

Getting Started with NI-Motion™ for NI 73xx Motion Controllers

This document provides instructions for installing and getting started with the NI-Motion driver software and National Instruments 73xx motion controllers. Refer to the user manual or technical reference material that came with your computer for specific instructions about the computer.

Refer to the [Documentation](#) section at the end of this guide for a list of the documents included with the NI-Motion driver software and the 73xx motion controller.

Installing NI-Motion

The following items are necessary for getting started with the 73xx motion controller:

- NI-Motion driver software
- Measurement & Automation Explorer (MAX) configuration software
- One of the following software packages and documentation:
 - LabVIEW
 - LabWindows™/CVI™
 - Microsoft Visual C++
 - Microsoft Visual Basic
- NI Motion Assistant (optional)
- A computer with an available PXI or PCI slot
- NI 73xx motion controller

NI-Motion Software Installation

You must install the NI-Motion driver software *before* installing a 73xx motion controller for the first time. If you are upgrading from a previous version of the NI-Motion driver software, it is not necessary to remove the 73xx motion controller before installing the upgrade. The upgrade does not affect the existing Windows configuration.

Complete the following steps to install the NI-Motion driver software:

1. Insert the NI-Motion CD into the CD-ROM drive to display the NI-Motion installation screen.
2. Click **Install NI-Motion**.
3. Follow the installer prompts through the remainder of the installation.
4. Refer to the `NI-Motion ReadMe.htm` file for last-minute information.

73xx Motion Controller Installation

The following sections explain how to install the PXI and PCI controllers.



Note When adding or removing a controller from a Windows 2000/XP system, you must be logged on with administrator-level access. After you have restarted the system, you may need to refresh MAX to view the new controller.

PXI Controllers

1. Power off and unplug the chassis.



Caution To protect yourself and the computer from electrical hazards, the computer must remain unplugged until the installation is complete.

2. Choose an unused peripheral slot and remove the filler panel.
3. Touch a metal part on the chassis to discharge any static electricity that might be on your clothes or body. Static electricity can damage the controller.
4. Insert the PXI controller into the chosen slot. Use the injector/ejector handle to fully secure the device into place.
5. Attach the front panel of the PXI controller to the front panel mounting rails of the chassis with the slot screws on the chassis.
6. Visually verify the installation.
7. Plug in and power on the chassis.

PCI Controllers

1. Power off and unplug the computer.



Caution To protect yourself and the computer from electrical hazards, the computer must remain unplugged until the installation is complete.

2. Open the computer case to expose access to the PCI expansion slots.
3. Choose an unused +3.3 V or +5 V PCI slot, and remove the corresponding expansion slot cover on the back panel of the computer.



Caution Do *not* insert or remove any NI PCI-7390 motion controller from your system without first disconnecting the +24 V power supplies from all PCI-7390 devices. Failure to do so may result in damage to your system and/or PCI-7390.

4. Touch a metal part on the computer case to discharge any static electricity that might be on your clothes or body before handling the controller. Static electricity can damage the controller.
5. Gently rock the controller into the slot. The connection may be tight, but do *not* force the controller into place.
6. If required, attach the mounting bracket of the controller to the back panel rail of the computer.
7. Replace the cover.



Caution Make sure you have correctly connected all safety devices before you power on the motion system. Safety devices include inhibits, limit switches, and emergency shut down circuits.



Caution Always power on the computer containing the 73xx motion controller, then the +24 V external power supply, if applicable, then initialize the controller before you power on the rest of the motion system. Power off in the reverse order.

8. Plug in and power on the computer.

Firmware Updates

Firmware is software that is loaded onto the 73xx motion controller. Firmware allows you to update the 73xx motion controller with new features and updates. The latest firmware is automatically installed on the computer when you install the latest version of NI-Motion. You must download the firmware to the 73xx motion controller.

