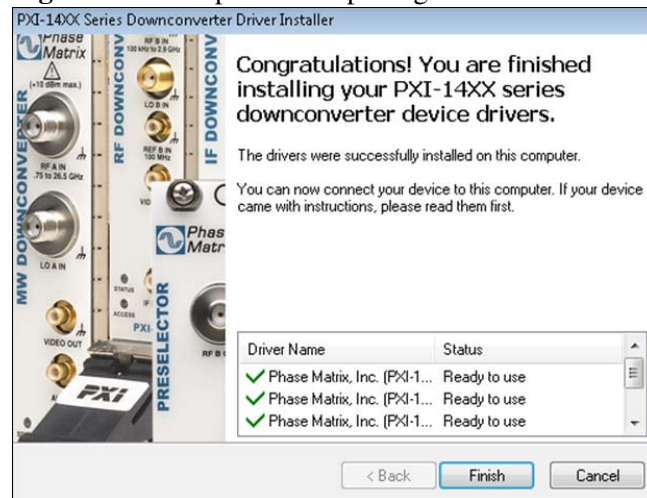
A Windows security window similar to the one shown in Figure 4 will appear.

Figure 4   Example of Copying Device Driver Files

6   Select **Next** to continue.

Figure 5   Example of Completing the Installer

Windows should display a message indicating that the installation was successful.

7   Select **Finish** to complete the device driver installation.

Step 3-2. Installing the Soft Front Panel

This procedure is used to install the PXI-1420's Soft Front Panel on an embedded controller or a PXI remote controller running Windows 7/XP.

NOTE	The device driver software must be installed before this Soft Front Panel can be used to control the PXI-1420.

Refer to "Step 3-1. Installing the PXI Device Driver" on page 10 for further details.

NOTE	Any application development environment (ADE) that is to be used (such as LabVIEW, LabWindows/CVI, or a third-party program) must be installed prior to installing the PXI device driver software or its Soft Front Panel.

NOTE	The following procedure is shown for systems running Windows XP and may vary slightly for systems running Windows Vista.

1 Install the Soft Front Panel using one of the following methods:

- Insert the optional CD containing the Soft Front Panel.

- Download the latest available Soft Front Panel from the Phase Matrix web site and unzip it to a location on the embedded controller or the PXI remote controller.

  Soft Front Panels are available at: www.phasematrix.com

2 Start the installation process by selecting **Start > Run > Browse**, navigate to the "setup.exe" file and select **Open** to start the installation wizard.

   After a small delay, a screen similar to Figure 6 is displayed. The actual screen that appears will have the label of the module Soft Front Panel being installed, so instead of "PXI-14XX," the label is displayed as either "PXI-1410," "PXI-1420," "PXI-1430B," "PXI-1440," or "PXI-1450B."

Figure 6   Example of Starting the Soft Front Panel Installation Wizard
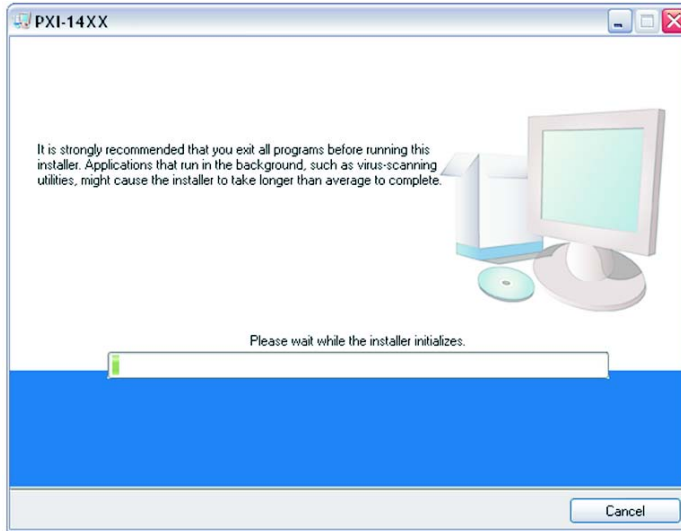

