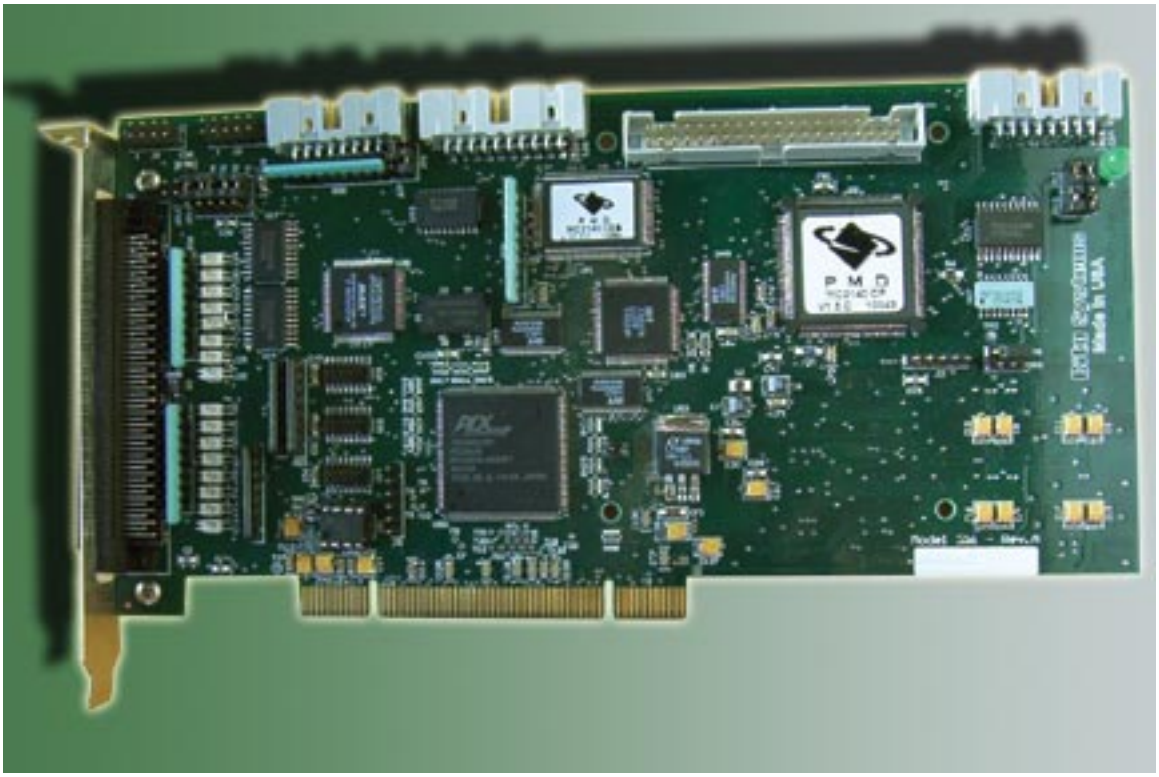
Cito
Systems

***PCI-bus Millennium* Series**
Motion Controller Board
For Brush & Brushless Servomotors

3mi-0x-B/BL



Product Description

The PCI-bus cards of the Millennium series are high performance feature-rich multi axis motion controllers. The 3mi-0x-B/BL model implements the Navigator MC28xx series chipsets - dedicated motion processors from PMD. It combines the ability to control both brush and brushless servomotors with on-board phase commutation. The user can designate which axes are brushed and which are brushless. These controllers harness the power of the Navigator high-speed DSP chip and incorporate ASIC and surface mount technologies. The Millennium controllers are available in configurations of 2 or 4 axes.

The DSP unit provides S-curve, trapezoidal, velocity contouring and electronic gearing profiling modes for Analog or PWM signal output. Onboard memory allows designers to capture on-the-fly motion data for analyzing system performance, tuning servo filters and diagnostic purposes. Motion trajectory segments can be blended into continuous motion path in the velocity mode.

