YASKAWA

Scalable
MP2200 Machine Controller
(up to 256 axes)

Compact
MP2300 Machine Controller
(up to 48 axes)

MP2000 Series Multi-Axis Machine Controllers Product Catalog

Unified Digital Network Technology for Servos (Rotary, Linear, and Direct Drive), Inverters, Remote I/O, and Stepper Motor Systems

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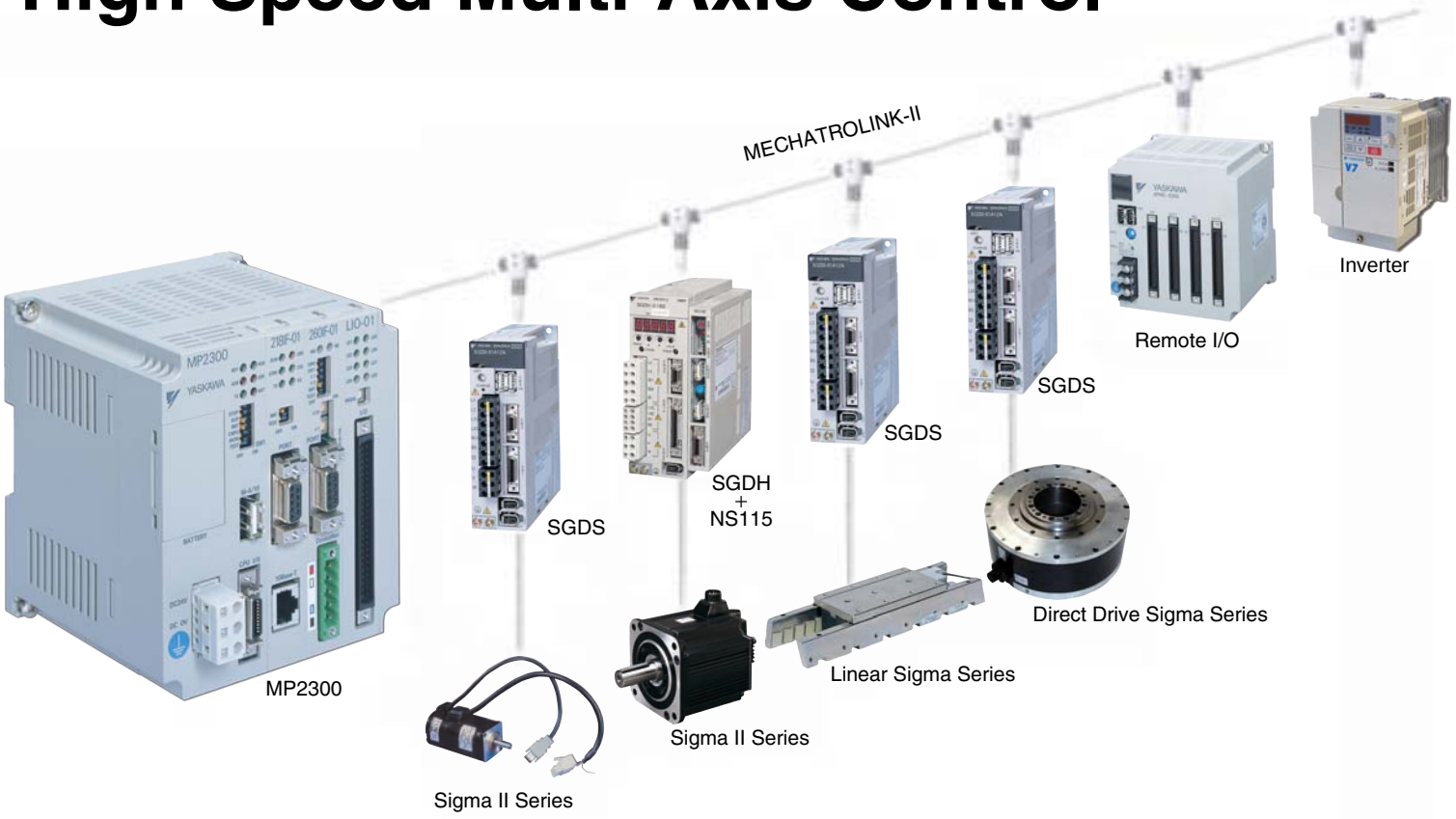
High Speed Multi-Axis Control



Maximizes Speed with Accurate Motion Control

High speeds in program processing and network communication are essential to maximize the output of intricate machines. The high-speed CPU used in the MP2000 Series shortens the execution time of commands. Also, with the MECHATROLINK-II motion network (transmission speed: 10 Mbps) used in the MP2000 Series, high-accuracy and high-speed motion control on multiple axes is realized.

Higher Speed Performance to Control Greater Number of Axes

● Execution Speed Comparison*1 (When comparing the execution time required for each machine controller with that for the MP930.)

Previous Generation		MP2000 Series	
MP930	MP920	MP2200	MP2300
1	1.3	2.6	1.4

*1 : Execution speed will vary in different applications and peripheral devices.
For example: MP2300 is 40% faster than MP930
MP2200 is twice as fast as MP920

● Number of Controlled Axes

Previous Generation		MP2000 Series	
MP930	MP920	MP2200	MP2300
14 axes	224 axes	256 axes	48 axes

Flexible and Powerful
MP2200, MP2300

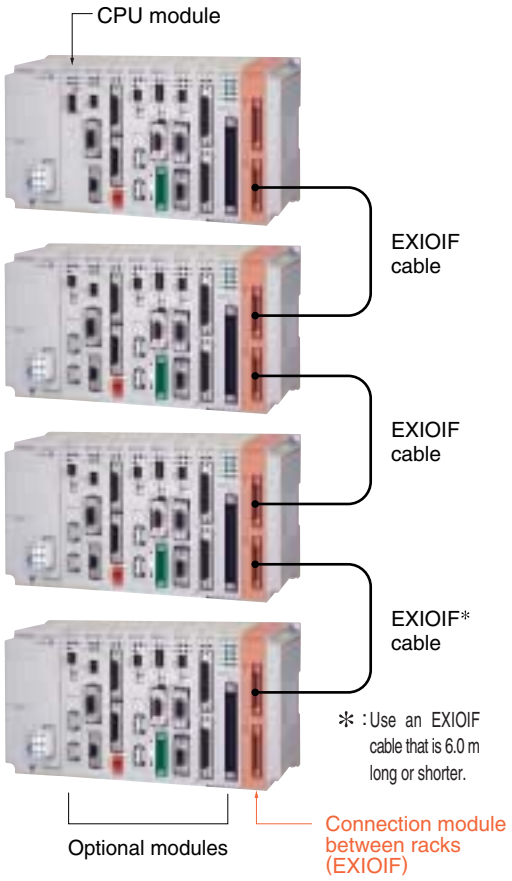
Various types of systems, such as analog or networked systems, can be constructed by combining optional modules.
The distributed installation of I/O, the use of a variety of motors drives, and communication to other brands of controllers are possible.

- Ethernet
- DeviceNet
- Profibus

Scalable Machine Controllers

MP2200 Machine Controller

The MP2200 can be greatly expanded. Nine optional modules can be mounted in one rack and four racks can be connected. The CPU modules can be used to realize a high-speed, motion control cycle of 0.5ms and control of 256 axes. Program storage is also available via removable flash memory modules.



Configuration with Max. Number of Racks

MP2200 Base Units

Name	Model	Description
MBU-01	JEPMC -BU2200	85 VAC to 276 VAC
MBU-02	JEPMC -BU2210	24 VDC ± 20%

Note: Attach a cover (sold separately; model: JEPMC-OP2300) to each empty slot.


CPU (indispensable)


EXIOIF

Modules for MP2200

Name	Model	Description
CPU-02	JAPMC -CP2210	· CPU module CompactFlash card slot × 1 USB port × 1 Memory: 11.5Mbytes
EXIOIF	JAPMC -EX2200	· For connecting racks (Max. 4 racks)

MP2300 Machine Controller

The MP2300 is an all-in-one machine controller. It has three slots for other modules and a basic module whose standard functions include those of a CPU module, an SVB module, and an I/O module. The CPU can be used to control 48 axes (when two SVB-01 modules are mounted). Most modules used for the MP2200 controller can be mounted in its three slots.

MP2300 Basic Module

Name	Model	Model
MP2300	JEPMC -MP2300	· 24 VDC ± 20% · MECHATROLINK-II × 1 channel · Input: 8 points, Output: 4 points

Note: Attach a cover (sold separately; model: JEPMC-OP2300) to each empty slot.

Wide Selection of Modules (For MP2200 and MP2300)

●Motion Control Modules

Connects to the SERVOPACK for motion control. Various MECHATROLINK slaves can be connected to the SVB-01 module.

Name	Model	Description	✻
SVB-01	JAPMC -MC2310	MECHATROLINK-II × 1 channel	16
SVA-01	JAPMC -MC2300	Analog-output 2-axis servo control	
PO-01	JAPMC -PL2310-E	Pulse-output 4-axis servo control	

✻: Maximum number of modules that one CPU can control.

●I/O Modules

Provides digital or analog I/O interface. 5 types of digital I/O modules, 2 types of analog I/O modules, and 1 type of counter module are available.

Name	Model	Description
LIO-01	JAPMC -IO2300	Digital input: 16 points (sink output mode) Digital output: 16 points (sink output mode) Pulse input: 1 point
LIO-02	JAPMC -IO2301	Digital input: 16 points (source output mode) Digital output: 16 points (source output mode) Pulse input: 1 point
LIO-04	JAPMC -IO2303	Digital input: 32 points Digital output: 32 points (sink output mode)
LIO-05	JAPMC -IO2304	Digital input: 32 points Digital output: 32 points (source output mode)
DO-01	JAPMC -DO2300	Digital output: 64 points (sink output mode)
AI-01	JAPMC -AN2300	Analog input: 8 channels
AO-01	JAPMC -AN2310-E	Analog output: 4 channels
CNTR-01	JAPMC -PL2300-E	Pulse-output counter

✻: One CPU can control unlimited number of modules.

●Communication Modules

Used to construct an open network. Modules with various types of interfaces are available.

Name	Model	Description	✻
218IF-01	JAPMC -CM2300	Ethernet(10BASE-T) port ×1 RS-232C port ×1	8
217IF-01	JAPMC -CM2310	RS-232C port ×1 RS-422/485 port ×1	
260IF-01	JAPMC -CM2320	DeviceNet port ×1 RS-232C port ×1	
261IF-01	JAPMC -CM2330	PROFIBUS port ×1 RS-232C port ×1	
215IF-01	JAPMC -CM2361	CP-215 communication/RS-232C	

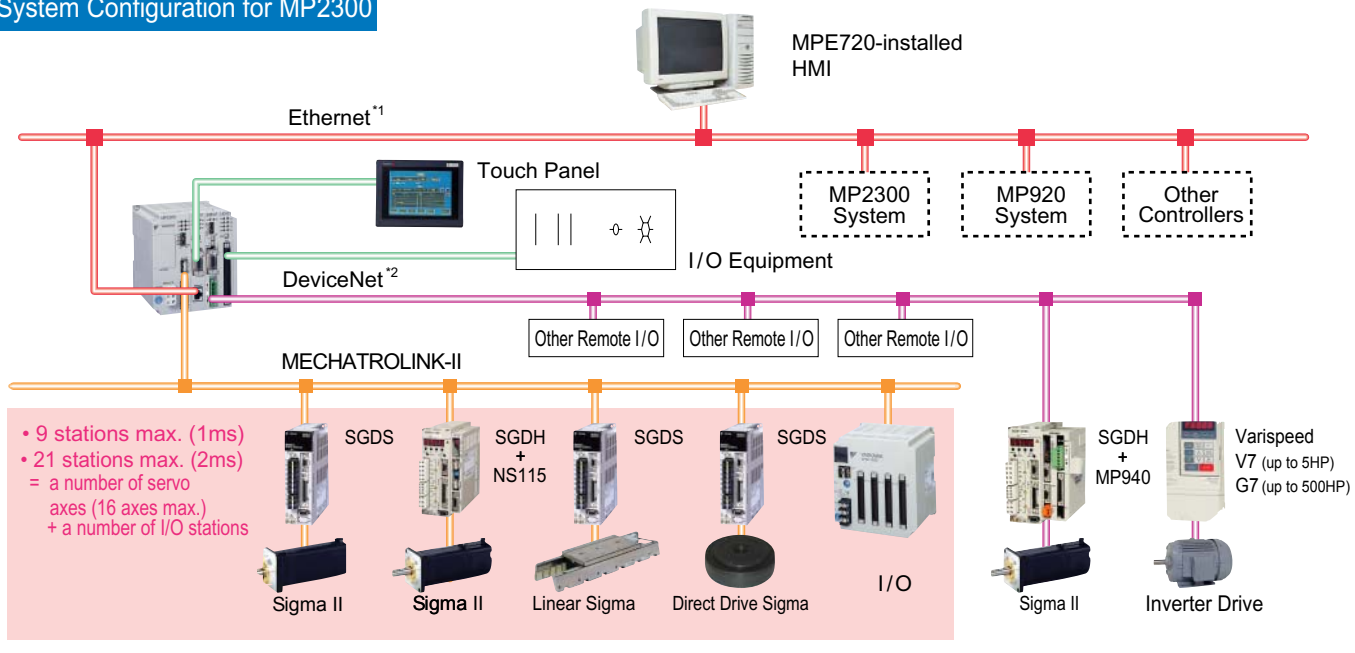
✻: Maximum number of modules that one CPU can control.
Note: For RS-232C communications, 16 ports can be used.

I/O Modules for MECHATROLINK-II

●Yaskawa or third-party modules* for distributed I/Os include 24VDC or 120/240VAC digital I/O, relay output, RTD, and analog I/O.

* Example of third-party distributed I/O module from Phoenix Contact www.phoenixcontact.com.

System Configuration for MP2300

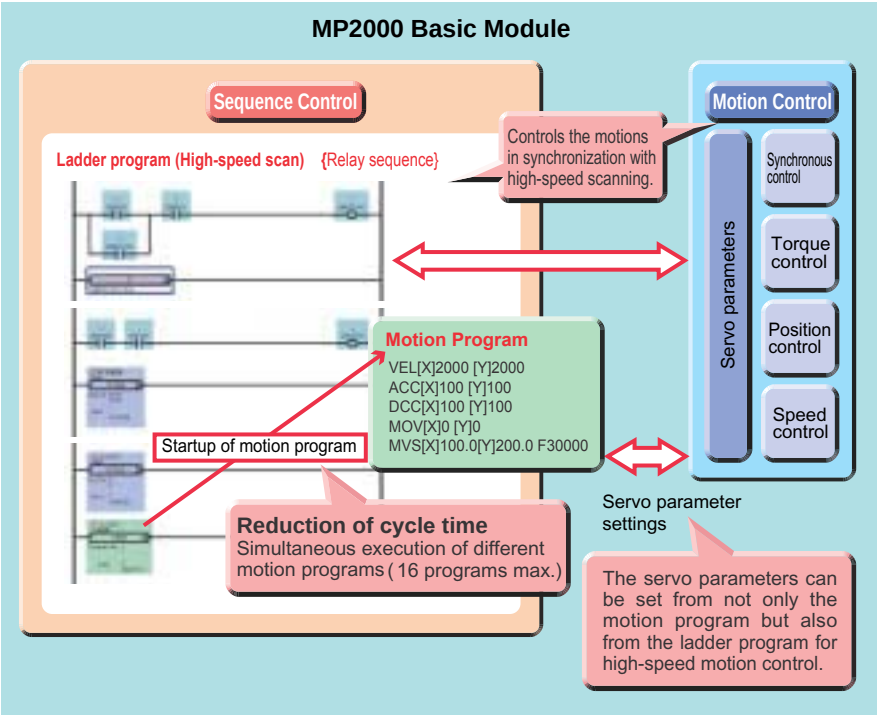


*1 Registered trademark of Xerox Corporation.
*2 Registered trademark of ODVA (Open Device Vendor Association).

