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Superior Electric

SLO-SYN® Model MX2000 Programmable Multi-Axis Controller



SERVO CONTROLS DRIVES | STEPPER CONTROLS | VOLTAGE CONDITIONING | ENGINEERED SYSTEMS | AC/DC



MX-2 2 axes configuration



MX-6
6 axes configuration

MX2000 Programmable Multi-Axis Motion Controller

This fully programmable, powerful DSP-based motion controller features its own built-in power supply and, in most cases, can serve as the only controller necessary even in complex and sophisticated machine control systems.

Depending on which model you choose, the **MX2000** can simultaneously operate up to 8 step motor or servo axes while performing up to 7 concurrent tasks. It has been designed for use with all SLO-SYN step motor drives (up to 50,000 micro-steps per revolution) and any analog or digital servo amplifier.

The **MX2000** WINDOWS-based software simplifies programming from a host computer through a serial data port. The software contains numerous screens so you can quickly and easily establish your system parameters. Plus, with built-in subroutine and looping (nestable up to 16 levels), your programming flexibility is greatly enhanced.

For ease of communicating with the controller, two serial ports are provided. The host port is switch-selectable for RS232 or RS485 protocol. There's also an auxiliary serial port that's factory set for RS232, and is jumper configurable for RS485.

With full servo and following capabilities, the **MX2000** facilitates easy-to-program servo gains and on-screen servo tuning while providing a complete selection of following commands.

The high performance, built-in power supply is AC line operated with a built-in line filter and MOV, and features flexible input power from 90 to 265 Vac, 50/60 Hz.

MX2000 optional input/output boards are available to suit your specific applications.

- **Digital Input/Output Board —** This board features a "bulletproof" design while providing 24 optically isolated and filtered inputs along with 16 short-circuit proof outputs. Sinking or sourcing operation is switch-selectable, and the board provides terminal-strip access to the system's isolated, built-in 24 Vdc power supply.
- **Expansion Input/Output BCD Board —** Two 50-pin headers allow you to connect up to 48 industry-standard, high-powered, OPTO-22 style input or output modules. Each header also can accommodate up to 4 BCD switch banks.
- **Dual-Axis Interface Board —** For your increased operating efficiency, the Dual-Axis board provides standard signals for most stepper drives and servo amplifiers along with inputs for two incremental encoders. This board also provides two sets of connections for limit, home, and mark registration sensors.

The **MX2000** series of Programmable Multi-Axis Motion Controllers. Your first choice when there's no substitute for flexible and reliable performance.

Features

- Full Coordinated motion control including linear interpolation of up to 8 axes, circular interpolation and polynomial splining among any two axes.
- Programmable using WINDOWS based BASIC-like coding software (included) or one of the optional software utilities, Motion Workbench or CAD-to-Motion
- Full math functions including Trig, Logs, and Square roots
- Subroutine capability (up to 16 nested levels)
- Multi-tasking of up to 7 concurrent tasks
- Up to 8 axes of stepper pulse and direction outputs, with Boost & Reduce
- Up to 8 axes of Encoder inputs and analog I/O
- Optical isolation, with built-in 24 Vdc 0.75 amp power supply for I/O power
- Upto 352 I/O points available using optional boards
- Easy to connect removable screw clamp terminations
- Flash Memory enhances ease of programming and firmware updates
- 2 serial ports, operating at up to 38 Kbaud
- Flexible 90-265 Vac 50/60 hertz input including built in line filter with MOV.
- MX-2 and MX-6 Units UL Recognized

Superior. By Design.

☐ High Performance

These fully programmable, multi-axis motion controllers can perform up to 7 tasks concurrently with a subroutine and looping capability, nestable up to 16 levels. And, depending on which model you select, you can control up to 8 axes simultaneously. The **MX2000-2** controls one or two axes, the **MX2000-6** controls up to 6, or, for up to 8- axes control, choose the model **MX2000-8**. The latter two models can be used with optional boards while providing more than 350 input/output points. The MX-6 and MX-8 configurations provide two (MX-6) or five (MX-8) expansion slots. Page 163 defines which optional boards can be used in each expansion slot.

These stand-alone units include their own built-in power supply and feature the industry-standard Texas Instruments TMS320C31 floating point, 32-bit, 33 MHz Digital Signal Processor (DSP).

This high performance hardware enables the MX2000 to operate in a **PLC emulation** type mode by multi-tasking up-to 7 complex motion control programs while still monitoring all of its 352 possible I/O points.

The base system consists of 3 major boards; the DSP Controller, Dual-Axis Interface, and Power Supply/Expansion, which communicate through a passive backplane. The MX-8 has a built-in power supply and does not utilize the power supply/expansion board.

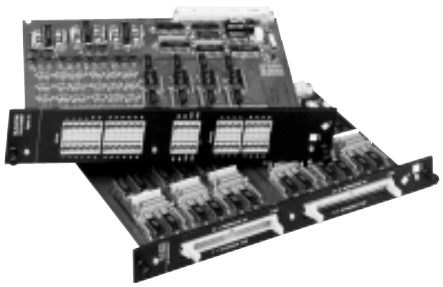
Each unit is AC line operated with a built-in line filter and MOV, and provides a flexible range of input voltage: 90-265 Vac, 50/60 Hz.

In addition to the above systems a card level version of the MX2000 controller is available for OEM type applications. The **MX2000-1C** is a complete 1 or 2 axis controller providing all the precision and reliability of our stand-alone systems in a single card.

All **MX2000** models offer ease of programmability with WINDOWS-based, development software through a host computer and two alternative serial ports. The host port is switch-selectable for either RS232 or RS485 protocol, with a switch-selectable baud rate of 4800, 9600, 19.2K, or 38.4K. The auxiliary serial port is factory set for RS232 protocol, and is jumper configurable for RS485. This port has a factory set baud rate of 9600 but can be software adjusted up to 38.4 Kbaud.

The WINDOWS format provides numerous screens for ease of establishing system parameters. The development software further provides simplified servo gain programmability, on-screen servo tuning with oscilloscope simulation, and a complete selection of following commands.

All **MX2000** models feature flexible input/output control, including switch-selectable sinking or sourcing. For even greater flexibility and performance, three optional input/output boards are available. The Digital Board features a "bulletproof" design; the Expansion - BCD Board provides connections for up to 48 OPTO 22 style inputs, 8 BCD switch bank, or a combination of both; and, the Dual-Axis Interface Board contains all the input/output connections you need to control two stepper/servo axes simultaneously.



☐ Reliability

Each **MX2000** is fully tested and burned in before shipment for maximum reliability.

Optically isolated inputs and outputs provide immunity from noise along with an added margin of safe and reliable operation. Plus, the built-in input/output 24 Vdc power source is short-circuit protected.

There's also a "power" indicator lamp on the MX-6 and MX-8 power supply boards, a "fault" indicator on the DSP board, and a "busy" indicator on the Dual-Axis interface board.

In addition the MX2000 family of controls meets IEC 801-4 Standard for immunity against electrical interference ("noise") in industrial environments.

☐ Easy to Install & Maintain

Built with a powerful DSP-based controller, an **MX2000** Motion Controller usually can operate as the only controller, even in highly complex and sophisticated motion control systems. For added economy and ease of installation, each unit also includes its own built-in power supply.