3   Continue to the next screen.

Figure 7   Example of Selecting Destination Directory for Executables
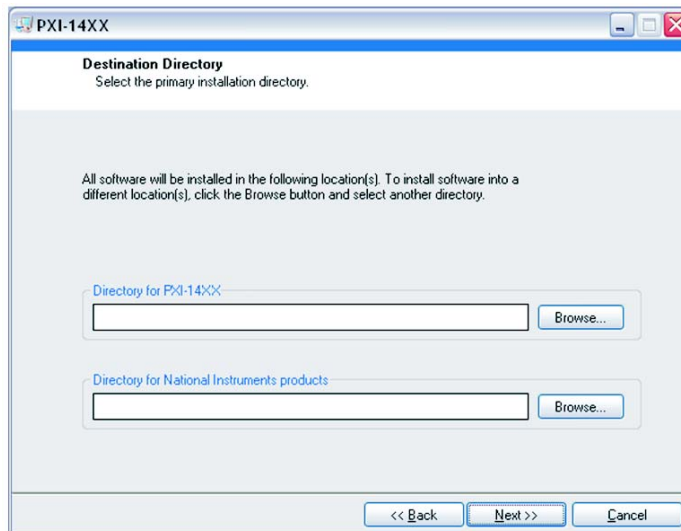
4   Enter the destination directory for the PXI-1420's Soft Front Panel executables or browse to a destination directory by selecting the **Browse** button.

5   Once the file path has been entered, select **Next** to continue to the Software License Agreement.

Figure 8   Example Software License Agreement
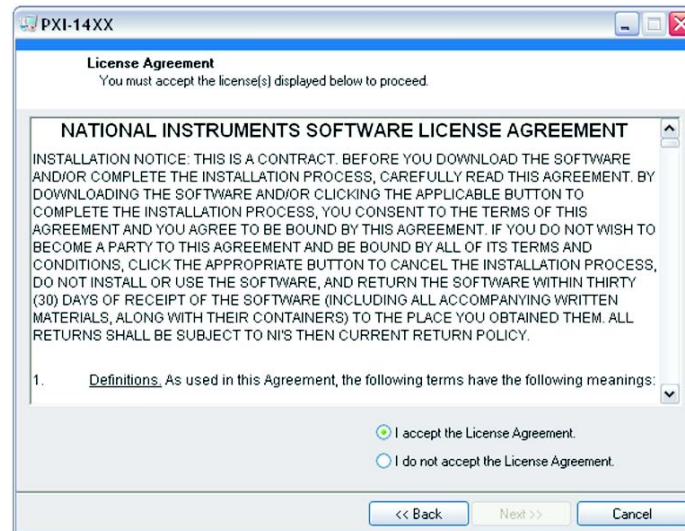
6   Carefully read through the Software License Agreement.

- If you agree to the terms of the software license agreement, select "I accept the License Agreement" and select **Next** to continue.

- If you do not agree, you will not be able to install the software.

Figure 9   Example Summary of Files Being Installed
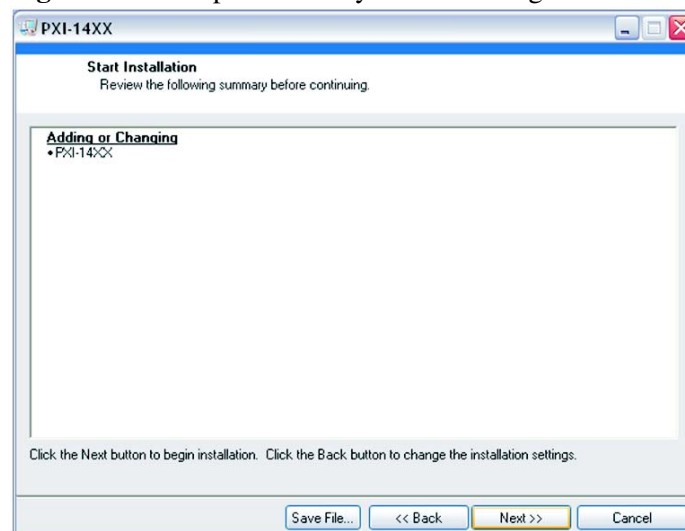
7   Review the list of files to be installed and select **Next** to begin the installation.

Figure 10 Example of Completing Soft Front Panel Installation Wizard
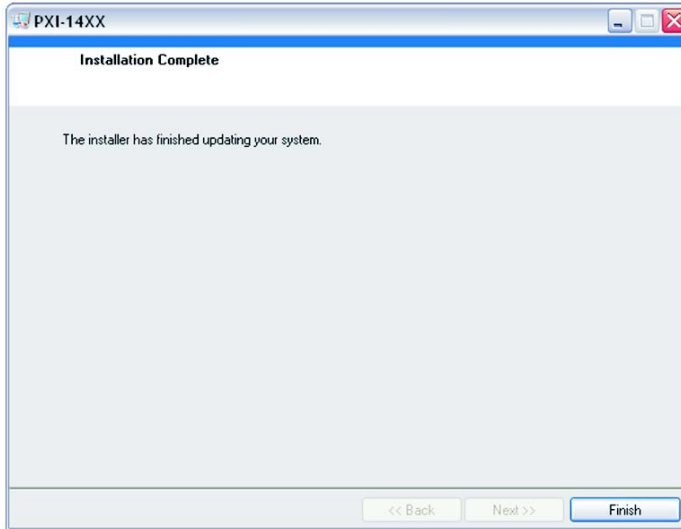
8   Select **Finish** to complete the Soft Front Panel installation.

