YASKAWA

Machine Controller and AC Servo Drive
Solutions Catalog

YASKAWA

Leading the world over 100 years
Constantly supporting the “times to come”

Since its founding in 1915 as a manufacturer for motors, Yaskawa Electric has capitalized on its motor drive technology to provide continuing support for the key industries of the times, rst for factory automation, and today, for mechatronics and robotics.
We continue to offer a new value to society by solving such issues as dwindling birth rate and an aging population, environment and energy issues as well as sophistication of industries through fusion of core technology advancement and open innovation.

∗: Yaskawa Electric led the world in putting forward the term "mechatronics" in the late 1960s.
This concept evolved when we combined our customers' machinery with Yaskawa's electronic products to create superior quality and function.

Changing Motion, Changing the World

Motion

Control

Solution

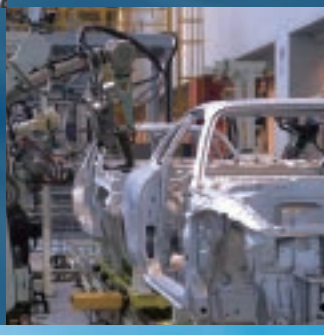
Yaskawa is committed to developing innovative mechatronics products and offering new solutions to the world. Yaskawa's technology and mechatronics products are used in a wide-variety of industrial sectors, systems, and machinery, and enable ultra-high-speed and ultra-precision control. Changing the motions performed by motors creates new concepts and products that can change the world.

APPLICATIONS

- Semiconductor
- Electronic parts
- Liquid crystal
- Machine tools

- Food/packing
- Transfer
- Textile

- Injection/molding
- Material processing
- Robots



Product Lineup

Yaskawa's mechatronics systems

Production instructions

Cell/Line Controls

Core Network
Ethernet
EtherNet/IP
FL-net
MP-Link
MEMOBUS

Production linecontrol PC

SoftMotion Engineering Tool

PC

Engineering Tool

MPE720

Machine Vision System

MYVIS YV260

Motion Controls

Machine Controller MP3000 Series

MP3100

MP3200

MP3300

Two-axis SERVOPACK with Built-in Controller

Σ-7C

Field Network
MECHATROLINK-4
MECHATROLINK-Ⅲ
MECHATROLINK-Ⅱ
CC-Link
DeviceNet
PROFIBUS-DP

Position
Speed
Torque
Control Method

*: MECHATROLINK-4 supports only Σ-7S

Drivers

Σ-7 Series

Σ-7S Σ-7W Σ-7FT

DC Power Input Σ-V Series

SGDV-□□□E

Integrated Servomotor

Σ-7F + Converter

Σ-V-MD Series

SGDV-MD A□□

Σ-S Series

SGPSS

Motors

Σ-7 Series Rotary Servomotors

SGM7M
SGM7J
SGM7P
SGM7A
SGM7G

Direct Drive Servomotors

SGM7E
SGM7F
SGM7D

Linear Servomotors

SGLGW
SGLFW2
SGLTW

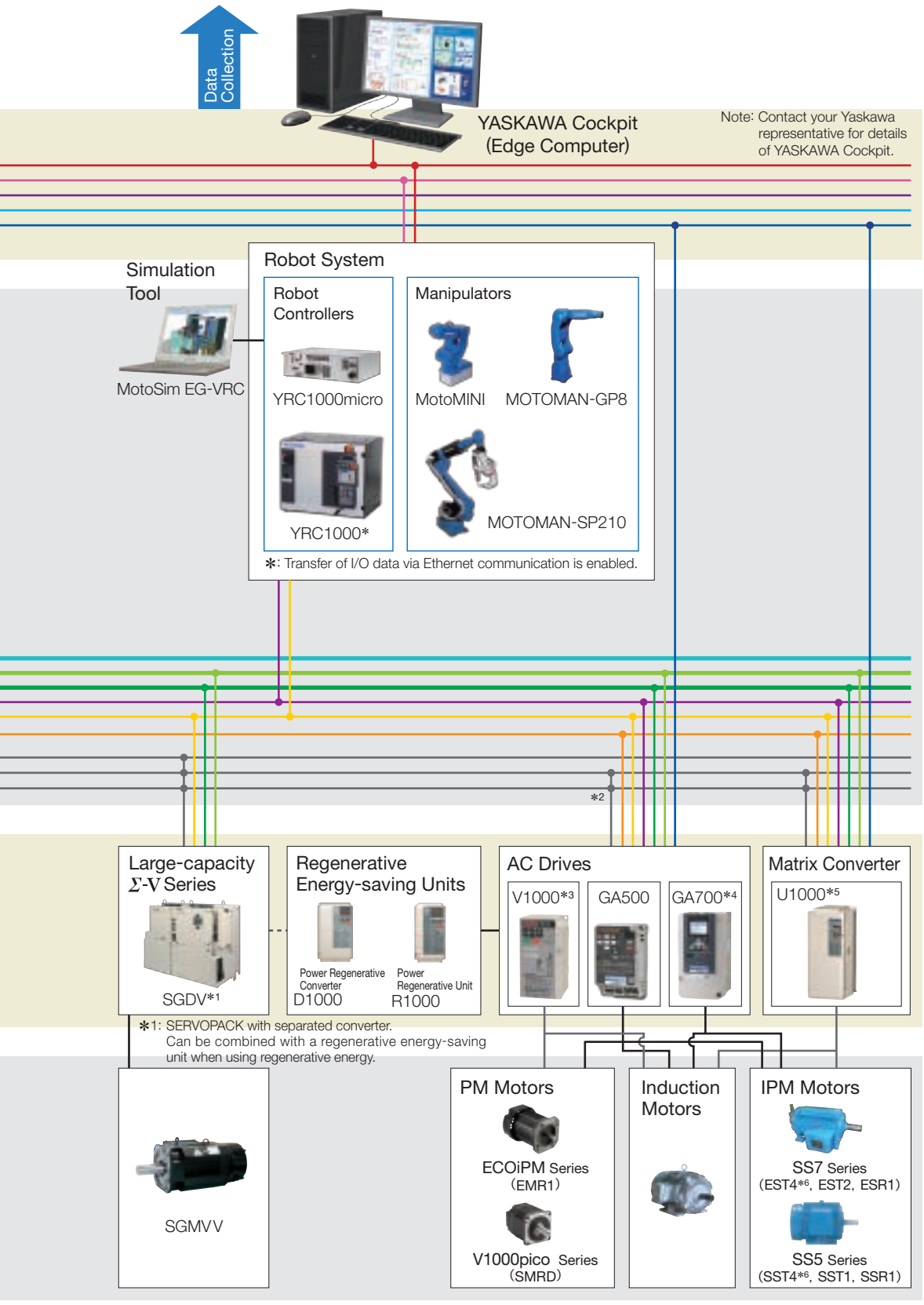
SGMMV

SGMSL

Support for industrial standard networks for open system architecture

We provide components compatible with the industrial standards required for mechanical system configurations including real-time core networks to connect controllers and field networks to connect equipment.

- Support for systems around the world through compliance with international standards.
  (Consult with Yaskawa for information on support for standard networks.)
- Supports multi-vendor system configurations.
  Core networks: Ethernet, EtherNet / IP, FL-net, MP-Link, MEMOBUS
  Field networks: MECHATROLINK-4/Ⅲ/Ⅱ (Consult with Yaskawa for information on support for other networks.)



*2: Available only for GA700 *3: Compatible with CompoNet and CANopen *4: Compatible with CANopen and LONWORKS
*5: Compatible with CANopen *6: EST4 and SST4 available for GA700 and U1000 only

MECHATROLINK, the motion network from our motion control expertise

High-performance mechanical systems can be constructed, in combination with our mechatronics components.

- Servo systems and input/output equipment necessary for configuring mechanical systems can be easily connected, providing high-speed response.
- 1: n synchronous communication for high-precision motion control.
- Certification under the SEMI E54.19 standard has been acquired. (This standard covers the sensor and actuator networks of semiconductor production systems.)
- Communication specifications MECHATROLINK-II: Transmission speed: 10 Mbps; communication cycle: 250 μs and higher; transmission distance: 50 m max.
  MECHATROLINK-III: Transmission speed: 100 Mbps; communication cycle: 125 μs and higher; transmission distance: 75 m between stations
  MECHATROLINK-4: Transmission speed: 100 Mbps; communication cycle: 125 μs and higher; transmission distance: 50 m between stations

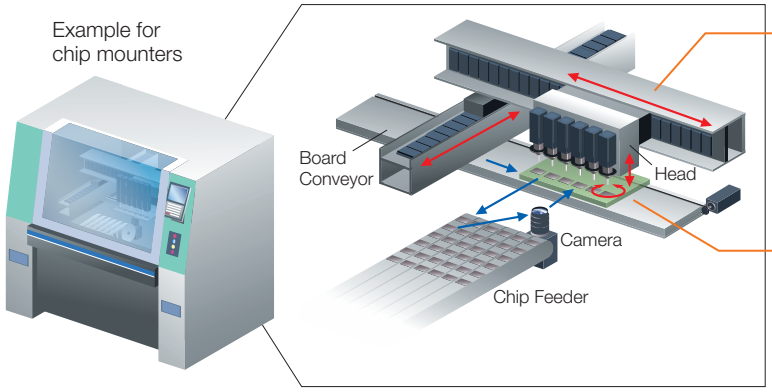
Note: The communication specifications of MECHATROLINK differ depending on the specifications of the Machine Controllers, SERVOPACKs, and AC Drives used. For further details, check the communication specifications of each equipment.

CONTENTS

Solution Examples

Ultimate system performance

Example for chip mounters



◎ Pick and Place Solutions

Issue A customer wants to improve the positioning accuracy to accommodate the increasingly microscopic sizes of the components to be mounted.

→ **Solution** Achieve high-precision positioning. (Refer to Issue 1.)

Issue Vibration results when the operating speed is increased to improve the takt time.

→ **Solution** Dramatically improve the vibration suppression.

◎ Alignment Solutions

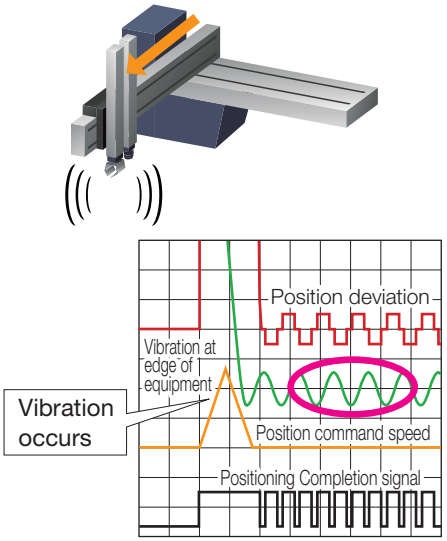
Issue A customer wants to speed up the alignment operation that uses image processing.

→ **Solution** By applying the Σ-7S-FT SERVOPACK with triggers at pre-set positions, high-speed non-stop alignment can be achieved. (Refer to Issue 2.)

Issue 1 We want to increase productivity by suppressing vibration of equipment.

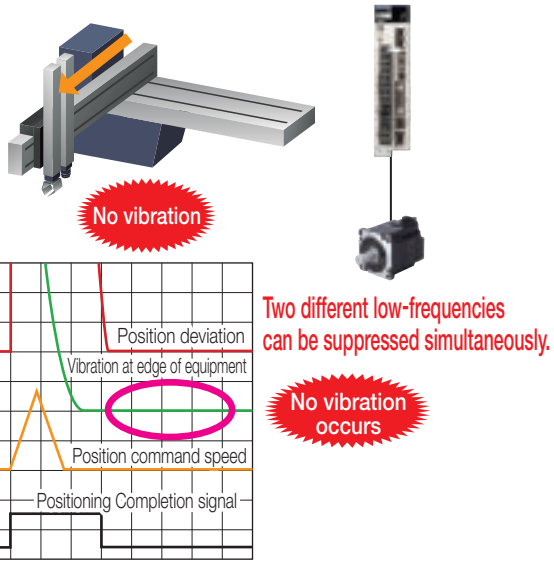
Problem

Vibration occurs at two different frequencies at the edges of equipment and it takes a while for the vibration to stop.