Programming is a simple task when using the included WINDOWS compatible software utility program.

Installed mounting slots and brackets facilitate ease of flat-wall mounting and service. In addition, all system inputs and outputs employ single-point, removable, screw-clamp terminations.

Specifications

General		
Processor	Texas Instruments TMS 320C31, 32 bit, Floating Point, Digital Signal Processor	
Speed	33 Mhz	
Flash EPROM	4 Mbit (512K x 8 bit), 2 Mbit (256K x 8 bit) available for user programs	
RAM	4 Mbit (128K x 32 bit), zero wait state, volatile	
Multi-Tasking	Up to 7 concurrent tasks	
Physical Characteristics		
MX2000-2	Size (Inches)	5.34 wide X 7.48 deep X 10.63 high
	Size (mm)	136 wide X 190 deep X 270 high
	Weight	8.25 Lbs (3.75 Kg)
MX2000-6	Size (Inches)	9.34W x 10.63H x 7.48D
	Size (mm)	237.3W x 270H x 190D
	Weight	11.0 lbs (5.0 kg)
MX2000-8	Size (Inches)	19.0W x 10.63H x 7.54D
	Size (mm)	482.6W x 270H x 191.6D
	Weight	12.0 lbs (5.45 kg)
Input Power		
MX2000-2, -6	Power requirement	90-265 VAC, 50/60 Hertz
	Current	<0.5 Ampere at 115 VAC
	Fuse	2A (normal blow), 250 VAC, 3AG type, (2 required)
MX2000-8	Power requirement	90 - 132 VAC or 175 - 264 VAC, 50/60 Hz.
	Current	< 3 A at 115 VAC
	Fuse	3A (slow blow), 250 VAC
Analog Output		
Output Range	- 10 Vdc to + 10 Vdc	
Output Loading	5 milliamps maximum (2 Kohm)	
Resolution	12 bits	
Accuracy	Zero Output Error	± 0.03 Vdc
	Full Scale Output Error	± 0.11 Vdc
Axis Inputs		
Sink Input	On-State Voltage	0-3 Vdc
	On-State Current	10.5 mA with Vin=0
	Off-State Voltage	24 Vdc
Source Input	On-State Voltage	12-24 Vdc
	On-State Current	10.5 mA with Vin=24Vdc
	Off-State Voltage	0-3 Vdc
Analog Inputs	Resolution	12 bits
	Sample Rate	1950 samples/sec.
	Voltage Range(IN+ to IN-)	-10 to +10 Vdc
	Input Impedance (IN+/IN- to AGND)	20 Kohm

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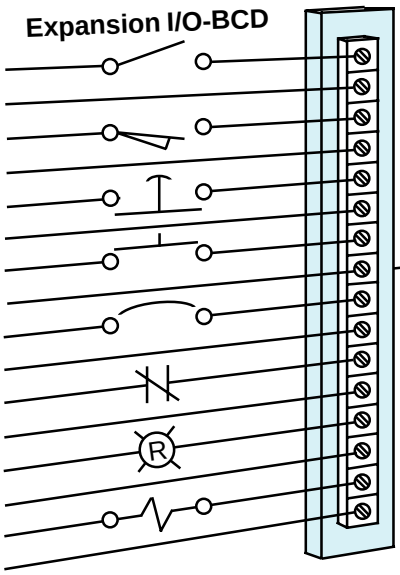
Specifications *(cont'd)*

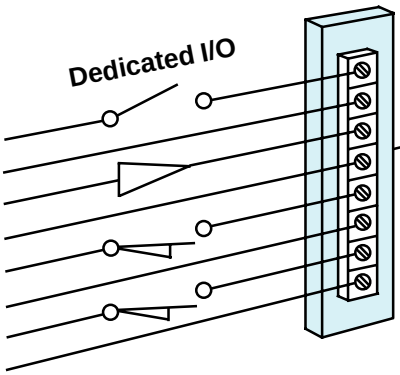
Stepper Drive Interface			
Output Signals	Open Collector drivers (TTL types 7406 or 7407)		
	Off-State Voltage Rating	30 Vdc	
	On-State Current Rating	40 mA	
Input Signal	Input Signal Loading	10 Kohm	
("Ready")	High Level Input Voltage	3.5 to 5.0 Vdc	
	Low Level Input Voltage	0.0 to 0.9 Vdc	
Encoder Interface			
High Level Current	7.3 mA typ. at Vin = 5 Vdc	(A+,B+, I+)	
	0.0 mA typ. at Vin = 0 Vdc	(A-, B-, I-)	
Low Level Current	-7.3 mA typ. at Vin = 0 Vdc		
Expansion I/O - BCD Port (MX2000-2 and MX2000-6)			
Input Characteristics	On-State Input Voltage	0 - 1.5 Vdc	
	On-State Input Current	1 mA max. (Vin=0)	
	Input Voltage	2.9 - 30 Vdc or open circuit	
Output Characteristics	Load Voltage	30 Vdc maximum	
	On-State Voltage	0.5 Vdc (15 mA load current)	
	On-State Current	15 mA maximum	
Digital I/O Port (MX2000-2A and MX2000-6A)			
Input Signals (Sink Mode)	On-State Voltage Range	0 - 12 Vdc	
	Input Current @ 12V	2.3 mA	
	Input Current @ 0V	6.5 mA	
(Source Mode)	On-State Voltage Range	10 - 24 Vdc	
	Input Current @ 10V	2.3 mA	
	Input Current @ 24V	6.5 mA	
Output Signals (Sink Mode)	Load Power Supply	Built-in 24 Vdc or external 12 - 24 Vdc	
	Current Rating	50 mA	
	Voltage Rating	24 Vdc	
	On State Voltage @ 50mA	2.0 Vdc maximum	
	Off State Leakage @ 24 Vdc	0.6 mA maximum	
(Source Mode)	Current Rating	50 mA	
	On State Voltage @ 50mA	20 Vdc minimum	
	Off State Leakage @ 24 Vdc	0.6 mA maximum	
Environmental Constraints			
Operating Temperature	+32°F to +122 °F (0 to +50 °C)		
Storage Temperature Range	-40 °F to +167 °F (-40°C to +75 °C)		
Humidity	95% maximum, noncondensing		
Altitude	10,000 feet (3048m) above sea level		

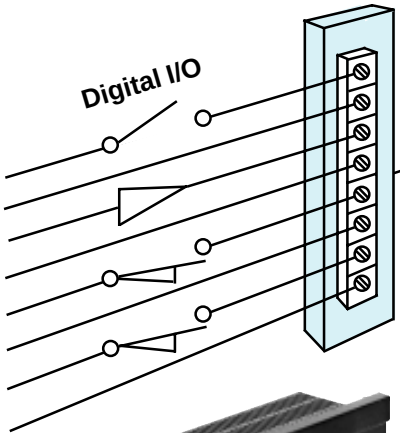
Design Features

- Wall mountable
- Removable printed circuit boards
- Removable clamp terminations
- Advanced programming capability
- Input/Output Expansion - BCD port
- Advanced DSP-based Machine control circuitry
- Expansion capability in the MX-6 and MX-8 configurations
- Optional I/O boards available for MX-6 and MX-8