(Step 3-3. Optional) Uninstalling the PXI Device Driver

This procedure is used to uninstall previous versions of the PXI-1420's device driver from an embedded controller or a PXI remote controller running Windows 7/XP.

NOTE	• If this is the first time that a PXI-1420's device driver is being installed, this procedure is optional and can be skipped. • If the embedded controller or the PXI remote controller has previously had a device driver of the same type installed, it must be removed before installing a new PXI-1420's device driver.

NOTE	The following procedure is shown for systems running Windows XP and may vary slightly for systems running Windows Vista.

Figure 11 Example of Device PX14XX Under "NI-VISA PXI Devices"
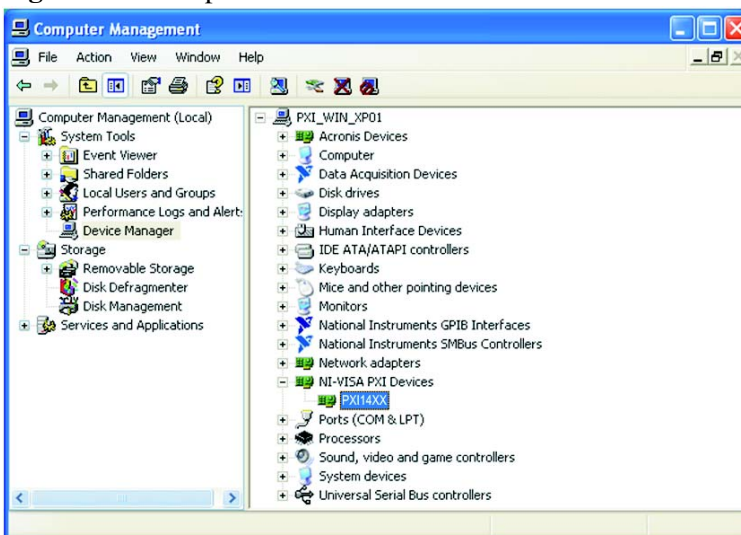
1 Open the Device Manager by selecting **Start > Control Panel > Performance and Maintenance > System**.

2 Select the **Hardware** tab and select **Device Manger**.

3 Select the **View** pull-down menu.

4 Select **Devices by connection** and the device should appear under "NI-VISA PXI Devices" with the label as "PM14XX."*

* PM14XX will actually display as PXI-1420 MW Downconverter Module.

5 To uninstall the device driver for a selected module, right-click on the selected device and a popup menu is displayed with five selectable choices.