High-speed Performance

With the synchronized processing of the sequence and motion controls, high-speed performances can be attained.

MP2000 Machine Controllers control the machine's motions in synchronization with high-speed scanning. Motion control starts within 1 scan from the start signal. Also, different motions can be controlled at the same time. This high-speed performance helps to reduce machine cycle time.



High-speed CPU Processing

Maximizing the speed for arithmetic calculations is essential for high-speed motion control.
The high-speed CPU processing of MP2000 Series Controllers is capable of coping with large-capacity programs.

Command Execution Time

0.2ms/1,000 steps*
(1.4 times faster than other controllers)

- Sequence commands

	High Speed ←
Others	0.23 µs
MP2300	0.12 µs

- Arithmetic operation commands

	High Speed ←
Others	0.46 µs
MP2300	0.38 µs

* Excluding overhead time

Program Capacity

The ladder program has 4,000 steps when the motion program has 1,200,000 characters (120,000 steps max. only with ladder program).

- Motion program

Others	80,000 characters
MP2300	1,200,000 characters

Applications


Coil Winding Machine


Bonder


Capacitor Winding Machine

Advanced Motion Control

MECHATROLINK-II for Online Switching with 4 Control Modes

A MECHATROLINK-II motion network (10Mbps) is used with MP2000 machine controllers for control of a flexible and highly precise servo system.
As well as torque, position, and speed control modes that are required for machine control, the MECHATROLINK-II also realizes synchronous phase control, which requires very high accuracy. Also, the controls for speed, torque, position, and synchronous phase can be switched while the machine is running, so you can accurately control the machine's complex motions.

MECHATROLINK-I

Transmission Speed	Transmission Cycle (Number of Controlled Axes)
4Mbps	2ms (14 axes)

MECHATROLINK-II

Transmission Speed	Transmission Cycle (Number of Controlled Axes)
10Mbps	0.5ms(4 axes) *1 1.0ms(9 axes) 1.5ms(15 axes) *1 2.0ms(16 axes) *2

*1 : For MP2200 only.
*2 : Twenty-one stations, including I/O equipment, can be connected.

Interpolation Functions for Simple Programming

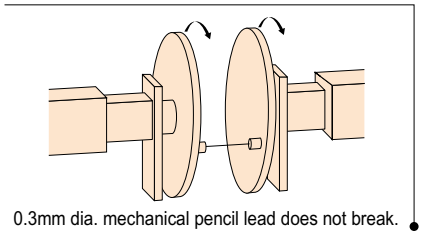
Commands for linear, circular, and helical interpolation are available for easy programming of machine motions.

Four Control Modes All-in-one

• Synchronous Phase Control

Not applicable for applications using motion control from a PC.

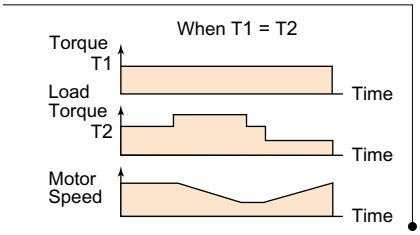
Speed control with position compensation (electronic shaft) or position control with 100% speed feed forward (electronic cam). Multi-axis servomotors can be controlled synchronously.



0.3mm dia. mechanical pencil lead does not break.

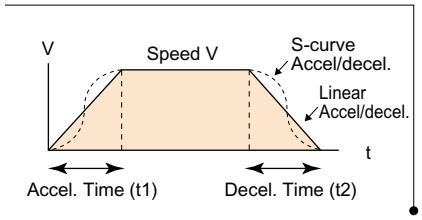
• Torque Control

Generates a constant torque, regardless of speed.



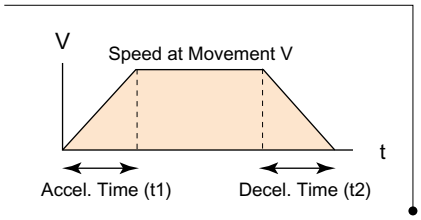
• Position Control

Advances to the target position, and stops or holds.

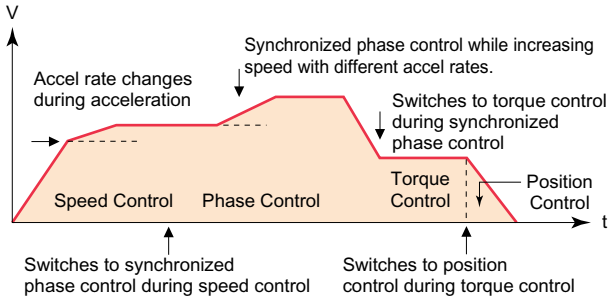


• Speed Control

Turns the motor at the specified speed, with user-defined acceleration/deceleration slopes.



Online Switching Control Modes

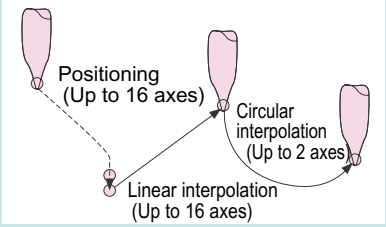


Applications

- Converting machine:
  From speed control to torque control
- Packaging machine:
  From synchronous control to position control

Linear Interpolation, Circular Interpolation

Basic motions, such as rapid traverse positioning, linear interpolation, and circular interpolation, can be easily programmed.



Helical Interpolation

Helical interpolation combines linear and circular interpolation (Fig. A).
Helical interpolation can also be used to create an arc segment in three-dimensional space (Fig. B) .

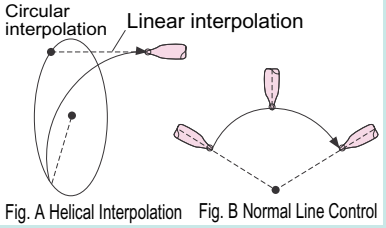


Fig. A Helical Interpolation Fig. B Normal Line Control

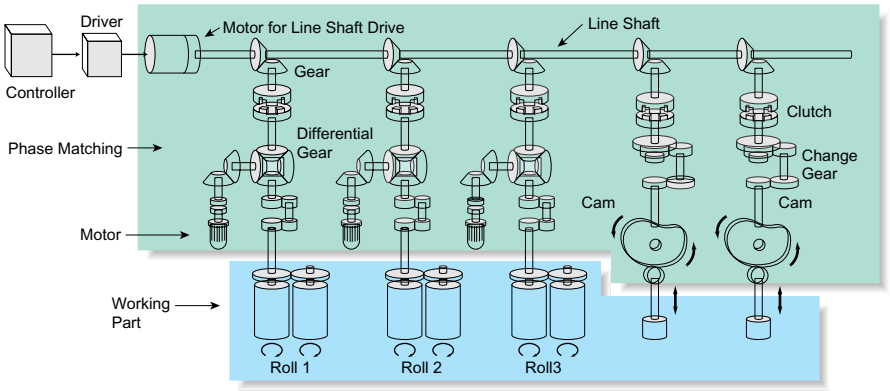
Advanced Motion Control

Electronic Shaft and Electronic Cam for Simplified Mechanism

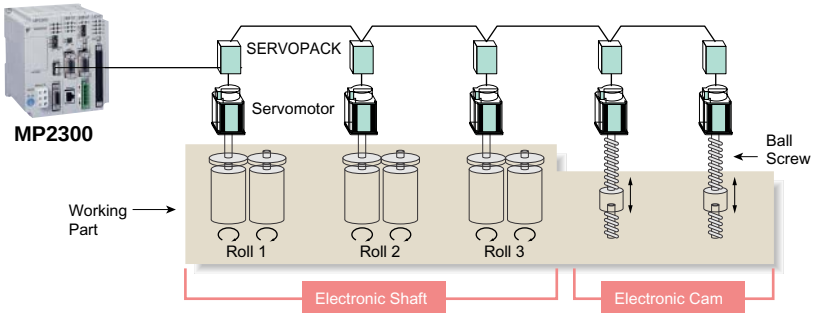
With an MP2000 controller, AC servo amplifiers that are connected to the MECHATROLINK-II can directly control each axis of a machine. Because the mechanical systems for adjusting phases are no longer needed, the machine's mechanism is greatly simplified and the wear on parts is eliminated. No wear means improved repeatability.
By using an MP2000 controller, you can also reduce the time for fine adjustments, retooling, and setup for lot changes.

Electronic Shaft and Electronic Cam for Synchronous Phase Control

Conventional Method



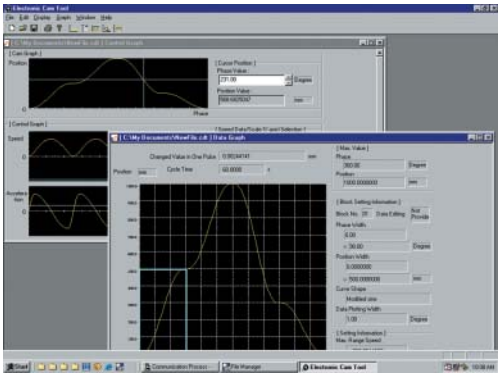
Synchronized Operation by MP2300



AC servomotors move the same way as with rollers on the line shaft.

AC servomotors move the same way as with the mechanical cam. Use the cam data generation tool (see below) for easy programming and adjustment.

Cam Data Generation
for Easy Programming (integrated in MPE720)



Cam curve definition

Set a curve at every block.
(20 blocks max. 25 curves)

Execution with MP2000

The data list is processed in MP2000. Motions of the machine can be monitored and adjusted with the following graphs.

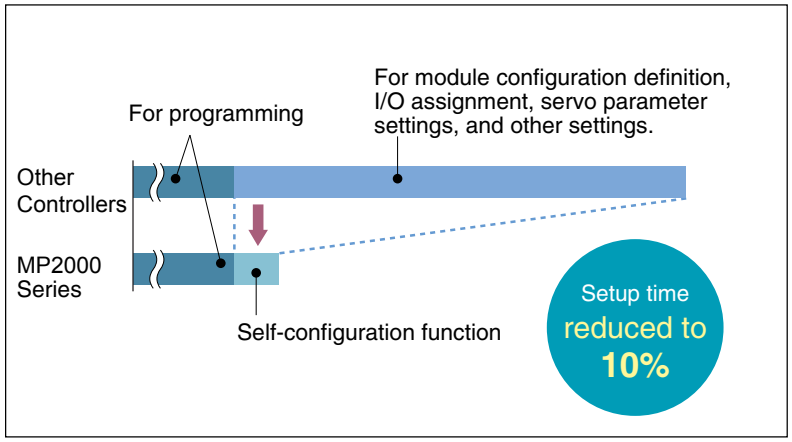
- Cam graph (displacement)
- Control graph (displacement, speed, acceleration, saltation)

Easy Setup and Customization

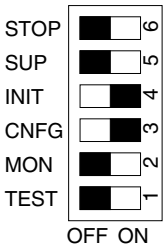
Input definition settings that are necessary with other controllers are not needed, so the setup time is greatly reduced.

The MP2000 Series Machine Controller automatically recognizes the devices connected to MECHATROLINK-II

- Optional module configuration definitions (I/O symbolic addressing)
- Communication parameter settings
- Servo drives (servo parameters) connected to MECHATROLINK-II
- I/O points connected to MECHATROLINK-II



Self-configuration with DIP switches

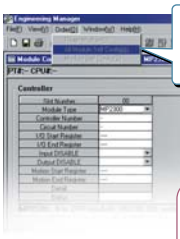


Set the DIP switches, INIT and CNFG, on the basic module or on the CPU module to ON, and then turn on the power supply.

More Information

- Any definitions that have been set with the self-configuration function will not be saved in the Flash ROM. Use the MPE720 to save these definitions in the Flash ROM.

Self-configuration with the MPE720



Select on the order menu in the MPE720 Engineering Manager window.

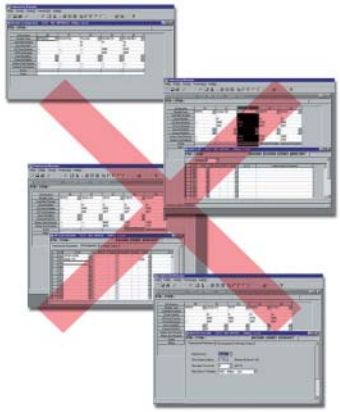
More Information

- All Modules (All Self-configuration) or Specified Modules (Module Self-configuration) can be selected.

Data that can be set by the Self-configuration function

- Module configuration definitions (Types of optional modules)
- I/O symbolic addressing
- Communication parameter settings
- Servo drives (Servopack parameters and SVB definition parameters) connected to the MECHATROLINK-II
- I/O points connected to the MECHATROLINK-II

Free from troublesome settings

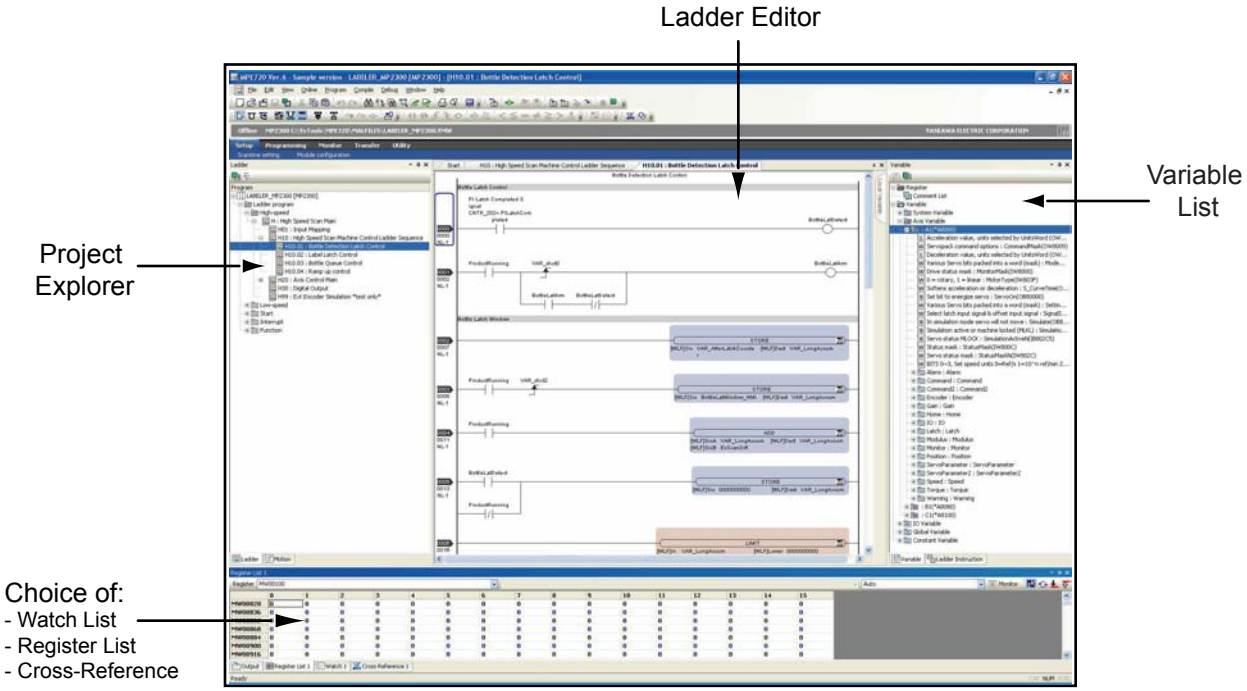


MotionWorks™ Application Development Software

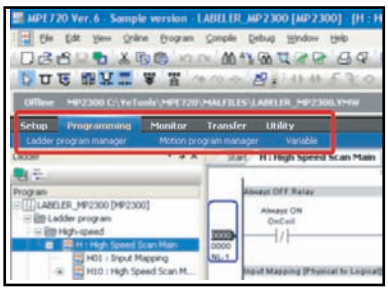
Increased Programming Flexibility with MPE720 Ver. 6

MotionWorks™ MPE720 Ver. 6 is a single Integrated Development Environment for programming sequence, process, and motion control. It is ideal for applications in packaging, converting, assembly, material handling, etc.