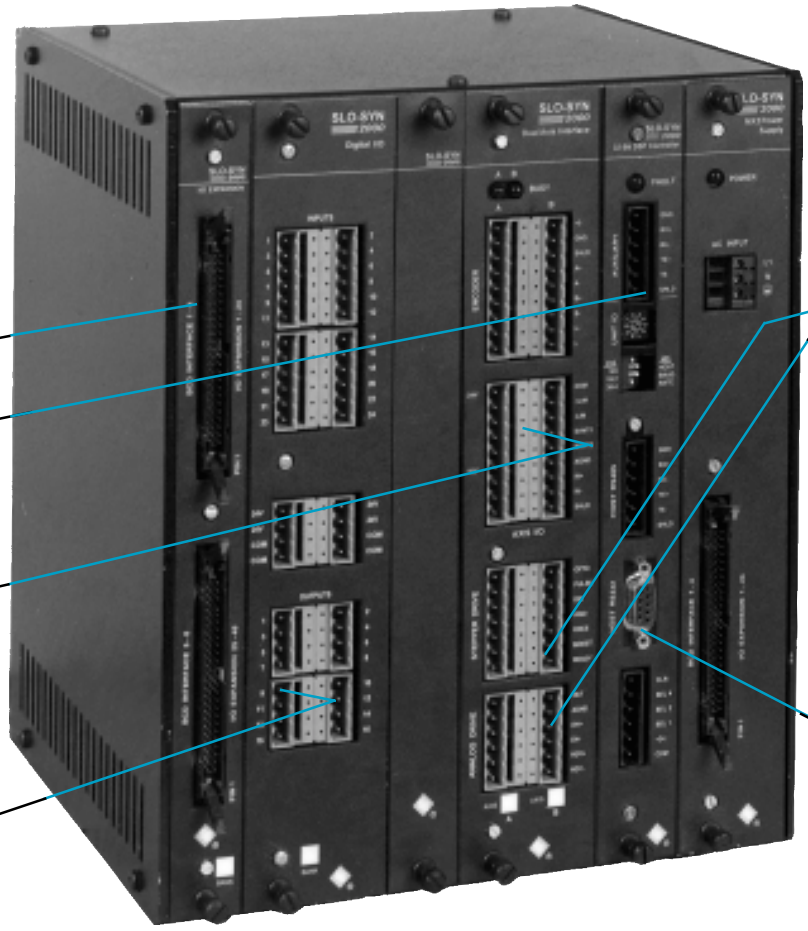
MX2000 THE COMPLETE SOLUTION FOR MACHINE AND MOTION CONTROL





