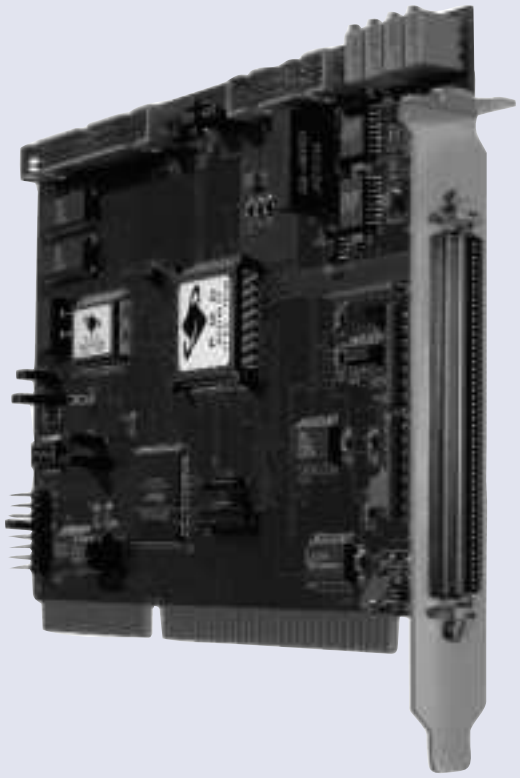
Navigator-ISA™ Motion Controller For Servo or Step Motors

Features

- Available in 1, 2 and 4-axis configurations.
- DC brushed, step or brushless DC motors (using external commutation).
- Motion profiles include S-curve, trapezoidal, velocity contouring and electronic gearing.
- Independently programmable acceleration and deceleration.
- Advanced PID filter with velocity and acceleration feed forward, bias offset and 32-bit position error.
- Velocity and acceleration changes on-the-fly for trapezoidal and velocity-contouring profiles.
- Incremental encoder quadrature input and optional parallel input for absolute encoder or resolver.
- Trace capabilities for system performance checks, servo-tuning, maintenance and diagnostics.
- Encoder rate to 5.0 Mcounts/sec.
- 10-bit 20 kHz PWM or 16-bit DAC motor control output to amplifier for servos +/-10v. Up to 5 MHz pulse and direction output for step motors.
- Advanced breakpoint capability allows precise sequencing of events.
- PLC-style programmable inputs and outputs, including per-axis programmable inputs and outputs.
- 8 general purpose digital inputs and outputs, 4 amplifier enable outputs.
- 8 general-purpose analog inputs.
- Two-directional limit switches, index input and home indicator per axis.
- Axis settled indicator and tracking window in addition to automatic motion error detection.



General Description

The Navigator-ISA™ Motion Controllers for servo or step motors are PC-based ISA-Bus cards that fit directly into an IBM-compatible slot. The Navigator-ISA boards are used in embedded control systems for industrial control, automation and robotic applications. They are available in 1, 2 and 4-axis configurations. The boards are completely designed in surface mount technology and use PMD's Navigator chipset, for either DC brushed, step or brushless DC motors (using external commutation). They are equipped with 256 KB memory to store extensive motion sequences and/or motion trace information to perform complex motion profiles without interrupting the host and to store motion trace information to gather comparison values for system performance checks, servo-tuning, maintenance and diagnostics.

With 118 to 168 commands, depending on model, the Navigator-ISA instruction set offers flexibility and versatility to software application programmers. Instructions are used to initialize and control the motion controller. User selectable profiling modes supported by the motion processor include S-curve, trapezoidal, velocity contouring and electronic gearing. The Navigator-ISA accepts input parameters such as position, velocity, acceleration and jerk from the host and generates a corresponding trajectory on-the-fly. Onboard memory is available for downloading complex multi-dimensional motion profiles and tracing profile data.

The Navigator-ISA cards are extensively supported by state of the art software tools, resources and programs. Pro-Motion™ software, a Windows™ Graphical User Interface (GUI), provides a quick and convenient way to exercise the card. It allows system parameters, profile information and other useful motion information to be set and stored. In addition, Pro-Motion provides a powerful "motion oscilloscope" function that allows up to four real-time motion variables to be displayed at the same time, simplifying servo tuning and machine performance optimization. Complementing Pro-Motion is C-Motion™, an Application Programmer's Interface (API) comprised of a C-source code library for developing applications in DOS or Windows environments.