Solution

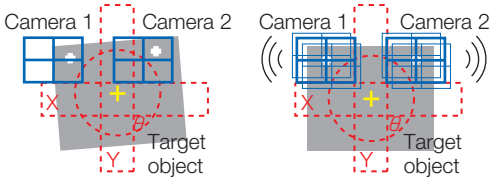
Vibration at two different low-frequencies is suppressed simultaneously with the automatic adjustment function.



Issue 2 We want to improve positioning accuracy to handle increasingly smaller workpieces.

Problem

Positioning accuracy needs to be improved because parts that are handled are becoming increasingly smaller.

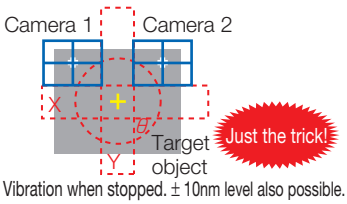


Before positioning correction

After positioning correction

Solution

High-precision positioning becomes possible for precision workpieces by replacing the existing drive with the Σ-7 Servo Drive.



Vibration when stopped. ±10nm level also possible.

Note: This will depend on the installation conditions.

◎ Σ-7S SERVOPACKs

- 3.1 kHz response frequency
- Improved vibration suppression

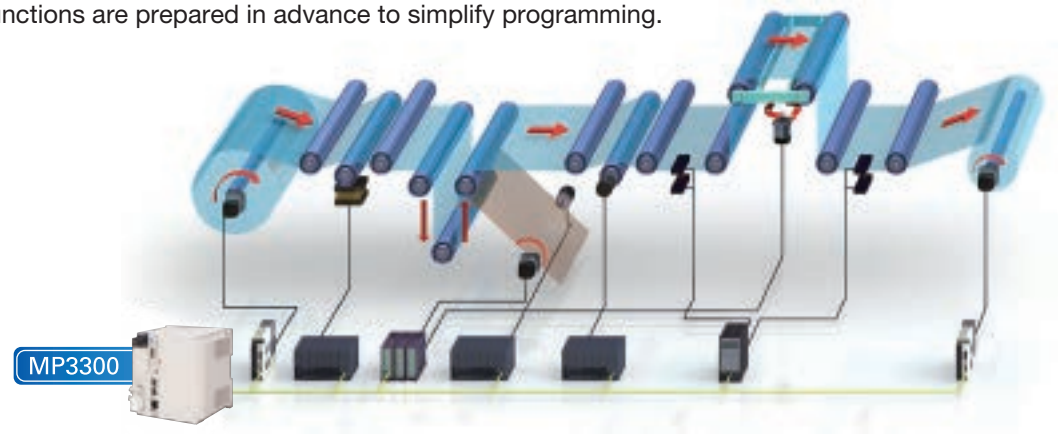
◎ Σ-7 Servomotors (High-resolution encoders)

24 bits = 16,777,216 pulses/rev.
For 20 mm lead ball screws
1.2 nm resolution

Issue 3 We want to achieve high-precision roll-to-roll control without extra effort in hardware or software.

MP 3300

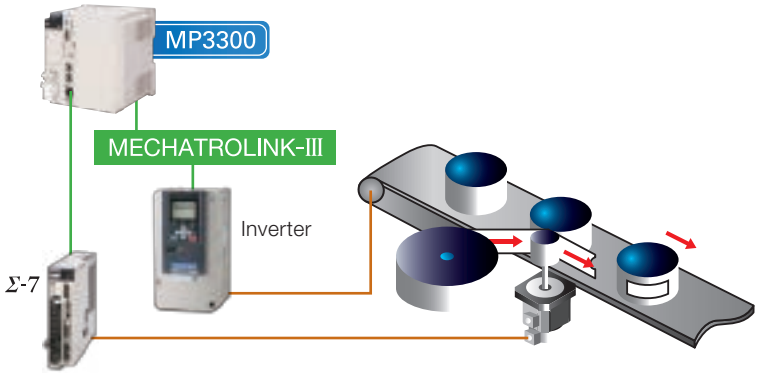
This application example for a winder achieves high-precision winding, feeding, dancer control, and tension control. Control is achieved with standard Servo Drives and Inverters. Special tension controllers are not required. User functions are prepared in advance to simplify programming.



Issue 4 We want to follow a high-speed driven mechanism with another mechanism at high speed and precision.

MP 3300 Σ-7

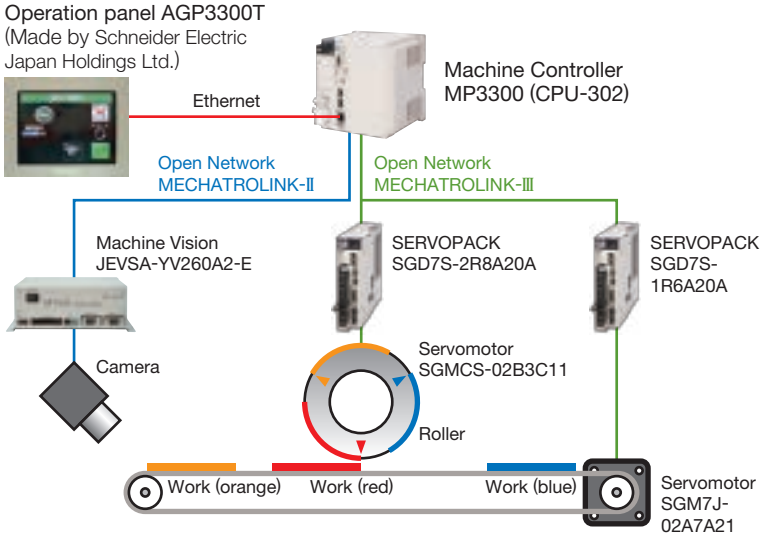
This application example for a labeling machine applies labels to workpieces that are conveyed from an upstream process on a high-speed belt conveyor. A high-speed, high-precision system can be easily built by connecting Inverters and Servo Drives to a network and having the slave axes (Servo Drives) follow the control of the master axis (an Inverter).



Issue 5 High-precision, intermittent synchronization solutions

MP 3300 Σ-7

Intermittent synchronization of the rollers is performed between the lengths of workpieces on the belt. The MP3300 performs synchronized control only during the required sections of the linear operation of the belt and rotary operation of the rollers. This can be applied to many packaging machines, including rotary cutters and labeling machines.



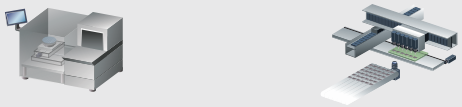
Issue 6 We want to handle variable product and lot size production.

MP3300 Σ-7 Σ-7C

Current Production Site

Breakdown of Process Only Product A is Produced

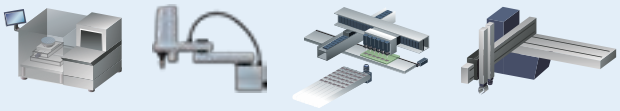
Single Function Machine → Dedicated Conveyance Machine → Single Function Machine → Dedicated Conveyance Machine



Next-Generation Production Site

Breakdown of Process
Products A, B, and C Can All Be Produced

Cross-Functional Machine → Robot → Cross-Functional Machine → Robot



A production line that saves labor and improves productivity through cross-functional machines and robots for conveyance between processes.

Changing Environment around Manufacturing

Variable Product and Lot Size Production

Demands for productivity improvements and for flexible production lines that can handle variable product and lot size production have been increasing at production sites in recent years. Therefore, achieving cross-functionality in equipment itself is becoming increasingly necessary.

Yaskawa can contribute to building your future production site with a rich set of components that will meet your new needs and our record of delivering those components.

Yaskawa's Rich Set of Components

Yaskawa offers a full lineup of components including motion control products (Machine Controllers, AC Servo Drives, Inverters, and other products) and robots. We can propose solutions that contribute to automating and creating cross-functionality in your equipment and conveyance machines between processes.

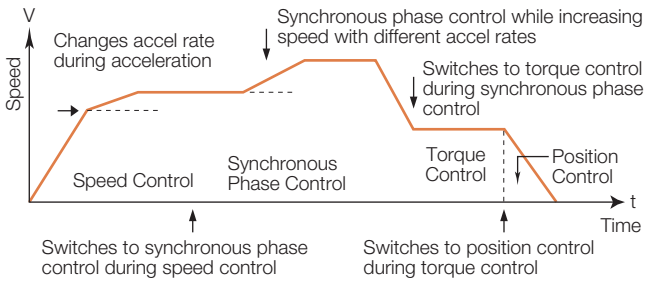
In particular, the Σ-7C facilitates the creation of modular equipment in both the software and hardware facets of equipment.

▶ Refer to Issue 8 of the Examples of Solutions on page 9.

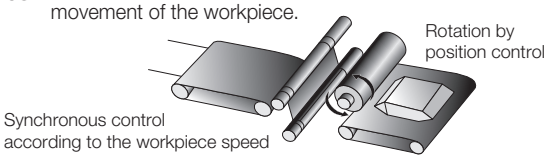
Issue 7 I want to improve productivity.

MP3000 Σ-7

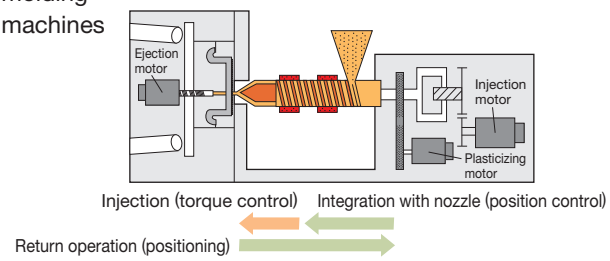
MP3300 can be controlled with a single CPU, from simple to complex operations. (No additional optional module is required) MP3300 can shorten takt time by freely switching online between the four control modes of synchronous phase control that require high control performance, in addition to position speed and torque control.



●Packaging machines Synchronized phase control enables cutting, sealing and other kinds of processing that are synchronized with the movement of the workpiece.

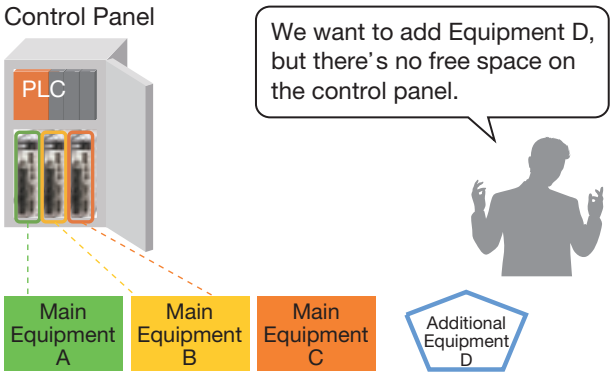


●Injection molding machines Switching from position control to torque control can be executed without deceleration.