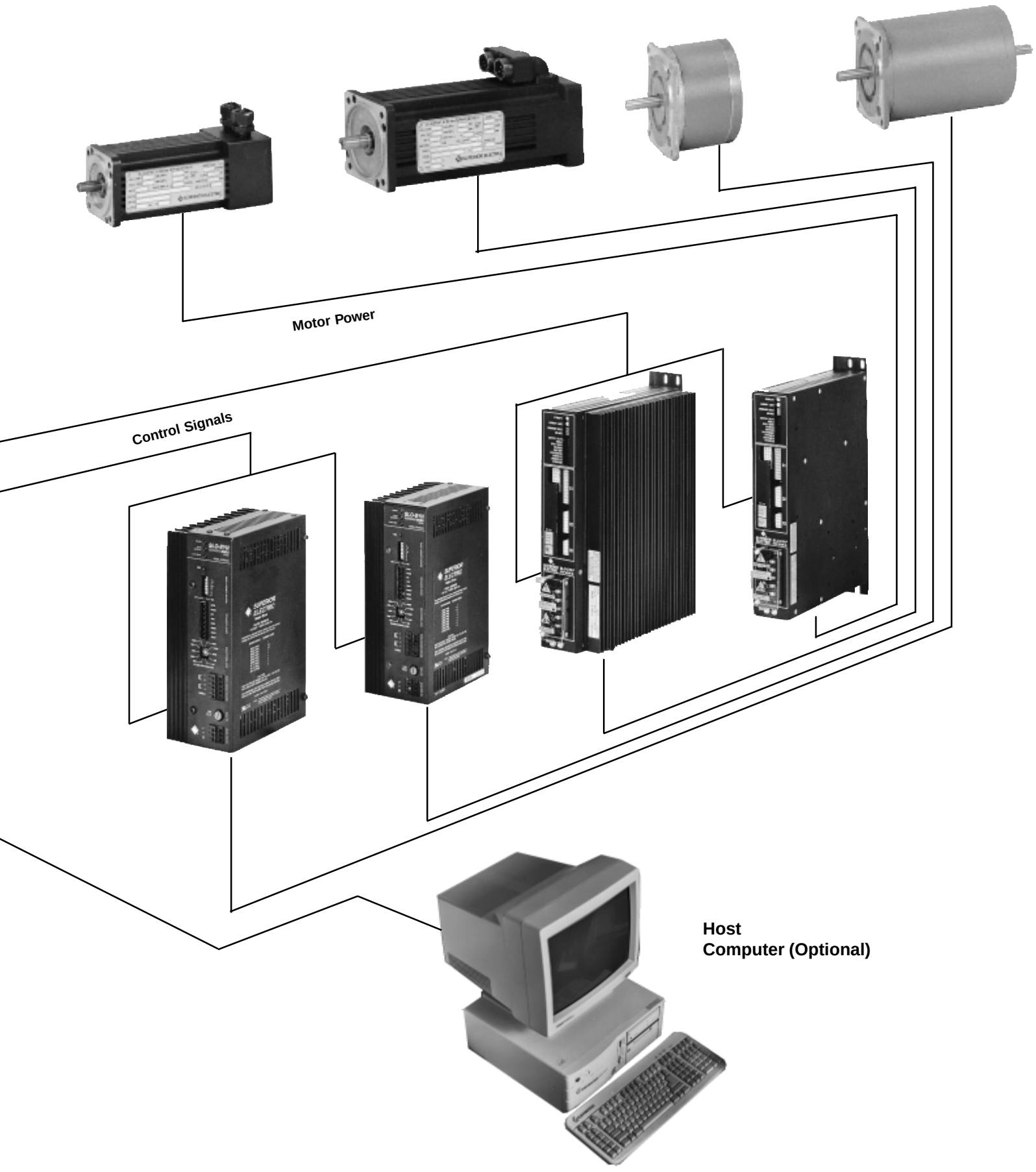


MX2000-6 Modular Rack System

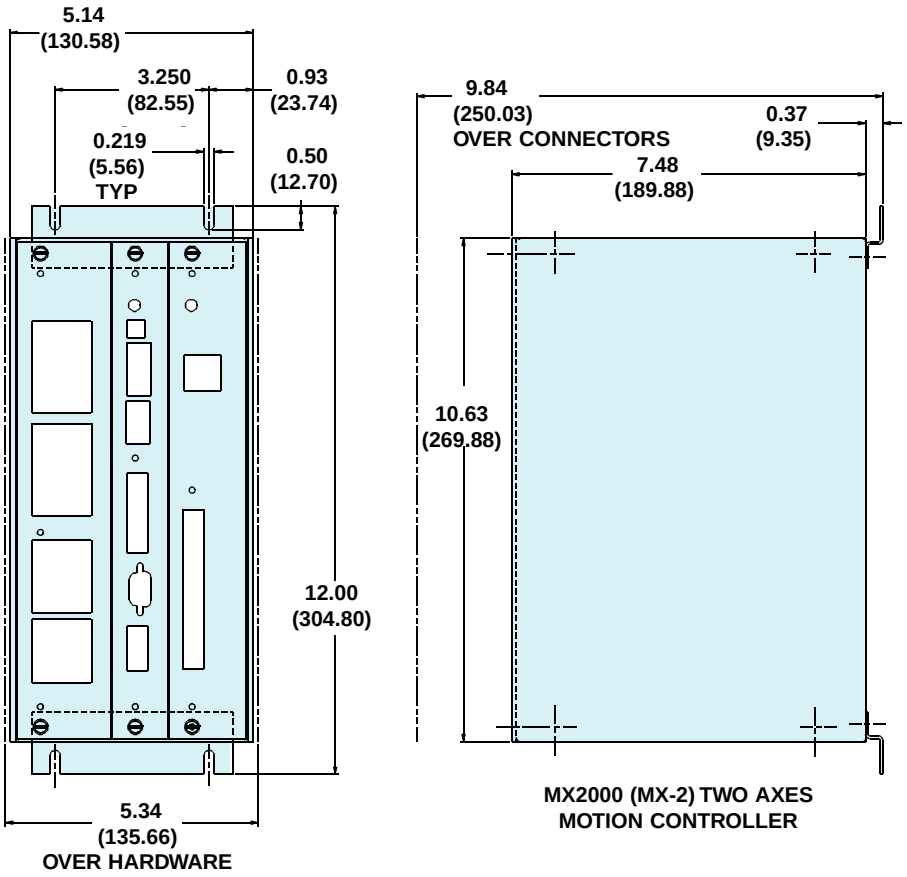




OPERATOR
INTERFACE
PANEL
IWS 30/120/127SE

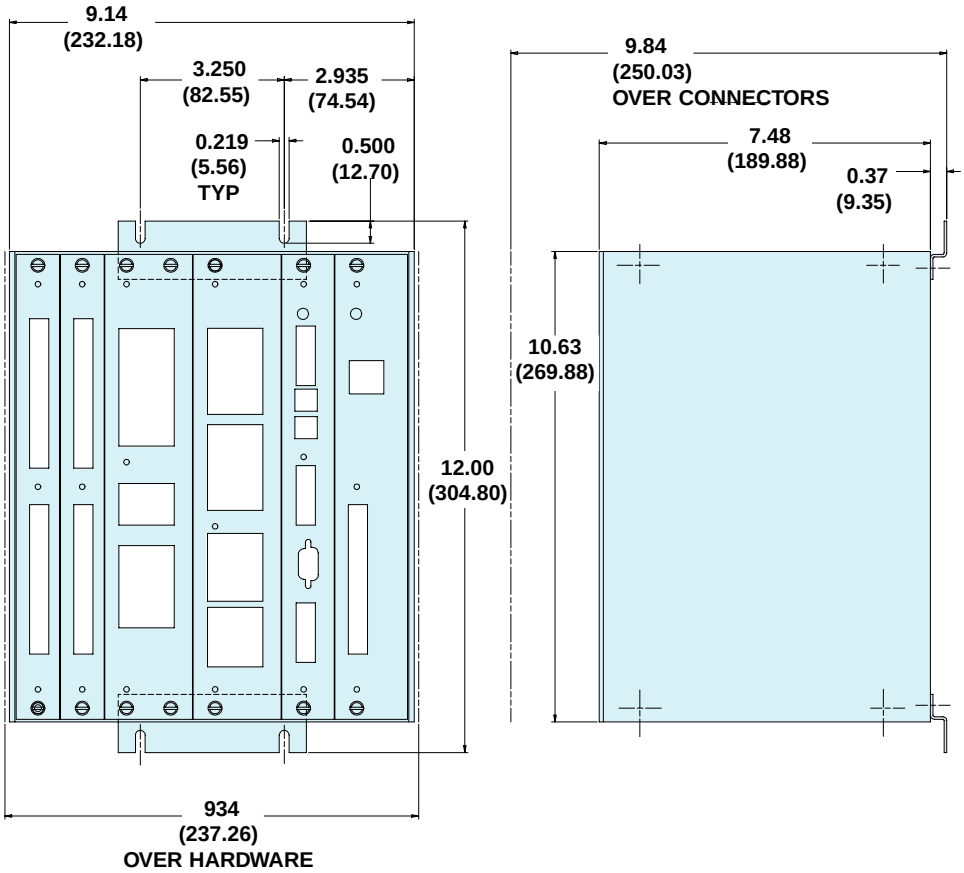

Motor Power
Control Signals
Host
Computer (Optional)

Dimensions, MX2000-2 (MX-2)



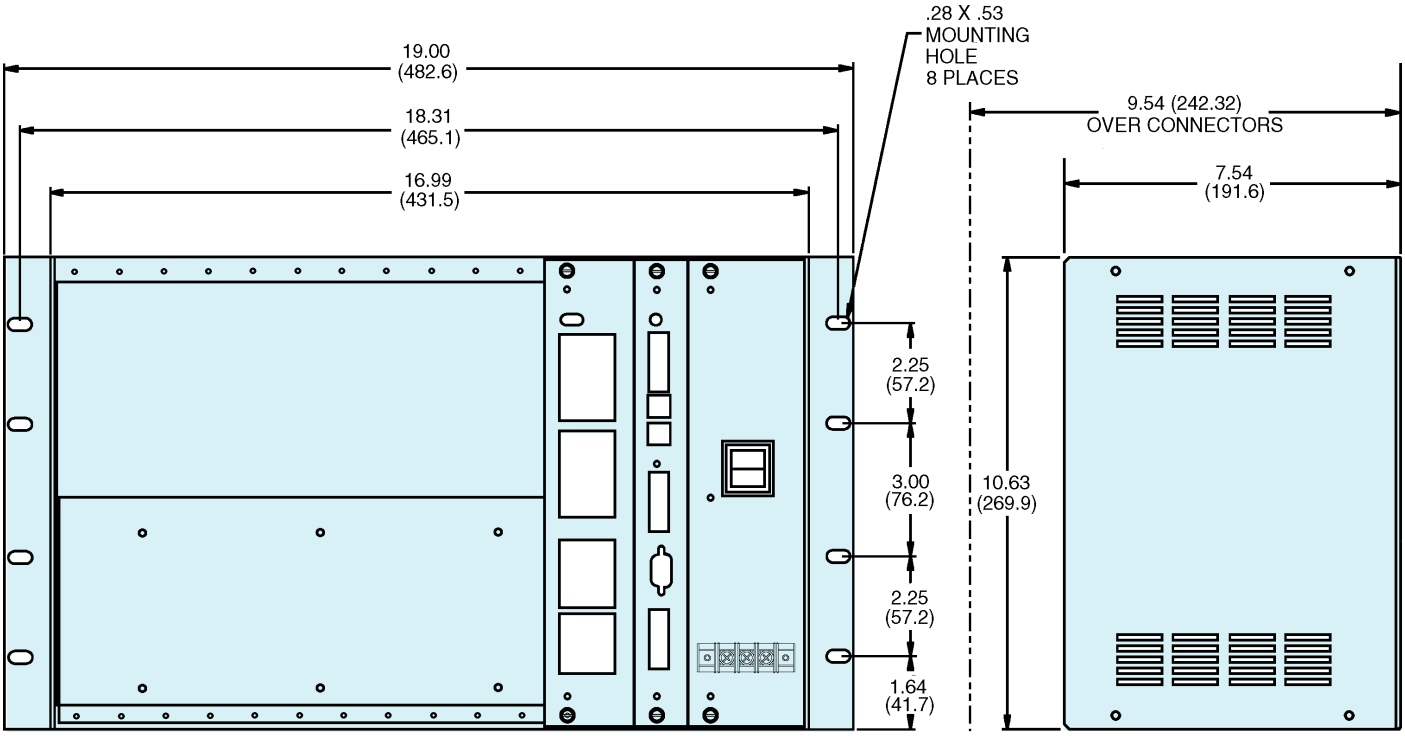
Dimensions in ( ) are millimeters.