6 Select **Uninstall** and a popup window is displayed with a conformation to continue with the uninstall process.

Figure 12 Example of Confirming Device Driver Removal

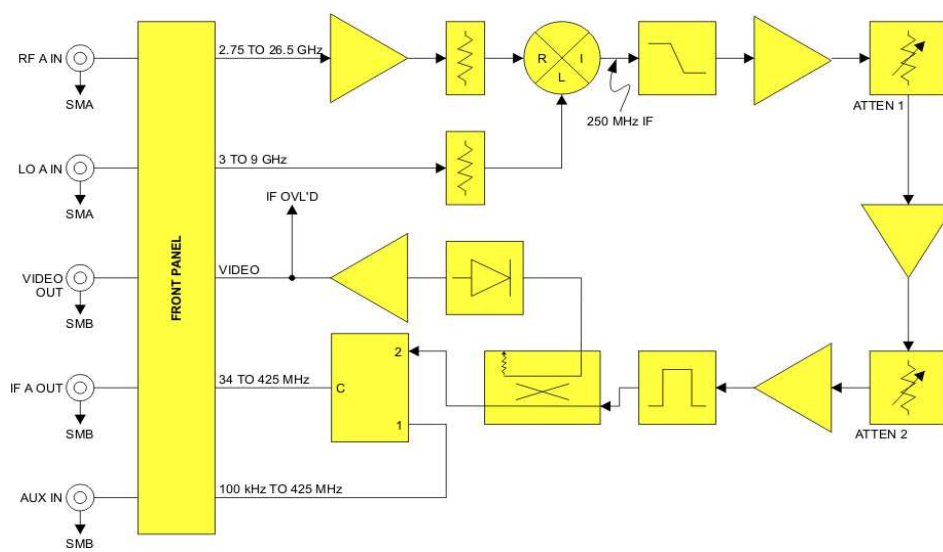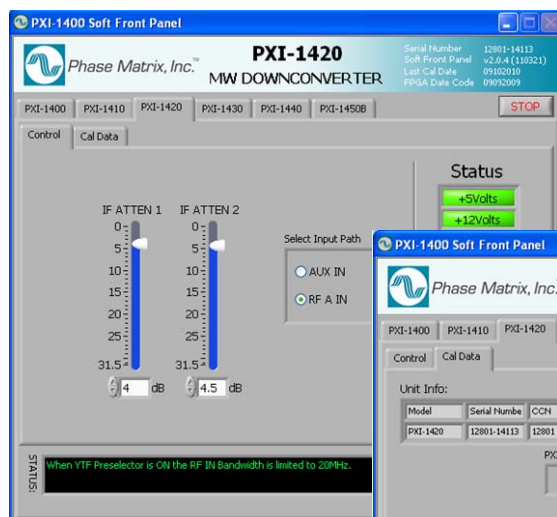**7** Select **OK** to confirm the prompt and uninstall the device driver.

Step 4. Review Hardware and Software Front Panels

Hardware Front Panel

Figure 13 Hardware Front Panel of the
PXI-1420 MW Downconverter Module

<table>
<tr><td>**C A U T I O N**</td><td>The maximum power input to the input connector (RF A IN 2.75 GHz to 26.5 GHz) must not exceed +10 dBm!</td></tr>
</table>

STATUS LED   This LED indicates the overall health of the PXI-1420. This includes the power supplies and other hardware. The PXI-1420 has extensive built-in-test (BIT). Additional insight can be learned by reading the status section of the Soft Front Panel.

The STATUS LED can have four possible conditions:

- **Green** indicates that all power supplies are functioning within their tolerances and all hardware is functioning.

- **Amber** indicates that all power supplies are functioning within their tolerances, but there is other hardware failures.

- **Red** indicates a failure in the power supplies and module hardware. This can be a catastrophic failure.

- **Off** indicates a failure in the power supplies, but module hardware seems to be functioning. Module hardware functioning indication can be erroneous in this mode since this circuitry can be compromised by a power supply failure.

ACCESS LED   This Solid AMBER LED blinks to indicate each time the module is written to or read from.

| CAUTION | The maximum power input to the input connector (RF A IN 2.75 GHz to 26.5 GHz) must not exceed +10 dBm! |

| CAUTION | When using a PXI-1410 Preselector Module with a PXI-1420 MW Downconverter Module, caution must be used! |

Although a PXI-1410 Preselector Module can accept input power levels up to an operating point of +30 dBm, its step attenuator must be set to 20 dB or higher; this attenuation is required so that the power coming out of the PXI-1410 Preselector Module does not exceed the maximum allowed power that can be applied to the RF A IN input connector of the PXI-1420 MW Downconverter Module.

Damage can occur if power exceeds +10 dBm applied to the PXI-1420 MW Downconverter Module's input connector!

RF A IN 2.75 GHz to 26.5 GHz   SMA (f) connector is used to input a microwave signal that is to be down converted.

This microwave signal can be supplied one of two ways:

• directly to the RF A IN connector, in a range of 2.75 GHz to 26.5 GHz.

The maximum operating power applied to the PXI-1420's input connector (RF A IN 2.75 GHz to 26.5 GHz) is -40 dBm.

The PXI-1420 is designed to operate with signals below -40 dBm. Operation above -40 dBm is allowed with degraded performance.

• (preselected/attenuated) through the PXI-1410 Preselector Module's RF A IN connector, out of its RF A OUT connector, and in through the RF A IN connector of the PXI-1420 MW Downconverter Module.

LO A IN   SMA (f) connector is used to deliver the LO signal from the PXI-1450B Local Oscillator Module, into the front panel of the PXI-1420 MW Downconverter Module.

This LO signal is used to down convert the microwave signal that is input to the RF A IN connector and produce a 250 MHz IF OUT; see the description for the IF A OUT connector.