Technical Specifications

Available configurations	1, 2 or 4-axis, half-size ISA-Bus card
Operating modes	***Closed loop*** (motor command is driven from output of servo filter) ***Open loop*** (motor command is driven from user-programmed register)
Communication Modes	16/16 parallel
Position range	-2,147,483,648 to +2,147,483,647 counts
Velocity range	-32,768 to +32,767 counts/sample with a resolution of 1/65,536 counts/sample
Acceleration & deceleration ranges	-32,768 to +32,767 counts/sample^2 with a resolution of 1/65,536 counts/sample^2
Jerk range	0 to 1/2 counts/sample^3, with a resolution of 1/ 4,294,967,296 counts/sample^3
Profile modes	***S-curve point-to-point*** (Velocity, acceleration, jerk and position parameters) ***Trapezoidal point-to-point*** (Velocity, acceleration, deceleration and position parameters) ***Velocity-contouring*** (Velocity, acceleration and deceleration parameters) ***Electronic gear*** (Encoder or trajectory position of one axis used to drive a second axis. Master and slave axes and gear ratio parameters)
On the fly control	Of profile and filter parameters with pre-load and individual axis or simultaneous multi-axis update
Electronic gear ratio range	-32,768 to +32,767 with a resolution of 1/65,536 (negative and positive direction)
Filter modes (not for step motor versions)	Scalable PID + Velocity feedforward + Acceleration feed forward + Bias. Also integration limit, settable derivative sampling time and output motor command limiting
Filter parameter resolution (not for step motor versions)	16 bits
Position error tracking	Motion error window (allows axis to be stopped exceeding programmable window) Tracking window (allows flag to be set if axis exceeds a programmable position window for a programmable amount of time after trajectory motion is complete)
Motor output modes	DAC (16 bits) ±10V output PWM (10-bit resolution at 20 KHz) Pulse and Direction Output with 5 MHz

Maximum encoder rate	Incremental (up to 5 Mcounts/sec)
Servo loop timing range	100 µsec nominal (Exact time is 102,4 µsec) per enabled axis
Limit switches	2 per axis: one for each direction of travel, digitally filtered
Position-capture triggers	2 per axis: index and home signals
Other digital signals (per axis)	1 AxisIn signal per axis, 1 AxisOut signal per axis
Software-invertible signals	Encoder A, Encoder B, Index, Home, AxisIn, AxisOut, PositiveLimit, NegativeLimit (all individually programmable per axis)
Analog input	8 x 10-bit analog inputs
RAM/external memory support	256 KBytes (64 K Double Word Memory Positions)
Trace modes	One-time Continuous
Number of trace variables	27 (only 4 can be viewed at the same time)
Number of host instructions	118-168
Emergency stop	5V TTL input (either for smooth stop, abrupt stop or motor off) uses the AxisIn signal
I/Os	8 digital inputs / TTL, active low 4 axis specific inputs 8 digital outputs / TTL, active low 4 digital outputs for amplifier enable 4 axis specific outputs 8 analog inputs
Special profile mode combinations	Trapezoidal mode with Electronic gearing S-curve mode with Electronic gearing
Master/Slave change	Automatic Master/Slave change possible if programmed in user-defined Software
Motor check	Programmable max. motion error with or without automatic motor shutdown
Connectors	100 position AMP connector
Dimensions	Half-size ISA-Bus card; 4.8 in. x 6.3 in.
Power supply	4.80V to 5.25V

Ordering Information

MB702110 - 1-axis PC-ISA-Bus motion controller for servo motors including 16 uncommitted I/Os and 8 analog inputs
MB702120 - 2-axis PC-ISA-Bus motion controller for servo motors including 16 uncommitted I/Os and 8 analog inputs
MB702140 - 4-axis PC-ISA-Bus motion controller for servo motors including 16 uncommitted I/Os and 8 analog inputs
MB702510 - 1-axis PC-ISA-Bus motion controller for step motors including 16 uncommitted I/Os and 8 analog inputs
MB702520 - 2-axis PC-ISA-Bus motion controller for step motors including 16 uncommitted I/Os and 8 analog inputs
MB702540 - 4-axis PC-ISA-Bus motion controller for step motors including 16 uncommitted I/Os and 8 analog inputs

OPTIONS:
Cable-1003 or Cable-1006 - Matching shielded cable, 100 positions to 100 positions
IM-1000 - interface and interconnect board (1 for each set of 4 axes); Mounting: Phoenix EN snap-on rail

*For industrial temperature versions please contact PMD.

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