Dimensions, MX2000-6 (MX-6)



Dimensions in ( ) are millimeters.

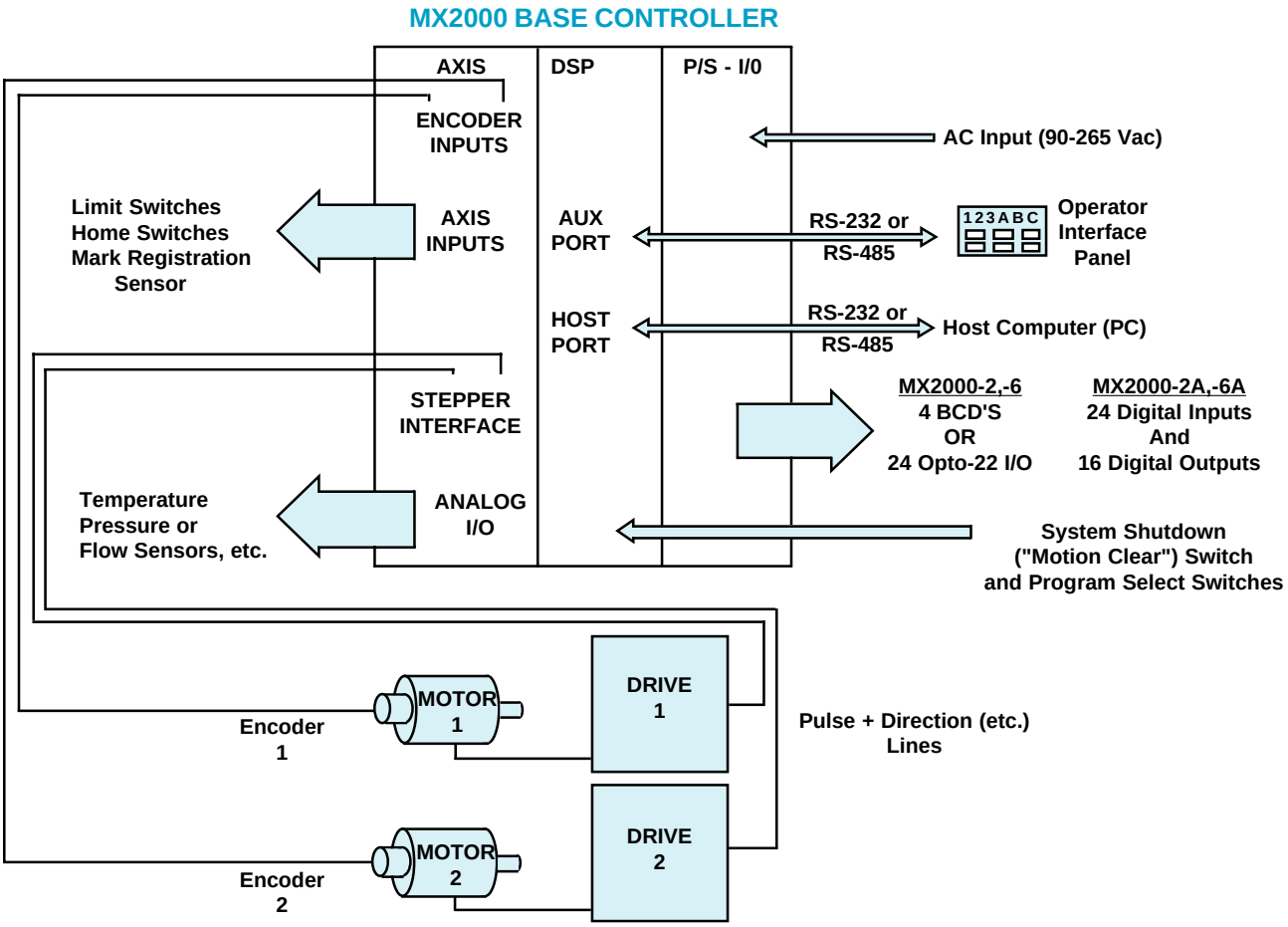
Dimensions, MX2000-8 (MX-8)



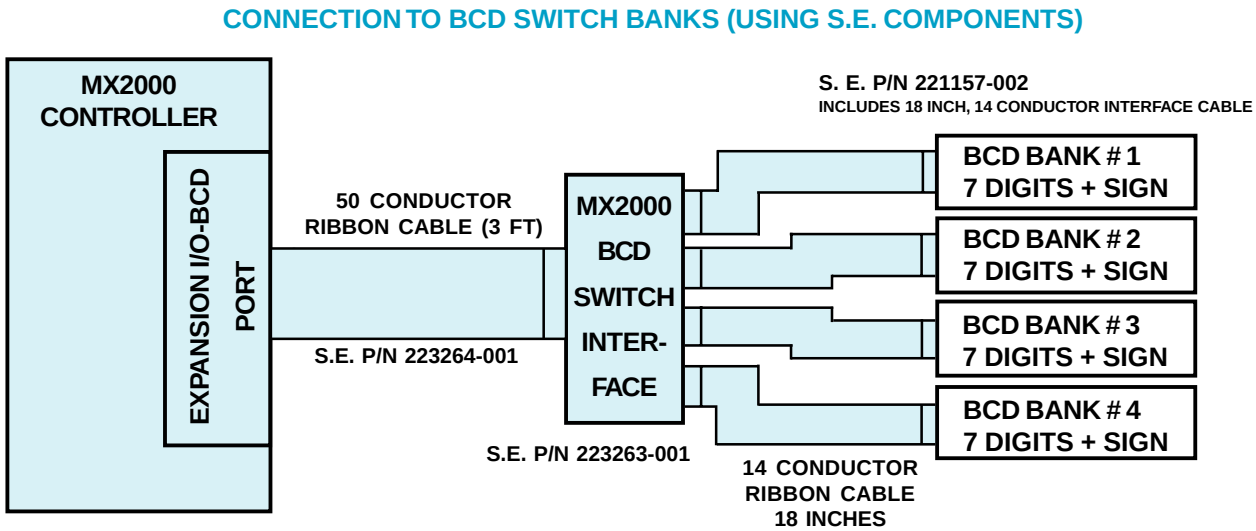
DIMENSIONS IN ( ) ARE MILLIMETERS

The MX2000-8 (MX-8) can be mounted as shown in the above diagram or it can be mounted in a standard 19 inch rack. To mount the MX-8 in a 19 inch rack simply remove the side mounting panels, one at a time, and rotate them 180°, then reattach them to the unit. The mounting hole pattern is compatible with a standard 19 inch rack in this configuration.