VIDEO OUT   SMB (m) connector is used to output the video output signal which is enabled at all times. The video output is a DC level which is representative of the total signal power contained within the IF passband of the system.

CAUTION   The maximum power input to the AUX IN connector must not exceed +10 dBm!

AUX IN   SMB (m) connector is used to input an externally generated IF signal (100 kHz to 425 MHz) that bypasses the down conversion process of the PXI-1420; this IF signal is directly available from the IF A OUT connector.

IF B OUT on the PXI-1430 RF Downconverter Module can also be directly connected to this AUX IN. This allows switching of the IF output signals between the PXI-1420 MW Downconverter Module and the PXI-1430 RF Downconverter Module without the use of the PXI-1440 IF Downconverter Module.

CAUTION   The maximum power output of the IF A OUT connector can exceed +20 dBm!

Care should be used when connecting this IF A OUT to a digitizer or other equipment. When the IF A OUT normal operating range is exceeded, the overload indicator will be illuminated. (Refer to Table 2.)

IF A OUT   SMB (m) connector is used to output an IF signal. When the down conversion circuitry is used, a 250 MHz centered IF signal is output. In addition, this IF signal can be 100 kHz to 425 MHz when an IF signal is supplied through the AUX IN connector which bypasses the down conversion circuitry. This IF signal can be used to supply an input signal to the IF A IN input connector of the PXI-1440 IF Downconverter Module.

Soft Front Panel

Control Tab

Figure 14 Control Tab
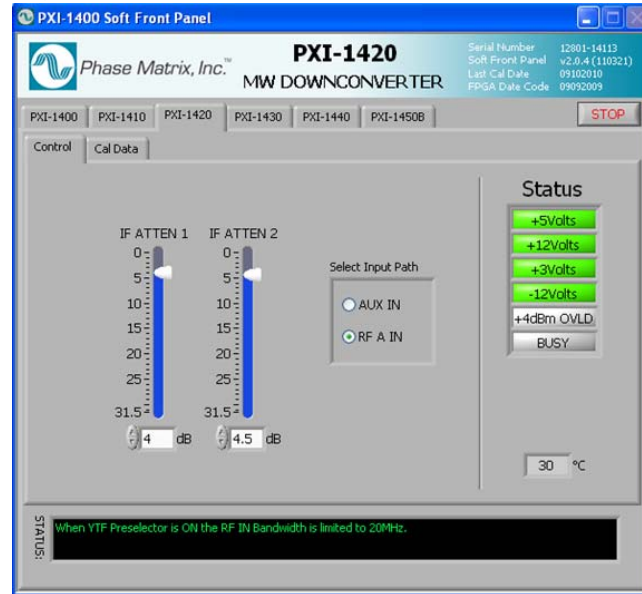
Serial Number, Soft Front Panel, Last Cal Date, and FPGA Date Code shown in the top-right corner of the Soft Front Panel is information about the PXI module being controlled by this Soft Front Panel. This information cannot be changed through the Soft Front Panel.

Stop Button This button is used to stop the Soft Front Panel from reading and writing to the PXI module; it halts the program and is the preferred way to exit the program.

NOTE	System gain is a combination of the settings for IF ATTEN 1 and IF ATTEN 2.

Using both attenuators will result in better system performance. For optimum performance, the factory recommends that when adjusting the IF attenuators of the PXI-1420, the adjustment should be made so that no part of the IF chain is overloaded.

To prevent overloading during an adjustment, first adjust IF ATTEN 2 from 0 to 20 dB, and then adjust IF ATTEN 1 until reaching the desired attenuation.

IF ATTEN 1 (dB) This slide control (along with an entry box) is used to select the level of IF attenuation and may be changed by pointing to the slide control and dragging it up or down to select

different levels of IF attenuation; the corresponding selected value of IF attenuation is displayed in the entry box below the slide control. The entry box value may be changed by highlighting the numbers and entering the change or by using the up/down buttons to the left of the entry box. Values can be entered from 0 dB to 31.5 dB in 0.5 dB steps.
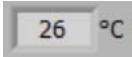
IF ATTEN 2 (dB)   This slide control (along with an entry box) is used to select the level of IF attenuation and may be changed by pointing to the slide control and dragging it up or down to select different levels of IF attenuation; the corresponding selected value of IF attenuation is displayed in the entry box below the slide control. The entry box value may be changed by highlighting the numbers and entering the change or by using the up/down buttons to the left of the entry box. Values can be entered from 0 dB to 31.5 dB in 0.5 dB steps.

