UMX
USB Multi-Axis Motion Controller

FEATURES

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

Communications
- USB 2.0
- Plug and Play
- Stand-alone

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

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

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

Software and Firmware
- High level programming expertise not required
- Over 150 commands, "universal" to all OMS controllers
- Commands are ASCII characters
- Capable of conversion to "user" defined units i.e. inches / revolutions
- Software for Windows$^©$ 95/98, NT, 2000, XP and Vista.
- Software supplied at no additional cost

Flexible and Expandable
- Small form factor, 3.55" x 3.3"
- 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, OMS controls are 100% tested and quality inspected

Tel: (503)629-8081or (800)707-8111   Fax: (503)629-0688   www.Pro-DexOMS.com

PRO-DEX, OREGON MICRO SYSTEMS   Beaverton, Oregon

DESCRIPTION

The UMX controller is compatible with the PC78 and PCIx controller families with 2-4 axes control. The UMX supports up to 12 general purpose TTL I/O bits, 8 of which are user definable.

The step pulse is a TTL level 50% duty cycle square wave that supports velocities of 0 through 1,044,000 pulses per second. The encoder feedback functionality supports quadrature encoders up to 12 MHz at a 4 times the encoder line resolution and is used as closed-loop feedback for the stepper axes or as independent position feedback. The encoder feedback can provide slip and/or stall detection. Each axis includes dedicated +/- overtravel inputs, a home input, and an auxiliary output.

PROGRAMMING

UMX motion controllers are easily programmed with 2 and 3 character ASCII commands through an extensive command structure. The commands are combined into character strings to create sophisticated motion profiles and are passed to the UMX controller. A separate 'FIFO' command queue for each axis is used to store the parsed commands by the UMX until they are executed allowing the host to send a complex command sequence and attend to other tasks while the UMX manages the motion process. These command queues store 200 command and parameter words and include a command loop counter which allows multiple executions of any command string.

The following commands are available in the UMX family of motion controllers. Some 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. With user units defined, distances, velocity and acceleration parameters may be input in inches, revolutions, etc.*

Synchronized moves may be made by entering the AA or AM command. This command performs a context switch which allows entering commands of the format MRx#,y#,z#,t#;. Numbers are entered for each axis which is to be commanded to move. An axis may be skipped by entering the comma with no parameter. The command may be prematurely terminated with a ";", i.e. a move requiring only the X and Y axes would use the command MRx#,y#; followed by the GO command. Each axis programmed to move will start together upon executing the GO command. The UMX can be switched back to the unsynchronized mode by entering the desired axis command such as AX.

PROGRAMMING EXAMPLES

In a typical move requirement where it is desired to home the stage then move to a specified position, the following will demonstrate the programming:
Initialize the velocity and acceleration parameters to a low value suitable for homing. Set a PID filter proportional gain of 2 and a derivative gain of 6. Perform the home operation initializing the position counter to zero.
Initialize the velocity and acceleration parameters to perform a faster motion and move to an absolute position of 10,000 counts from home in the positive direction and set the done flag when finished.
The following would be input from the host computer:

        AX;
        VL1000;
        AC10000;
        KP2;
        KD6;
        HN;
        HM0;
        VL5000;
        AC50000;
        MA10000;
        GO;
        ID;

In a move requiring a three axis coordinated move to a position in free space the following could be used:

        AX;
        KP2;
        KD6;
        HN;
        AY;
        KP2;
        KD6;
        HN;
        AZ;
        KP2;
        KD6;
        HN;
        AM;
        VL5000,5000,5000;
        AC50000,50000,50000;
        MT1000,2000,3000;
        GO;
        ID;

The controller would calculate the relative velocities required to perform a straight line move from the current position to the desired position.

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* The user manual has all commands listed and should be used to program the Motion Controller.

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SPECIFICATIONS

Velocity

0 to 1,044,000 counts per second simultaneous on each axis

Acceleration

0 to 8,000,000 counts per second per second

Position range

67,000,000 counts (±33,500,000)

Accuracy

Position accuracy and repeatability ±0 counts for point to point moves

Velocity accuracy ±0.01% for step pulse output

Environmental

Operating temperature range: 0 to 50 ºC

Storage temperature range: -20 to 85 ºC

Humidity: 0 to 90% non-condensing

Power

+5VDC @ 1 A typical

+/-12VDC @ 0.2 A typical

Dimensions

3.25 x 3.55 x 0.5 inches

Communication

USB 2.0: software drivers included

Limit switch inputs

TTL input levels with on board 2.2K pull up resistor, requires only external switch closure to ground or TTL level input signal. Input sense (low or high true) selectable by command input for each axis.

Home switch inputs

TTL input levels with on board 2.2K pull up resistor, requires only external switch closure to ground or TTL level input signal. Input sense (low or high true) selectable by command input for each axis.

User definable I/O

12 bits of user definable I/O. 8 bits are user configurable as inputs or outputs. One auxiliary output per axis and are fixed as outputs. Factory default is 4 inputs, 4 outputs and 1 auxiliary per axis.