General Application Overview



Expansion I/O - BCD Port



Programming Commands Grouped By Function

Motion

ABSPOS	Sets or returns the absolute position.
ACCEL	Sets or returns the acceleration rate.
ARC	Initiate a coordinated motion to move in an arc.
BUSY	Returns the motion status of the axis.
DECEL	Sets or returns the deceleration rate.
DIST	Returns the incremental distance moved.
DONE	Returns the motion status of the axis.
ENCERR	Returns the encoder error count.
ENCMODE	Sets or returns the encoder mode of operation.
ENCPOS	Returns the encoder absolute position.
EVENT1	Returns the EVENT1 state of an axis.
EVENT2	Returns the EVENT2 state of an axis.
FEEDRATE	Sets the feedrate override for a path motion.
HARDLIMIT	Enable/disable/return HARDLIMIT state of an axis.
HARDLIMNEG	Returns the HARDLIMNEG state of an axis.
HARDLIMPOS	Returns the HARDLIMPOS state of an axis.
JOGSTART	Run continuously in the specified direction.
JOGSTOP	Stop continuous run.
JOYSTICK ..JOYSTICK END	Enables/disables Joystick inputs.
LINE	Initiates a coordinated motion in a straight line.
LOWSPD	Sets or returns the low speed (starting speed).
MAXSPD	Sets or returns the maximum allowed speed.
MOVE	Initiates an indexed move.
MOVEHOME	Run until the home input is activated.
MOVEREG	Run until the registration input is activated.
PATH..PATH END	Begin a continuous motion path.
POINT	Specify coordinates, which the motor will move through in a path.
POSMODE	Sets or returns the positioning mode.
PROFILE	Sets/returns the acceleration/deceleration profile.
RADIUS	Sets the arc radius for Path blending.
SOFTLIMIT	Enable/disable/eturn SOFTLIMIT state of an axis.
SOFTLIMNEG	Sets or returns the absolute negative travel limit distance.
SOFTLIMPOS	Sets or returns the absolute positive travel limit distance.
SPEED	Sets/returns the speed used for coordinated motion.
VELOCITY	Sets or returns the target velocity.
WAITDONE	Waits for motion to be done/completed for the specified axes.

Following

FOLANALOG	Selects the analog input and following axes for the task. Enables Analog following.
FOLDEVIATION	Master deviation velocity of a task in units/sec for a 10 volt analog input voltage.
FOLENCODER	Selects the encoder axis and following axes for the task. Enables Encoder or Pulse and Direction (Digital) following.
FOLEND	Terminates the analog following mode of a task.
FOLMAXRATIO	Axis velocity clamp for a advance cycle, must be greater than the FOLRATIO
FOLMINRATIO	Axis velocity clamp for a recede cycle, must be less than the FOLRATIO
FOLMODE	Selects the task following mode and direction.
FOLOFFSET	Sets the axis offset position in units from the initial sync position in velocity following.
FOLRATIO	Sets a ratio of the following axis to the master axis.
FOLSYNC	Return the following sync status of an axis.
FOLTRIG	Selects the trigger mode for starting a following axis in motion.

Motor Control

BOOST	Enables or disables the motor boost current feature, or returns status thereof.
REDUCE	Enables or disables the reduce current feature, or returns status thereof.
WNDGS	Enables or disables the motor winding current, or returns status thereof.

Input-Output Control

ANALOG	Sets or returns the analog voltage on axis card.
BCD	Returns the value on the BCD port.
DRVREADY	Enables or disables checking of the drive ready (READY) signal on the axis board
EXIN	Returns expansion board input states.
EXOUT	Sets, resets, or returns the state of the expansion outputs.
FILTER	Sets the filter value for the defined analog input.
IN	Returns the state of the inputs on the I/O board.
OUT	Sets, resets, or returns the state of the specified outputs.

Mathematics

ABS	Returns the absolute value of an expression.
LOG	Returns the natural logarithm of x.
MOD	Returns the divide remainder.
SIGN	Returns the sign of the expression.
SQRT	Returns the square root.

Trigonometry

ATN	Returns the arctangent of the angle.
ATN2	Returns the arctangent of y/x.
COS	Returns the cosine of the angle.
SIN	Returns the sine of the angle.
TAN	Returns the tangent of the angle.

Boolean Logic

AND	Logical conjunction operator.
NOT	Logical complement operator.
OR	Logical inclusive or operator.
XOR	Logical exclusive or operator.
&	Bitwise AND operator.
|	Bitwise inclusive or operator.
^	Bitwise exclusive or operator.
~	Bitwise complement operator.
>>	Bitwise shift bits right.
<<	Bitwise shift bits left.

Timing Functions

TIMER	Sets or reads Task Timer.
WAIT	Wait for the period of time to expire.

String Manipulation

ASC	Returns the ASCII code of character.
CHR$	Returns a one character string for the given ASCII code.
FORMAT	Enables or disables the formatting of the STR$ returned string
GETCHR	Wait for a character to be received via the serial port.
HEX$	Returns the HEX character equivalent of the argument.
HVAL	Returns the hex value of a string.
INCHAR	Returns a character from the serial port.
INPUT	Reads data from the selected serial port.
INSTR	Returns the first occurrence of a character in a string.
LCASE$	Converts a string to lower case letters.
LEFT$	Returns the leftmost characters of a string.
LEN	Returns the number of characters in the string.
MID$	Returns characters from within a string.
PRINT	Transmit data to the selected serial port.
PRINT USING	Prints string characters as formatted numbers.
RIGHT$	Returns the right most characters from a string.
STR$	Returns a string representation of a numeric expression.
STRING$	Returns a string of characters.
UCASE$	Converts a string to upper case letters.
VAL	Returns the value of a string.

Continued next page ...

Programming Commands Grouped By Function (cont'd)

Program Flow Control

DO...LOOP	Begin a repeatable a block of statements.
END	End of program.
FOR..NEXT...STEP ...EXIT FOR	Begin a repeatable block of statements.
GOSUB...Returns	Branch to a subroutine and returns.
GOTO	Branch unconditionally to the specified label.
IF..THEN ..ELSE..END IF	Begin a conditional block of statements.

Miscellaneous

COMMON	Defines common variables to be shared between tasks.
DATA	Define numeric values.
#DEFINE	Defines a symbolic name to be a particular string of characters.
DIM	Defines an array.
#INCLUDE	Includes a file name in a user's task.
ERR	Returns the error number.
LOF	Returns the number of characters in the designated RS232 port.
NVR	Non volatile storage of a variable (1-64).
READ	Reads values into variables or arrays.
REM or '	Remark or comment, ignored by the compiler.
RESET	Initializes System to power on condition.
RESTORE	Restores data list pointer to beginning.
SETCOM	Sets the baud rate and data format of the AUX serial port.
SHIFT	Shifts an array.
WARNING	Sets or returns task warning count.