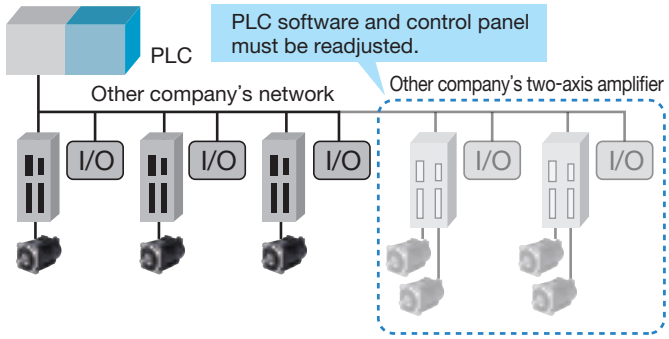
Issue 8 We want to easily add new units to existing equipment. Σ-7C

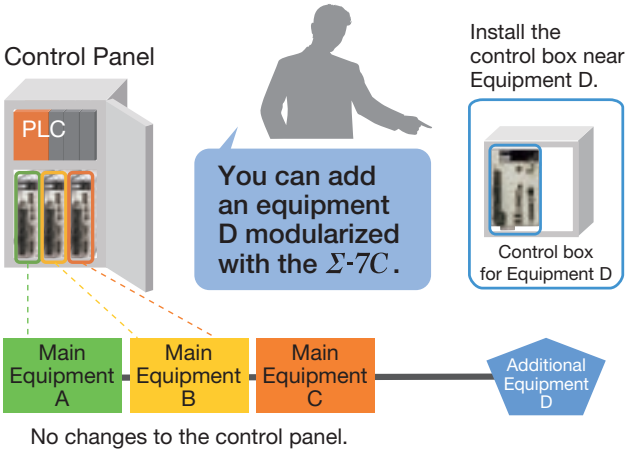
This solution is a specific example for improving the flexibility of upstream and downstream conveyance processes for equipment and the equipment itself. Options can be easily added by creating modular equipment.



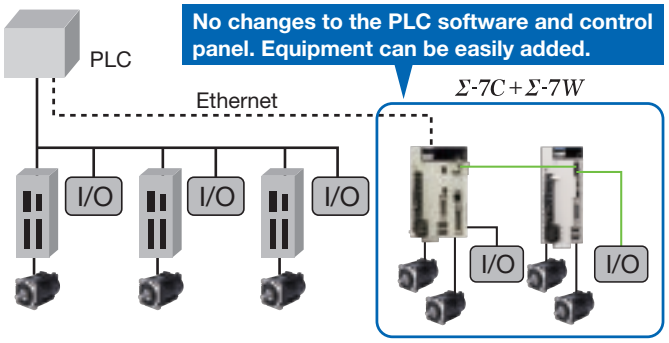
System Configuration Example

Before Equipment added on the same network.



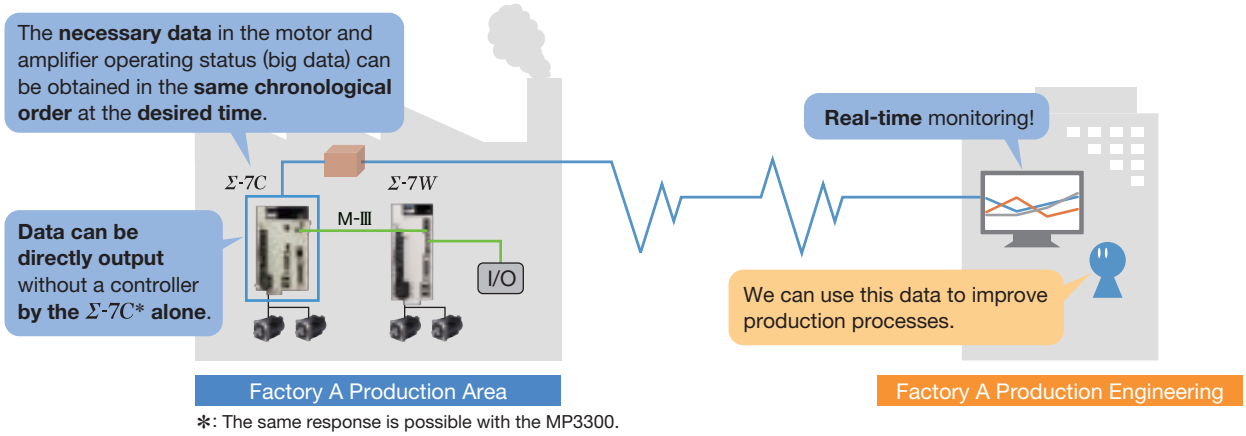


Installing the Σ-7C Add the equipment with the Σ-7C.

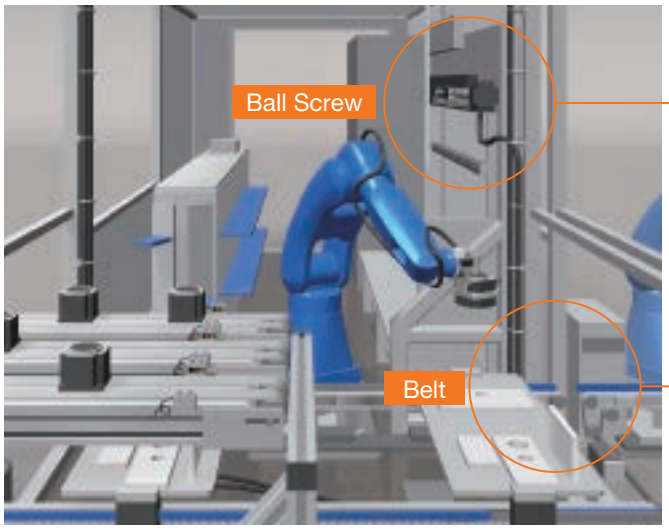


Issue 9 We want to respond to requests from users to visualize the operating status of equipment. Σ-7C MP3300

You can respond to requests from users to visualize the operating status of equipment.



*: The same response is possible with the MP3300.



Problem
- Malfunction period cannot be predicted
- Unexpected production line stoppage
- Increased costs due to need for specialized software and equipment
- Lack of space to equip sensors

⇒ **Solution** Ball screw preventive maintenance
(Refer to Issue 10.)

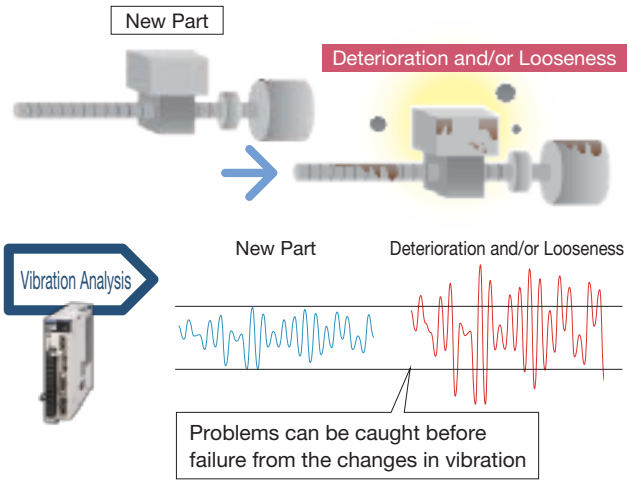
Problem
- Belt looseness causes positioning error
- The positioning error harms the produce equality

⇒ **Solutiion** Monitoring belt deterioration by aging
(Refer to Issue 11.)

Issue 10 We want to prevent sudden belt conveyor stops. Σ-7 MP 3300

New Functions Use of sensing data (Vibration monitor)

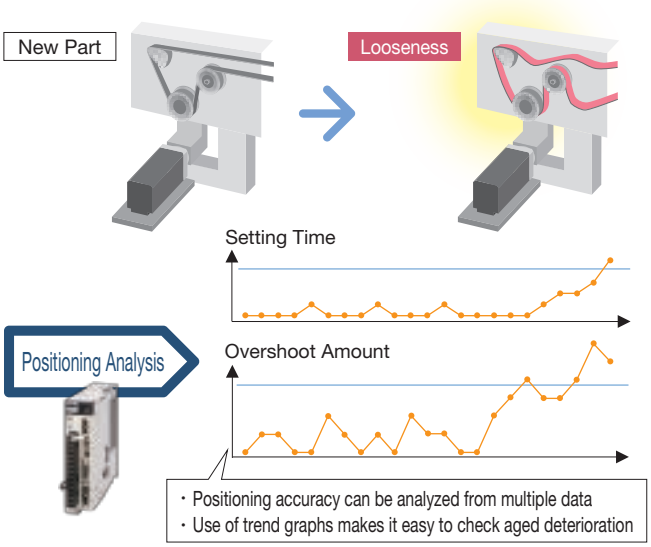
The vibrational component is ascertained by the SERVOPACK (amplifier) from the motor response to monitor the "estimated vibration". Users can then infer a ball screw failure from the changes in vibration so that the parts can be replaced before an actual malfunction.



Issue 11 We want to maintain constant positioning accuracy. Σ-7 MP 3300

New Functions Use of sensing data (Positioning monitor)

The SERVOPACK (amplifier) can perform primary analysis of positioning status from the motor response. The positioning "settling time" and "overshoot", passing the specified position are monitored in order to ascertain positioning changes.

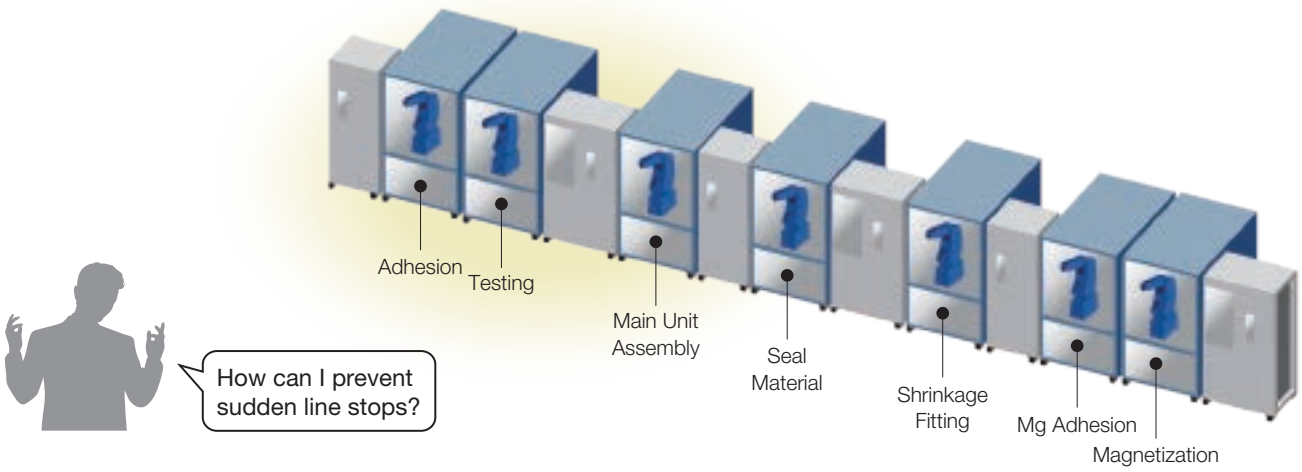


Issue 12 We want to monitor the entire equipment and verify data when defects occur.