- Reduce your machine development time
- Routines can be written in ladder, function block, or structured text
- Symbolic addressing
- Graphical editor simplifies cam profile generation
- Multi-level password protection
- Customizable watch windows

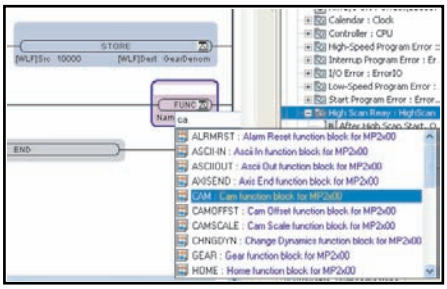


Program Navigation



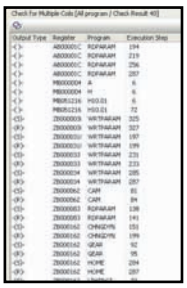
Tabs allow easy access to different parts of program.

Enhanced Function Name Selection



Full function name and description displayed.

Program Verification



Displays warnings such as "Multiple Coils".

Total Support System for Designing, Adjustment, and Maintenance

Windows-Based Design for Simplified Setting and Monitoring

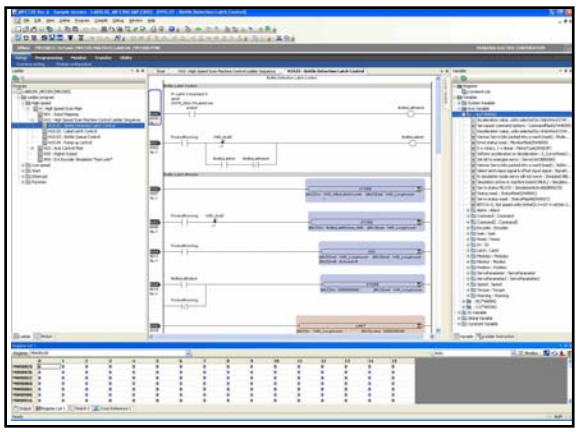
You can set and monitor the system and your project files in the following windows:

- Setup
- Programming
- Monitoring
- Transfer
- Utilities Management

Main Project Window

MotionWorks™ Version 6 is based upon the latest standards in graphical user interfaces (GUI) and includes scan-based PLC style programming, symbolic addressing, drag-and-drop objects, and easy user access to elements of the application from anywhere within a project.

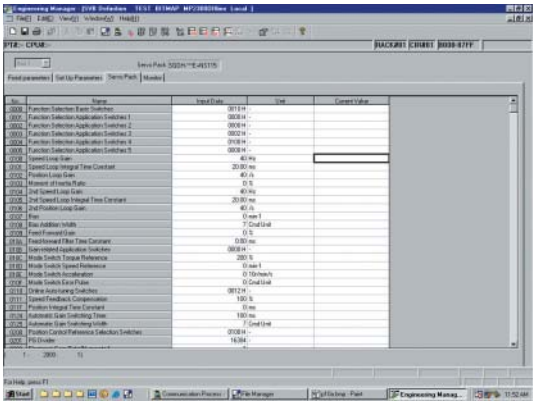
▼Main Project Window



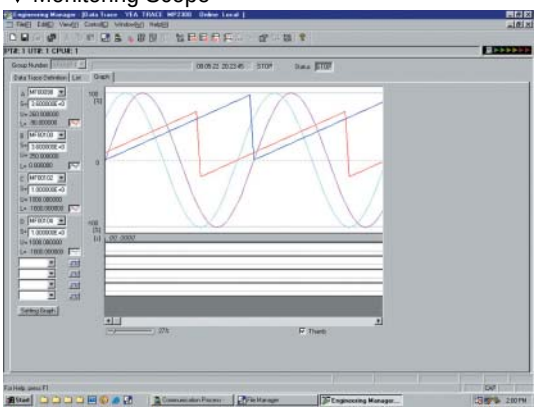
Windows for Setup and Monitoring

When used with the Ladder and Motion Editor, it can be used as a programming, monitoring, or debugging tool.

▼Servo Parameter Adjustment Window

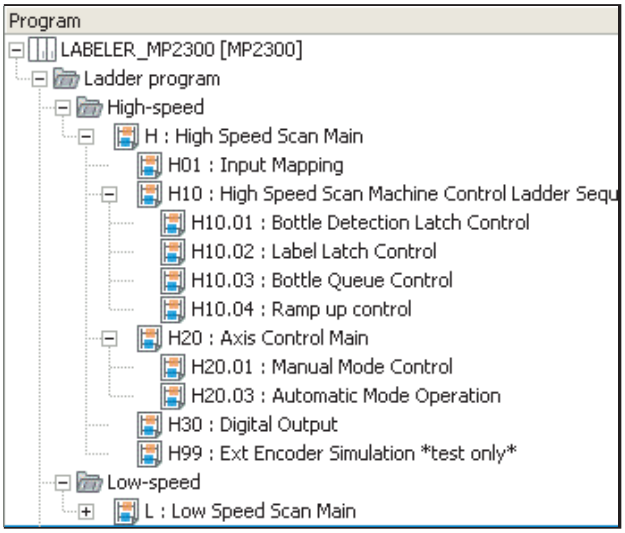


▼Monitoring Scope



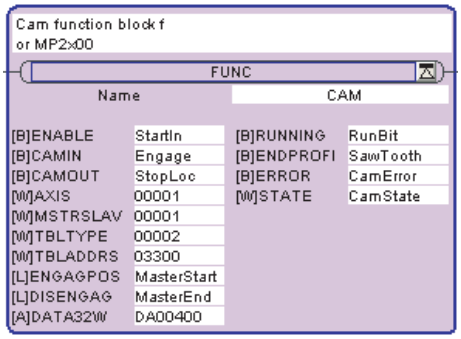
Tips to reduce the program management time

- **Hierarchy Programming**
  Programs are managed in ladder files. The files are hierarchically ordered and are grouped according to the program process to clarify the structure of the program. There are three types of project files: startup, high-speed scan process, and low-speed scan process.



Advantages
- Programs are standardized as ladder files, making reuse possible.
- Using merge and copy reduces the programming time.
- Files are grouped by processes, functions, and designers.

- **Functions**
  Standard functions and custom user functions are available. Custom user functions allow the user to make specialized operations and can be referenced from any ladder program.

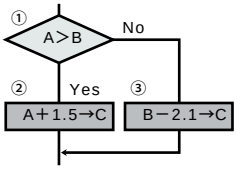


Letter in parentheses denotes data type:
B = Bit, W = Word, L = Long word, A = Address

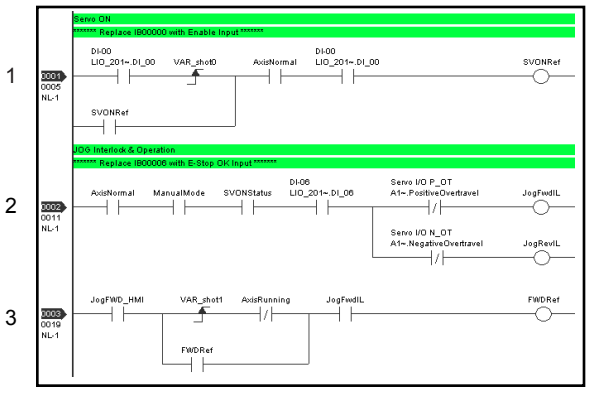
Advantages
- Easily divides programs into sections.
- Simplified program design and maintenance.

- **Structured Language**
  By using a structured programming language that includes IF, WHILE, and FOR statements, the programs are compact and easy to understand.

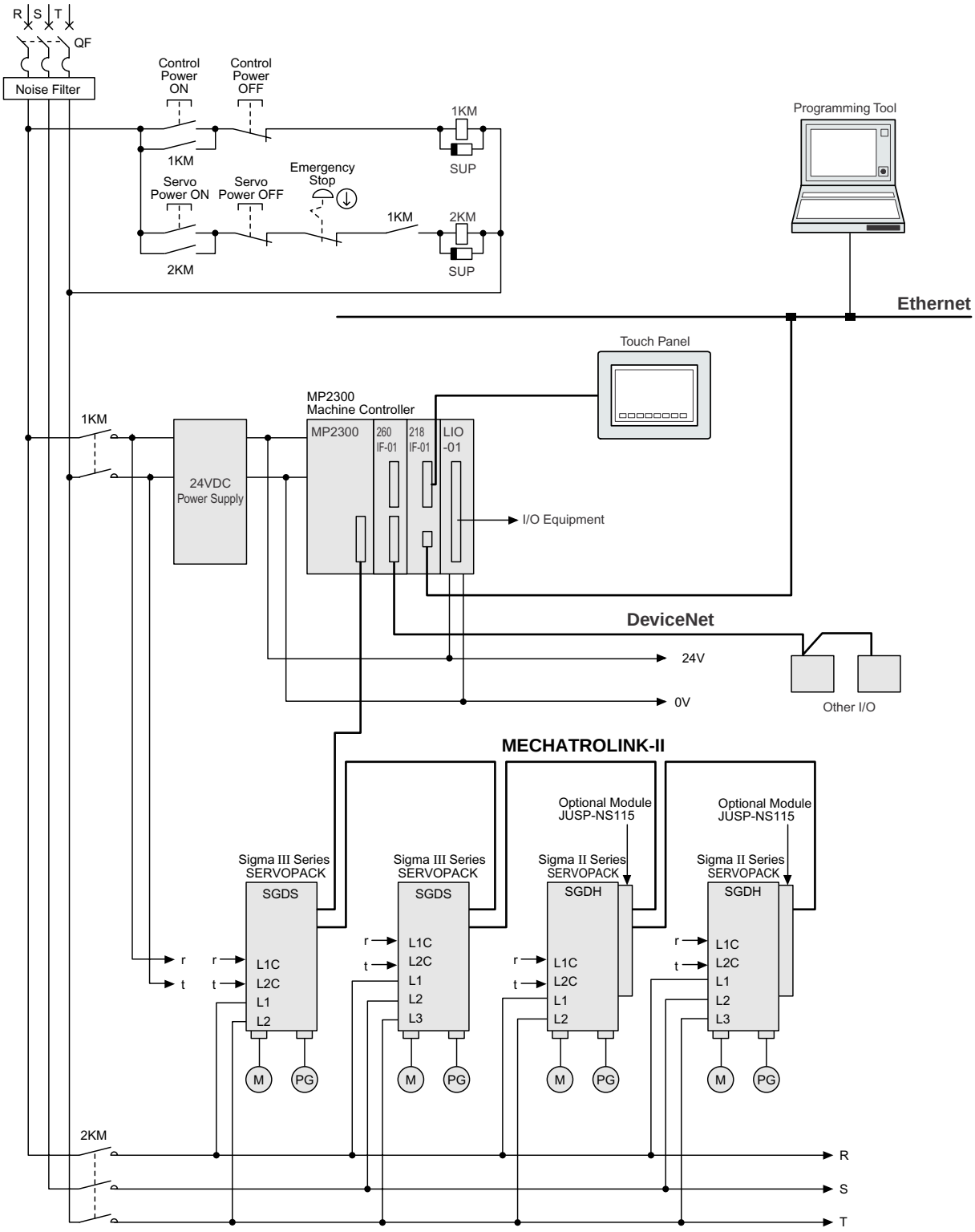
Process



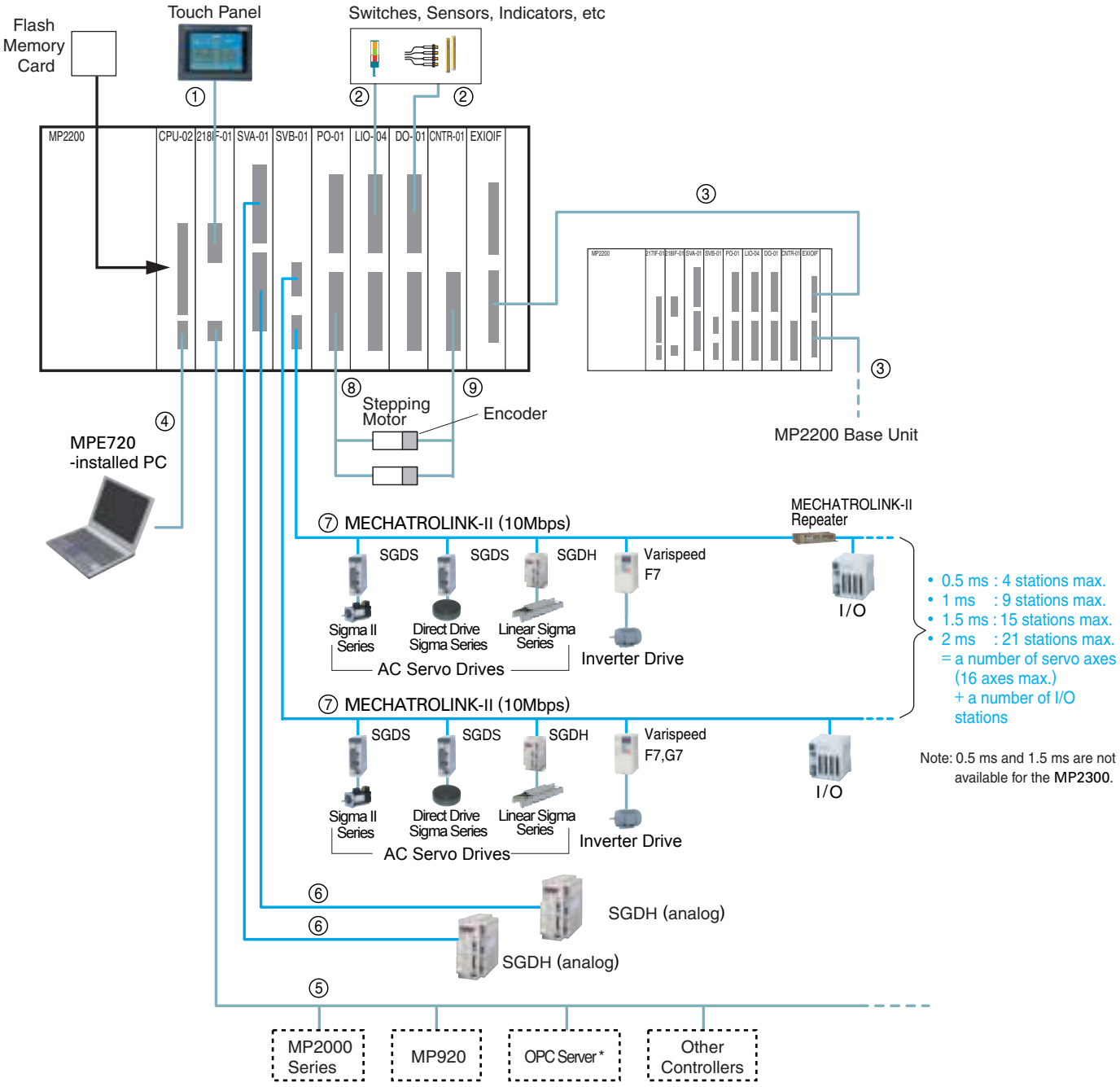
Program



MP2300 System Connection Diagram Example



MP2200 System Connection Diagram Example



* Can be connected to OPC server such as Kepware to monitor the data via the 218IF-01 Ethernet port. Contact Kepware Technologies for more information (http://www.kepware.com)

