Product Datasheet - Technical Specifications

More information in our Web-Shop at ▶ **www.meilhaus.com** and in our download section.

Your contact

Technical and commercial sales, price information, quotations, demo/test equipment, consulting:

Tel.:   **+49 - 81 41 - 52 71-0**

FAX: **+49 - 81 41 - 52 71-129**

E-Mail: **sales@meilhaus.com**

Downloads:
www.meilhaus.com/en/infos/download.htm

www.meilhaus.de

MAXk Data Sheet

PCI 10-Axis Motion Controller

FEATURES

• PID update rate of 122 μs on all 10 axes

Delivers exceptional servo control on multi-axis applications. Identical outcomes when utilizing one or all axes of motion. Configurable PID filter with feedforward coefficients.

• 266 MHz, 32-bit RISC processor

Updates all signals and data points providing superior application control. An order of magnitude faster than our competition on an 8 axis controller.

• 64k Shared Memory

Permits rapid data transfer to & from controller. Large size accommodates expandability to unique and custom applications.

• PCI Universal Bus - 3.3 or 5.0 volts

PCI Rev 2.2 compliant. Compatible with current and future PCI bus computers.

• Memory

32 MB System Memory.

• Controller I/O Capabilities

Up to 4 Channels of general purpose Analog Input, with 16 bit, +/-10 VDC input
Up to 12 Analog outputs, +/- 10 VDC output
Up to 16 user-definable digital I/O
Home and Limit for each axis

• Motion Feedback

Support Quadrature Encoder Feed back up to 16 MHz.

• 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

2 High density shielded 100 pin connectors

Additional Features

- All communication via Device Driver and Driver Support DLL.

- Dual Port RAM is utilized for high-speed communications

- PCI 33 MHz Target Device

- Independent and coordinated motion of all axes.

- Slip & Stall detection with encoder feedback.

- Patented technology to minimize torque ripple and velocity modulation.

- Independent home, positive and negative over-travel inputs.

- Non-volatile macro storage, parameter storage.

- Linear/Circular interpolation

- Constant or Variable Velocity contouring (all axes)

- 2x 100 Pin connectors

- Field upgradable firmware

- Firmware upgrades and enhancements

- Customizable solutions available for your requirements

- Example programs and application code provided

- Web page support for downloading software and documentation

OMS Motion, Inc.

DESCRIPTION

The MAXk is a full length PCI bus motion controller that conforms to the PCI Local Bus specification, rev 2.2. The MAXk is capable of up to 10-axis of control of which each axis can be configured as an open loop stepper, a closed loop stepper, or a servo axis.

The MAXk is powered by a PowerPC processor. This high performance processor provides a 64-bit Floating Point processor and is clocked at 266MHz. This provides the MAXk with the pure processing power to update every signal of the controller, i.e. I/O bits, direction, limits, etc., at rates of 122µs.

The MAXk supports up to 16 general purpose digital I/O signals. In addition it has four general purpose analog inputs that can be used to sense Pressure Transducers, Dial Switches, etc. Analog inputs can also be used to control velocity override. These analog inputs have 16-bit resolution with +/- 10 VDC input.

Each axis has servo output signal capability; configured as a +/- 10V or 0-10V signal and is driven by a 16-bit DAC. The servo control loop is a PID filter with feedforward coefficients and an update rate of 122µs. The step pulse is a TTL level, 50% duty cycle square wave that supports velocities of 0 through 4,176,000 pulses per second. Encoder feedback functionality supports quadrature encoders up to 16 MHz and is used as the servo feedback, as feedback for the stepper axes or as independent position feedback. Encoder feedback is also used to provide slip and or stall detection. Every axis includes dedicated +/- over travel inputs, a home input, and an auxiliary output. The MAXk is available in several different models that support a different number of axes.

PROGRAMMING

MAXk 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 MAXk. The commands are executed sequentially, allowing the host to send a complex command sequence and attend to other tasks while the MAXk manages the motion process. These command queues store 2559 command values and include a command loop counter which allows multiple executions of any queued command.

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#,w#,k#;

Numbers are entered for each axis 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 MAXk can be switched back to the independent-axis mode by entering the desired single 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 for a single axis:

- Initialize the velocity and acceleration parameters to a suitable value. Set PID filter gain values. Perform the home operation initializing the position counter to zero. Perform a motion to an absolute position of 10,000 and set the done flag for that axis when the move is finished.

  The following would be input from the host computer:

      AX;
      VL5000;
      AC50000;
      KP20;
      KI1;
      KD45;
      HN;
      HM0;
      MA10000;
      GO;

In a move requiring a three axis coordinated move, to a select position the following commands could be used:

      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 absolute position so that all axes arrive at their destinations at the same time.