Select INPUT Path   These selection buttons are used to select between AUX IN and RF A IN.

- When AUX IN (100 kHz to 425 MHz) is selected, an externally generated IF signal can be input that bypasses the down conversion process of the PXI-1420; the signal is directed to the IF A OUT connector.

- When RF A IN (2.75 GHz to 26.5 GHz) is selected, the signal, after being down converted, is directed to the IF A OUT connector.

Status The Status LEDs described in Table 2 indicate the status of each of the indicators.

Table 2 Soft Front Panel, Status LEDs

Indicator	Description
+5Volts	+5 V power supply displays green when functioning and is within tolerance.
+12Volts	+12 V power supply displays green when functioning and is within tolerance.
+3Volts	+3 V power supply displays green when functioning and is within tolerance.
-12Volts	-12 V power supply displays green when functioning and is within tolerance.
+4 dBm OVLD	Displays green when an IF overload condition has been detected. Either the RF signal applied at RF A IN has exceeded maximum operating level or the IF attenuation setting is too low.
26 °C	This number indicates the internal real-time ambient temperature of the module in degrees Celsius.

Status Indicator The Status Indicator displays messages related to system configuration. Messages may be errors or warnings.

Cal Data Tab

Figure 15 Cal Data Tab

The Cal Data tab displays data that is stored in the module hardware. This data is loaded at the factory during initialization and calibration.

The upper portion of this tab displays unit information such as model number, serial number, configuration-control number, FPGA part number, EEPROM part number, and last calibration date.

The bottom portion of this tab displays calibration points from the on-board memory of the unit. Although data values can be viewed from this tab, the Soft Front Panel cannot be used to modify or overwrite the data values. These stored data values are normally utilized by the driver in real-time correction applications.

Unit Info:

Each PXI module is identified by three sets of numbers:
the model number, serial number (S/N), and a configuration-control
number (CCN). See "PXI Module Identification" on page 35 for an
example.

Model   displays the model along with any special configuration
identifiers. These model and special configuration identifiers are
assigned by the factory.

Serial Number   displays the serial number that has been assigned
by the factory.

CCN   displays the configuration control number that has been
assigned by the factory.

As Phase Matrix, Inc. continually improves and updates its products,
changes to materials occur. When a part or assembly in a Phase Matrix
instrument is changed to the extent that it is no longer interchangeable
with an earlier part, the configuration control number (CCN) of the
instrument is changed.

FPGA P/N   displays the Phase Matrix part number associated with
the Field Programmable Gate Array (FPGA). This FPGA controls all of
the I/O functions of the PXI module.

EEPROM P/N   displays the Phase Matrix part number associated
with the Electrically Erasable Programmable Read Only Memory
(EEPROM). This EEPROM controls the PXI related configuration such
as the manufacture ID, etc.

Last Cal Date   displays the date that the last calibration was run
and that the calibration file was created.

FPGA Date   Displays the applicable FPGA version date.

PXI-1420 Corrections

The following corrections were made to adjust the level of IF attenuation so that no part of the IF chain is overloaded for the given RF A IN Frequency. The values displayed here for IF ATTEN 1, IF ATTEN 2, and IF Fine Loss can be used to accurately set the system gain to 38 dB for a given RF A IN Frequency. Using this Soft Front Panel, the user can only change the RF A IN Frequency and view calibration data associated with that frequency. This Soft Front Panel cannot be used to change the actual value of IF ATTEN 1, IF ATTEN 2, or IF Fine; it is only used to view the values that should be set in order to obtain a system gain of 38 dB. This value can be set from the Control Tab.

IF ATTEN 1   represents the setting of IF ATTEN 1 for a particular RF A IN frequency. This represents the correction value that needs to be set for IF ATTEN 1 of the unit. This value can be set from the Control Tab.

IF ATTEN 2   represents the setting of IF ATTEN 2 for a particular RF A IN frequency. This represents the correction value that needs to be set for IF ATTEN 2 of the unit. This value can be set from the Control Tab.

IF Fine Loss   represents a residual error that exists after setting IF ATTEN 1 and IF ATTEN 2. This error cannot be corrected in the PXI module due to the 0.5 dB step limitation of IF ATTEN 1 and IF ATTEN 2. This residual error value cannot be set from the Control tab or this Cal Data tab, it can only be mathematically applied externally.