Names and Models of Cables

No.	Name	Model	Length m
①	RS-232C Communication Cable	JEPMC-W5311-□□	2.5 / 15.0
②	I/O Cable for LIO-04 and DO-01	JEPMC-W6060-□□	0.5 / 3.0
③	EXIOIF Cable	JEPMC-W2091-□□	0.5 / 1.0 / 2.5
④	USB Cable	Use a USB cable.	
⑤	Ethernet Communication Cable	Use 10Base-T cross or straight cables.	
⑥	Connection Cable for SVA-01	JEPMC-W2040-□□	0.5 / 1.0 / 3.0
⑦	MECHATROLINK-II Cable	JEPMC-W6002-□□	0.5
		JEPMC-W6003-□□	1.0 / 3.0 / 5.0 / 10.0 / 20.0 / 30.0 / 40.0 / 50.0
⑧	Connection Cable for PO-01	JEPMC-W6060-□□	0.5 / 1.0 / 3.0
⑨	I/O Cable for CNTR-01	JEPMC-W2063-□□-E	0.5 / 1.0 / 3.0

General Specifications

Items		Specifications
Environmental Conditions	Operating Temperature	0°C to +55°C
	Storage Temperature	-20°C to +85°C
	Operating Humidity	30% to 95% (non-condensing)
	Storage Humidity	5% to 95% (non-condensing)
	Corrosive Gas	No combustible or corrosive gas
	Operating Altitude	2,000m above sea level or lower
Electrical Operating Conditions	Noise Resistance	Conforming to JIS B3502 Power supply noise (FT noise): 2kV or larger for 1 min. Radiation noise (FT noise): 2kV or larger for 1 min. Gland noise (Impulse noise): 1kV or larger for 10 min. Static noise (Aerial discharge): 8kV or larger □ □ □ for 10 times

Items		Specifications
Mechanical Operating Conditions	Vibration Resistance	Conforming to JIS B3502 1. Frequency: 16.7Hz Vibration acceleration: 14.7m/s² 2 hours in each direction (X, Y, and Z) 2. Frequency: 10Hz to 57Hz Vibration amplitude: Single-amplitude of 0.075mm 3. Frequency: 57Hz to 150Hz Vibration acceleration: a fixed acceleration of 9.8m/s²
	Shock Resistance	Peak acceleration of 294m/s²(30G) twice for 11ms each in directions X, Y, and Z
Installation Requirements	Ground	Ground to 100Ω or less
	Cooling Method	Natural cooling

Controllers and Modules: UL, cUL File # E184524

Controller Options

●MP2300 Base Unit

Model Name: MP2300
Model: JEPMC-MP2300
Approx. Mass: 500g

Items	Specifications
Power Supply	Input power voltage: 24 VDC ±20% Current consumption: 1A Inrush current: 40A or less
Motion Network	One circuit for MECHATROLINK-II Twenty-one stations, including servo amplifiers and I/O equipment, can be connected. (16 axes for servo amplifiers) Transmission speed: 10Mbps (MECHATROLINK-II) Maximum segment length: 50m
I/O Signals	Direct input: 8 points (One point can be used for interrupts), 24VDC, 4mA, and source mode or sink mode input Direct output: 4 points, 24VDC, 100mA, open collector, and sink mode output
Slot for Optional Modules	3 slots
Dimensions (mm)	120 Width x 130 Height x 108 Depth

●MP2200 Base Unit

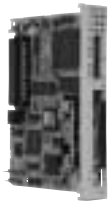
Model: JEPMC-BU2200
Approx. Mass: 665 g

Model: JEPMC-BU2210
Approx. Mass: 640 g

Items	Specifications	
	JEPME-BU2200(MBU-01)	JEPME-BU2210(MBU-02)
Power Supply	Input power voltage: 85 VAC to 276 VAC Current consumption: 1.5 A or less with I/O rating Inrush current: 10 A or less when completely discharged, 200 VAC input, output rating	Input power voltage: 24 VDC ± 20% Current consumption: 3.0 A or less with I/O rating Inrush current: 10 A or less when completely discharged, output rating
Motion Network	Not available for the base unit	
I/O Signals	Not available for the base unit	
Slot for Optional Modules	9 slots	
Expansion Configuration	Maximum of 4 base units can be connected using the EXIOIF	
Dimensions (mm)	240 × 130 × 108 (W × H × D)	

CPU Module (MP2200 only)

● CPU Module (CPU-02) MP2200



CPU-02 Module
Model: JAPMC-CP2210
Approx. Mass: 80 g

Items	Specifications
	CPU-02
Max. Number of Controlled Axes	256 axes
High-speed Scan	0.5 ms to 32.0 ms (in units of 0.5 ms)
Low-speed Scan	2.0 ms to 300.0 ms (in units of 0.5 ms)
User Memory Capacity	11.5 MB
Expansion Ports	1 slot for Compact Flash card 1 port for USB card (for engineering)

Note: Not applicable to multiple CPU system

Connection Module (MP2200 only)

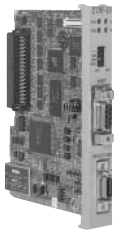
● Connection Module between Racks (EXIOIF) MP2200

Model: JAPMC-EX2200
Approx. Mass: 80 g

Items	Specifications
Number of Expansion Racks	4 racks max.
Rack No.	Automatically identified

Communication Modules

● General-purpose Serial Communication Module (217IF-01) MP2200 MP2300



Model: JAPMC-CM2310
Approx. Mass: 100g

● For RS-232C communication

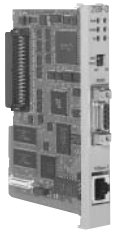
Items	Specifications
Interface	One port
Connector	D-sub 9 pins (Female)
Max. Transmission Distance	15m
Transmission Speed	76.8kbps
Access Mode	Asynchronous (Start-stop synchronization)
Communication Protocols	MEMOBUS (Master or Slave), MELSEC, or non-procedure
Media Access Control Method	1:1
Transmission Format (Can be set)	Data bit length: 7 or 8 bits Stop bits: 1 or 2 bits Parity bits: Even, odd, or none

● For RS-422/485 communication

Items	Specifications
Interface	One port (RS-422 or -485)
Connector	MDR 14 pins (Female)
Max. Transmission Distance	300m
Transmission Speed	76.8kbps
Access Mode	Asynchronous (Start-stop synchronization)
Communication Protocols	MEMOBUS (Master or Slave), MELSEC, or non-procedure
Media Access Control Method	1:1 (RS-422) 1:N (RS-485)
Transmission Format (Can be set)	Data bit length: 7 or 8 bits Stop bits: 1 or 2 bits Parity bits: Even, odd, or none

Communication Modules (continued)

● Ethernet Communication Module (218IF-01) MP2200 MP2300



Model: JAPMC-CM2300
Approx. Mass: 90 g

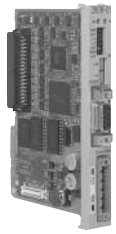
For Ethernet communication

Items	Specifications
Interface	One port (10BaseT) (RJ-45 modular jack)
Max. Segment Length	100 m
Transmission Speed	10 Mbps
Access Mode	IEEE802.3
Flame Format	Ethernet Ver.2 (Conforming to DIX)
Connections	TCP/UDP/IP/ARP
Max. Number of Words in Transmission	512 words (1024 bytes)
Communication Protocols	Extended MEMOBUS, MEMOBUS, MELSEC-A, non-procedure, or MODBUS/TCP
Max Number of Connections	20 stations

For RS-232C communication

Items	Specifications
Interface	One port
Connector	D-sub 9 pins (Female)
Max. Transmission Distance	15m
Transmission Speed	19.2 kbps
Access Mode	Asynchronous (Start-stop synchronization)
Communication Protocols	MEMOBUS (Master or Slave), MELSEC, or non-procedure
Media Access Control Method	1:1
Transmission Format (Can be set)	Data bit length: 7 or 8 bits Stop bits: 1 or 2 bits Parity bits: Even, odd, or none

● DeviceNet Communication Module (260IF-01) MP2200 MP2300



Model: JAPMC-CM2320
Approx. Mass: 90 g

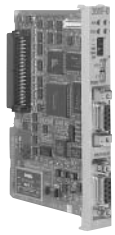
For DeviceNet communication

Items		Specifications
Number of Circuits		1
Applicable Communication		Conforms to DeviceNet - I/O transmission (polled I/O and bit-strobed I/O) - Explicit messaging
I/O Communication	Max. Number of Slaves	63 nodes
	Max. I/O Bytes	1024 bytes or 256 bytes per node
Message Communication (Only for Master)	Max. Number of Nodes	63 nodes (Synchronous communications possible: 8 nodes)
	Max. Message Length	256 bytes
	Executed Functions	MSG-SGD function
Switches on the Front		Two rotary switches: Node address settings DIP switch: Settings for transmission speed and switching master or slave
Indicators		2 LEDs: MS or NS
Power Voltage for Communication		24 VDC ±10% (Using the specially designed cable)
Max. Current Consumption		Communication power: 45 mA (Supplied by transmission connectors)

For RS-232C communication

Items	Specifications
Interface	One port
Connector	D-sub 9 pins (Female)
Max. Transmission Distance	15 m
Transmission Speed	19.2 kbps
Access Mode	Asynchronous (Start-stop synchronization)
Communication Protocols	MEMOBUS (Master or Slave), MELSEC, or non-procedure
Media Access Control Method	1:1
Transmission Format (Can be set)	Data bit length: 7 or 8 bits Stop bits: 1 or 2 bits Parity bits: Even, odd, or none

● PROFIBUS Communication Module (261IF-01) MP2200 MP2300



Model: JAPMC-CM2330
Approx. Mass: 90 g

For PROFIBUS communication

Items	Specifications
Functions	DP slave Cyclic communication (DP standard function)
Transmission Speed	12M/6M/4M/3M/1.5M/750k/500k 187.5k/93.75k/19.2k/9.6kbps (Automatic detection)
Configuration	By PROFIBUS Master
Slave Address	1 to 64
I/O Processing	Total capacity of IW/OW registers: 64 words Max. I/O allocation (IN and OUT each): 64 words
Diagnostic Functions	Display for status and slave status using the EWS. I/O error display for SW registers

For RS-232C communication

Items	Specifications
Interface	One port
Connector	D-sub 9 pins (Female)
Max. Transmission Distance	15 m
Transmission Speed	19.2 kbps
Access Mode	Asynchronous (Start-stop synchronization)
Communication Protocols	MEMOBUS (Master or Slave), MELSEC, or non-procedure
Media Access Control Method	1:1
Transmission Format (Can be set)	Data bit length: 7 or 8 bits Stop bits: 1 or 2 bits Parity bits: Even, odd, or none

Motion Modules

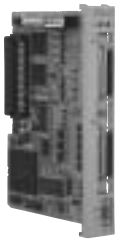
● MECHATROLINK-II Motion Control Module (SVB-01) MP2200 MP2300

Model: JAPMC-MC2310
Approx. Mass: 80 g

Items	Specifications
Communication Circuits	1 circuit
Communication Ports	2 ports
Terminator	External resistor (JEPMC-W6022 required)
Transmission Speed	10 Mbps
Communication Cycle	0.5 ms, 1 ms, 1.5 ms, 2 ms
Number of Connecting Stations*	21 stations (16 axes for servo drives) /2 ms, 15 stations (15 axes for servo drives) /1.5 ms, 9 stations (9 axes for servo drives) /1 ms, 4 stations (4 axes for servo drives) /0.5 ms
Retry Function	Available with MECHATROLINK-II
Slave Function	Available with MECHATROLINK-II
Transmission Distance	See "MECHATROLINK-II Repeater" on page 21

* MECHATROLINK-II (32-byte mode)

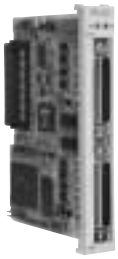
● Analog Output Motion Control Module (SVA-01) MP2200 MP2300



Model: JAPMC-MC2300
Approx. Mass: 100 g

Items	Specifications
Number of Controlled Axes	2
Analog Output	2 channels/1 axis, -10 V to +10 V, 16-bit D/A
Analog Input	2 channels/1 axis, -10 V to +10 V, 16-bit A/D
Pulse Input	1 channel/1 axis, 5-V differential inputs, phase A/B pulse, and 4Mpps (16Mpps with 4 multipliers)
Input Signals	6 points/1 axis, 24 VDC, 4 mA, and source mode or sink mode input
Output Signals	6 points/1 axis, 24 VDC, 100 mA, open collector, and sink mode output

● Pulse Output Motion Control Module (PO-01) MP2200 MP2300



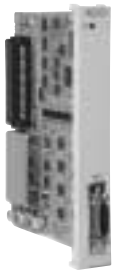
Model: JAPMC-PL2310-E
Approx. Mass: 100 g

Items	Specifications
Number of Controlled Axes	4
Pulse Output	Output Method : CW/CCW, sign + pulse, and A/B Maximum Frequency : 4 Mpps with CW/CCW or sign + pulse, 1 Mpps with phase A/B (before multiplication) Interface : 5-V differential outputs
Digital Input	5 points × 4 channels, source mode input DI_0 : Separate for each power supply: 5 V/3.9 mA, 12 V/10.9 mA, 24 V/4.1 mA DI_1 to DI_4 : Power supply shared: 24 V/4.1mA
Digital Output	4 points × 4 channels Open collector and sink mode output (24 V/100 mA)
Current Consumption	5V, 1.0A max.

