# 4-Axis Position (Pulse) Command Motion Controller

## NI PCI-7390

- 4-axis motion controller with direct connectivity to Yaskawa Sigma II, Mitsubishi MR-J2S, and Panasonic Minas A drives
- Built-in optical isolation for protection against ground loops, spikes, and surges
- 8 DI, 8 DO general-purpose isolated 24 V digital lines
- Programmable velocity and acceleration parameters for trapezoidal and S-curve velocity profiles
- Position capture triggers and position compare breakpoints for I/O synchronization
- Easy application development with LabVIEW, NI Motion Assistant, C, and Visual Basic

**Operating Systems**

- Windows 2000/XP
- LabVIEW Real-Time ETS

**Recommended Software**

- LabVIEW
- LabWindows/CVI
- NI Motion Assistant

**Driver Software (included)**

- NI-Motion 7.2

## Overview

The National Instruments PCI-7390 is a position (pulse) command stepper motion controller with isolation designed for use with drives that accept position (p-) command mode or step (pulse) command input. The NI PCI-7390 has accessories specifically designed for direct connectivity to Yaskawa Sigma II, Mitsubishi MR-J2S, and Panasonic Minas A drives. The PCI-7390 provides fully programmable motion control for up to four independent or coordinated axes of motion. It features dedicated motion I/O for limit and home switches and additional I/O for general-purpose functions such as in-position, inhibit input/drive alarm, and servo ready. You can use the PCI-7390 controller for point-to-point and straight-line vector moves. The PCI-7390 also performs arbitrary and complex motion trajectories through circular, spherical, or helical interpolation. The PCI-7390 uses quadrature encoders for position and velocity feedback (closed-loop only) and provides advanced encoder functions such as trigger (position capture) and breakpoint (position compare).

## Software

The PCI-7390 is shipped with the NI-Motion driver, which includes a VI library for National Instruments LabVIEW software and functions for NI LabWindows/CVI, C, and Visual Basic. For other languages, you can execute all setup and motion control functions by calling into a dynamic link library (DLL). The NI-Motion VI library implements the full API, along with a useful set of example programs. The NI-Motion software also includes a series of example programs for use with ANSI C-based LabWindows/CVI. NI Motion Assistant offers a point-and-click interface for creating motion control sequences quickly and easily. When you have created a motion task, you can use NI Motion Assistant to generate the task in LabVIEW or C code or code recipes to speed up development.

## Hardware

The PCI-7390 is a high-performance controller that uses an advanced dual-processor architecture including a 32-bit CPU combined with a digital signal processor (DSP) and a custom field-programmable gate array (FPGA). The PCI-7390 uses the DSP for all closed-loop control and motion trajectory generation. The DSP chip is complemented by a custom FPGA that performs the high-speed encoder interfacing, trigger (position capture) and breakpoint (position compare) functions, motion I/O processing, and pulse generation for hard real-time functionality. The embedded CPU runs a multitasking, real-time OS and handles host communications, command processing, multiaxis interpolation, error handling, general-purpose digital I/O, and overall motion system integration functions.

The PCI-7390 also offers high-performance encoder features such as position capture triggers and position compare breakpoints for high-speed synchronization of motion with actuators, sensors, and other parts of the complete motion system. You can program a position compare breakpoint output to transition when the associated encoder value equals the breakpoint position. You can use a breakpoint output to directly control actuators or as a trigger to synchronize data acquisition or other functions in the motion control system.

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## 4-Axis Position (Pulse) Command Motion Controller

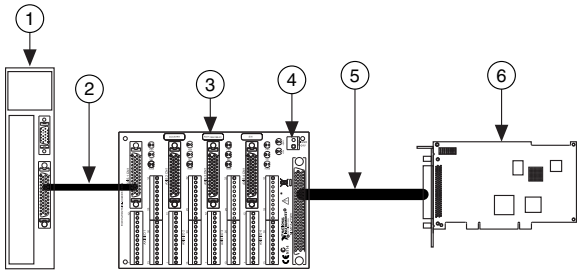
The 100-pin SCSI I/O connector provides all the signals for four axes of closed-loop motion control, including encoder feedback, limit and home inputs, breakpoint (position compare) outputs, trigger (position capture) input, inhibit (alarm) inputs, and in-position inputs. The connector also can provide shutdown (emergency stop) input, drive (servo) ready inputs, inhibit (drive enable) outputs, alarm clear outputs, and general-purpose inputs and outputs. All inputs and outputs are optically isolated.