Σ-7 MP 3300

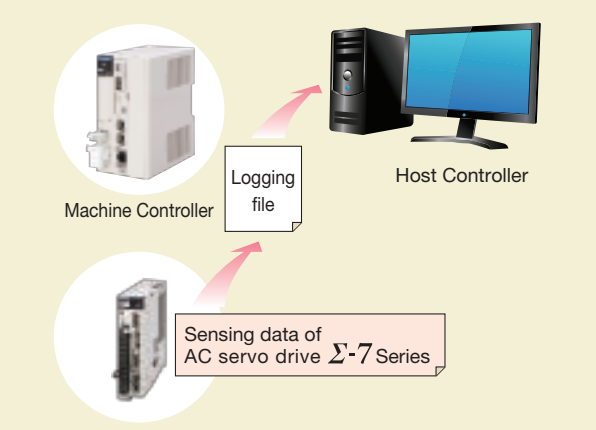
Problem

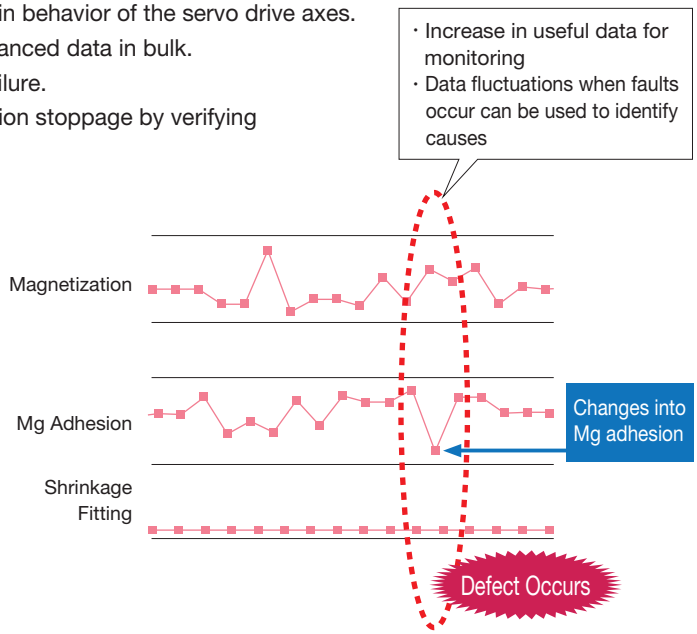
- The types and amounts of data are insufficient for completely monitoring the entire equipment
- A fault occurs but it cannot be recreated when examined such that no countermeasures can be applied
- Want to monitor effects of part consumption and wear

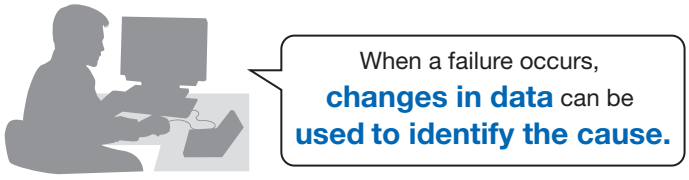


New Functions Use of increased amounts of sensing and logging data

You can monitor production equipment status from changes in behavior of the servo drive axes.
Increased amount of data enables the collection of richly enhanced data in bulk.
You can trace back data when investigating the cause of a failure.
You can prevent defective products and unexpected production stoppage by verifying the accumulated data and product quality.

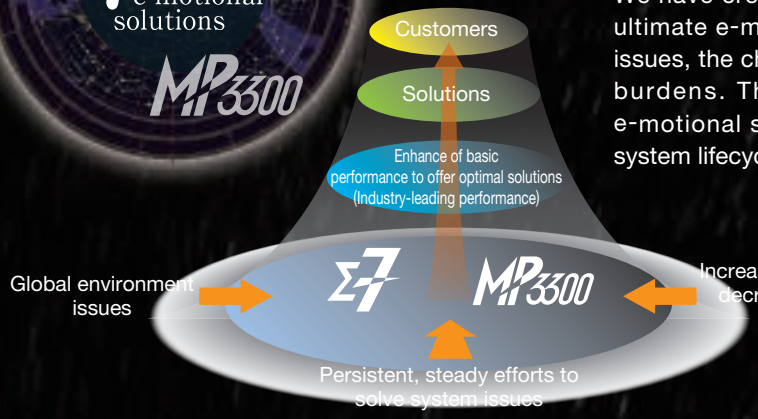






Motion control is one of Yaskawa's strengths, and our technology enables ultra-high-speed and ultra-precision control in industrial sectors around the world. Our basic philosophy is to design and develop products from a user-oriented perspective, and we strive to remain true to this ideal.

We have created the MP3300 and the Σ-7 series to offer "7 ultimate e-motional solutions" that address various system issues, the changing global environment, and increasing labor burdens. These new products allow Yaskawa to offer e-motional solutions for various situations throughout the system lifecycle.



Selection
Developers and designers

Major advantages

Enables selection from wide variety of products.

Seven ultimate solutions

1 System performance
The superlative performance of our existing products has reached newer heights. System performance is given another lift by utilizing new solutions.
- Reduced Servomotor sizes P.14

2 Ease of use
We have eliminated hassles with adjustment procedures and significantly reduced startup time.

3 Environmental performance
Our products meet overseas specifications and exacting operating conditions. You can also easily create energy-saving systems when using our ultimate solutions.
- Expanded specification ranges P.18

4 Safety and security
System can be operated safely because our Servo Drives comply with safety standards and safety is ensured by monitoring.

5 Support
We support our customers every step of the way from product selection to product maintenance. We also offer support solutions that are one step ahead of our competitors.
- Examination of multi-axis regeneration

6 Lineup
We have expanded our product lines and built up our product series to be compatible with other company systems. Selecting the products of your motion systems is now a one-step process.
- Σ-7S/W/C ●MP3300
- Rotary/Direct Drive/Linear Motors
- Partner's Products P.24
- Optimize applications P.43

Σ-7-FT

7 Compatibility
Our products are the same size as existing products so they can easily be swapped out. The compatibility of programs and parameters is also preserved. By replacing products, you can easily improve the performance of your system.
- Functional compatibility P.25
- Mounting compatibility P.25
- Application compatibility P.25

Design Developers and designers	Trial production Developers and designers	Production Manufacturers	Operation Operators	Maintenance Maintenance staff
Enhance performance and preventive safety measures to increase safety and security.	Avoid wasted time with stable and vibration-free operation without tuning.	Ship products with specified parameters to facilitate assembly.	Monitor temperatures directly using built-in temperature sensors to increase safety and security.	Easily collect and manage product data to enhance service.
●Industry-leading performance P.14-P.15 ●Optimal functions for each application P.15	●Vibration suppression P.15			
●Self-configuration P.16	●Multi-axis tuning P.16 ●Tuning-less P.16 ●Integrated tracing			●Traceability P.23
●List of specifications			●Energy-saving functions P.18 ●2-axis SERVOPACKs P.18	
●Safety functions P.19 ●Supports SIL3 specification requirements P.19			●Momentary power interruptions ●Temperature protection P.19 ●Visual identification of operating statuses P.18, 20-21	●Improved data detection function P.20-21
●Downloading of CAD data ●Self-configuration P.16		●Build-To-Order service P.22		●Traceability P.23 ●Data logging ●Lifespan diagnostics P.23

1 System performance

The superlative performance of our existing products has reached newer heights. System performance is given another lift by utilizing new solutions.

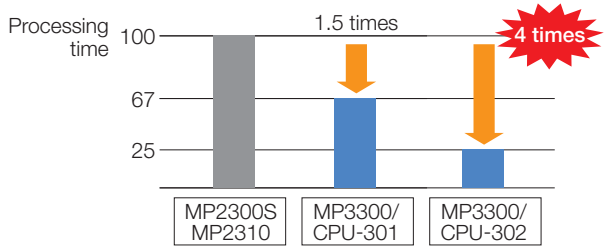
Σ-7 : Features of Σ-7 MP3300 : Features of MP3300

MP3300 Machine Controller

★ Operates 1.5 times faster
★ 64-bit data types (double-precision real numbers, quadruple-length integers) supported
★ MECHATROLINK-Ⅲ provided as a standard feature

Improved CPU performance*

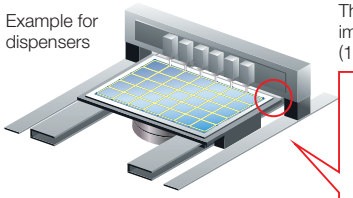
Helps increase equipment speed and shorten takt times.



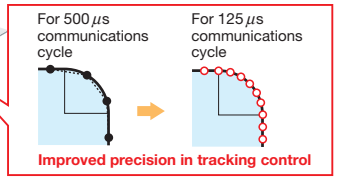
*: Ladder operation speed where the scan time of the MP2300S/MP2310=100

High-precision control

● 125 μs communications cycle is supported.



The precision of tracking corners is improved by using the CPU-302 Module (125 μs communications cycle).



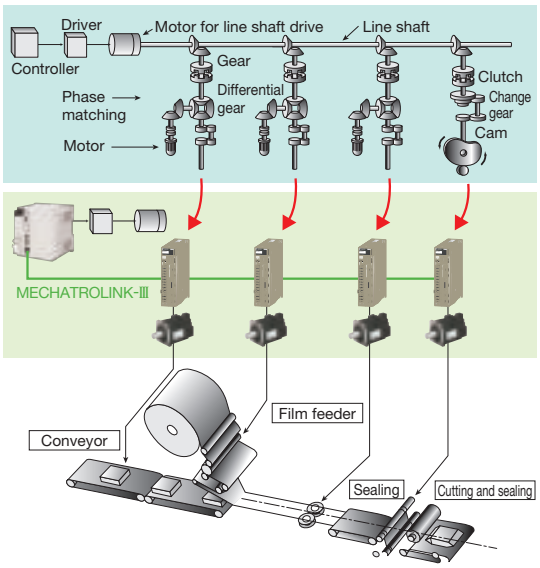
● Double-precision real-number, 64-bit integer data are supported. Rounding errors during arithmetic calculations are reduced, and control at higher levels of precision can be achieved.

Applicable for electronic cam control

Using electronic cams that can compensate for mechanical error not only makes it easier to design the cams, but it also lets you create high-performance equipment with less error.

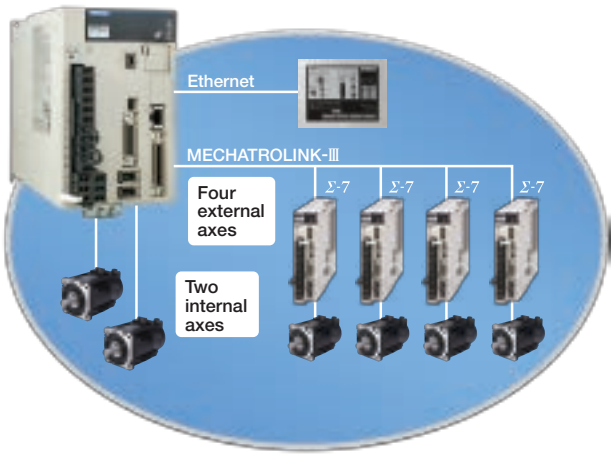
Equipment performance is improved

Machines are easier to design



Σ-7C Two-axis SERVOPACKs with Built-in Controllers

★ Internal axes can be synchronized with external axes.
★ High-speed I/O used for the Controller Function Module.
★ 3.1 kHz response frequency
★ Improved vibration suppression



Build small-scale equipment system without PLC using one SERVOPACK.

Controller and Servo Functionality **All-in-One!**

- The command/response delay is minimized with the two internal axes.
- Compact with Built-In Controller
- No Battery Required
- 16 digital inputs (DI), 16 digital outputs (DO), and a pulse input (PI) on one channel as Standard I/O

Σ-7 SERVOPACKs

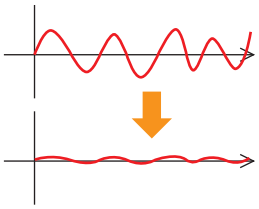
Σ-7S
(Single-axis)

Σ-7W
(Two-axis)

★ 3.1 kHz response frequency
★ Improved vibration suppression
★ FT specifications to optimize applications

▶ See page 43.

Ripple compensation



Σ-7 SERVOPACKs can reduce speed ripples caused by motor cogging, even for machines for which speed loop gains cannot be set high. This ensures smooth operation.

Enhanced vibration suppression function

- **Notch filter**
  Suppresses high-frequency vibrations of 500 Hz or higher.
  ⇒ Number of filters increased from 2 to 5.
- **Anti-resonance control**
  Suppresses vibrations at frequencies ranging from several hundred Hz to 1 kHz.
  ⇒ Vibrations can now be suppressed at multiple frequencies in comparison with one frequency in earlier models.

Vibration suppression

- Suppresses vibrations at low frequencies (30 Hz and lower).
  ⇒ Vibrations can now be suppressed at two different frequencies in comparison with one frequency in earlier models.