Local I/O Modules

● Analog Output Module (AO-01)

MP 2200 MP 2300



Model: JAPMC-AN2310-E
Approx. Mass: 90 g

Items		Specifications	
Number of Channels		4	
Number of Channels to be Used		1 to 4	
Isolation		Between channels: Not isolated Between input connector and system power supply: Photocoupler isolation	
Output Voltage Range		-10 V to +10 V	0 V to +10 V
Resolution		16 bits (-31276 to +31276)	15 bits (0 to +31276)
Maximum Allowable Load current		±5 mA	
Accuracy	25 °C	±0.1% (±10 mV)	
	0 to 55 °C	±0.3% (±30 mV)	
Output Delay Time		1.2 ms*	
Current Consumption		5 V, 800 mA max.	

*After change with a full scale of -10 V to +10 V

● Counter Module (CNTR-01)

MP 2200 MP 2300

Model: JAPMC-PL2300-E
Approx. Mass: 85 g

Items	Specifications
Number of Channels	2
Input Circuit (Selected by software)	5-V differential: 4-MHz response frequency (RS-422, not isolated) 12 V: 120-kHz response frequency (12 V,7 mA, current source mode input, and photocoupler isolation)
Input Method	A/B (1, 2, or 4 multipliers), UP/DOWN (1 or 2 multipliers), and sign(1 or 2 multipliers)
Counter Functions	Reversible counter, interval counter, and frequency measurement
Maximum Frequency	4 MHz with 5-V differential input (16 MHz with 4 multipliers)
Coincident Interruption	Simultaneous output to CPU module via system bus and output module
Coincident Output	2 points, 24 V, 50mA current sink mode input, and photocoupler isolation
DO Output	2 points, 24 V, 50 mA, current sink mode input, and photocoupler isolation (zone output, speed-coincidence output, and frequency-coincidence output)
PI Latch Input	2 points, 24 V, source mode input, and photocoupler isolation
Current Consumption	5 V, 600 mA

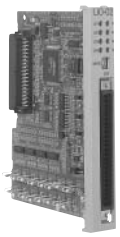
Local I/O Modules (cont'd)

● I/O Modules (LIO-01/-02) MP 2200 MP 2300

Model Name: LIO-01
Model: JAPMC-IO2300
Approx. Mass: 80 g

Digital I/O for LIO-01/-02 Modules

Items	Specifications
Input Signals	16 points (All connected) and 24 VDC ± 20%, 5 mA (TYP) Sink mode or source mode input and photocoupler isolation Min. ON voltage/current: 15V/1.6 mA Max. OFF voltage/current: 5V/1.0 mA Max. Response time: OFF -> ON 1 ms and ON -> OFF 1 ms Interruption (DI-00): DI-00 can be used for interruptions. If an interruption is enabled, the interrupt drawing is started when DI-00 is set to ON. Pulse Latch (DI-01): DI-01 can be used for pulse latching. If pulse latching is enabled, the pulse counter is latched when DI-01 is set to ON.
Output Signals	16 points (All connected) and 24 VDC ± 20%, 100 mA max. Open collector: sink mode output (LIO-01 module) source mode output (LIO-02 module) Photocoupler isolation and Max. OFF current: 0.1 mA Max. Response time: OFF -> ON 1 ms and ON -> OFF 1 ms Output Protection: Fuse (For protection against fires caused by an overcurrent when outputting after a short circuit occurred. If circuit protection is required, provide a fuse for each output circuit.

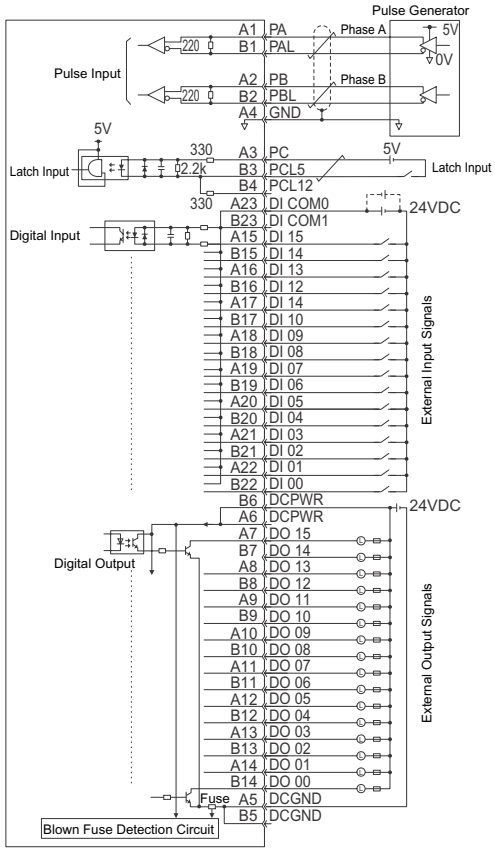


Model Name: LIO-02
Model: JAPMC-IO2301
Approx. Mass: 80 g

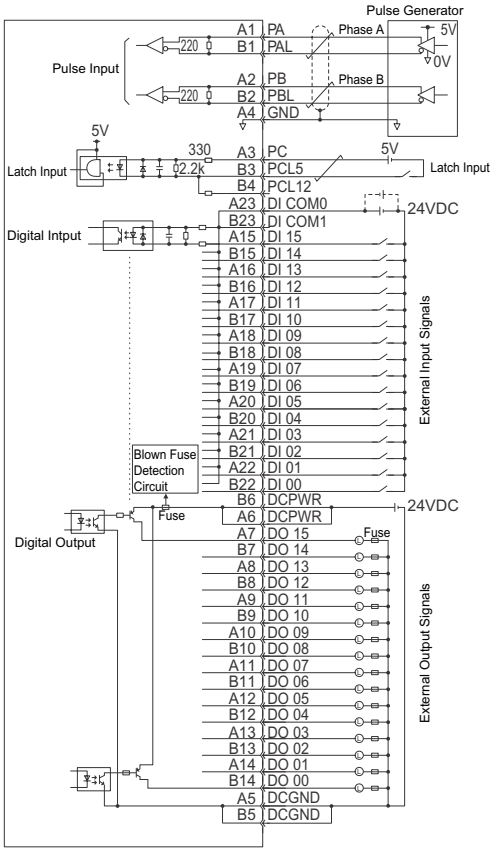
Pulse Input for LIO-01/-02 Modules

Items	Specifications
Number of Channels	1 (Phase A, B, or Z input)
Input Circuit	Phase A/B: 5V differential inputs, no insulation, and max. frequency 4 MHz Phase Z: 5V/12V photocoupler inputs and max. frequency 500 kHz
Input Method	Phase A/B (1,2, or 4 multipliers), sign (1 or 2 multipliers), addition/subtraction (1 or 2 multipliers)
Latch Input	Pulse latch with phase Z or DI-01 Min. Response time: 5 μs when input with phase Z; 60 μs when input with DI-01
Others	Coincident detection; Preset and clear functions for counter values

I/O Circuit Diagram for LIO-01

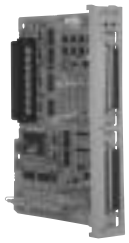


I/O Circuit Diagram for LIO-02

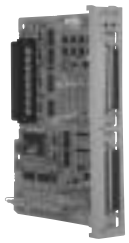


Local I/O Modules (cont'd)

• I/O Modules (LIO-04/-05) MP2200 MP2300

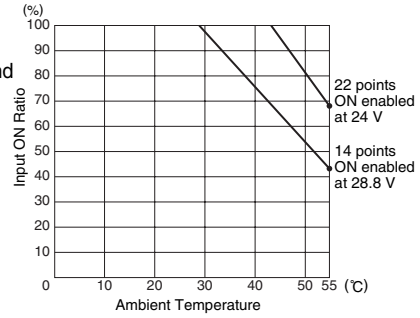


LIO-04 Module
Model: JAPMC-IO2303
Approx. Mass: 80 g



LIO-05 Module
Model: JAPMC-IO2304
Approx. Mass: 80 g

Items	Specifications
Input Signals	32 points (8 points connected) and 24 VDC ±20%, 5 mA (TYP) Sink mode or source mode input and photocoupler isolation Min. ON voltage/current: 15 V/1.6 mA Max. OFF voltage/current: 5 V/1.0 mA Max. Response time: OFF→ON 0.5 ms and ON→OFF 0.5 ms Interruption (DI-00, DI-01, DI-16, DI-17): DI-00, DI-01, DI-16, and DI-17 can be used for interruptions. If an interruption is enabled, the interrupt drawing is started when DI-00, DI-01, DI-16, or DI-17 is set to ON. Note: See right for the derating conditions.
Output Signals	32 points (8 points connected) and 24 VDC ±20%, 100 mA max. Open collector: sink mode output (LIO-04 module) source mode output (LIO-05 module) Photocoupler isolation and Max. OFF current: 0.1 mA Max. Response time: OFF→ON 0.5 ms and ON→OFF 1 ms Output protection: Fuse (for protection against fires caused by an overcurrent when outputting after a short circuit occurred) If circuit protection is required, provide a fuse for each output circuit.



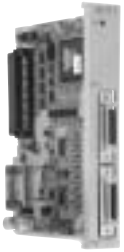
Number of Input ON Points Temperature Derating

● Output Module (DO-01) MP2200 MP2300

Model: JAPMC-DO2300
Approx. Mass: 80 g

Items	Specifications
Number of Output Points	64
Output Method	Transistor or open collector: sink mode output
Isolation	Photocoupler isolation
Output Voltage	24 VDC(+19.2 V to 28.8 V)
Max. Output Current	100 mA
Max. OFF Current	0.1 mA
Max. Response Time	OFF→ON: 0.5ms / ON→OFF: 1ms
Number of Common Points	8
Protective Circuit	Fuse for common circuits
Fuse Rating	1 A
Error Detection	Fuse blowout detection

● Analog Input Module (AI-01) MP2200 MP2300



Model: JAPMC-AN2300
Approx. Mass: 100 g

Items	Specifications	
Analog Input Range	−10 V to +10 V	0 mA to 20 mA
Number of Channels	8 [(4 channels/connector)×2]	
Number of Channels to be Used	1 to 8	
Isolation	Between channels: Not isolated Between input connector and system power supply: Photocoupler isolation	
Max. Rated Input	±15V	±30mA
Input Impedance	20kΩ	250Ω
Resolution	16 bits (−31276 to +31276)	15 bit (0 to +31276)
Accuracy (0℃ to 55℃)	±0.3% (±30 mV)*	±0.3%(±0.06 mA)*
Input Conversion Time	1.4 ms max.	
Current Consumption	5 V,500 mA	

* After offset and gain adjustment by MPE720.

Remote I/O Modules for MECHATROLINK-II

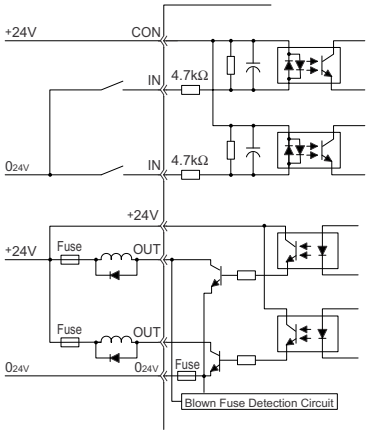
● 64-Point I/O Module (IO2310/IO2330) MP2200 MP2300

Model: JEPMC-IO2310
Approx. Mass: 590 g

Items	Specifications
I/O Signals	Input: 64 points 24VDC, 5mA, sink/source mode input Output: 64 points, 24 VDC, 50mA when all points ON*, Sink mode output (IO2310), Source mode output (IO2330) Signal connection method: Connector (FCN360 series)
Module Power Supply	24VDC (20.4V to 28.8V) Rated current: 0.5A, Inrush current: 1A

* The max. rating is 100mA per point.

IO2310 I/O Circuit Diagram

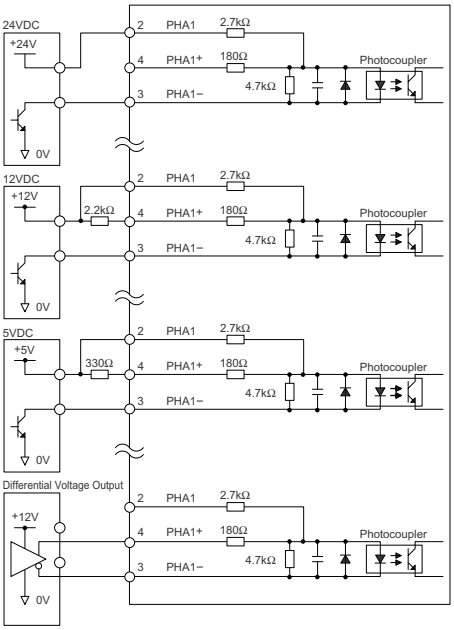


● Counter Module (PL2900) MP2200 MP2300

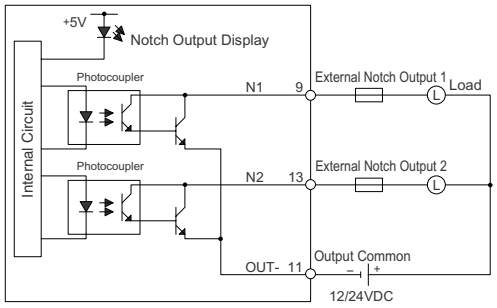
Model: JEPMC-PL2900
Approx. Mass: 300 g

Items	Specifications
Number of Input Channels	2
Functions	Pulse counter, notch output
Pulse Input Method	Sign + pulse (1/2 multipliers), A/B pulse (1/2/4 multipliers), Addition/subtraction (1/2 multipliers)
Max. Counter Speed	1200kpps (4 multipliers)
Pulse Input Voltage	3/5/12/24VDC
External Power Supply	For input signal : 24VDC For driving load : 24VDC For module : 24VDC (20.4V to 26.4V) 120mA or less

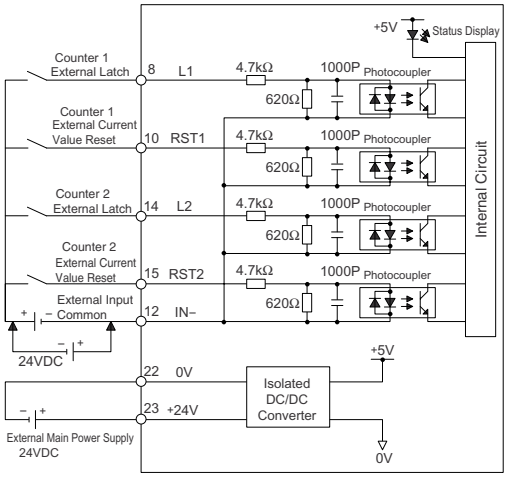
Pulse Input Circuit Diagram



DO Circuit Diagram



DI Circuit Diagram

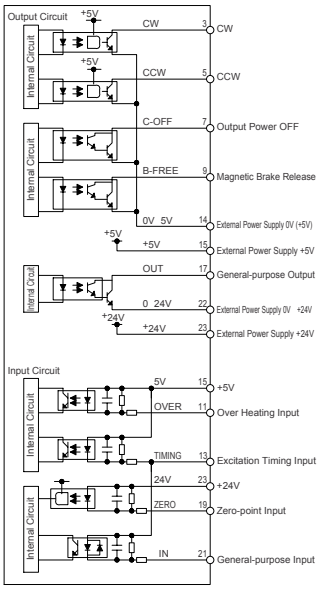


● Pulse Output Module (PL2910) MP2200 MP2300

Model : JEPMC-PL2910
Approx. Mass : 300

Items	Specifications
Number of Output Channels	2
Functions	Pulse positioning, JOG run, zero-point return
Pulse Output Method	CW, CCW pulse, sign + pulse
Max. Output Speed	500kpps
Pulse Output Voltage	5VDC
Pulse Interface Circuit	Open collector output 5VDC, 10mA/circuit
External Control Signal	Digital input: 8 points/module 5VDC x 4 points 24VDC x 4 points Digital output: 6 points/module 5VDC x 4 points 24VDC x 2 points

Circuit Diagram (Pulse Output, DI, DO)



● Analog Input Module (AN2900) MP2200 MP2300

Model: JEPMC-AN2900
Approx. Mass: 300 g

Items	Specifications
Number of Input Channels	4
Input Voltage Range	-10 V to +10 V
Input Impedance	1 MΩ min.
Data Format	Binary, -32000 to +32000
Input Delay Time	4ms max.
Error	±0.5% F.S. (at 25℃) ±1.0% F.S. (at 0℃ to 60℃)
External Power Supply	24 VDC (20.4 V to 26.4 V), 120 mA max.