Complete the following steps to download firmware to a 73xx motion controller:



1. Click the MAX icon on the desktop, or select **Start»Programs»National Instruments»Measurement & Automation** to open MAX.
2. Expand **Devices and Interfaces**, and then expand **NI Motion Devices** in the configuration tree.
3. Select the motion controller for which you want to download firmware. An exclamation point on the 73xx motion controller icon indicates that the firmware is outdated and must be updated.
4. Click the **Firmware** tab at the bottom of the window. An exclamation point appears for each firmware sector that requires an update.
5. Click the **Update Firmware** button at the top of the window to update all the firmware files on your device.



Tip To find NI-Motion updates, visit ni.com/motion and select **Drivers & Downloads**. For support questions, visit ni.com/support/motion.

LabVIEW Real-Time Module Setup

Using 73xx motion controllers with the LabVIEW Real-Time Module and a remote PXI system is very similar to using NI-Motion with a PCI 73xx motion controller in the host machine. The only difference is that you must map the remote PXI system to the local machine before you configure and initialize the motion system. Figure 1 shows a remote 73xx motion controller mapped to the local machine. The IP address in the device name indicates that it is a remote device.

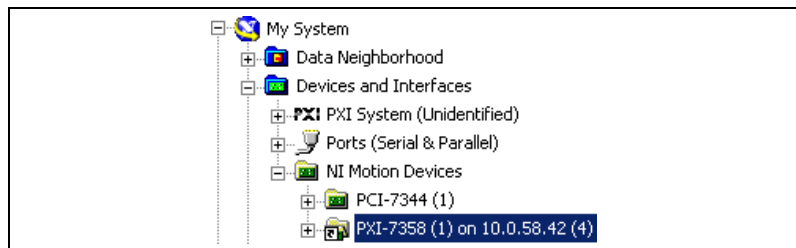


Figure 1. Mapped Remote 73xx Controller

When the 73xx motion controller is initialized, you can create a deterministic, real time motion control application using the LabVIEW Real-Time Module and target the application to the remote device in the PXI system. Refer to the *Remote Systems* topic in the *Measurement & Automation Explorer Help for Motion* for information about mapping the remote system to the local machine.

Configuring Your Motion Control System

Before you configure your motion control system, install your motion hardware, including 73xx motion controller, motors, drives, encoders, UMI (if necessary), limits, and home switches. Refer to the appropriate hardware documentation for installation instructions.



Note You must have a complete hardware setup to configure and test your servo system.



Note National Instruments recommends you connect the 73xx motion controller axis inhibit outputs to the drive. Inhibit outputs are typically used to disable the servo or stepper drive for power saving, safety, or specific application reasons. Refer to the *NI-Motion User Manual* for information about inhibit outputs.

National Instruments recommends you use MAX to configure and test your motion control system. Refer to the *Measurement and Automation Explorer Help for Motion* for step-by-step configuration procedures.

NI Motion Assistant

National Instruments Motion Assistant is a graphical prototyping tool you can use to prototype motion control applications. Motion Assistant contains the following features: simple and complex moves, graphical prototyping, and code creation.

Simple and Complex Moves

Motion Assistant offers several move types that represent the most often used moves in motion control. Supported moves include the following:

- Reference moves include home and index moves.
- Straight-line moves create simple point-to-point movement for basic motion applications.
- Arc moves enable circular, three-dimensional, and helical arc types.
- Contouring moves allow any trajectory specified by a series of coordinates.

Graphical Prototyping

Motion Assistant is a fully graphical interface that makes it easy for you to prototype a motion application by creating a series of moves. The position, velocity, and acceleration of the moves are all graphed and editable in two and three dimensions.

Code Creation

When you are finished creating a prototype of a motion control application, you can use the Motion Assistant code creation feature to export LabVIEW or C/C++ code. You can use the exported code to complete the application in LabVIEW, C, or C++. You also can use Motion Assistant to generate code recipes that you can use to code a motion control application in other text languages, such as Microsoft Visual Basic.

The code generation feature of Motion Assistant also creates placeholders in the generated code or code recipes for non-motion code, such as data or image acquisition, in any location you specify.

Advanced Features

Motion Assistant supports the digital output and position compare output features that are available on 73xx motion controllers. These features are designed to be used with motion control to synchronize or coordinate external processes with moves.