These functions can be adjusted automatically using the autotuning function.

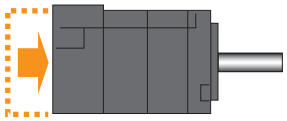
Σ-7 Servomotors

Servomotors with Batteryless Absolute Encoders are available for 4 models.

★ Compact dimensions
(approx. 80% smaller than our earlier models)
★ High-resolution 24-bit encoder incorporated
(16,777,216 pulses/rev)
★ Maximum torque: 350%
(small capacity)

Compact dimensions

Models: SGM7J, SGM7A
□40 mm (50/100/150 W)



Approx. 80% smaller than earlier models.

High-resolution, 24-bit encoder

Encoder resolution comparison

Σ-Vseries
20 bits =
1 million pulses/rev (approx.)

Σ-7series
24 bits =
16 million pulses/rev (approx.)

16 times higher!

Solution for 50-W or greater models

Servomotors with Batteryless Absolute Encoders are also available. (Except SGM7M model)

● Retains current position without a battery

When the motor turns, power is generated by the magnet and coil to store the data in non-volatile memory.

Batteryless encoders remove worries about the battery running out and losing rotational data.

● Solves issues related to batteries

No time or effort for replacement	No inventory management	No need to ship batteries	No disposal costs

● Easily replace Servomotors

▶ See "Servomotor" on page 25.

2 Ease of use

We have eliminated hassles with adjustment procedures and significantly reduced startup time.

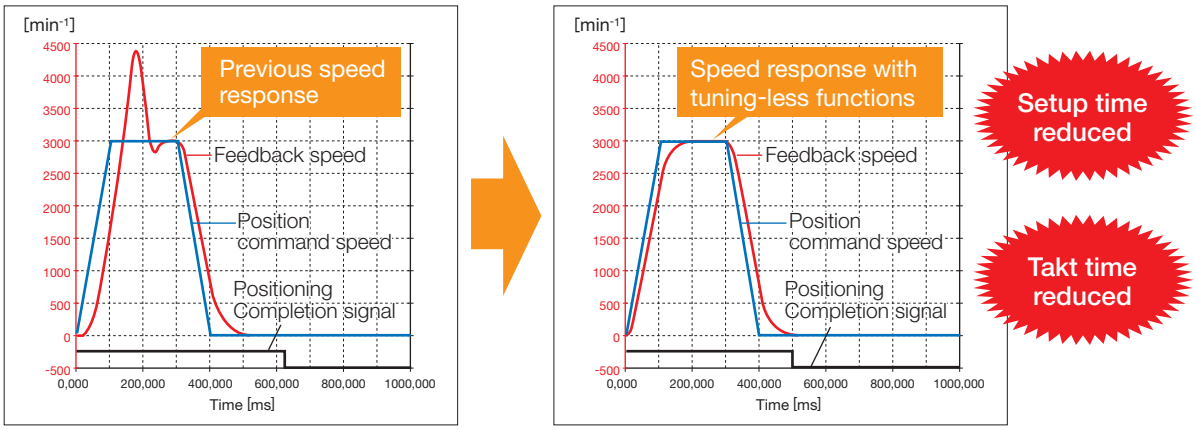
Σ-7 : Features of Σ-7 MP3300 : Features of MP3300

No need to adjust servo gains Σ-7

With Yaskawa's original tuning-less function, systems can run without vibration for a load with 30 times (max.) of the load moment of inertia. Systems remain stable even with load changes during operation.

	Σ-V Series	Σ-7 Series
Allowable load moment of inertia ratio	30 times (max.)	30 times (max.)
Max. control gain	Speed loop gain 40 Hz (approx.)	Speed loop gain 70 Hz (approx.)

When the allowable load moment of inertia ratio is 30 times:



Automatic setup using the self-configuration function MP3300

The self-configuration function automatically recognizes the configuration of all the MP3300 optional units and modules, as well as all slave devices (servo units and I/O devices) connected to the MECHATROLINK motion network. This function eliminates the need for definition input work, and delivers vastly shortened startup times. The self-configuration function generates the definition files listed below.

- Module configuration definition
- I/O register assignments
- Communication parameters for Communication Module
- Servo Drives connected to MECHATROLINK (servo parameters and user definitions)
- I/O devices connected to MECHATROLINK (number of input and output points)

●Using the DIP Switch

●Using the MPE720 support tool

Online editing enables programming without stopping the machine MP3300

Efficient debugging operations while using online editing ensure you finish trial operation faster. A register map will show you the current application status of registers in the program at a glance so that you can easily search for unused registers that are required to add to or change programs.

Editing without Stopping the Controller

While online, you can change the program in the Controller and on the PC at the same time.

Register Status Displayed in Colors

White: Unused registers
Green: Registers used with the same data type
Red: Registers used with different data types

- When the program is not working correctly, you can check red registers.
- If you need to use new registers, just look for white ones.

Information on used registers is displayed in balloons for mouse rollovers.

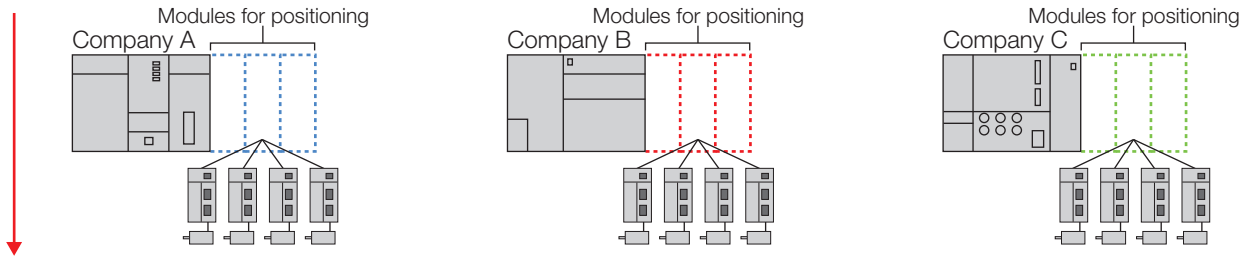
Save time and reduce costs with Yaskawa's ideal motion control system

MP 3300

Simplify the construction of standardized drive systems that work with any PLC using Yaskawa's ideal motion control system for servo drives.

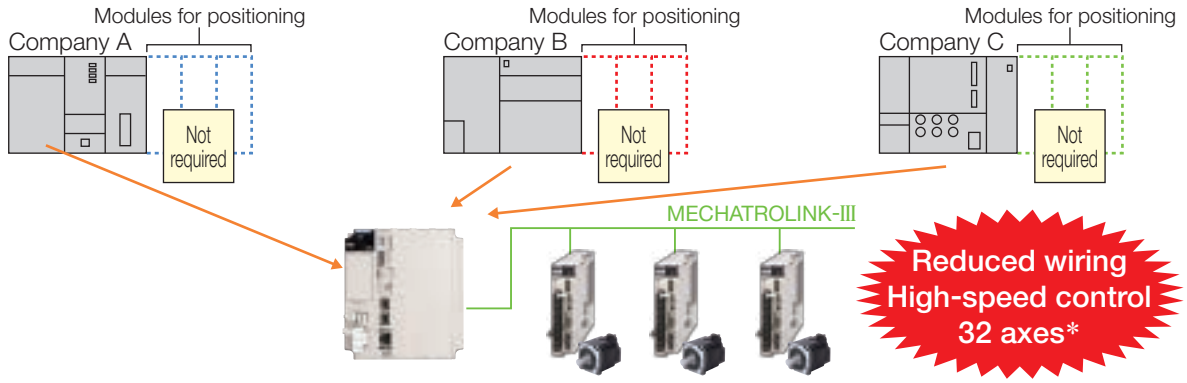
Positioning Systems that Use PLC

Issue When similar systems but different types of PLCs are used, motion control programs will be different for each PLC, as shown below.



Positioning System with MP3300

Solution The same motion control programs can be used by applying the MP3000 Series, which can be connected to the PLC of each company.



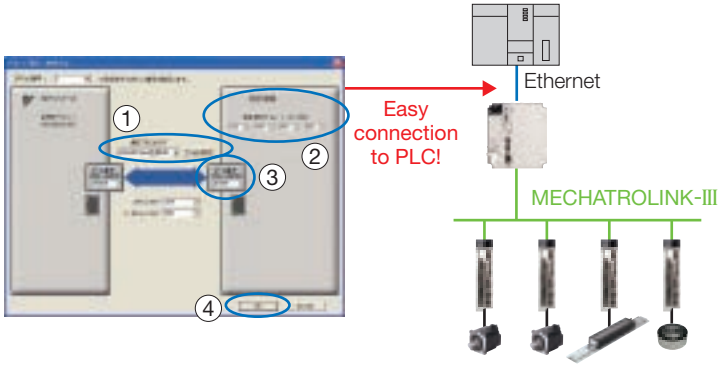
*: When the CPU-301 or -302 module (32 axes) is used.

PLC connection with a simple setup and easy programming

MP 3300

Procedure

① Select a PLC product.
② Enter the IP address of the PLC.
③ Enter the port number of the PLC.
④ Establish the connection by clicking the OK Button.



Our products meet overseas specifications and exacting operating conditions. You can also easily create energy-saving systems when using our ultimate solutions.

Satisfies specifications for use overseas and in harsh operating conditions

MP 3300 Σ-7

- 240 VAC supply voltage also supported
- High-altitude use increased to 2,000 meters above sea level*
- Maximum ambient temperature raised to 60°C*

*: Derating required.

Waterproof protective structure upgrade to IP67 rating

Σ-7

[SGM7J, SGM7A (IP22 for 7.0 kW) and SGM7G models]

Protective Structure (IEC60034-5)

IP 67

◎ Rating for protection from water:
The units can be used even when they are immersed in water under specific conditions (immersed at a depth of 1 m below the surface of the water for 30 minutes).

◎ Rating for protection from contact and entry of solid foreign objects:
Safe dust-proof structure
Structure is completely protected from the entry of dust.

Saves energy with effective use of regenerative energy

Σ-7

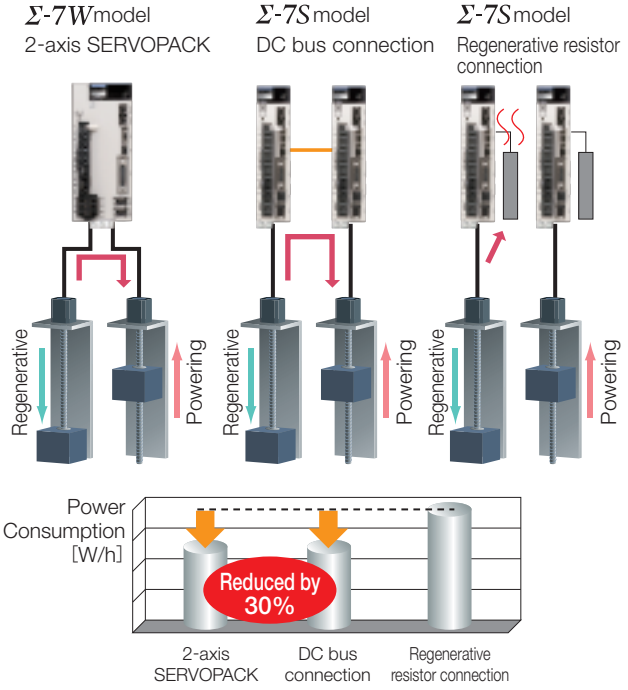
Regenerative energy can be effectively used between two axes when using a 2-axis integrated SERVOPACK or single-axis SERVOPACKs with a DC bus connection. This saves energy in equipment where regenerative energy was previously consumed by regenerative resistors.

Features

● Energy savings for all equipment
- Supplies regenerative energy that was discarded as heat to other axes.
- Reduces the amount of electrical power consumed.

