MAXnet
Ethernet / RS232
5½Axis Motion Controller and I/O

The MAXnet is a 5½-axis motion controller for automated equipment, robotics and applications requiring accuracy, precision and flexibility. The Ethernet interface utilizes standard TCP/IP protocol for compatibility and can virtually be controlled and/or monitored from almost anywhere. A high-speed RS232 serial interface is included at baud rates of 9600 to 115.2K. In addition to the limits, home and motion control signals the MAXnet includes 8-bidirectional I/O, 5-digital axis outputs, 2-analog inputs and 1-analog output (the ½ axis). Oregon Micro Systems motion controllers have a 20+ year reputation of reliability and performance and the MAXnet is no exception.

On-board Flash memory can store macro programs for stand-alone applications. The MAXnet firmware can be upgraded through the Ethernet or serial communication interfaces allowing the controller to be embedded in systems without the need for removal.

A key feature of the MAXnet is the expansion interface for daughter boards that provide unmatched flexibility and help minimize the need for third party controls. This interface utilizes the Port-X interface on the on-board PowerPC to control these specialized add-on solutions that are tightly coupled to the motion. Requirements that fall between a custom daughter board and the need for additional features, OMS can customize the controller to provide a competitive advantage that could not otherwise be realized.

Speed to market with an optimum product is what the MAXnet offers. No one can integrate our controllers faster and with a higher degree of performance than we can, which results in getting our customers to market faster with a better overall product.
Specifications

Velocity
0 to 4,176,000 pulses per second

Acceleration
0 to 8,000,000 pulses per second

Position Range
4,294,967,295 pulses (±2,147,483,647)

Accuracy
Position accuracy ± 0 counts for
Point to point moves
Velocity accuracy ± 0.01% of peak
Velocity in jog mode

Environmental
Operating temperature range: 0 to 50 °C
Storage temperature range: -20 to 85 °C
Humidity: 0 to 90% non-condensing

Power
+5VDC +/-5% at 1.4 Amp typical
+12VDC at 0.1 Amp typical = +/-5%
-12VDC at 0.1 Amp typical = +/-

Dimensions
6.5" x 4" x 0.75"

Encoder Feedback
Maximum 16 MHz after 4x quadrature detection Differential signal

Connection
100-PIN SCSI type connector for all control signals, shielded

Limit switch inputs
TTL Input levels, Input sense (low or high true) selectable by command input for each axis. (12 mA typical)

Home switch inputs
Input levels 3-30 VDC Input sense (low or high true) selectable by command input for each axis. Accuracy to 1 encoder count.

User definable I/O
8 bits of user definable digital I/O. The 8 bits are user configurable and are configured as 4 inputs and 4 outputs as defaults from the factory

Analog IO
+/−10V and 0 to +10V, max. 16-bit resolution
One per servo axis plus one general purpose output; Two general purpose inputs

Step pulse output
Pulse width 50% duty cycle. TTL level signal output at 12mA typical

Direction output
TTL level signal output at 12mA typical

Ethernet
TCP/IP, Standard RJ45 connector

RS232
Baud rate: 9600-115.2K
Standard 9-pin D-Sub Connector

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DESCRIPTION
The new MAXp 1 to 8 axes motion controller is compatible with current 5.0V PCI configurations and the 3.3V/5V Universal PCI bus. MAXp is built on a PowerPC 32-bit RISC processor running at 266 MHz. The use of this processor delivers exceptional servo control, capabilities, quality, and application performance on multi-axis requirements. All signals, data points, and the PID loop update every 122 µs on all 8 axes. The MAXp also features 64k of Shared Memory permitting near real-time data transfer between the application program and the controller. Each axis of the MAXp controller can be configured as a servo, open loop stepper, or a closed loop stepper.

The advantages for you are: application performance, future expandability, and robust design; all carried out in an ISO 9001-2000 certified facility. The MAXp was developed with a surplus of capability, allowing MAXp to be customized to your individual request. Because most applications have unique requirements the MAXp is the optimal choice to bring about creativity to motion. Applications requiring multi-axis motion control, including virtually any robot or automated machine, should use the MAXp controller.