The boards interface to external components via a 100 pin high density connector providing motor outputs and reading pulsed encoder (incremental or absolute), limit switches and home indicator input signals. They are capable of handling eight analog inputs and eight user-defined discrete I/Os.

The card is supported by C-Motion™ - extensive C-language software library and Windows drivers, which allow development of any motion control application. EasyMotion™, a Windows application package with the industry's first ever MotionWizard, assists in a quick and easy way to set up and tune even complex electro-mechanical systems.

The boards can be used in a variety of industries, such as robotic, machine tool, semiconductor, medical, food processing, textile and many others.

Features:

- Uses DSP and ASIC high speed dedicated motion processors in 2 or 4 axes configuration
- Supports single phase brushed and 2 or 3-phase brushless motors
- 6-step (Hall based) or sinusoidal commutation *of brushless motors only*
- Independent or synchronous axes programming
- Open or closed servo loop operating modes
- Advanced PID filter with velocity and acceleration feedforward, bias offset and 32-bit position error
- Axis settled indicator and tracking window in addition to automatic motion error detection
- Choice of S-curve, trapezoidal, velocity contouring or electronic gearing motion profiles
- Asymmetric acceleration and deceleration to custom program a trapezoidal motion profile
- Velocity and acceleration changes on-the-fly for trapezoidal and velocity contouring profiles
- Position range from –2,147,483,648 to +2,147,483,647 counts
- Velocity range from -32,768 to +32,767 counts/sample with a resolution of 1/65,536 counts/sample in
- velocity contouring profile mode or from 0 to 32,767 counts/sample with a resolution of 1/65,536 counts/sample in all other modes
- Acceleration and deceleration range from –32,768 to 32,767 counts/sample^2 with a resolution of 1/65,536 counts/sample^2
- Jerk range from 0 to 1 counts/sample^3 with a resolution of 1/4,294,967,296 counts/sample^3
- Electronic gear ratio range from –32,768 to 32,767 (negative and positive direction)
- Programmable sample rate from 150 µsec to 3355 msec per axis
- Single-ended or differential incremental encoder maximum rate up to 5.0 Mcounts/sec
- Maximum parallel feedback device rate up to 160.0 Mcounts/sec
- Parallel feedback device word size: 16 bits
- 3 Hall effect input signals per axis (TTL level) *for brushless motors only*
- Commutation rate 10 kHz for 4 axes or 20 kHz for 2 axes
- +/-10V differential 16-bit DAC output signal
- PWM motor output signal of 10-bit resolution at 20 kHz – 50/50 PWM mode supports 1, 2 or 3 phase motors, Sign/Magnitude PWM mode supports 1 or 2 phase motors only
- On-board 64 kByte dual-port memory buffer for data and parameters storage
- PCI-bus communication interface
- Opto-isolated dedicated inputs for two-directional travel limit switches, home indicator and fault signal operating at +5V, +12V, +24V or +48V
- 8 general purpose discrete TTL level input lines
- 8 uncommitted discrete output lines operating at TTL level, expandable to 128 outputs or opto-isolated capable of sinking or sourcing maximum 350 mA at 50V
- 8 general purpose 10-bit analog inputs in range of 0 to 5.0 V dc
- Automatic motor shutdown on motion error
- Programmable host interrupts
- Trace capabilities for system performance testing, servo-filter tuning and diagnostic purposes
- Software functions support coordinated linear and circular interpolation, point-to-point positioning and contouring, backlash compensation, jogging, homing, etc.
- Status reporting for position, speed and errors
- Infinite number of linear and arc segments for smooth motion
- Programmable event triggers for monitoring elapsed time, motion complete, position, motion error, limit switches and position wrap-around

Axes Control Signals Connector (J4)