Table 3   AUX IN Port Response

280	290	300	310	MHz
-0.43	-0.44	-0.45	-0.45	dB

The AUX IN Port Response table displays insertion-loss data associated with the AUX IN port. The data values are stored in the PXI-1420's memory during each measurement and are displayed as port response over frequency.

Use the Horizontal Slider Bar to view correction values to the left and right of the values currently being displayed.

Table 4 IF Filter Response

280	290	300	310	MHz
-0.43	-0.44	-0.45	-0.45	dB

The IF Filter Response table displays the correction data associated with the IF output frequency. This data can be used to mathematically improve (flatten) the IF filter response. The IF Filter is centered at 250 MHz and has approximately 350 MHz of BW.

Use the Horizontal Slider Bar to view correction values to the left and right of the values currently being displayed.

Step 5. Confirm Basic Module Operation

Purpose of Confirmation

The purpose of this process is to confirm the basic module operation of the PXI-1420.

Confirmation Requirements

The PXI-1420 is confirmed by measuring the IF center frequency and bandwidth with a 10.25 GHz input frequency. This process confirms that all connectors, switches, cables, and related circuitry used in these signal paths are functional.

Equipment Requirements

Figure 16 shows a block diagram of the equipment setup with the type of equipment (or equivalent performance) required to confirm basic module operation.

Table 5 Equipment Requirements to Confirm Basic Module Operation

Qty	Equipment	Description
1	Agilent 83650A	Signal Generator, 26.5 GHz
1	Agilent 8566B	Spectrum Analyzer
1	NI PXIe-1065	PXI chassis
1	NI PXI-8106	PXI Embedded Controller with Windows 7/XP
1		Display

Equipment Settings

Signal Generator	
CW	10.25 GHz
Modulation	OFF
Level	-40 dBm

Spectrum Analyzer	
Frequency	250 MHz
Span	500 MHz
RBW	1 MHz
VBW	3 MHz
Attenuation	10 dB
Scale	1 dB/Div
Reference	0 dB

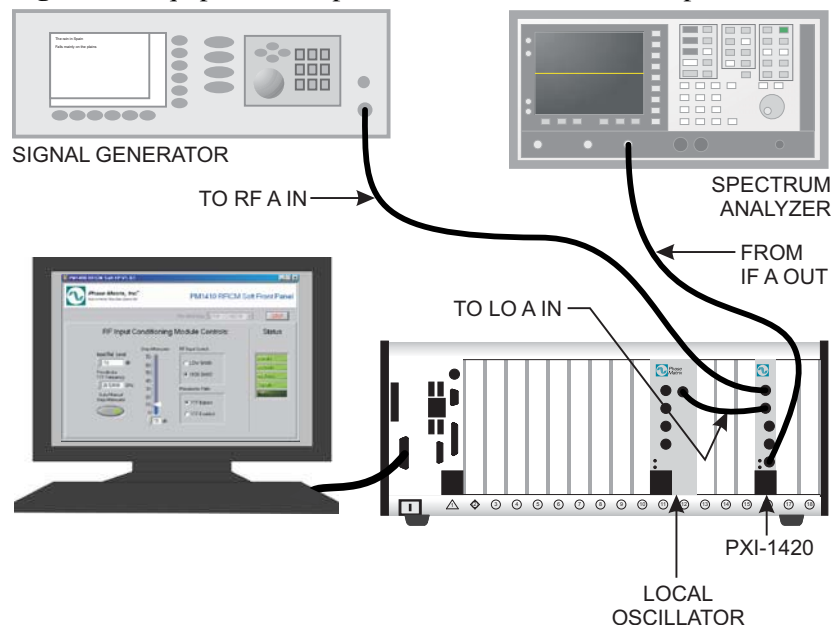| PXI-1450B Local Oscillator Module	
Frequency	3.5 GHz
Modulation	OFF

PXI-1420 MW Downconverter Module
Set IF Gain Control to provide 38 dB of gain. (Refer to the "IF Center Frequency and Bandwidth Check" on page 33.)

Equipment Setup to Confirm Basic Module Operation

Figure 16 Equipment Setup to Confirm Basic Module Operation

IF Center Frequency and Bandwidth Check

1 Connect the equipment as shown in Figure 16.

- Connect the RF Output of the Signal Generator
  to RF A IN of the PXI-1420.

- Connect the LO OUT of the PXI-1450B Local Oscillator Module
  to LO A IN of the PXI-1420 MW Downconverter Module.

- Connect the IF A OUT of the PXI-1420
  to the RF Input of the Spectrum Analyzer.