The digital output feature allows you to write to an ancillary digital output line on the 73xx motion controller under the following move conditions:

- Before Move Completes
- After Move Completes
- After Blend Completes

The position compare output feature allows you to write to the position compare output lines on the 73xx motion controller at a specified position in the move. If you are using a 7350 motion controller, you can configure multiple or periodic position compare outputs. Both options add multiple position compare outputs to a single move.

Hardware Support

Motion Assistant 1.3 is compatible with NI-Motion 7.0 and later. To create LabVIEW code from a Motion Assistant prototype, you must have LabVIEW 7.0 or later installed.

Motion Assistant requires that either the actual controller or the virtual representation of a 73xx motion controller be installed in the computer. Refer to the *Motion Assistant Help* for more information.

Using Motion Assistant Without Hardware

If you do not have a 73xx motion controller, you can use a virtual 73xx motion controller in MAX to preview the functionality of Motion Assistant. Follow the instructions in the *Motion Assistant Help* to install a virtual 73xx motion controller.

Documentation

This section summarizes each document included with the 73xx motion controller and the NI-Motion driver software. Use this information to determine which document is most useful for the task you are performing:

- **NI 73xx hardware user manual**—The hardware user manual describes the electrical and mechanical aspects of the 73xx motion controller, and contains information about installing and operating the device.
- **NI-Motion User Manual**—The software user manual is task-based and takes you through each phase of designing and executing a motion application. This document contains information about selecting a motor, designing a basic move, designing a multi-axis move, incorporating vision and DAQ into motion applications, and working with common motion concepts, such as contouring and breakpoints.
- **NI-Motion ReadMe**—This HTML document contains system requirements, installation instructions, descriptions of any changes made to the software, information about new features in the release, and information about late-breaking known issues that are not documented in other NI-Motion documents.
- **NI-Motion Function Help**—This help file for C and Visual Basic environment applications includes dedicated function reference files, and provides details about each function, including a description of the function, a list of the function parameters, illustrations, and error codes.
- **NI-Motion VI Help**—This help file for LabVIEW applications includes dedicated VI reference files, and provides details about each VI, including VI descriptions, lists of control and input terminals, usage, illustrations, and error codes.
- **Measurement & Automation Explorer Help for Motion**—This help file provides information about using MAX to configure the 73xx motion controller as well as some advanced conceptual information about topics such as Bode analysis and control loop parameters.

Where to Go for Support

The National Instruments Web site 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.

National Instruments corporate headquarters is located at 11500 North Mopac Expressway, Austin, Texas, 78759-3504. National Instruments also has offices located around the world to help address your support needs. For telephone support in the United States, create your service request at ni.com/support and follow the calling instructions or dial 512 795 8248. For telephone support outside the United States, contact your local branch office:

Australia 1800 300 800, Austria 43 0 662 45 79 90 0,
Belgium 32 0 2 757 00 20, Brazil 55 11 3262 3599,
Canada 800 433 3488, China 86 21 6555 7838,
Czech Republic 420 224 235 774, Denmark 45 45 76 26 00,
Finland 385 0 9 725 725 11, France 33 0 1 48 14 24 24,
Germany 49 0 89 741 31 30, India 91 80 51190000,
Israel 972 0 3 6393737, Italy 39 02 413091, Japan 81 3 5472 2970,
Korea 82 02 3451 3400, Lebanon 961 0 1 33 28 28,
Malaysia 1800 887710, Mexico 01 800 010 0793,
Netherlands 31 0 348 433 466, New Zealand 0800 553 322,
Norway 47 0 66 90 76 60, Poland 48 22 3390150,
Portugal 351 210 311 210, Russia 7 095 783 68 51,
Singapore 1800 226 5886, Slovenia 386 3 425 4200,
South Africa 27 0 11 805 8197, Spain 34 91 640 0085,
Sweden 46 0 8 587 895 00, Switzerland 41 56 200 51 51,
Taiwan 886 02 2377 2222, Thailand 662 278 6777,
United Kingdom 44 0 1635 523545

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