Pin	Signal Name	Pin	Signal Name	Pin	Signal Name	Pin	Signal Name
01	QuadA1+	26	QuadA2+	51	QuadA3+	76	QuadA4+
02	QuadA1-	27	QuadA2-	52	QuadA3-	77	QuadA4-
03	QuadB1+	28	QuadB2+	53	QuadB3+	78	QuadB4+
04	QuadB1-	29	QuadB2-	54	QuadB3-	79	QuadB4-
05	Index1+	30	Index2+	55	Index3+	80	Index4+
06	Index1-	31	Index2-	56	Index3-	81	Index4-
07	Vcc (encoder)	32	Vcc (encoder)	57	Vcc (encoder)	82	Vcc (encoder)
08	GND (encoder)	33	GND (encoder)	58	GND (encoder)	83	GND (encoder)
09	Hall1A*	34	Hall2A*	59	Hall3A*	84	Hall4A*
10	Hall1B*	35	Hall2B*	60	Hall3B*	85	Hall4B*
11	Hall1C*	36	Hall2C*	61	Hall3C*	86	Hall4C*
12	GND (Hall)	37	GND (Hall)	62	GND (Hall)	87	GND (Hall)
13	PosLim1	38	PosLim2	63	PosLim3	88	PosLim4
14	NegLim1	39	NegLim2	64	NegLim3	89	NegLim4
15	Home1	40	Home2	65	Home3	90	Home4
16	AxisIn1	41	AxisIn2	66	AxisIn3	91	AxisIn4
17	AxisOut1	42	AxisOut2	67	AxisOut3	92	AxisOut4
18	PWMMagA1	43	PWMMagA2	68	PWMMagA3	93	PWMMagA4
19	PWMMagB1*	44	PWMMagB2*	69	PWMMagB3*	94	PWMMagB4*
20	PWMMagC1*	45	PWMMagC2*	70	PWMMagC3*	95	PWMMagC4*
21	Not used	46	Not used	71	Not used	99	Not used
22	DACA1	47	DACA2	72	DACA3	97	DACA4
23	DACB1*	48	DACB2*	73	DACB3*	98	DACB4*
24	GND (DAC)	49	GND (DAC)	74	GND (DAC)	99	GND (DAC)
25	Opto GND	50	Opto GND	75	Opto GND	100	Opto GND

* - depends on user axes designation

User-defined Digital I/O Connector (J5)

Pin	Signal Name	Pin	Signal Name
01	PrlIn0	11	PrlIn5
02	PrlOut0	12	PrlOut5
03	PrlIn1	13	PrlIn6
04	PrlOut1	14	PrlOut6
05	PrlIn2	15	PrlIn7
06	PrlOut2	16	PrlOut7
07	PrlIn3	17	GND
08	PrlOut3	18	Vcc
09	PrlIn4	19	GND
10	PrlOut4	20	Vcc

Serial Channel Connector (J2)

Pin	Signal Name
01	SrlXmt
02	SrlRcv
03	Synch
04	GND
05	Vcc

Analog Input Connector (J1)

Pin	Signal Name	Pin	Signal Name
01	Analog1	09	AnalogRefHigh
02	Analog2	10	AnalogRefLow
03	Analog3	11	AnalogVcc
04	Analog4	12	AnalogGND
05	Analog5	13	Vcc
06	Analog6	14	GND
07	Analog7	15	Synch
08	Analog8	16	~HostIntrpt

High Power I/O Connector (J7)

Pin	Signal Name	Pin	Signal Name
01	High PrlOut0	09	High PrlOut4
02	+VS	10	Pwr GND
03	High PrlOut1	11	High PrlOut5
04	+VS	12	Pwr GND
05	High PrlOut2	13	High PrlOut6
06	+VS	14	Pwr GND
07	High PrlOut3	15	High PrlOut7
08	+VS	16	Pwr GND

Environmental and Electrical Ratings

Dimensions	4.00” x 8.25”
Storage Temperature	-40 °C to 125 °C
Operating Temperature	0 °C to 70 °C (an industrial version with an operating range of –40 °C to 85 °C is also available)
Power Consumption	1A @ 5V; 83mA @ +/-12V
Supply Voltage Limits	-0.3V to +7.0V
Supply Voltage Operating Range	4.75V to 5.25V
Analog Output Range	-10.0V to 10.0V
Analog Input Range	0.0V to 5.0V

Ordering information