PROGRAMMING
MAXp motion controllers are easily programmed with ASCII character commands through an extensive command structure. These commands are combined into character strings to create sophisticated motion profiles with features of I/O and other functionality. A separate FIFO command queue for each axis is used to store the commands once they are parsed by the MAXp. The commands are executed sequentially, allowing the host to send a complex command sequence and attend to other tasks while the MAXp manages the motion process. These command queues store 2560 command values and include a command loop counter which allows multiple executions of any command string. All commands are sent to the controller as two or three character ASCII strings. Some of these commands expect one or more numerical operands to follow. These commands are identified with a '#' after the command. The '#' indicates a signed integer input parameter or a signed fixed point number of the format ##.# when user units are enabled. User Units define, distances, velocity and acceleration parameters and may be inputted in inches, millimeters, revolutions, etc. Synchronized moves may be made by entering the AA or AM command mode. This form of the command performs a context switch that allows entering commands of the format: MRx#,y#,z#,t#; u#, v#, r#, s#;

FEATURES
- PID update rate of 122 µs on all 8 axes
- 266-MHz, 32-bit RISC processor
- 64k Shared Memory
- PCI Universal Bus – 3.3V or 5V
- 8 Mb system memory
- 4 channels of general purpose Analog Input, with 16 bit, +/-10 VDC input
- Support Quadrature Encoder feedback up to 8 MHz.
- Backlash compensation
- Linear, Parabolic, Cosine, “S” - curve & custom profiles
- Real time encoder position capture
- Firmware upgrades and enhancements
- Circular Interpolation
- Electronic Gearing
DESCRIPTION
The PC46 intelligent motion controller allows control of up to 6 axes in one I/O slot of an ISA/AT Bus or compatible computer. All axes are controlled through 4 I/O ports for control, status feedback, data and commands. Each axis has a separate command queue allowing the host computer to transfer a command string then proceed with other tasks, while the PC46 manages the motion process. The computer can be interrupted at any point in the command stream to coordinate the motion process with other activities. Each axis can perform individual unrelated moves or they can be coordinated as required by the application.

The PC46 generates step and direction pulses for control of most popular step motor drivers. It also supports servo or linear motor drivers which accept step and direction inputs. The PC46 supports high resolution micro stepping of 50,000 steps per revolution with a standard 200 step per revolution (1.8 degree per step) stepping motor by developing the high pulse rates required for these applications. This high resolution allows the stepping motor to run smoothly at all speeds and minimizes low speed torque loss due to mechanical resonance effects. The velocity streaming mode allows an arbitrary move contour under control of the host computer. Constant velocity contouring with circular interpolation on any 2 axes and linear interpolation on up to six axes at constant velocity are available for applications on selected models.

Simple ASCII commands can be easily sent to the board from any high level language, for example Basic, Pascal or C, which allows input and output to an I/O device. An additional 20 bits of general purpose input and output lines can be used to monitor or initiate other events and are under the control of the host computer. Complex move sequences, time delays, status checks and control of other external events can be programmed through the ISA/AT Bus interface.

Incremental encoder feedback is available as an option on up to 2 axes for those applications requiring precise position feedback and/or correction. The encoder option can correct for position errors, monitor for slip or stall, or allow tracking of one motor with another.

PROGRAMMING
PC46 motion controllers are easily programmed with double character ASCII commands through an extensive command structure. These commands are combined into character strings to create sophisticated motion profiles. It includes a 200 command and parameter buffer for each axis and a command loop counter which allows multiple executions of any command string.
MAXv
Intelligent 8-Axis Motion Controller for VME Bus

FEATURES

PID update rate of 122 µs on all 8 axes
- Delivers exceptional servo control on multi-axis applications.
- Identical outcomes when utilizing one or all axes of motion.
- Configurable PID filter with feed forward coefficients.

266 MHz, 32-bit RISC processor
- Updates all signals and data points providing superior application control.

4032 Bytes of Dual Port RAM
- Permits rapid data transfer to & from controller.
- Large size accommodates expandability to unique and custom applications.