● Eliminates the need for regenerative resistors*
- Uses regenerative energy and eliminates the need for regenerative resistors.
- Lowers the cost of systems and saves space.
- Reduces temperature increases commonly caused by the use of regenerative resistors.

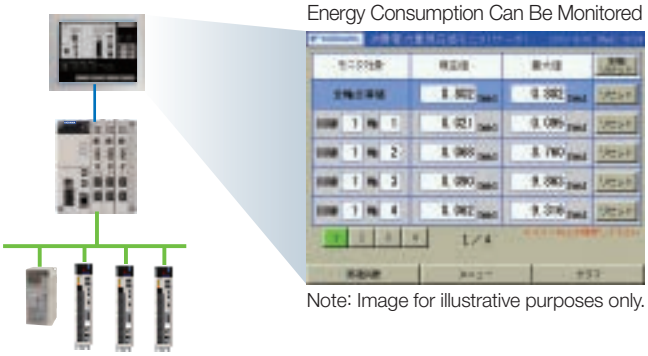
*: Regenerative resistors may be required, depending on machine configurations.



Visualization of Energy Consumption

MP 3300 Σ-7

The power in the motion system can be monitored through the MP3300.



Note: Image for illustrative purposes only.

No Battery Disposal Required

Σ-7 Σ-7C

Servomotors with Batteryless Absolute Encoders

Batteries that were required for each axis of a Servomotor with Encoder are no longer necessary.

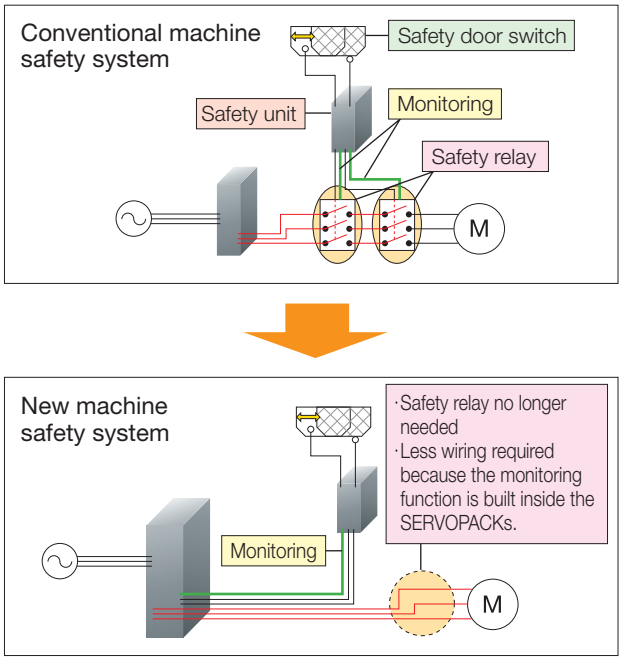
Two-axis SERVOPACKs with Built-in Controllers Σ-7C

A battery in the controller section is no longer required due to the use of non-volatile memory.

Satisfies requirements of the SIL 3 of the IEC 61508 functional safety standards (first in Japan)

Certification under this standard will improve the safety of our customers' systems and reduce the costs associated with additional safety certification. It will also be easier to implement compliant safety systems for press machines and other systems on the market in Europe and other regions. This certification will also reduce the man-hours required for wiring connections and the number of peripheral devices.

Stop Category 0 (Safe Torque Off) incorporated



Features

- Meets safety standards for SIL 3 of the IEC 61508
  Yaskawa will become the first company in Japan to acquire SIL3 certification for its servo drives. This indicates a significant improvement in safety compared to the Σ-V series.
- Improved functions with safety option module
  The safety option module (SGDV-OSA01A) for the Σ-V series can also be used with the Σ-7 series. The following functions meet the requirements stipulated under IEC 61800-5-2:*
  STO: Safe Torque Off (immediate removal of power to motor)
  SS1: Safe Stop 1 (removal of power after motor has decelerated and stopped)
  SS2: Safe Stop 2 (maintenance of power after motor has decelerated and stopped)
  SLS: Safely-Limited Speed (limit placed on motor speed)
  The responsiveness of these safety functions is significantly enhanced without going through a host system.

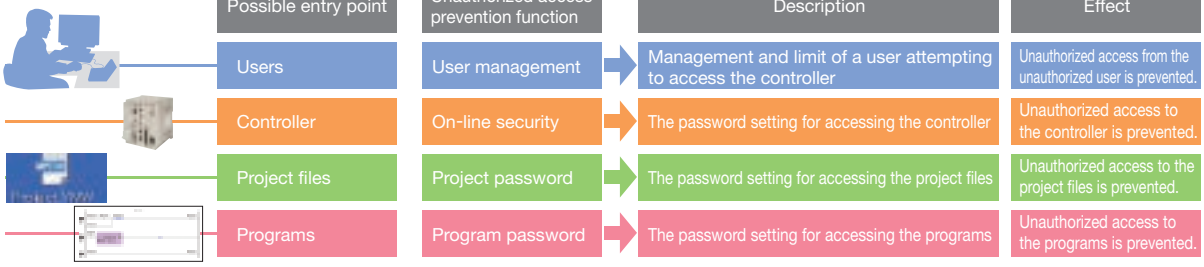
*: SIL2 applies when a system is used with the safety option.

Protect systems from high temperatures MP3300 Σ-7

MP3300, Σ-7 SERVOPACKs, and servomotors are equipped with temperature sensors that can directly monitor temperatures of machines and detect abnormalities to prevent failures.
Real-time temperatures can be viewed on a display by using MP3300.

Several kinds of powerful functions to prevent unauthorized access MP3300

Security functions stand guard to block off multiple possible entry points including programs, projects, controllers, and users.

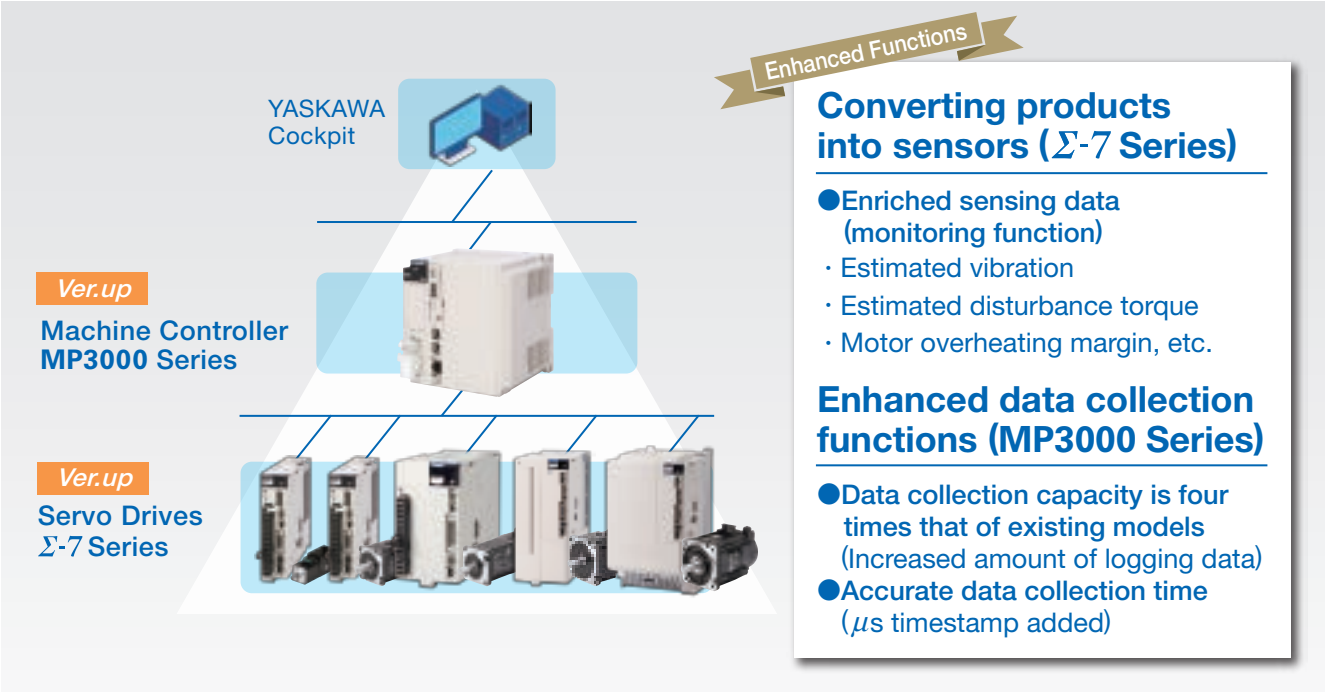


Possible entry point	Unauthorized access prevention function	Description	Effect
Users	User management	Management and limit of a user attempting to access the controller	Unauthorized access from the unauthorized user is prevented.
Controller	On-line security	The password setting for accessing the controller	Unauthorized access to the controller is prevented.
Project files	Project password	The password setting for accessing the project files	Unauthorized access to the project files is prevented.
Programs	Program password	The password setting for accessing the programs	Unauthorized access to the programs is prevented.

The causes of product failures can now be inferred accurately and quickly through the analysis of device operational data.

Supporting big data visualization through enhanced data detection functions.

Yaskawa updated software versions of MP3000 Series Machine Controllers and Σ-7 Series AC Servo Drives to solve data acquisition and sensor installation issues at production sites. This improves the type and quantity of big data detected from equipment and facilities to track operational status and causes of abnormalities.



Corresponding Models and Versions

Corresponding Product	Model	Supported Ver.
Machine Controller	MP3100	1.44 or later
	MP3200	
	MP3300	
Two-axis SERVOPACK with built-in controller	Σ-7C	1.09 or later (Only the enhanced data logging function is supported)
SERVOPACK	Σ-7S MECHATROLINK-4	0030 or later
	Σ-7S MECHATROLINK-Ⅲ	002C or later
	Σ-7W MECHATROLINK-Ⅲ	
Tools	YASKAWA Cockpit	1.0 or later
	MPE720 Ver.7	7.46 or later
	SigmaWin＋	7.27 or later

Examples of Solutions Refer to pages 10 and 11.

Features

● Improved monitoring accuracy

Upgrade Σ-7 Series AC Servo Drives to acquire various types of data and allow the servo drives to be used more easily as sensors. Monitoring the vast amounts of data automatically extracted by SERVOPACKs (such as vibration, disturbance, positioning, communication quality, and temperature data) using the MPE720 can be useful in predicting equipment failures and monitoring aged deterioration.

AC Servo Drive
Σ-7 Series

Use servo drives as a sensor!

Sensing Data Type of Σ-7 Series

Classification		Additional Sensing Data	Unit	Monitoring using Digital Operator	Maintenance Monitoring using MPE720	Existing Σ-7 Data
Control	Vibration monitor	Estimated vibration Max. value of estimated vibrational amplitude	min^{-1}	Un10C Un078	— Applicable	Torque reference Speed reference/FB Positioning reference/FB
	Disturbance monitor	Estimated disturbance torque (thrust) Max. value of estimated disturbance torque (thrust) Min. value of estimated disturbance torque (thrust)	%	Un079 Un07A Un07B	— Applicable Applicable	—
	Positioning monitor	Setting time Overshoot amount Residual vibration frequency	0.1 ms reference unit 0.1 Hz	Un105 Un106 Un107	— — —	—
Environment	Communications quality monitor	Number of serial encoder communication errors Number of MECHATROLINK communication errors	times	Un104 Un147	Applicable Applicable	—
	Temperature monitor	Servomotor overheating margin	℃	Un174	Applicable	Installation environment monitor (amplifier, motor)
Operational status	Operational status monitor	Max. value of accumulated load factor Overload margin	% 0.01%	Un145 Un14E	Applicable —	Accumulated load ratio (10 s) Power consumption, regenerative/DB load ratio

● Improved analysis accuracy

Upgrade MP3000 Series Machine Controllers to allow time stamps to be recognized from second units to μs units (1/1,000,000th of a second). The MPE720 can use these time stamps to accurately combine and display the times for multiple items of logging data, which makes it easier to perform data analysis and simplifies the process of identifying the causes of failures when they occur.