The PCI-7390 incorporates the National Instruments RTSI bus, which provides high-speed connectivity among National Instruments products, including image acquisition and data acquisition products. Using the RTSI bus, you can easily synchronize several functions to a common trigger or timing event across multiple motion, image, or data acquisition devices.

| | | | |
|---|---|---|---|
| Isolated +5V OUT | 50 | 100 | Isolated +5V OUT |
| Isolated Ground | 49 | 99 | Isolated Ground |
| +24V IN | 48 | 98 | Axis 2 General-Purpose Output 0 |
| General-Purpose Output Supply | 47 | 97 | Axis 3 General-Purpose Output 0 |
| Axis 1 General-Purpose Output 0 | 46 | 96 | Axis 4 General-Purpose Output 0 |
| Axis 1 General-Purpose Output 1/Axis 1 Inhibit-Out* | 45 | 95 | Axis 3 General-Purpose Output 1/Axis 3 Inhibit-Out* |
| Axis 1 Encoder Phase A + | 44 | 94 | Axis 3 Encoder Phase A + |
| Axis 1 Encoder Phase A - | 43 | 93 | Axis 3 Encoder Phase A - |
| Axis 1 Encoder Phase B + | 42 | 92 | Axis 3 Encoder Phase B + |
| Axis 1 Encoder Phase B - | 41 | 91 | Axis 3 Encoder Phase B - |
| Axis 1 Index (Encoder Phase Z) + | 40 | 90 | Axis 3 Index (Encoder Phase Z) + |
| Axis 1 Index (Encoder Phase Z) - | 39 | 89 | Axis 3 Index (Encoder Phase Z) - |
| Isolated Ground | 38 | 88 | Isolated Ground |
| Axis 1 Step (CW) + | 37 | 87 | Axis 3 Step (CW) + |
| Axis 1 Step (CW) - | 36 | 86 | Axis 3 Step (CW) - |
| Axis 1 Dir (CCW) + | 35 | 85 | Axis 3 Dir (CCW) + |
| Axis 1 Dir (CCW) - | 34 | 84 | Axis 3 Dir (CCW) - |
| Axis 1 Breakpoint (Position Compare) | 33 | 83 | Axis 3 Breakpoint (Position Compare) |
| Axis 1 VI_COM | 32 | 82 | Axis 3 VI_COM |
| Axis 1 Trigger (Position Capture) | 31 | 81 | Axis 3 Trigger (Position Capture) |
| Axis 1 Forward Limit Switch | 30 | 80 | Axis 3 Forward Limit Switch |
| Axis 1 Reverse Limit Switch | 29 | 79 | Axis 3 Reverse Limit Switch |
| Axis 1 Home Switch | 28 | 78 | Axis 3 Home Switch |
| Axis 1 Inhibit-In (Alarm) | 27 | 77 | Axis 3 Inhibit-In (Alarm) |
| Axis 1 In-Position | 26 | 76 | Axis 3 In-Position |
| Axis 1 General-Purpose Input 0 | 25 | 75 | Axis 3 General-Purpose Input 0 |
| Axis 1 General-Purpose Input 1*/Axis 4 Drive (Servo) Ready | 24 | 74 | Axis 3 General-Purpose Input 1*/Axis 4 Drive (Servo) Ready |
| Isolated Ground | 23 | 73 | Isolated Ground |
| Axis 2 General-Purpose Output 1/Axis 2 Inhibit-Out* | 22 | 72 | Axis 4 General-Purpose Output 1/Axis 4 Inhibit-Out* |
| Axis 2 Encoder Phase A + | 21 | 71 | Axis 4 Encoder Phase A + |
| Axis 2 Encoder Phase A - | 20 | 70 | Axis 4 Encoder Phase A - |
| Axis 2 Encoder Phase B + | 19 | 69 | Axis 4 Encoder Phase B + |
| Axis 2 Encoder Phase B - | 18 | 68 | Axis 4 Encoder Phase B - |
| Axis 2 Index (Encoder Phase Z) + | 17 | 67 | Axis 4 Index (Encoder Phase Z) + |
| Axis 2 Index (Encoder Phase Z) - | 16 | 66 | Axis 4 Index (Encoder Phase Z) - |
| Isolated Ground | 15 | 65 | Isolated Ground |
| Axis 2 Step (CW) + | 14 | 64 | Axis 4 Step (CW) + |
| Axis 2 Step (CW) - | 13 | 63 | Axis 4 Step (CW) - |
| Axis 2 Dir (CCW) + | 12 | 62 | Axis 4 Dir (CCW) + |
| Axis 2 Dir (CCW) - | 11 | 61 | Axis 4 Dir (CCW) - |
| Axis 2 Breakpoint (Position Compare) | 10 | 60 | Axis 4 Breakpoint (Position Compare) |
| Axis 2 VI_COM | 9 | 59 | Axis 4 VI_COM |
| Axis 2 Trigger (Position Capture) | 8 | 58 | Axis 4 Trigger (Position Capture) |
| Axis 2 Forward Limit Switch | 7 | 57 | Axis 4 Forward Limit Switch |
| Axis 2 Reverse Limit Switch | 6 | 56 | Axis 4 Reverse Limit Switch |
| Axis 2 Home Switch | 5 | 55 | Axis 4 Home Switch |
| Axis 2 Inhibit-In (Alarm) | 4 | 54 | Axis 4 Inhibit-In (Alarm) |
| Axis 2 In-Position | 3 | 53 | Axis 4 In-Position |
| Axis 2 General-Purpose Input 0 | 2 | 52 | Axis 4 General-Purpose Input 0 |
| Axis 2 General-Purpose Input1*/Axis 4 Drive (Servo) Ready | 1 | 51 | Axis 4 General-Purpose Input 1*/Axis 4 Drive (Servo) Ready |