VME64 Specification
- The 160-pin P1/P2 connectors provide high density connectivity on the back plane.
- VME and VME64 compliant

Controller capabilities
- 6 Channels of general purpose analog input with 16 bit, +/-10 VDC input
- 2 Channels of general purpose analog output with 16-bit +/-10 VDC output.

Motion Feedback
- Support Quadrature Encoder Feed back up to 16 MHz on up to 10 encoder inputs.

Sophisticated Control Functionality
- 16 bit DAC analog resolution.
- Step pulses from 0 to 4,176,000 steps per second (+/- 0 steps).
- Backlash compensation.
- Custom, parabolic, “S”-Curve & linear trajectory profiles.
- Real time encoder position capture.
- S-Curve with 4-quadrant jerk parameters.

Control signals
- Two 68-pin SCSI3 and one 50-pin SCSI2 connectors for high density signal connection on the front panel.
- 16 “user definable” digital I/O.
- P2 connector is 160-pins and supports most of the signals available on the front panel.

ADDITIONAL FEATURES
- Consumes a single VME (6U) slot
- Interface port VME P1 and P2 supports both 96 Pin and 160 pin connectors.
- Supports A16, A24 and A32 Addressing modes.
- Non-Volatile Macro Storage
- VME64bus specification ISO/IEC 15776:2001(E).
- Motion parameters continuously available in shared RAM for real time profile status.
- Electronic “mailbox” in shared RAM for priority commands, i.e. abort
- Patented technology to minimize torque ripple and velocity modulation
- Internal Watchdog timer for safety
- Slip & Stall detection with encoder feedback
- Circular interpolation
- Constant velocity linear interpolation (all axes)
- Axis control signals are also on P1 & P2 connector.
- Output is +/-10V, or Step & Direction per Axis
- Independent home and plus / minus over-travel inputs for each axis
- Commands are intuitive for programming ease.
- Over 150 ASCII character commands, “universal” to current and previous OMS controllers
- Capable of conversion to “user” defined units i.e. inches/ revolutions if desired.
- Person to person toll-free tech support: 800-707-8111

Tel: (503)629-8081 or (800)707-8111
Fax: (503)629-0688 or (877)629-0688
WEB SITE: www.pro-dex.com

Pro-Dex, Inc. Beaverton, Oregon
PC78
Intelligent Motion Controller for PC/104 or RS-232

FEATURES

Controller capabilities
- Four axes of stepper control with encoder feedback or servo
- Encoder feedback to 12MHz

Communications
- PC/104 bus
- Stand-alone with RS-232 port
- Interrupt or polling communication
- 4 I/O registers for control & status

Sophisticated Control Functionality
- 16 bit DAC analog resolution
- Independent and coordinated motion of all axes at the same time
- Slip & Stall detection with encoder feedback
- Crystal controlled step pulse from 0 to 1,044,000 steps per second
- Circular interpolation
- Constant velocity linear interpolation (all axes)
- Electronic gearing

32 bit Processor for Extensive Co-Processing
- Does not burden the host with overhead
- Custom, parabolic, cosine, linear trajectory profiles
- Patented technology to minimize torque ripple and velocity modulation
- Internal watchdog timer for safety

Control signals
- Single high density shielded SCSI3 connector
- Up to 12 user I/O
- Motion Control Output is +/-10V or 0-10V Servo or Step & Direction
- Dedicated home and plus / minus over-travel inputs for each axis

OMS - EZ™ Software programming
- High level programming expertise not required
- Over 150 commands, “universal” to all Pro-Dex, Inc. controllers
- Commands are ASCII characters
- Capable of conversion to “user” defined units i.e. inches / revolutions
- Software for WIN95/98, NT, 200 and XP.
- Software supplied at no additional cost

Flash Memory
- Field upgradeable firmware within Windows operating systems
- Non-volatile program storage and parameter storage

Flexible and Expandable
- Conforms 100% to all PC/104 specifications
- Customizable solutions available for your requirements

Factory Direct Technical Support
- Person to person toll-free tech support: call 800-707-8111
- Application notes and Documentation on the Web
- Example programs and application code provided
- All Pro-Dex, Inc. controls are 100% tested and quality inspected

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