● Analog Output Module (AN2910) MP2200 MP2300

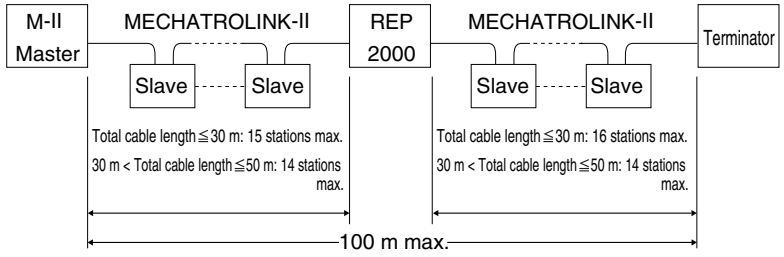
Model: JEPMC-AN2910
Approx. Mass: 300 g

Items	Specifications
Number of Input Channels	2
Output Voltage Range	-10 V to +10 V
Max. Allowable Load Current	±5 mA (2kΩ)
Data Format	Binary, -32000 to +32000
Output Delay Time	1ms max.
Error	±0.2% F.S. (at 25℃) ±0.5% F.S. (at 0℃ to 60℃)
External Power Supply	24 VDC (20.4 V to 26.4 V), 120 mA max.

● MECHATROLINK-II Repeater MP2200 MP2300

Model: JEMC-REP2000
Approx. Mass: 340 g

Required to stabilize communication and to extend the total length of the cable.

Items	Specifications
Communication Type	MECHATROLINK-II
Max. Cable Length	Between controller and repeater: 50 m, After repeater: 50 m
Max. Connected Stations	Total stations on both sides of repeater : 30*
Restrictions	
Power Supply	24 VDC, 100 mA

* Limited to the max. number of connectable stations of the controller (e.g., 21 stations for the MP2000 series).

● Third Party I/O Through Mechatrolink-II Bus Coupler

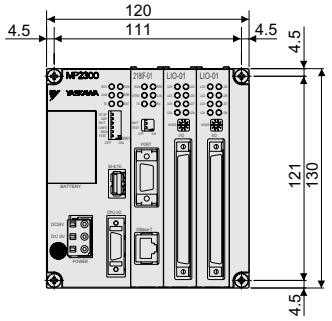
Phoenix Contact Inc. offers a variety of Mechatrolink-II-compatible distributed I/O modules. A sampling is listed below.

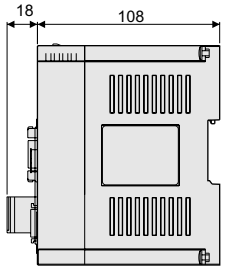
I/O Number	Description	Rating
1,2,3,4,16, 32	Digital Input and Output terminal blocks	24 VDC, 120 VAC, 240 VAC
1,2, 4, 8	Analog Input and Output terminal blocks	0-20 rnA. 4-20 mA, 0-10 V.
2,6, 8	Temperature Inputs	RTDs, Thermocouplers

Many others available. Visit them at www.phoenixcontact.com.

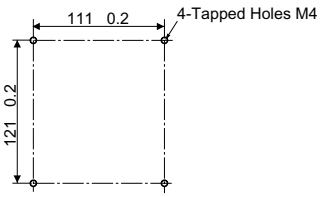
Dimensions Units (mm)

● MP2300 Base Unit

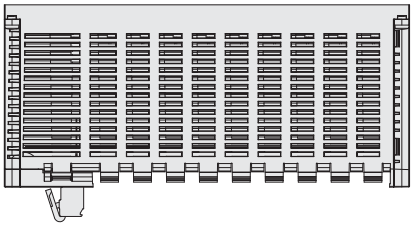




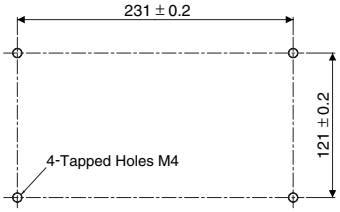
Mounting Hole Diagram

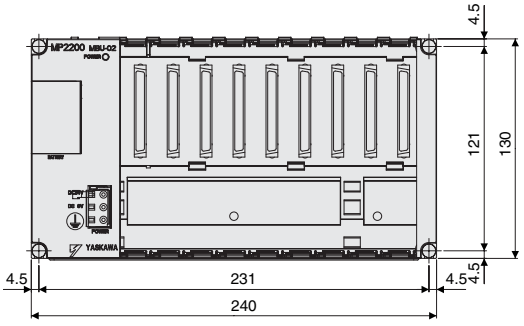


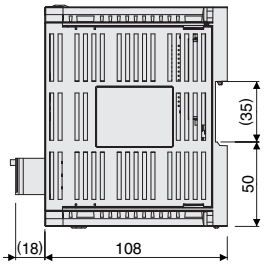
● MP2200 Base Unit



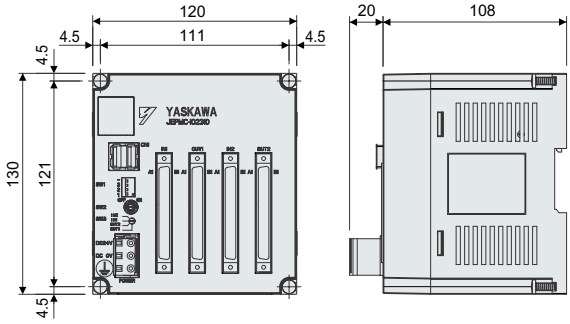
■ Mounting Hole Diagram



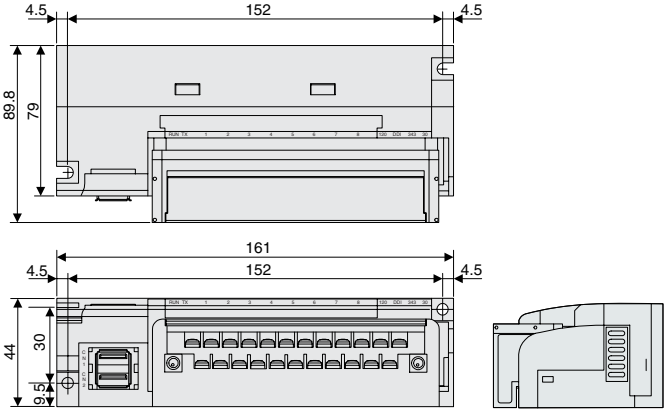




● 64-point I/O Module



● Counter, Pulse, and Analog Modules



MotionWorks Engineering Tool

●MPE720 Ver. 6

Hardware and Software Requirements

CPU	Pentium 800MHz or more (1GHz or more recommended)
Memory	128 Mbytes or more (256 Mbytes or more recommended)
Display	Resolution: 1024 x 768 pixels min., High Color (16 bits)
Free Hard Disk Space	200 Mbytes min.
CD Drive	1 (only for installation)
Pointing Device	PS/2 interface
Communication Port	RS-232C, Ethernet, or USB
Operating System	Windows 95/ Windows 98/ Windows NT4.0 (SP5 or higher), Windows 2000 (SP1 or higher), Windows XP
Web Browser	Internet Explorer 5.5 or later (for Help window display)
Other	Acrobat Reader Version 6.00 or later for Help displays

Functions

Items	Description
Setup	Scansetter, Module Configurator
Programming	Ladder Program Manager, Motion Program Manager, Variable Manager
Monitor	Scope, Register List, Watch, System Monitor
Transfer	Project Upload/Download/Save
Utility	Engineering Builder, CAM Tool, Start Page, Communications

Application Program Utility

MPLoader

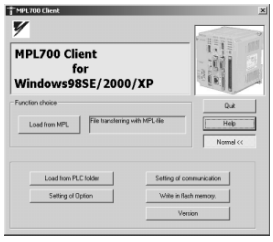
MPLoader is a data transfer tool that can be used to easily update the application program of machine controllers in the MP2000 series without using the MPE720.
Functions such as system configuration definition, programming, and monitoring are not provided so that the original application program is secure and will not be overwritten.

MPLoader, data transfer tool for machine controllers

Main Functions

●For Simplified Loading

The application program can be easily loaded to a machine controller if MPLoader is installed on your PC.

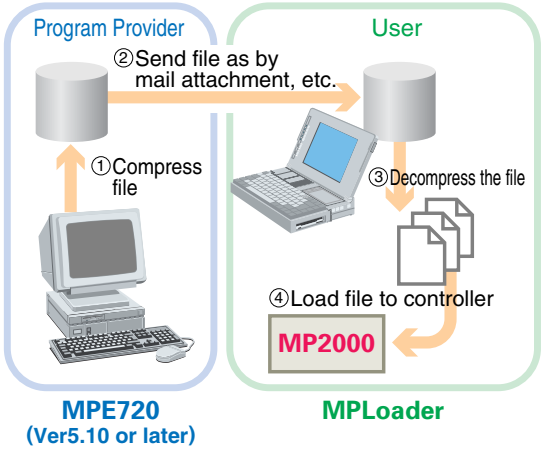


●For Machine Controllers in the MP2000 and MP900 series.

MPLoader can be used in a system that has different models of machine controllers from the MP series.

●For Compressed and Non-compressed Data

MPLoader can be used to decompress a compressed MAL file and load the data to the controller. Also, it can be used to batch load non-compressed PLC files. Data can be compressed as MAL files with MPE720 Ver.5.10 or later.



Engineering Tool MPE720 (cont'd)

Ladder Instructions

Classifications	Instructions	Functions
Program Control Instructions	SEE	Child drawing call
	MSEE	Motion program call
	FUNC	Function call
	XCALL	Extension program call
	FOR END_FOR	For structure
	WHILE END_WHILE	While structure
	IF END_IF	If structure
	EXPRESSION	Expression structure
Direct I/O Instructions	INS	Direct input
	OUTS	Direct output
Relay Circuit Instructions	NOC	NO contact
	NCC	NC contact
	ON-PLS	Rising pulse
	OFF-PLS	Falling pulse
	TON[10ms]	10ms on-delay timer
	TOFF[10ms]	10ms off-delay timer
	TON[1s]	1s on-delay timer
	TOFF[1s]	1s off-delay timer
	COIL	Coil
	S-COIL	Set coil
	R-COIL	Reset coil
Logic Operation Instructions	AND	Conjunction
	OR	Logical sum
	XOR	Exclusive OR

Classifications	Instructions	Functions
Numeric Operation Instructions	ADD	Addition
	SUB	Subtraction
	ADDX	Extended addition
	SUBX	Extended subtraction
	STORE	Store
	MUL	Multiplication
	DIV	Division
	INC	Increment
	DEC	Decrement
	MOD	Integer remainder
	REM	Real number remainder
	TMADO	Add time
	TMSUB	Subtract time
	SPEND	Spend time
Numeric Conversion Instructions	INV	Sign inversion
	COM	1's complement
	ABS	Absolute value conversion
	BIN	Binary conversion
	BCD	BCD conversion
	PARITY	Parity conversion
	ASCII	ASCII conversion 1
	BINASC	ASCII conversion 2
	ASCBIN	ASCII conversion 3
Numeric Comparison Instructions	<	<
	≤	≤
	=	=
	≠	≠
	≥	≥
	>	>
Data Operation Instructions	RCHK	Range check
	ROTL	Bit left rotation
	ROTR	Bit right rotation
	MOVB	Bit transfer
	MOVW	Word transfer
	XCHG	Exchange transfer
	SETW	Table initialization
	BEXTD	Byte-to-word expansion
	BPRESS	Word-to-byte compression
	BSRCH	Binary search
	SORT	Sort
	SHFTL	Bit left shift
	SHFTR	Bit right shift
	COPYW	Word copy
	BSWAP	Byte swap

Classifications	Instructions	Functions
Basic Function Instructions	SQRT	Square root
	SIN	Sine
	COS	Cosine
	TAN	Tangent
	ASIN	Arc sine
	ACOS	Arc cosine
	ATAN	Arc tangent
	EXP	Exponent
	LN	Natural logarithm
	LOG	Common logarithm
DDC Instructions	DZA	Dead zone A
	DZB	Dead zone B
	LIMIT	Upper/lower limit
	PI	PI control
	PD	PD control
	PID	PID control
	LAG	First-order lag
	LLAG	Phase lead/lag
	FGN	Function generator
	IFGN	Inverse function generator
	LAU	Linear accelerator
	SLAU	S-curve accelerator
	PWM	Pulse width modulation
Table Data Operation Instructions	TBLBR	Table read
	TBLBW	Table write
	TBLSRL	Row search
	TBLSRC	Column search
	TBLCL	Table clear
	TBLMV	Table block transfer
	QTBLR,QTBLRI	Queue table read
	QTBLW,QTBLWI	Queue table write
	QTBLCL	Queue table write pointer clear
System Functions	COUNTER	Counter
	FINFOUT	First-in/first-out
	TRACE	Trace
	DTRC-RD	Data trace read
	FTRC-RD	Failure trace read
	ITRC-RD	Inverter trace read
	MSG-SND	Send message
	MSG-RCV	Receive message
	ICNS-WR	Inverter constant write
	ICNS-RD	Inverter constant read

