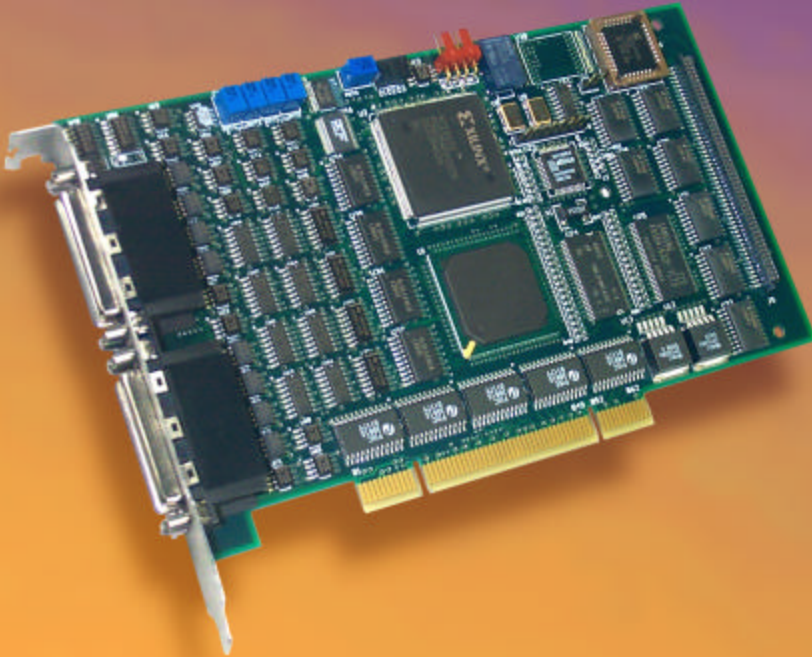# MultiFlex PCI 1040 Motion Controller

## An Introduction to the MultiFlex PCI 1040 Motion Control Card...

The MultiFlex PCI 1040 is a 4 axis stepper and servo motion control card designed to offer OEM machine builders unprecedented power and flexibility in an exceptionally compact, cost-effective package. Comprehensive features include:

- 4 axes of pulse control (stepper or pulsed servo) in an economical half-length PCI card
- Available with 4 optional encoders - providing up to 4 axes of closed-loop control
- Multi-axis point-to-point & coordinated motion
- Trapezoidal, S-curve and parabolic profiles
- 5 MHz pulse outputs for precise micro-stepping
- 20 million encoder counts/sec
- Open and closed-loop stepper control
- 1 KHz closed-loop update rate each axis
- On-the-fly trajectory changes
- Eight 14-bit analog inputs (option)
- On-board multi-tasking and programmable interrupts free host PC for other tasks
- Consistent real-time behavior: Peak performance is maintained no matter which features are enabled
- Dedicated high-speed I/O (encoder capture & compare)
- I/O signals conveniently available via high-density SCSI connectors on end bracket
- All I/O signals are differential or complementary twisted-pairs for superior noise immunity
- Includes Motion Integrator™ suite of graphical installation, tuning and diagnostic programs
- 32 and 64-bit Windows and Linux drivers

- *A high-performance 1-4 axis stepper and pulse-controlled servo motion controller*

- *Advanced RISC processor for robust real-time motion and I/O control*

- *Extensive on-board digital and analog I/O*

- *Small footprint: PCI short-card*

- *Comprehensive support for C/C++/C#, Delphi LabVIEW and Visual Basic programmers*

- *Powerful suite of software utilities and sample programs included*

- *High-perfornance, value priced*

**PMC**
Precision MicroControl Corp.
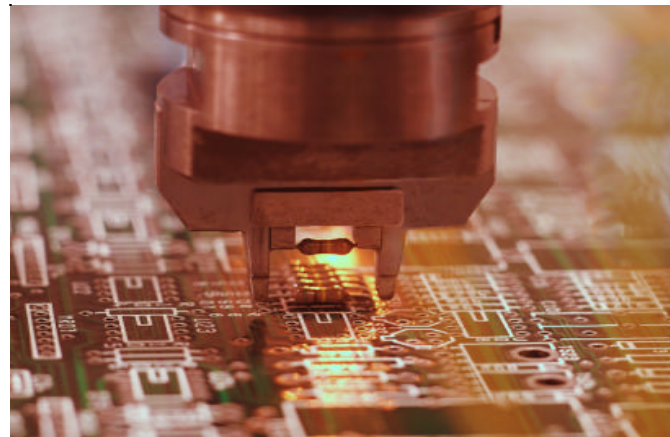
# *MultiFlex PCI 1040 Specifications*

## Form-factor

- Single slot, PCI-bus Short-Card
- PCI Universal Card (3.3 & 5V)