Machine Controller
MP3000 Series

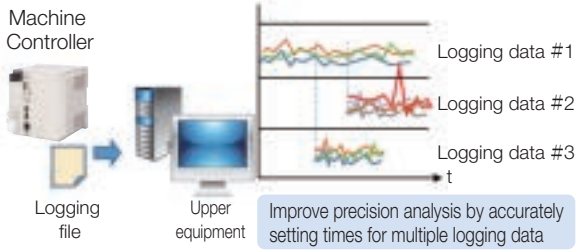
Use data logging function!

Logging data (image)

No.	Date/Time	SubSeconds (0.01μs)	MW0000	MW0001	GW0000	GW0002
0	yyyy/mm/dd hh:mm:ss	34512500	15544	1	49992	15544
1	yyyy/mm/dd hh:mm:ss	34525000	15545	2	49992	15545
2	yyyy/mm/dd hh:mm:ss	34537500	15546	3	49993	15546
3	yyyy/mm/dd hh:mm:ss	34550000	15547	4	49994	15547
4	yyyy/mm/dd hh:mm:ss	34562500	15548	5	49995	15548
5	yyyy/mm/dd hh:mm:ss	34575000	15549	6	49996	15549

Conventional time stamp (count by seconds)

Time stamp in μs units

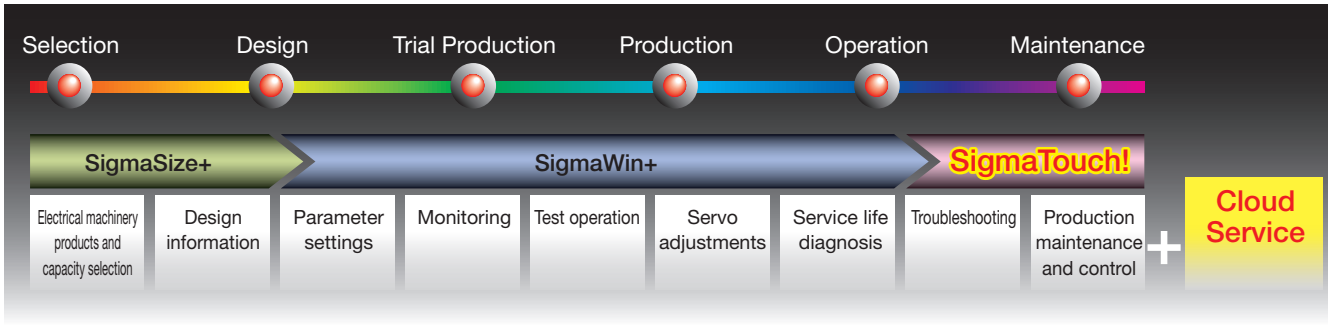


5 Support

We support our customers every step of the way from product selection to product maintenance. We also offer support solutions that are one step ahead of our competitors.

Yaskawa's MechatroCloud offers Build To Order (BTO) services. The SigmaTouch! smartphone application can be used to enhance product lifecycle management and maintenance service.

MP 3300 Σ-7



MechatroCloud

An industry first

MechatroCloud is a new cloud service provided by the Yaskawa Electric.

MechatroCloud is available in Japan only.
Refer to Cloud Services on the e-Mechatronics website for more information about MechatroCloud.

Details of service

◎ Build To Order service
Customers can place orders after specifying the parameters they want when their SERVOPACKs are shipped from the factory.

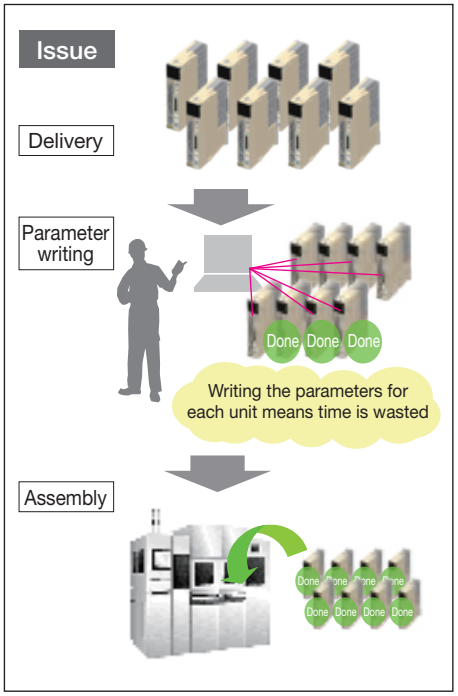
◎ Product management and maintenance service
The product manufacturing information used specifically by each customer can easily be saved and displayed at any time.

How to use the service

Register as a corporate member of our customer Web services. You can use MechatroCloud after you have registered.

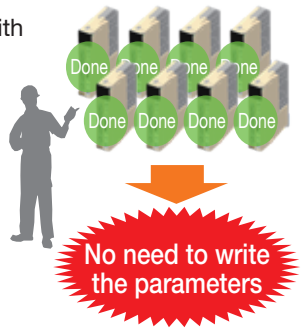
Single or multiple orders possible after specifying parameters (BTO) Σ-7

Customers can now place single or multiple orders for SERVOPACKs in the Σ-7 series after specifying parameters at the factory shipment stage. It is no longer necessary to write the parameters at the system assembly site, which means that production lead times can be reduced.



Solution

The Σ-7 SERVOPACKs are delivered with the customer-specified parameters already written prior to shipment.



This reduces the man-hours involved in system assembly work.

The names of the axes are printed on the boxes in which the products are delivered. This ensures that these are no mistakes made when installing the axes.

Product management and maintenance service

MP 3300 Σ-7

- Manufacturing information for each product can be easily viewed by using SigmaTouch!, Yaskawa's smartphone application. To view, simply hold your smartphone over the QR code of the product.
- MechatroCloud can also be used with SigmaWin+.

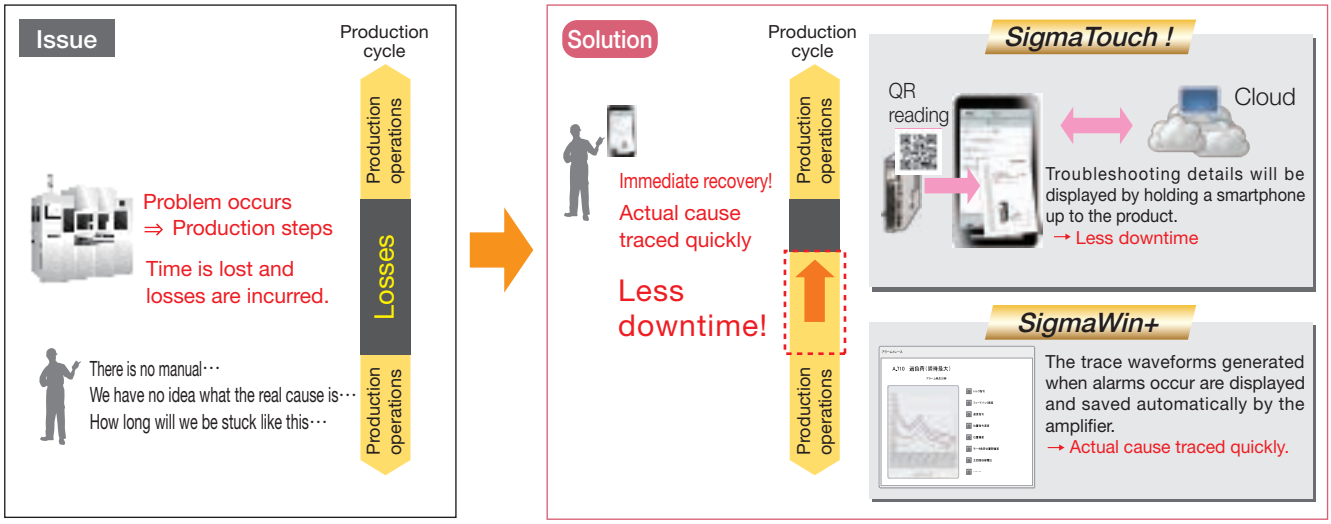
Features:
Simply hold your smartphone over the QR code of the product to access the MechatroCloud service.
· You can view the product manufacturing information and the troubleshooting information stored in the MechatroCloud.
· You can view manuals for servomotors, servo drives, and machine controllers.

Note: QR code is a registered trademark of Denso Wave Incorporated.

Easier and faster troubleshooting options

MP 3300 Σ-7

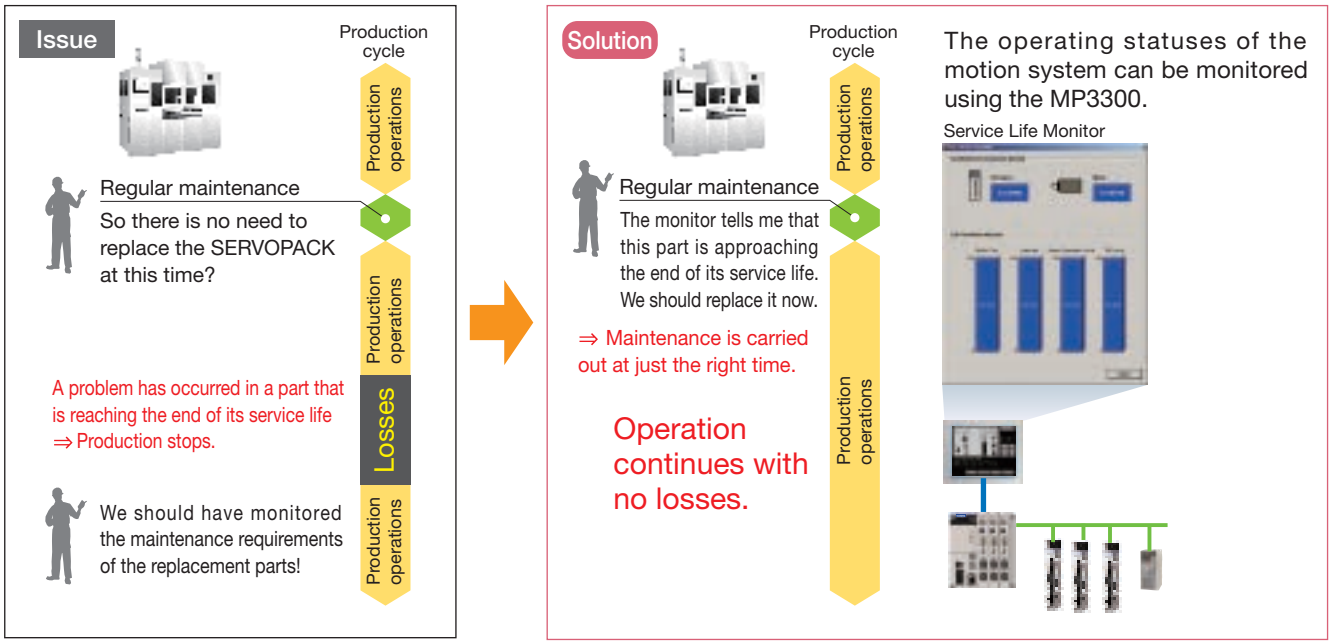
Operators can use smartphones on-site to display the amplifier manual and troubleshooting details. The trace waveforms generated when alarms occur can be saved automatically, and the real causes of problems can be tracked faster, which reduces downtime.