Sequence Controls

Items	Specifications
Program Capacity	MP2200: 150k steps max. only with the ladder program. (Varies according to the size of the motion program used.) MP2300 : 120k steps max. only with the ladder program. (Varies according to the size of the motion program used.)
Control Method	Sequence: High-speed and low-speed scan methods
Programming Language	Ladder program: Relay circuit Textual language: Numerical operations, logic operations, etc.
Scanning	2 scan levels : High-speed scan and low-speed scan High-speed scan time setting : 1.0ms to 32ms (Integral multiple of a MECHATROLINK-Ⅱ communication cycle) (0.5ms to 32ms for MP2200) Low-speed scan time setting : 2.0ms to 300ms (Integral multiple of a MECHATROLINK-Ⅱ communication cycle)
User Drawings, Functions, and Motion Programs	Startup drawings (DWG.A) : 64 drawings max. Up to 3 hierarchical drawing levels High-speed scan process drawings (DWG.H) : 200 drawings max. Up to 3 hierarchical drawing levels Low-speed scan process drawings (DWG.L) : 500 drawings max. Up to 3 hierarchical drawing levels Interrupt processing drawings (DWG.I) : 64 drawings max. Up to 3 hierarchical drawing levels Number of steps : Up to 1000 steps/drawing User functions : Up to 500 functions Motion programs : Up to 256 Revision history of drawings and motion programs Security functions of drawings and motion programs
Data Memory	Common data (M) registers : 64k words System (S) registers : 4k words Drawing local (D) registers : Up to 16k words/drawing Drawing constant (#) registers : Up to 16k words/drawing Input (I) registers : 32k words (shared with output registers) Output (O) registers : 32k words (shared with input registers) Constant (C) registers : 16k words
Trace Memory	Data trace : 128k words (32k words × 4 groups), 16 items/group defined
Memory Backup	Program memory : Flash memory (Battery backup for M registers)
Data Types	Bit (relay) : ON/OFF Integer : −32768 to +32767 Double-length integer: −2147483648 to +2147483647 Real number : ± (1.175E −38 to 3.402E +38)
Register Designation Method	Register number : Direct designation of register number Symbolic designation : Up to 8 alphanumeric characters (up to 200 symbols/drawing) With automatic number or symbol assignment

Motion Controls

Items	Specifications
Control Specifications	PTP control, interpolation, speed reference output, torque reference output, position reference output, phase reference output
Zero-point Return (17 types)	① DEC1+C ⑩ POT & C pulse ② ZERO ⑪ POT only ③ DEC1+ZERO ⑫ HOME LS & C ④ C pulse ⑬ INPUT ✻⑤ DEC2+ZERO ⑭ HOME only ✻⑥ DEC1+LMT+ZERO ⑮ NOT & C pulse ✻⑦ DEC2+C ⑯ NOT only ✻⑧ DEC1+LMT+C ⑰ INPUT & C pulse ⑨ C pulse only ✻: Only with SVA
Number of Controlled Axes	1 to 16 axes (1 group)
Reference Unit	mm, inch, deg, pulse
Reference Unit Minimum Setting	1, 0.1, 0.01, 0.001, 0.0001, 0.00001
Coordinate System	Rectangular coordinates
Max. Programmable Value	−2147483648 to +2147483647 (signed 32-bit value)
Speed Reference Unit	mm/min, inch/min, deg/min, pulse/min mm/s, inch/s, deg/s, pulse/s

Items			Specifications
Acceleration/Deceleration Type			Linear, asymmetric, S-curve
Override Function			Positioning: 0.01% to 327.67% by axis Interpolation: 0.01% to 327.67% by group
Programs	Language		Special motion language: Ladder
	Number of Tasks		16 (Equal to the number of tasks that the ladder instruction, MSEE, can execute at the same time.)
	Number of Programs		Up to 256
	Program Capacity	MP2200	36 k lines (1.6 M characters) when the ladder program has 4 k steps. Varies according to the size of the motion program used. For example, the motion program has 24 lines (1.2 M characters) when the ladder program has 40k steps.
		MP2300	24 k lines (1.2 M characters) when the ladder program has 4 k steps. Varies according to the size of the motion program used. For example, the motion program has 16k lines (800 k characters) when the ladder program has 40 k steps.

Motion Commands

Classifications	Commands	Functions
Axis Move Commands	MOV	Positioning
	MVS	Linear interpolation
	MCC	Circular interpolation, Helical circular interpolation (clockwise)
	MCW	Circular interpolation, Helical circular interpolation (counter clockwise)
	ZRN	Zero-point return
	SKP	Skip
	MVT	Set time positioning
	EXM	External positioning
Basic Control Commands	ABS	Absolute mode
	INC	Incremental mode
	POS	Current position set
	PLN	Coordinate plane setting
	MVM	Move on machine coordinate
	PLD	Program current position update
Speed and Acceleration/ Deceleration Commands	ACC	Acceleration time change
	SCC	S-curve time constant change
	VEL	Set velocity
	IAC	Interpolation acceleration time change
	IDC	Interpolation deceleration time change
	IFP	Interpolation feed speed ratio setting
	FMX	Maximum interpolation feed speed setting
High-level Control Commands	PFN	In-position check
	INP	Second in-position check
	SNG	Ignore single block signal
	UFC	User function call

Classifications	Commands	Functions
Control Commands	MSEE	Subprogram call
	TIM	Dwell time
	IOW	I/O wait
	END	Program end
	RET	Subprogram end
	EOX	One scan wait
Sequence Commands	IF, ELSE, IEND	Branching commands
	WHILE, WEND	Repeat commands
	PFORK, JOINTO, PJOINT	Parallel execution commands
	SFORK, JOINTO, SJOINT	Selective execution commands
	=	Substitution
	+ , - , * , /, MOD	Arithmetic operations
	| , ^ , & , !	Logic operations
	SIN, COS, TAN, ASN, ACS, ATN, SQRT, BIN, BCD	Function commands
	==, < >, >, < , >= , <=	Numeric comparison commands
	SFR, SFL, BLK, CLR	Data operation
	(), S{}, R{}	Others

Electronic Cam Data Generation Tool

Items	Specifications
Data Generation	Cam curves can be selected from: - Straight line - Cycloid - Modified constant velocity - Trapecloid - Single-dwell modified trapezoid m=1 - Single-dwell modified sine - No-dwell modified trapezoid - Free-form curve - Inverted paired strings - Parabolic - Modified trapezoid - Asymmetrical cycloid - Single-dwell cycloid m=1 - Single-dwell ferguson trapezoid - Single-dwell trapecloid - No-dwell modified constant velocity - Inverted trapecloid - Simple harmonic - Modified sine - Asymmetrical modified trapezoid - Single-dwell cycloid m=2/3 - Single-dwell modified trapezoid m=2/3 - No-dwell simple harmonic - NC2 curve - Paired strings
Data Editing	Data graph: Parameter setting, style setting, graph data editing Data list: Insert, delete, etc. Control graph display: Displacement data, speed data, acceleration data, saltation data, graph comparison
Data Transfer	Cam data file is transferred to MP2300 registers (M or C)

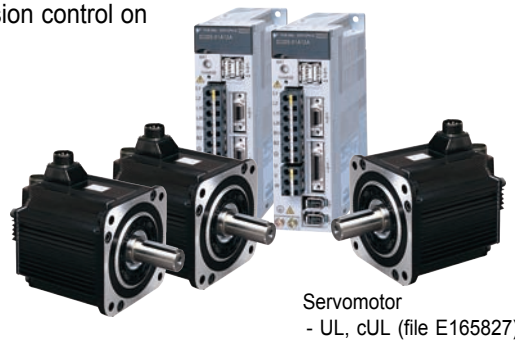
Sigma III Series (Model : SGDS)

Servo ampilfiers of the Sigma III series provide the highest performance for frequent high-speed and high-precision positioning. They are suitable for applications that require high-speed and high-response performances, especially for machines that require high productivity with a quick tact time.

Features

- The position control algorithm reduces the settling time for high-rigidity machines to 1 ms or less. Smooth, high-speed operations minimize the positioning error for low-rigidity machines.
- The highly accurate absolute position data and upgraded vibration suppression control on stopping are indispensable for extra-fine processing and high-precision.
- You can easily adjust the servo gains with SigmaWin+ on the MECHATROLINK-II network.

Amplifier
- UL, cUL(file E147823)
- CE



Servomotor
- UL, cUL (file E165827)
- CE

Type Designation

SGDS A5 A 12 A

- SGDS: SGDS SERVOPACK
- Capacity: A5: 50W to 75: 7.5kW
- Supply voltage: A: 200 VAC, F: 100 VAC
- Model: 12: Mechatrolink
- Design Revision

Servomotor/Amplifier Combinations

Servomotors			SERVOPACK Model SGDS- □		
			100V	200V	
Series	Model	Capacity	Single-phase	Single-phase	Three-phase
SGMAH Super High Power Rate Series 3000min-1	SGMAH-A5	50 W	A5F	A5A	
	SGMAH-01	100 W	01F	01A	
	SGMAH-02	200 W	02F	02A	
	SGMAH-04	300 W	04F		
	SGMAH-04	400 W		04A	
	SGMAH-08	750 W		08A	
SGMPH*1 Flat Series 3000min-1	SGMPH-01	100 W	01F	01A	
	SGMPH-02	200 W	02F	02A	
	SGMPH-04	400 W	04F	04A	
	SGMPH-08	750 W		08A	
	SGMPH-15	1500 W			15A
SGMGH*1 High-speed Feed Series 1500min-1	SGMGH-05	0.45 kW			10A
	SGMGH-09	0.85 kW			10A
	SGMGH-13	1.3 kW			15A
	SGMGH-20	1.8 kW			20A
	SGMGH-30	2.9 kW			30A
	SGMGH-44	4.4 kW			50A
	SGMGH-55	5.5 kW			60A*2
	SGMGH-75	7.5 kW			75A*2
SGMSH Super High Power Rate Series 3000min-1	SGMSH-10	1.0 kW			10A
	SGMSH-15	1.5 kW			15A
	SGMSH-20	2.0 kW			20A
	SGMSH-30	3.0 kW			30A
	SGMSH-40	4.0 kW			50A
	SGMSH-50	5.0 kW			50A

*1: Servomotors with gears are also available.

*2: Available 3rd Quarter, 2006.

*3: A complete set of motor and Mechatrolink amplifier specifications is available. Ask for catalog publication YEA-KAA-S800-3.

Sigma II Series (Model: SGDH)

With the products in the Sigma II series, your machines can perform at high speeds and feed smoothly. By mounting an application module on the SGDH SERVOPACK, you can connect a SERVOPACK to various networks such as MECHATROLINK-II or DeviceNet.

Type Designation

SGDH 05 D E

- **SGDH SERVOPACK**
- **Capacity** 05: 500W to 1E: 15.0kW
- **Supply Voltage** D: 400 VAC
- **Model** E: Speed, torque, or position control

- UL, cUL (file E147823)
- CE

▲Application modules
JUSP-NS115: For MECHATROLINK-II
JUSP-NS300: For DeviceNet
JEPMC-MC410: MP940 for DeviceNet

Servomotor/Amplifier Combinations

Servomotors			SERVOPACK Model SGDH-□□ With attached application module *2
Series	Model	Capacity	400V Three-phase
SGMGH *1 High-speed Feed Series 1500min^{-1} 	SGMGH-05	0.45 kW	05DE
	SGMGH-09	0.85 kW	10DE
	SGMGH-13	1.3 kW	15DE
	SGMGH-20	1.8 kW	20DE
	SGMGH-30	2.9 kW	30DE
	SGMGH-44	4.4 kW	50DE
	SGMGH-55	5.5 kW	60DE
	SGMGH-75	7.5 kW	75DE
	SGMGH-1A	11 kW	1ADE
	SGMGH-1E	15 kW	1EDE
SGMSH Super High Power Rate Series 3000min^{-1} 	SGMSH-10	1.0 kW	10DE
	SGMSH-15	1.5 kW	15DE
	SGMSH-20	2.0 kW	20DE
	SGMSH-30	3.0 kW	30DE
	SGMSH-40	4.0 kW	50DE
	SGMSH-50	5.0 kW	50DE
SGMUH High-speed Feed Series 6000min^{-1} 	SGMUH-10D	1.0 kW	10DE
	SGMUH-30D	3.0 kW	30DE

*1: Servomotors with gears are also available.
*2: Attach an application module to the SGDH SERVOPACK for networking.
*3: A complete set of motor and Mechatrolink amplifier specifications is available. Ask for catalog publication YEA-KAA-S800-3.

Servomotors:
- UL, cUL (file E165827)
- CE

Direct Drive Sigma Series

Driving a load directly without gears simplifies a machine's structure and achieves powerful and smooth operations at any speed without any noise. (Instantaneous peak torque: 6.0Nm to 600Nm; Maximum motor speed: 250RPM to 500RPM)

Features

- High-precision indexing is available with a 20-bit high-resolution encoder (1048576P/R).
- No backlash means that a high-precision, high-speed operation with shorter settling times is possible.
- A current control algorithm with conversions for the d-q axis realizes higher accuracy in torque control.

Servomotor/Amplifier Combinations

Servomotors *				SERVOPACK		
Series		Model	Rated Torque	Sigma III Series Model SGDS- ☐		
				Single-phase 100V	Single-phase 200V	Three-phase 200V
Small-capacity	Outer diameter: 135mm	SGMCS-02B	2 N m	02F	02A	
		SGMCS-05B	5 N m	02F	02A	
		SGMCS-07B	7 N m	02F	02A	
	Outer diameter: 175mm	SGMCS-04C	4 N m	04F	04A	
		SGMCS-10C	10 N m	04F	04A	
		SGMCS-14C	14 N m	04F	04A	
	Outer diameter: 230mm	SGMCS-08D	8 N m	04F	04A	
		SGMCS-17D	17 N m	04F	04A	
		SGMCS-25D	25 N m	04F	04A	
	Outer diameter: 290mm	SGMCS-16E	16 N m		08A	
		SGMCS-35E	35 N m		08A	
Medium-capacity	Outer diameter: 280mm	SGMCS-45M	45 N m			10A
		SGMCS-80M	80 N m			15A
		SGMCS-1AM	110 N m			20A
	Outer diameter: 360mm	SGMCS-80N	80 N m			15A
		SGMCS-1EN	150 N m			30A
		SGMCS-2ZN	200 N m			30A

* A complete set of motor specifications is available. Ask for catalog publication YEA-KAA-DDM-1. These motors are compatible with the amplifiers shown on page 27.

Model Designation

Servomotor

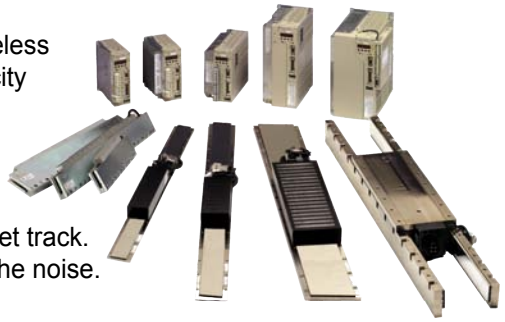
SGMCS 04 C 3 A 1 1

- SGMCS: Direct Drive Servomotor
- 04: Rated Torque
  - Small Capacity
    - 02: 2N m
    - 04: 4N m
    - 05: 5N m
    - 07: 7N m
    - 08: 8N m
    - 10: 10N m
    - 14: 14N m
    - 16: 16N m
    - 17: 17N m
    - 25: 25N m
    - 35: 35N m
  - Medium Capacity
    - 45: 45N m
    - 80: 80N m
    - 1A: 110N m
    - 1E: 150N m
    - 2Z: 200N m
- C: Motor Outer Diameter
  - B: 135mm
  - C: 175mm
  - D: 230mm
  - E: 290mm
  - M: 280mm
  - N: 360mm
- 3: Encoder Specifications
  - 3: 20-bit absolute* (Standard)
  - * Within one rotation
- A: Design Revision Order
  - A: Standard Medium Capacity
  - B: Standard Small Capacity (16E and 35E only)
  - C: Standard Small Capacity
- 1: Flange Specifications
  - 1: Small Capacity
  - 3: Medium Capacity
- 1: Option
  - 1: Standard

Linear Sigma Series

The Linear Sigma Series features a feeding mechanism directly coupled to the load for high-speed and high-precision positioning

Features



- Coreless GW linear servomotors: The zero-cogging nature of the coreless construction and the lack of magnetic force help to minimize the velocity ripple and extend the life of the linear motion guides.
- FW linear servomotors with iron core: The flat-bed design of the FW linear motors requires minimal installation space.
- TW linear servomotors with iron core: The TW linear motors negate the effects ofthe magnetic force between the motor coil and the magnet track. This feature extends the life of the linear motion guides and reduces the noise.