Servo Gains & Limits

INTLIM	Sets/returns servo axis integral limit.
KAFF	Sets/returns servo axis accel. feed forward gain.
KD	Sets/returns servo axis derivative gain.
KI	Sets/returns servo axis integral gain.
KP	Sets/returns servo axis proportional gain.
KVFF	Sets/returns servo axis velocity feed forward gain.
OUTLIMIT	Sets/returns the maximum analog output voltage allowed on a servo axis.

Base Systems

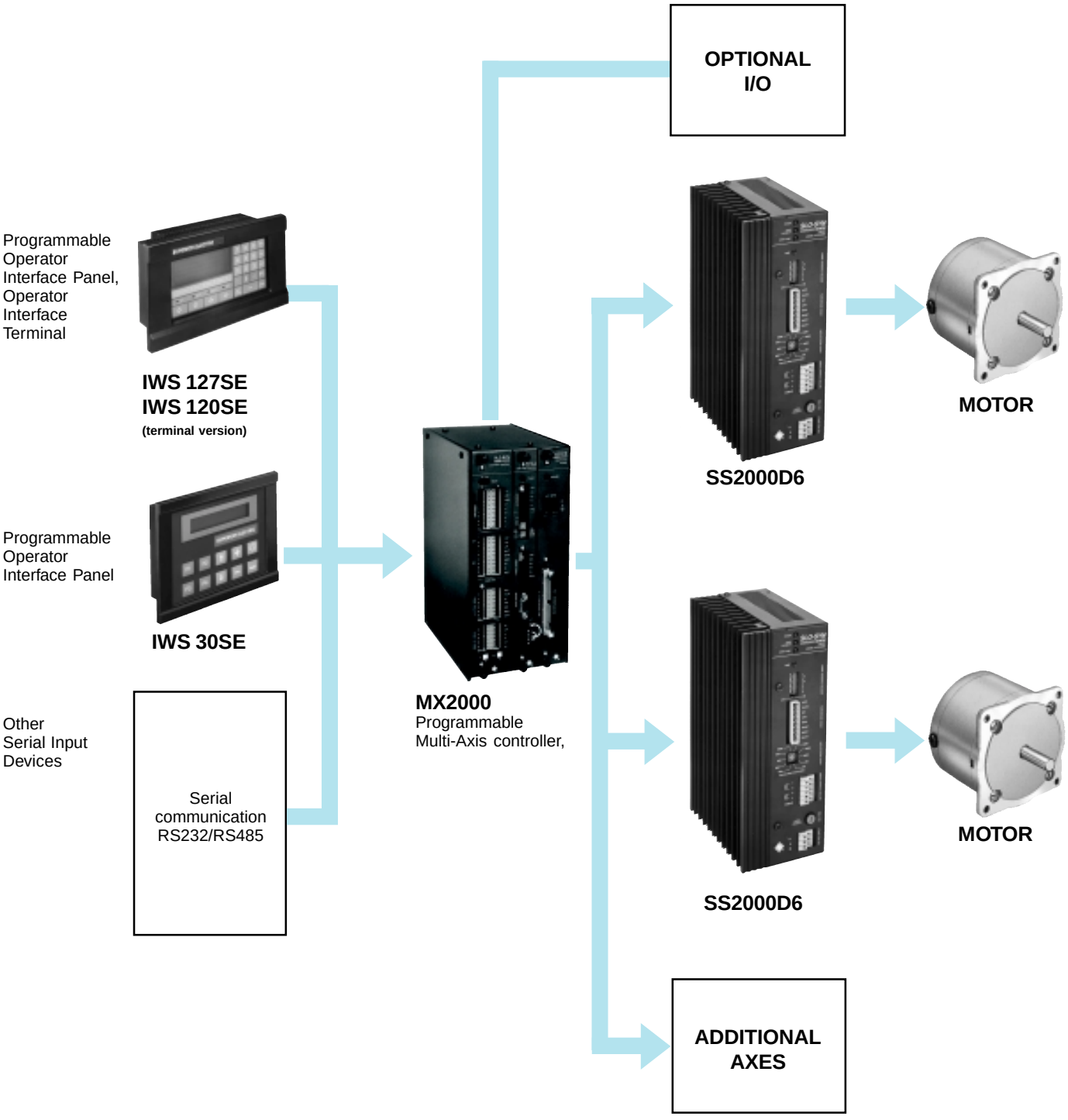
# AXIS		
1, 2	**MX2000-2 (MX-2)** **BASE 2 AXIS CONTROL SYSTEM**	Includes: Enclosure, DSP Board, Power Supply Board with I/O-BCD Interface, and Dual-Axis Interface Board
	MX2000-2A (MX-2A) **BASE 2 AXIS CONTROL SYSTEM**	Includes: Enclosure, DSP Board, Power Supply Board with Digital Interface, and Dual-Axis Interface Board
	MX2000-1C (MX-1C)	Includes: MX2000 1-2 axis Controller Card for OEM applications
2 TO 6	**MX2000-6 (MX-6)** **BASE 5-1/2 SLOT SYSTEM**	Includes: Enclosure, DSP Board, Power Supply Board with I/O-BCD Interface, and Dual-Axis Interface Board
	MX2000-6A (MX-6A) **BASE 5-1/2 SLOT SYSTEM**	Includes: Enclosure, DSP Board, Power Supply Board with Digital Interface, and Dual-Axis Interface Board
2 TO 8	**MX2000-8 (MX-8)** **19 INCH SYSTEM ENCLOSURE**	Includes: Enclosure, DSP Board,Power Supply and Dual-Axis Interface Board

For the MX-6(A) and MX-8 add Dual-Axis Boards, I/O Boards and Filler Panels as required