## Direct Connectivity to Yaskawa Sigma II Drives

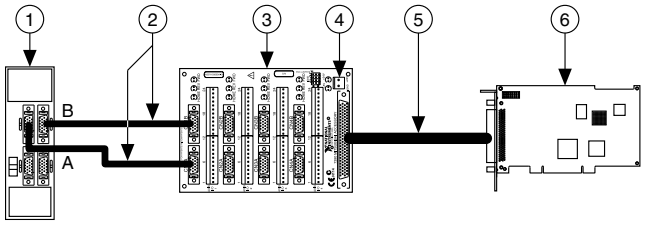
The NI MCA-7790Y accessory connects the PCI-7390 and Yaskawa Sigma II drives. To connect a Yaskawa drive to the PCI-7390, connect a 50-pin cable from the drive to the MCA-7790Y, an SCSI 100-pin cable (included) from the MCA-7790Y to the PCI-7390, and a 24 V power supply to the MCA-7790Y.




1. Yaskawa Sigma II Series Drive
2. 50-Pin Cable
3. NI MCA-7790Y
4. Power Supply Connection
5. SCSI 100-Pin Cable
6. NI PCI-7390

## Direct Connectivity to Mitsubishi J2S Series Drives

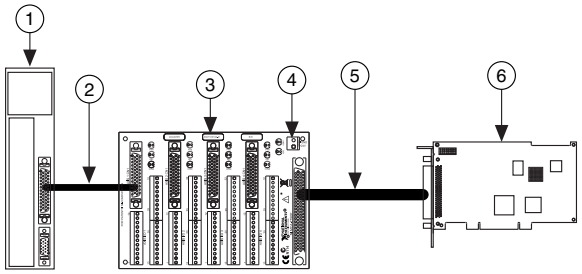
The NI MCA-7790M accessory connects the PCI-7390 and Mitsubishi MR-J2S drives. To connect a Mitsubishi drive to the PCI-7390, connect two 20-pin cables from the drive to the MCA-7790M, an SCSI 100-pin cable (included) from the MCA-7790M to the PCI-7390, and a 24 V power supply to the MCA-7790M.




1. Mitsubishi MR-J2S Series Drive
2. 20-Pin Cables
3. NI MCA-7790M
4. Power Supply Connection
5. SCSI 100-Pin Cable
6. NI PCI-7390

## Direct Connectivity to Panasonic Minas A Drives

The NI MCA-7790P accessory connects the PCI-7390 and Panasonic Minas A drives. To connect a Panasonic drive to the PCI-7390, connect a 50-pin cable from the drive to the MCA-7790P, an SCSI 100-pin cable (included) from the MCA-7790P to the PCI-7390, and a 24 V power supply to the MCA-7790P.




1. Panasonic Minas A Series Drive
2. 50-Pin Cable
3. NI MCA-7790P
4. Power Supply Connection
5. SCSI 100-Pin Cable
6. NI PCI-7390

## Connectivity to Other Drives with Position (Pulse) Command Input

You can use the CB-100 kit to connect the PCI-7390 motion controller to other drives that accept a position (pulse) command input. Connect the PCI-7390 to the two CB-50 connector blocks with an R1005050 cable (terminal blocks and cable included in the CB-100 kit). Wire the drive to the screw terminals on the CB-50 connector blocks.

### Ordering Information

| | |
|---|---|
| NI PCI-7390 | 779034-01 |
| **Accessories** | |
| MCA-7790Y kit (for Yaskawa drives) | 779611-01 |
| MCA-7790M kit (for Mitsubishi drives) | 779612-01 |
| MCA-7790P kit (for Panasonic drives) | 779613-01 |
| CB-100 kit (for other drives) | 777812-01 |
| NI Motion Assistant | 778553-01 |
| 20-pin cable | 194604-02 |
| 50-pin cable | 194466-02 |

***BUY NOW!***

For complete product specifications, pricing, and accessory information, call (800) 813 3693 (U.S.) or go to **ni.com/motion**.

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