CAUTION	The maximum power input to the input connector (RF A IN 2.75 GHz to 26.5 GHz) must not exceed +10 dBm!

2 Set the Signal Generator frequency to 10.25 GHz
and the output power to -40 dBm.

3 Set the LO frequency to 3.5 GHz.

4 Using the Soft Front Panel of the PXI-1420:

- Set the Select INPUT Path to RF A IN.

| NOTE | System gain is a combination of the settings for IF ATTEN 1 and IF ATTEN 2. |

Using both attenuators will result in better system performance. For optimum performance, the factory recommends that when adjusting the IF attenuators of the PXI-1420, the adjustment should be made so that no part of the IF chain is overloaded.

To prevent overloading during an adjustment, first adjust IF ATTEN 2 from 0 to 20 dB, and then adjust IF ATTEN 1 until reaching the desired attenuation.

5 Using the Soft Front Panel of the PXI-1420, adjust the system IF Attenuation until the signal from the IF A OUT (as indicated on the Spectrum Analyzer) has reached -2 dBm; this power level is equivalent to +38 dB of gain through the PXI-1420.

6 Set the Spectrum Analyzer to Max Hold.

7 Sweep the Signal Generator RF frequency from 10 GHz to 10.5 GHz, keeping the output level constant.

8 Confirm that the maximum fluctuation, at the IF A OUT connector, between 75-425 MHz is less than or equal to 3 dB.

If a Problem Occurs

If a problem occurs, perform the following checks before returning a PXI module for repair:

1 Check that all system components are powered on:

- PXI mainframe
- PXI-1420 MW Downconverter Module
- PXI-1450B Local Oscillator Module
- Signal Generator
- Spectrum Analyzer

2 Check that all cable connections are properly made. (Refer to the "IF Center Frequency and Bandwidth Check" on page 33.)

3 Check that the STATUS LED is Green. (Refer to page 21.)

4 Check that the ACCESS LED switches each time that a path is selected. (Refer to page 21.)

5 Contact Phase Matrix Customer Support for additional help.

Service Information

Periodic Maintenance

No periodic preventive maintenance is required. There are no hardware adjustments within the PXI-1420.

Phase Matrix recommends that the PXI-1420 is calibrated every 24 months or whenever a problem is suspected. The specific calibration interval depends upon the accuracy required.

PXI Module Identification

Each PXI module is identified by three sets of numbers: the model number (PXI-1450 is shown in this example), a configuration-control number (CCN), and a serial number (S/N).

These numbers are located on a label affixed to the frame on the side of the PXI-1420 (some units may have separate CCN and serial-number labels). The model number, CCN, serial number, and the numbers of any options must be included in any correspondence regarding your PXI module. A typical serial-number label is shown in Figure 17.

Figure 17 Example of a Label Affixed to the Side of the PXI Module

MODEL: PXI-1450 ← Model Number
CCN: 13101 ← Configuration Control Number
S/N: 13101-14106 ← Serial Number
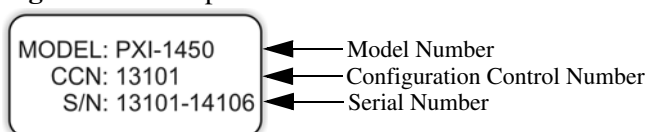
Factory Service

If you are returning a PXI module to Phase Matrix for service or repair, be sure to include the following information with the shipment:

• Name and address of owner.

• Model, complete serial number, and CCN of the PXI module.

• A complete description of the problem. Be sure to provide enough information so that the problem can be verified:

  • Under what conditions did the problem occur?

  • Did the unit work and then fail?

  • What other equipment was connected to the PXI module when the problem occurred?

• The name and telephone number of someone familiar with the problem who can be contacted by Phase Matrix if any further information is required.

• The shipping address to which the PXI module is to be returned. Include any special shipping instructions.

Shipping Instructions

1 Place the PXI module in an antistatic bag or enclosure.

2 Wrap the PXI module in heavy plastic or kraft paper.

3 Repack the PXI module in the original container, if available.

   If the original container cannot be used, pack the PXI module in a heavy (275 pound test) double-walled carton with approximately four inches of packing material between the PXI module and the inner carton.

4 Seal the carton with strong filament tape or strapping.

5 Mark the carton to indicate that it contains a fragile electronic instrument.

6 Ship the PXI module to Phase Matrix at the following address:

Phase Matrix, Inc.
109 Bonaventura Dr.
San Jose, CA 95134
Tel: 1-408-428-1000
www.phasematrix.com