Accessories/Options

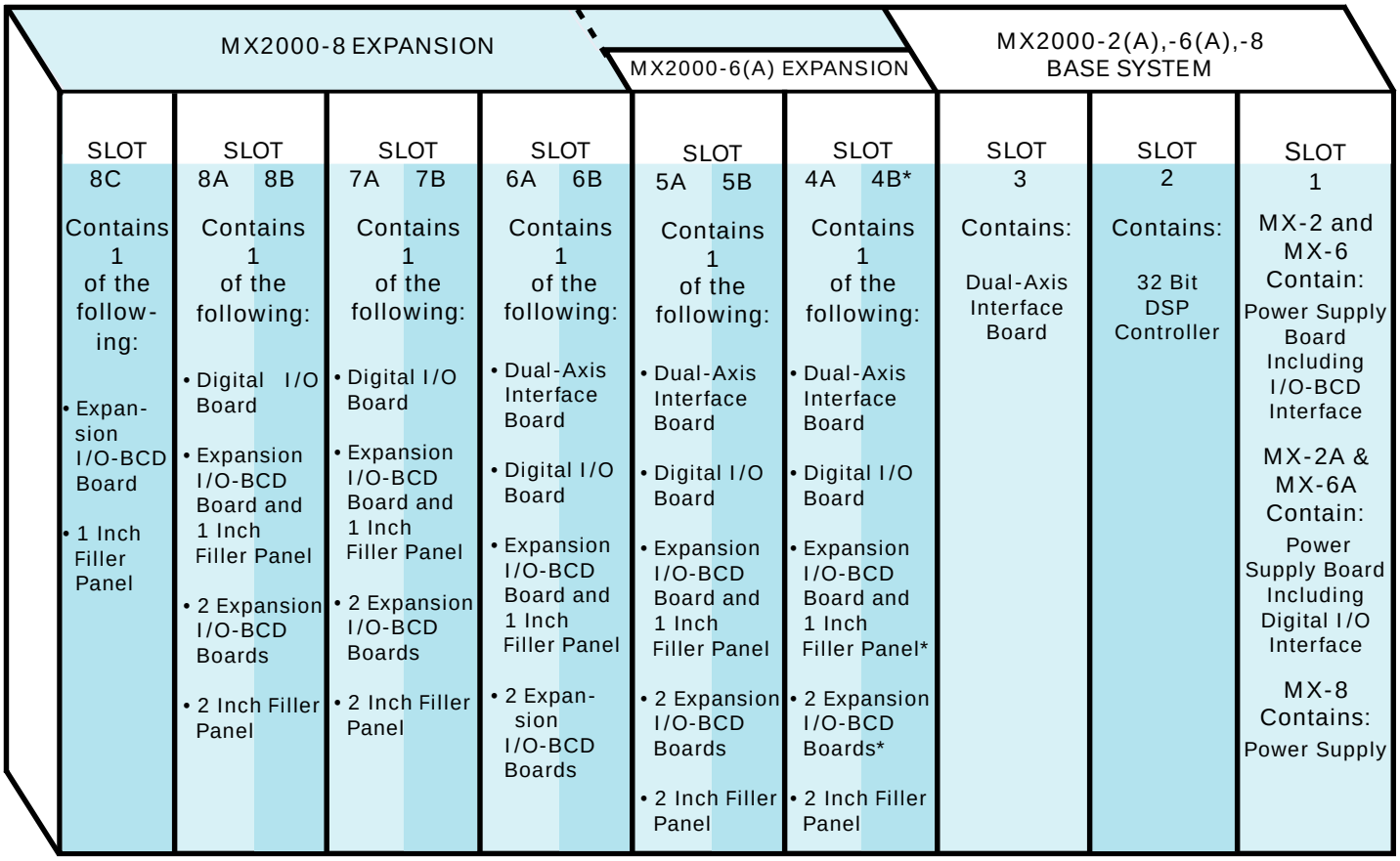
DUAL-AXIS INTERFACE BOARD		Part Number: 222420-001
DIGITAL I/O BOARD		Part Number: 222421-001
I/O-BCD EXPANSION BOARD		Part Number: 222642-001
DSP BOARD WITH 32K RAM		Part Number: 221794-003
BLANK FILLER PANELS	1 Inch Wide	Part Number: 223145-001
	2 Inch Wide	Part Number: 223146-001
PROGRAMMING SOFTWARE (WINDOWS)	Motion Workbench	Part Number: 224418-001
	CAD-to-Motion	Part Number: MX2000-CTM
OPERATOR INTERFACE PANEL	IWS 30SE	Part Number: 222682-001
	IWS 127SE	Part Number: 222683-001
BCD SWITCH	BCD Switch including 18 inch Cable	Part Number: 221157-002
BCD SWITCH INTERFACE	Handles up to 4 BCD Switches	Part Number: 223263-001
BCD INTERFACE CABLE	50-Conductor Flat Ribbon Cable, 3 ft. Connects the MX2000 I/O-BCD Port to the BCD Switch Interface	Part Number: 223264-001

Typical Motion Control System



Ordering an MX2000-2,-6,-8 System

For a 3 to 8 Axis System order requisite number of Dual-Axis boards (part # 222420-001), digital I/O boards (part # 222421-001), expansion I/O-BCD boards (part # 222642-001), or filler panels as required.



* MX-8 only, MX-6 has only one connector in the slot 4A position.

1. Determine the number of axes to be controlled (2 to 8).
2. Select MX2000 package: MX-2(A), 2 Axis no additional I/O; MX-6(A), 2 or 4 axis with additional I/O or 6 axes with I/O provided on the power supply board; MX-8, 2 to 8 axes with or without additional I/O.
3. Select number of Dual-Axis interface boards.
4. If additional I/O is required (MX-6 or MX-8), determine the number of slots remaining for I/O boards.
5. Select I/O Boards based on I/O requirements and available slots.
6. Select filler panels based on remaining empty slots.
7. Determine the characteristics of the motor loads, take into consideration inertia, torque and speed.
8. Use sizing and selection software (CAMAS) to determine motor/drive amplifier selection for each axis.
9. Select the Superior SLO-SYN packaged or modular motor/drive combination best suited for the particular application of each axis.
10. Select proper motor/options/cables for each axis.

Sample System — 4 Stepper Axes

Components, description and quantity requirements for 4 axes with digital I/O and 4 BCD Switches

- Qty. 1, MX2000-6 (MX-6), Multi-Axis Controller Rack which includes:
  1 DSP board, 1 Power Supply Board, and 1 Dual-Axis Interface board
- Qty. 1, 222420-001, Dual-Axis Interface Board
- Qty. 1, 222421-001, Digital I/O Board
- Qty. 4, SS200D6, Packaged Drive
- Qty. 4, M112-FF206C5, Motor with Encoder
- Qty. 4, 216022-032, Motor Cable - 25 Feet
- Qty. 4, 220170-002, Encoder Cable - 25 Feet
- Qty. 4, 221157-002, BCD Switch including 18 inch cable
- Qty. 4, 223263-001, BCD Switch Interface (handles up to 4 BCD Switches)
- Qty. 1, Motion Workbench Programming Software (icon driven)

Sample System — 2 Servo Axes and 2 Stepper Axes

Components, description and quantity requirements for 2 servo axes and 2 stepper axes

- Qty. 1, MX2000-6 (MX-6), Multi-Axis Controller Rack which includes:
  1 DSP board, 1 Power Supply Board, and 1 Dual-Axis board
- Qty. 1, 222420-001, Dual-Axis Interface Board
- Qty. 1, SS2000-S12RE\0922MT, 12 Amp Servo Motor Amplifier
- Qty. 1, SS2000-S12RE\1151MT, 12 Amp Servo Motor Amplifier
- Qty. 1, PS12-230, 12 Amp Power Supply
- Qty. 1, S092-2M, 92 mm, 2 stack, Med Speed Winding Motor
- Qty. 1, S115-1M, 115 mm, 1 stack, Med Speed Winding Motor
- Qty. 1, GCSA-M2/R-4/5-03, Motor Cable Set for S092 Motor, Length 3m
- Qty. 1, GCSA-M4/R-4/5-03, Motor Cable Set for S115 Motor, Length 3m
- Qty. 2, ACK-10, Amplifier I/O Cable Kit
- Qty. 1, PSK-1, Servo Power Supply Cable Kit
- Qty. 2, SS200D6, Packaged Drive
- Qty. 2, M112-FF206C5, Motor with Encoder
- Qty. 2, 216022-032, Motor Cable - 25 Feet
- Qty. 2, 220170-002, Encoder Cable - 25 Feet
- Qty. 1, CAD-to-Motion Programming Software
  (converts DXF format CAD file to MX2000 motion commands)

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