## Communication

- High speed binary communication via dual-ported RAM
- Configurable for PCI-bus interrupt or polling communication

## Programming

- Programmable with C/C++, Visual Basic, Delphi or LabVIEW
- Native LabVIEW/BridgeVIEW support via the Motion VI Library
- Supports Windows 98/2000/XP® Plug&Play & Windows NT®
- Includes Motion Integrator™ graphical and intuitive Windows® software suite for easy installation, tuning and diagnostics
- For Real-Time OS support, contact PMC
- Also programmable in easy-to-use motion command language
- Programmable PC interrupts
- Programmable in user units (mm, microns, ft./sec...etc.)

## Motion Capabilities

- 1-4 axes of pulse control
- Stepper or pulse-controlled servo systems
- 4 axes of optional closed-loop control with auxiliary encoder
- Point-to-point positioning
- Multi-axis synchronized & coordinated motion
- Trapezoidal, parabolic and S-curve velocity profiles
- Independent acceleration & deceleration
- Linear & circular interpolation
- High-resolution electronic gearing
- Position & velocity control modes
- Backlash compensation
- Motion trajectory & PID parameters can be changed on-the-fly
- High-speed  position capture inputs and encoder compare

## Memory

- 16  Mbytes Dynamic RAM
- 512 Kbytes Flash ROM

## Kinematic Ranges

- Position: 64 bit floating point
- Velocity and acceleration: 64 bit floating point

## Servo Control Signals

- 4 axes of pulse & direction signals for pulse-controlled servo drives: 5MHz maximum pulse rate each axis

## Servo Filter

- Proportional/Integral/Derivative with acceleration, deceleration & velocity feed forward (PID-FF)
- 1 KHz servo loop rate each axis

## Stepper Control Signals

- 4 axes of pulse/direction or CW/CCW stepper control
- 5 MHz maximum step (pulse) rate each axis (up to 4 axes)
- Full step, half-step and microstepping control. Full & half current
- Open or closed-loop stepper control

## Position Feedback

- Optional: 4 quadrature incremental encoders with index
- 20 MHz encoder count rate for each axis (up to 4 axes)
- Single-ended or differential inputs (A+, A-, B+, B-, I+, I-)
- Digital noise filtering
- 32-bit position resolution
- Hardware encoder failure detection

## I/O Signals

- 16 uncommitted bi-directional opto-isolated inputs with individually configurable supply & return: 5 to 24 Volts. (For home, ± limits, amp fault, etc.)
- 12 uncommitted high-current outputs (sinking up to 100 mA): 5 to 24 Volts. (For drive enable/disable, full/half current, step/microstep, etc.)
- 32 digital TTL I/O channels, 16 inputs and 16 outputs
- All TTL outputs can sink 24 mA and source 15 mA
- 8 channels of 14-bit analog inputs (optional)
- 4 high-speed position capture (latch) inputs and 2 high-speed encoder compare (breakpoint) outputs (less than 1 uSec latency)
- E-Stop configurable to any digital input

## Other Features

- Consistent, predictable execution: Specified performance is maintained no matter which features are enabled
- All features are software-configurable: no jumpers required
- Windows Flash Wizard for quick, power-on firmware updates
- On-board watchdog timer for failsafe operation
- All software is supplied at no extra charge
- Custom features and performance enhancements available upon request - firmware source code is available to qualified OEM's

## Connections

- All I/O signals on industry-standard 68 pin high-density VHDCI (SCSI) connectors on PCI end-bracket
- Low cost, industry-standard, shielded 68-conductor SCSI cables, available from PMC or from 3rd party cable suppliers
- All I/O signals routed as matched twisted pairs for superior noise immunity
- Low-cost screw-terminal wiring interconnection boards available

## Environmental & Mechanical

- Operating temperature: 0-55 ºC (32-131 ºF) R.H. non-condensing
- Size: 176mm x 107mm (6.875" x 4.2")  per PCI 2.2 specification