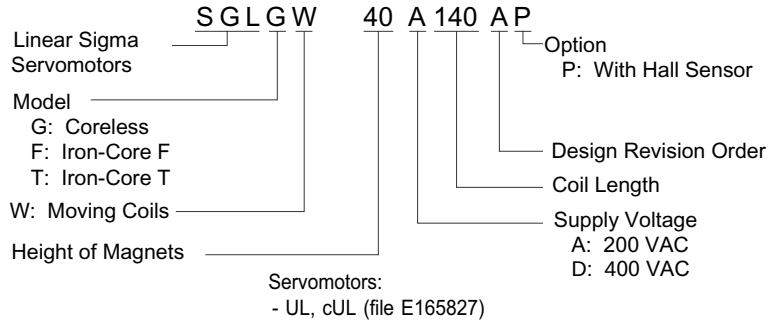
Servomotor/Amplifier Combinations

Linear Sigma Servomotors *			SERVOPACK		
Series	Model	Rated Force	Series Model SGDH-		
			Single-phase 200V	Three-phase 200V ▭	Three-phase 400V ▭
SGLGW Coreless GW (Peak force: 40N to 3000N)	SGLGW-40A140	47 N	01AE		
	SGLGW-40A253	93 N	02AE		
	SGLGW-40A365	140 N	04AE		
	SGLGW-60A140	73 N	02AE		
	SGLGW-60A253	147 N	04AE		
	SGLGW-60A365	220 N		08AE	
SGLFW Iron-core FW (Peak force: 86N to 2400N)	SGLFW-20A090	25 N	02AE		
	SGLFW-20A120	40 N	02AE		
	SGLFW-35□120	80 N	02AE		05DE
	SGLFW-35□230	160 N		05AE	05DE
	SGLFW-50□200	280 N		08AE	10DE
	SGLFW-50□380	560 N		15AE	15DE
	SGLFW-1Z□200	560 N		15AE	15DE
	SGLFW-1Z□380	1120 N		20AE	30DE
SGLTW Iron-core TW (Peak force: 380N to 6000N)	SGLTW-20A170	130 N		05AE	
	SGLTW-20A320	250 N		10AE	
	SGLTW-20A460	380 N		15AE	
	SGLTW-35□170	220 N		08AE	10DE
	SGLTW-35□320	440 N		15AE	20DE
	SGLTW-35A460	670 N		20AE	
	SGLTW-40□400	670 N		20AE	30DE
	SGLTW-40□600	1000 N		30AE	50DE
	SGLTW-80□400	1300 N		50AE	50DE
	SGLTW-80□600	2000 N		75AE	75DE

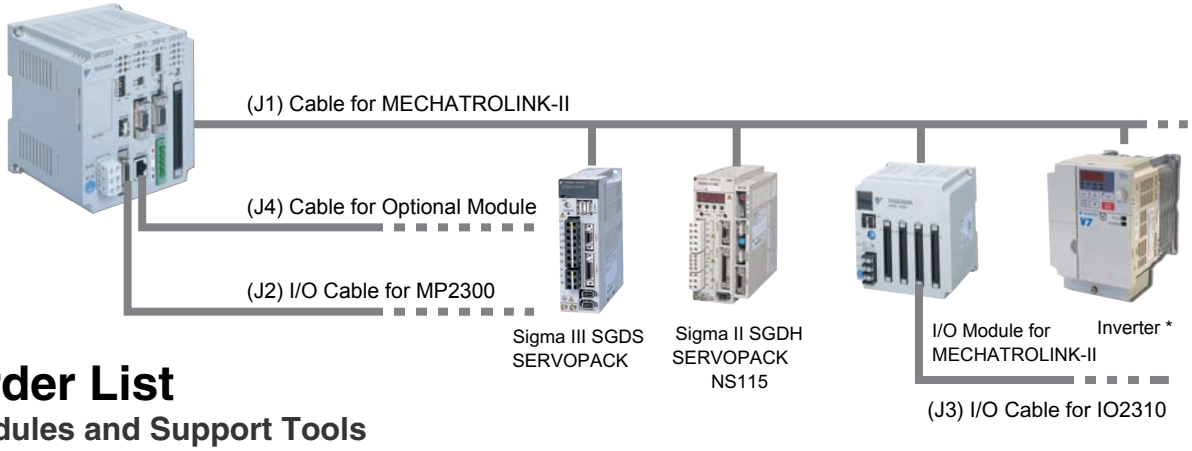
Attach the following application modules to the SGDH SERVOPACK for networking.
JUSP-NS115: For MECHATROLINK-II
JUSP-NS300: For DeviceNet
JEPMC-MC410: MP940 for DeviceNet

* A complete set of motor specifications is available. Ask for catalog publication YEA-KAA-S800-19.

Model Designation for Linear Servomotors



System Configuration



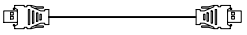
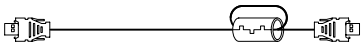
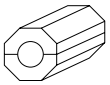
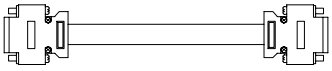
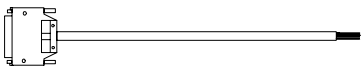
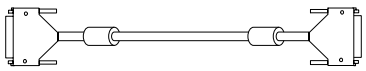
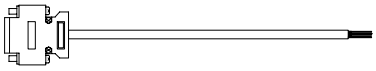
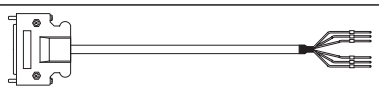
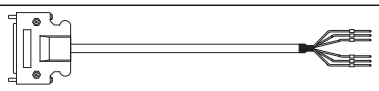
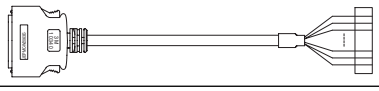
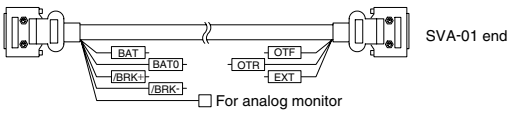
Order List

Modules and Support Tools

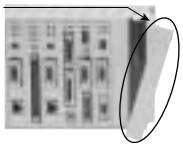
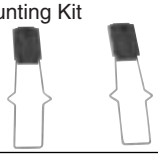
Classifications	Products	Model Name	Model	Specifications
Basic Module	MP2200 Base Unit	MBU-01	JEPMC-BU2200	100 VAC/200 VAC input base unit
		MBU-02	JEPMC-BU2210	24 VDC input base unit
	MP2300 Base Unit	MP2300	JEPMC-MP2300	MECHATROLINK-I and MECHATROLINK-II communication; 8-point input and 4-point output
	Slot Cover	-	JEPMC-OP2300	Slot cover for any empty slots (MP2200 or MP2300)
CPU Module	CPU-02 Module	CPU-02	JAPMC-CP2210	CPU module for MP2200, with CF card slot and USB port Note: A battery (JZSP-BA01) for backup data is provided
	Connection Module	EXIOIF	JAPMC-EX2200	Expansion interface for MP2200
Communication Modules (Optional)	General-purpose Serial Communication Module	217IF-01	JAPMC-CM2310	RS-232C/RS-422 communication
	Ethernet Communication Module	218IF-01	JAPMC-CM2300	RS-232C/Ethernet communication
	DeviceNet Communication Module	260IF-01	JAPMC-CM2320	RS-232C/DeviceNet communication
	Profibus Communication Module	261IF-01	JAPMC-CM2330	RS-232C/PROFIBUS communication
Local Slot Motion Modules	Analog Output	SVA-01	JAPMC-MC2300	2 axis, Six 24VDC I/O
	MECHATROLINK-II Network	SVB-01	JAPMC-MC2310	10MB/sec, up to 21 nodes (see specs for detail)
	Pulse Output	PO-01	JAPMC-PL2310-E	4 axis, 5V for stepper
Local Slot I/O Modules (Optional)	I/O Module	LIO-01	JAPMC-IO2300	16-point input, 16-point output (sink mode output), and 1-point pulse input
		LIO-02	JAPMC-IO2301	16-point input, 16-point output (source mode output), and 1-point pulse input
		LIO-04	JAPMC-IO2303	32-point input, 32-point output (sink mode output)
		LIO-05	JAPMC-IO2304	32-point input, 32-point output source mode output)
		DO-01	JAPMC-DO2300	24 VDC, 64 outputs, sink mode output
		AI-01	JAPMC-AN2300	±10 VDC analog input, 8 channels
		AO-01	JAPMC-AN2310-E	4 channel, analog outputs
		CNTR-01	JAPMC-PL2300-E	2 channel counter module with 2 latching inputs and 2 outputs
Distributed I/O Modules for MECHATROLINK-II	64-point I/O Module	IO2310	JEPMC-IO2310	24 VDC; 64-point input/output, sink mode output
		IO2330	JEPMC-IO2330	24 VDC, 64-point input/output, source mode output
	Counter Module	PL2900	JEPMC-PL2900	Reversible counter: 2 channels
	Pulse Output Module	PL2910	JEPMC-PL2910	Pulse output: 2 channels
	Analog Input Module	AN2900	JEPMC-AN2900	Analog input: -10 V to +10 V, 4 channels
	Analog Output Module	AN2910	JEPMC-AN2910	Analog output: -10 V to + 10 V, 2 channels
Engineering Tool	MotionWorks MPE720 Ver. 6	–	CPMC-MPE770**	Ver.6.02 or later The programming software to support you from system design to maintenance. Intuitive ladder programming and editing functions. Windows-based (Windows 95/98/NT4.0/XP) cam data generations.
	MECHATROLINK-II Repeater	–	JEPMC-REP2000	Extending MECHATROLINK-II to 100m max.
	MP Loader	–	CPMC-MPL700C	Version 5.10 or later

* For inverter selection and specifications, reference Yaskawa V7 with Mechatrolink II Catalog Publication YEA-KAA-V7M-1.
** Multiple license copies available. Contact your Yaskawa sales representative.

Cables and Connectors

Name		Model	Length m	Specifications	Qty
(J1)	Cable for MECHATROLINK-II	JEPMC-W6002-A5	0.5	With connectors on both sides 	
		JEPMC-W6003-A5	0.5	With ring core 	
		JEPMC-W6003-01	1.0		
		JEPMC-W6003-03	3.0		
		JEPMC-W6003-05	5.0		
		JEPMC-W6003-10	10.0		
		JEPMC-W6003-20	20.0		
		JEPMC-W6003-30	30.0		
	Terminal Resistor	JEPMC-W6022		For MECHATROLINK-II 	
	Ring Core	JEPMC-W6021		For MECHATROLINK-II cable 	
(J2)	I/O Cable for MP2300	JEPMC-W2060-A5	0.5	With connector on the MP2300 side 	
		JEPMC-W2060-01	1.0		
		JEPMC-W2060-03	3.0		
(J3)	I/O Cable for IO2310	JEPMC-W5410-05	0.5	With connector on the IO2310 side 	
		JEPMC-W5410-10	1.0		
		JEPMC-W5410-30	3.0		
(J4)	RS-232C Communication Cable (217IF-01, S18IF-01, 260IF-01, and 261IF-01)	JEPMC-W5311-03	2.5	PC side; D-SUB, 9-Pin, and Female  Communication module side; D-SUB, 9-Pin, and Male	
	RS-422/485 Communication Connector Kit for 217IF-01	YSC-1		Includes Connector (10114-3000VE) and Shell (10314-52AO-008) (from 3M Corporation)	
	Ethernet Communication Cable for 218IF-01	–		Source locally. Use a cable with a characteristic impedance of 100 W. Do not use 10BASE-T cables (UTP) for noise reduction, because they are not shielded. Install devices for Ethernet, such as a transceiver and HUB, outside the control panel. Use cross cables for directly connecting the MP2300 to a PC.	
	DeviceNet Communication Cable for 260IF-01	–		Use DeviceNet cables. Refer to the ODVA web site . http://www.odva.org	
	PROFIBUS Communication Cable for 261IF-01	–		Use PROFIBUS A cables.	
	Cable for I/O Module (LIO-01 or LIO-02)	JEPMC-W2061-A5	0.5	With connector on the module side 	
		JEPMC-W2061-01	1.0		
		JEPMC-W2061-03	3.0		
EXIOIF Cable (MP2200 Rack Conn.)		JEPMC-W2091-A5	0.5	With connectors on both ends 	
		JEPMC-W2091-01	1.0		
		JEPMC-W2091-2A5	2.5		
I/O Cable for LIO-04, LIO-05, DO-01, and PO-01		JEPMC-W6060-05	0.5	With a connector on the LIO-04/LIO-05/ DO-01 end 	
		JEPMC-W6060-10	1.0		
		JEPMC-W6060-30	3.0		
Input Cable for AI-01		JEPMC-W6080-05	0.5	With a connector on the AI-01 end 	
		JEPMC-W6080-10	1.0		
		JEPMC-W6080-30	3.0		
Output Cable for AO-01		JEPMC-W6090-05	0.5	With a connector on the AO-01 end 	
		JEPMC-W6090-10	1.0		
		JEPMC-W6090-30	3.0		
I/O Cable for CNTR-01		JEPMC-W2063-A5-E	0.5	With a connector on the CNTR-01 end 	
		JEPMC-W2063-01-E	1.0		
		JEPMC-W2063-03-E	3.0		
Connection Cable for SVA-01		JEPMC-W2040-A5	0.5	With connectors on both ends  SVA-01 end	
		JEPMC-W2040-01	1.0		
		JEPMC-W2040-03	3.0		

Optional Products

Applicable Machine Controller	Product Name	Product Model	Specifications	Qty
MP2000 Series Machine Controllers	Lithium battery 	JZSP-BA01	For data backup, 3.6 V, Lithium	
MP2200, MP2300	Protective cover 	JEPMC-OP2300	Front cover for empty slot	
	DIN Rail Mounting Kit 	JEPMC-OP300	Used to mount a module on DIN rail (1 pair in a set)	
MP2200 (CPU-02)	Compact Flash for data storage 	CFC-032MBA	32 Mbytes	
		CFC-064MBA	64 Mbytes	
		CFC-128MBA	128 Mbytes	

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