TTL input levels with on board 2.2K pull up resistor, requires only external switch closure to ground or TTL level input signal.

The auxiliary outputs are TTL open collector outputs (7406, max 48mA). The other outputs are TTL totem pole outputs (74LS243, max 24mA).

Step pulse output

Pulse width 50% duty cycle. Open collector TTL level signal (7406, max 48mA).

Direction output

Open collector TTL level signal (7406, max 48mA).
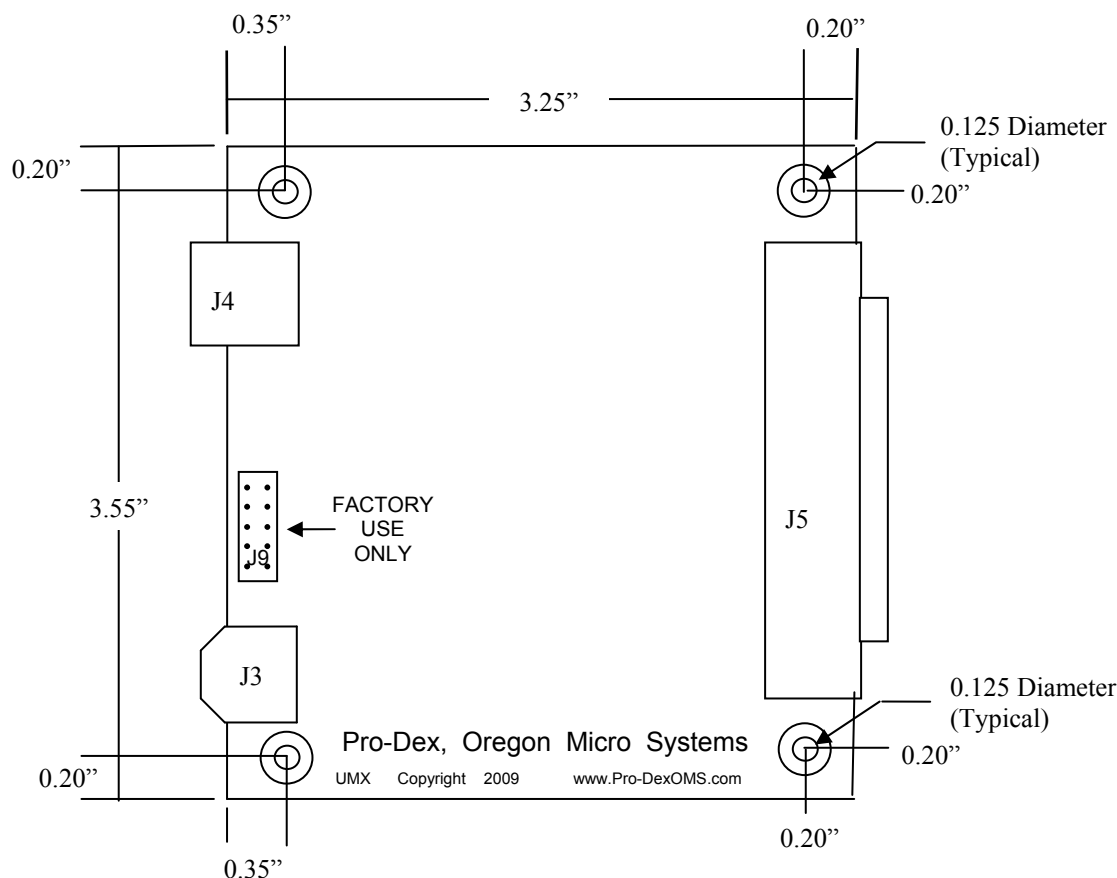
Encoder Feedback

Maximum 12 MHz after 4x quadrature detection

Differential TTL level signal MC26G32, max 150mA

"The Company in Motion"

www.Pro-DexOMS.com   (800) 707-8111

Actual Size Depiction below

0.35"   0.20"

3.25"

0.20"   0.125 Diameter (Typical)
0.20"

J4

3.55"   FACTORY USE ONLY   J5
J6

J3

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0.20"   0.125 Diameter (Typical)
0.20"

0.20"

0.35"

ORDERING INFORMATION

Pro-Dex OMS. - UMX Motion Controls				
MODEL	SERVO AXES	STEPPER AXES		USER I/O
		CONTROL	FEEDBACK	
UMX-25	2	0	0	12
UMX-26	0	2	2	12
UMX-45	4	0	0	12
UMX-46	0	4	4	12

ACCESSORIES	
MODEL	DESCRIPTION
IO68-M	I/O Breakout board for standard UMX motion control boards
CBL68-10	10 ft cable w/mating connector 68 pin, (IO68/UMX)
CDSWSUPP	Software drivers for Windows XP, Windows Vista and Windows 7.
CDMAN	Electronic Manual 1 per shipment provided, unless otherwise requested

Pro-Dex
Accelerating Possibilities
OREGON MICRO SYSTEMS

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