The following demonstrates cutting a hole with a 10,000 count radius using constant velocity contouring and circular interpolation:

- The contouring velocity is set to 1000 counts per second. A contour is defined beginning at coordinates 0,0 on the Z and T axes.

- Auxiliary output on the X axis is turned on, which could turn on the cutting torch or laser starting the cut at the center of the circle.
- A half circle is cut from the center to the outside of the hole positioning the cutting tool at the start of the hole.
- The hole is then cut, the torch turned off, the stage stopped and the contour definition completed.
- The stage is then positioned and the contour definition executed.

The following would be input from the host computer:

```
AA;
CV1000;
CD,,0,0;
AN;
CR0,5000,-3.1415926;
CR0,0,-6.2831853;
AF;
MT-10,10000;
CE;
MT,,-1000,0;
GO;
CX;
```

SPECIFICATIONS

Velocity

0 to 4,176,000 pulses per second simultaneous on each axis

Acceleration

0 to 8,000,000 pulses per second per second

Position range

± 2,147,487,647

Accuracy

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

Environmental

Operating temperature range: 0 to 50 degrees centigrade

Storage temperature range: -20 to 85 degrees centigrade

Humidity: 0 to 90% non-condensing

Power

+5VDC +/-5% at 1 amp typical
+3.3VDC +/-0.3% at 0.6 amps typical
+12VDC at 0.1 amp typical = +/-5%
-12VDC at 0.1 amp typical = +/-10%

Dimensions

12.283" x 4.200" x 0.475"
312 mm x 106mm x 12.06 mm

Communication Interface

Meets all signal specifications for PCI bus Specifications, Rev. 2.2.
Is backward compatible with MAXp

Limit switch inputs

TTL input levels. Input sense (low or high true) selectable by command input for each axis.

Connector

Two 100-Pin SCSI type connectors for all control and I/O signals, shielded. Controller models with 5 or less axes provide only half of the possible I/Os on one connector.

Home switch inputs

TTL input levels. Input sense (low or high true) selectable by command input for each axis. Accuracy to 1 encoder count

User definable I/O

Up to 16 bits of user definable Digital I/O. 16 bits are user configurable that are configured as 8 inputs and 8 outputs from the factory.

Analog inputs

Four analog inputs, +/-10V, 16 Bit resolution

Analog outputs

+/-10V and 0 to +10V,max. 1mA each, 16-bit resolution. One per axis plus two general purpose.

Step pulse output

Pulse width 50% duty cycle. Actively driven TTL level signal (max 12mA).

Direction output

Actively drive TTL level signal (max 12mA).

Incremental Encoder Feedback

Maximum 16 MHz after 4x quadrature detection. Differential TTL level signal (26LV32, max 15mA).

Absolute Encoders

SSI Technology

X and Y axes up to 12 bits resolution. (default)

Optional: absolute encoders are available up to 32 bits resolution for each axis.

Reference

PCI specification, Rev. 2.2.
PCB mechanical specification, IEEE 1101.1, 1101.10 and P1101.11

Software

High level expertise not required.

Over 250 ASCII character commands, expanded from current OMS command set

Software drivers and DLLs for Windows® provided at no additional cost

User Manual included

Servo Tuning Assistant software tools included

Support software available for download at our web-site (www.Pro-DexOMS.com)

ORDERING INFORMATION									
				I/O					
Model	Computer Interface	Axes	Servo / Stepper	Limit	Auxiliary	Home	Digital General Purpose	Analog	
								In	Out
MAXk-1000	Universal PCI	1	User Definable	2	1	1	8	2	2
MAXk-2000		2	User Definable	4	2	2	8	2	3
MAXk-3000		3	User Definable	6	3	3	8	2	4
MAXk-4000		4	User Definable	8	4	4	8	2	5
MAXk-5000		5	User Definable	10	5	5	8	2	6
MAXk-6000		6	User Definable	12	6	6	16	4	8
MAXk-7000		7	User Definable	14	7	7	16	4	9
MAXk-8000		8	User Definable	16	8	8	16	4	10
MAXk-9000		9	User Definable	18	9	9	16	4	11
MAXk-A000		10	User Definable	20	10	10	16	4	12
CBL58-3M	100-Pin, 3 meter cable (1 per 5 axes)								
CBL100-1	100-Pin, ribbon cable, 1 ft.								
IOMAXnet	100-Pin Connector Breakout Module (1 per 5 axes)								
CBLk	Internal MAXk cable for 6-axes or more								

OMS
MOTION, Inc.

3701-1900000
Rev. B