Achieve planned maintenance by monitoring the remaining service life

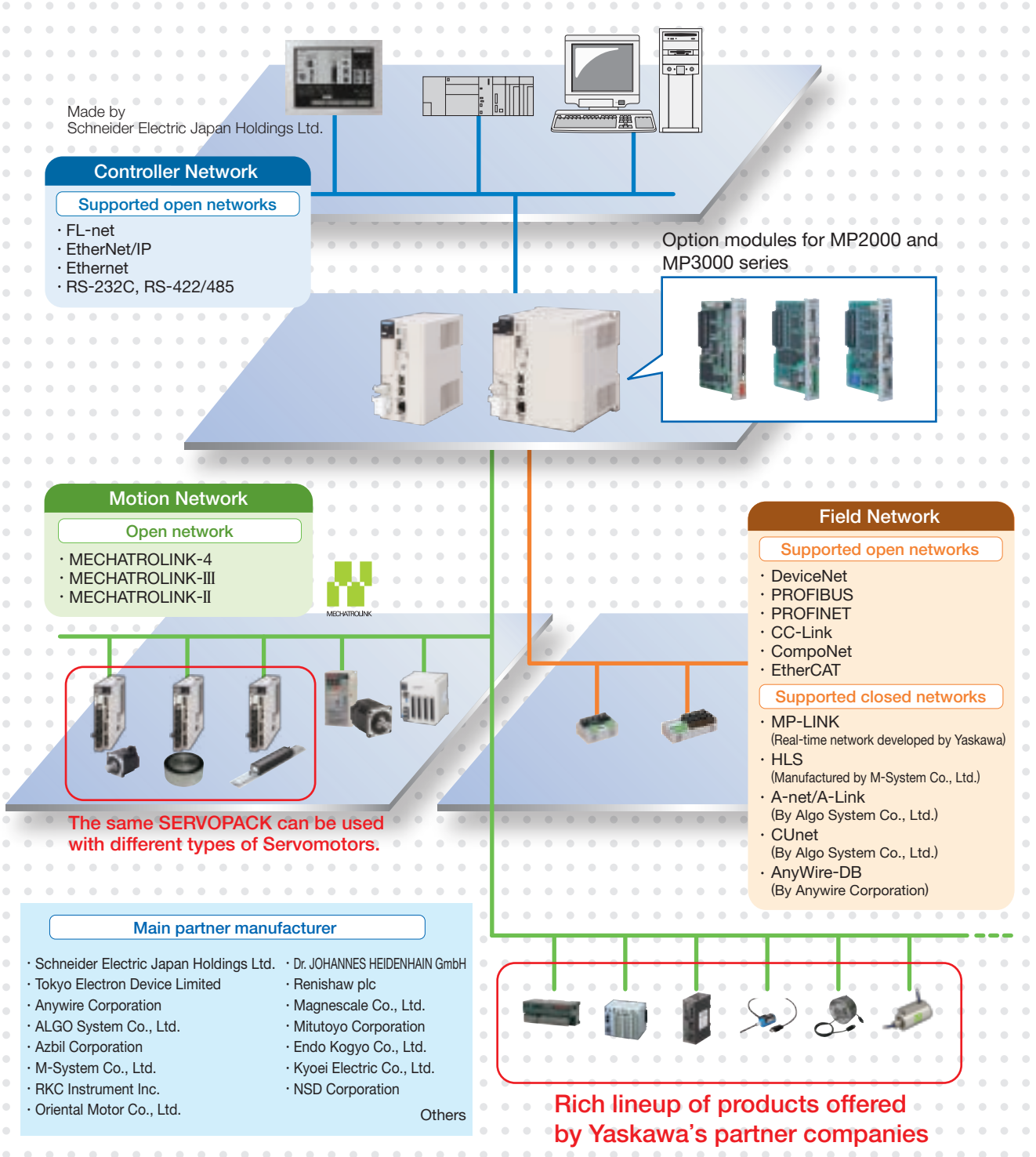
MP 3300 Σ-7

The service life of a product can be estimated, and users are notified when the parts should be replaced.
System failure can be prevented because parts can be replaced before products fail or a fault occurs.



We have expanded our product lines and built up our product series to be compatible with other company systems. Selecting the products of your motion systems is now a one-step process.

Flexible system construction with open network



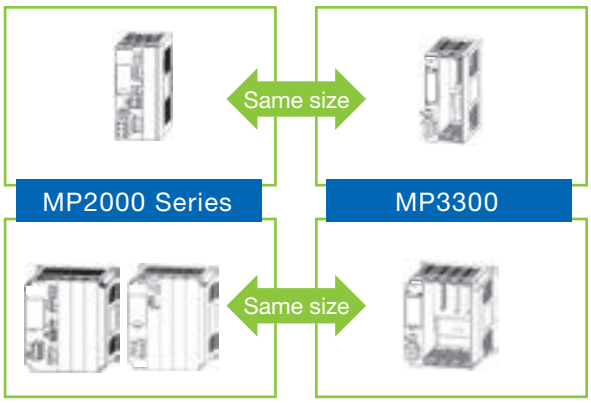
7 Compatibility

Our products are the same size as existing products so they can easily be swapped out. The compatibility of programs and parameters is also preserved. By replacing products, you can easily improve the performance of your system.

e-motional solution

Machine Controller

● Compatible with MP2000 series



● Applications

Program applications for the MP2000 series can be converted and used with the MP3300.

MP2000 applications

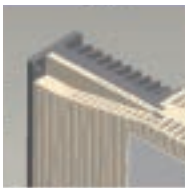
MP3000 applications

SERVOPACK

● Installation compatibility with the models in the Σ-V SERVOPOACK having the same capacity is featured for the SERVOPACKs.
The Σ-7 SERVOPACKs have improved shapes for mounting holes. With this new shape, it is much easier to insert a screwdriver.

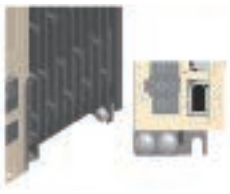
Mounting holes on Σ-V top

Mounting holes on Σ-7 top



Mounting holes on Σ-V bottom

Mounting holes on Σ-7 bottom

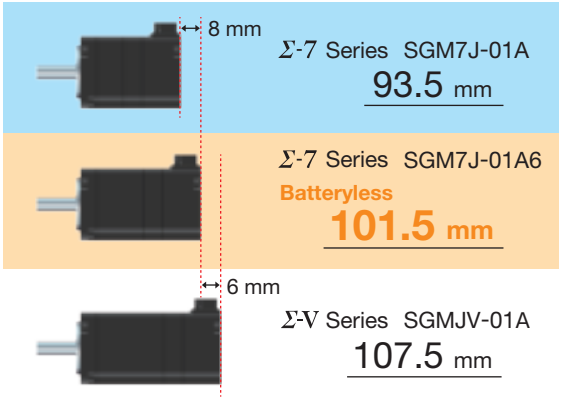


● Parameters

A parameter conversion mode is provided. The parameters of the Σ-V SERVOPACKs can be used with the Σ-7 SERVOPACKs, when using the SigmaWin+ parameter converter.

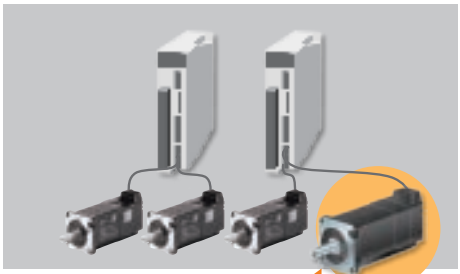
Servomotor

● Installation compatibility with the models in the Σ-V SERVOPOACK having the same capacity is featured for the SERVOPACKs.



● Easily-replaceable system configuration

Currently used incremental system



Batteryless absolute encoder

Replaceable by changing only the motor. SERVOPACK and cables can be left as is.

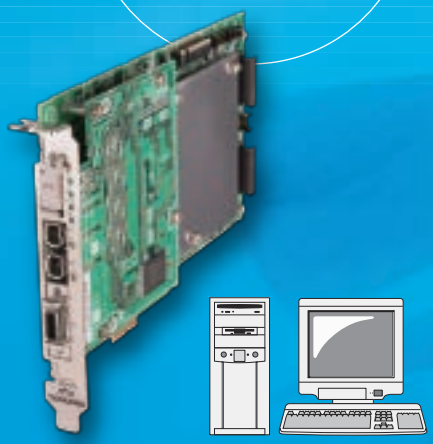
Machine Controller

The MP Machine Controller series anticipates the needs of increasingly complex and advanced systems to offer customers the most optimal solutions.

In the 1990s, Yaskawa introduced Machine Controllers to the motion control market that was dominated at the time by programmable controllers. Since then, Yaskawa has evolved as a top manufacturer of Machine Controllers and is turning customer problems into opportunities.

These efforts have included improvements in the high-speed performance of machines and systems, enhancement of productivity by reducing takt times, and monitoring the operation status.

MP3000 Series



Modular Type

Machine Controller

MP3100

A controller capable of high-speed, high-capacity data processing in systems that use computers.

Unit Connection Type

Machine Controller

MP3200

Motion, vision, and robotics systems deliver the highest possible machine performance.

Board Type

Machine Controller

MP3300

The base unit, CPU modules and optional modules can be freely combined to create a Machine Controller best suited to the user's control scale and control panel size.

MP3000

Option Modules — Mounted on the MP3200/MP3300 base unit

Motion Modules

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

Name	Model	Description
SVF-01	JAPMC -MC2330-E	MECHATROLINK-4 × 1
SVC-01	JAPMC -MC2320-E	MECHATROLINK-Ⅲ × 1
SVB-01	JAPMC -MC2310-E	MECHATROLINK-Ⅱ × 1
SVA-01	JAPMC -MC2300	Analog-output 2-axis servo control
PO-01	JAPMC -PL2310-E	Pulse-output 4-axis servo control

Note: One CPU can control up to 16 modules.

Expansion Interface Module

Used to connect the Expansion Rack (MP2200 Base Units MBU-01/-02/-03) to add the option modules.

Name	Model	Description
EXIOIF	JAPMC -EX2200-E	Expansion Interface

Note: Use the EXU-001 and -002 units when using Rack Expansions with sub-CPU for MP3200.

I/O Modules

Provides digital or analog I/O interface.

Name	Model	Description
LIO-01	JAPMC -IO2300-E	Digital input: 16 points (sinking output) Digital output: 16 points (sinking output) Pulse input: 1 point
LIO-02	JAPMC -IO2301-E	Digital input: 16 points (sourcing output) Digital output: 16 points (sourcing output) Pulse input: 1 point
LIO-04	JAPMC -IO2303-E	Digital input: 32 points Digital output: 32 points (sinking output)
LIO-05	JAPMC -IO2304-E	Digital input: 32 points Digital output: 32 points (sourcing output)
LIO-06	JAPMC -IO2305-E	Digital input: 8 points Digital output: 8 points (sinking output) Analog input: 1 channel Analog output: 1 channel Pulse counter: 1 channel
DI-01	JAPMC -DI2300-E*	Digital input: 64 points
DO-01	JAPMC -DO2300-E	Digital output: 64 points (sinking output)
AI-01	JAPMC -AN2300-E	Analog input: 8 channels
AO-01	JAPMC -AN2310-E	Analog output: 4 channels
CNTR-01	JAPMC -PL2300-E	Pulse-input counter

*: Supported version (CPU module Ver.1.47 or higher, MPE720 Ver.7.45 or higher)
Note: 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-E	Ethernet (10BASE-T) port × 1 RS-232C port×1
218IF-02	JAPMC -CM2302-E	Ethernet (100BASE-TX) port × 1 RS-232C port × 1
217IF-01	JAPMC -CM2310-E	RS-232C port × 1 RS-422/485 port × 1
260IF-01	JAPMC -CM2320-E	DeviceNet port × 1 RS-232C port × 1
261IF-01	JAPMC -CM2330-E	PROFIBUS port × 1 RS-232C port × 1
262IF-01	JAPMC -CM2303-E	FL-net (100BASE-TX) port × 1 (10BASE-TX) port × 1
263IF-01 EtherNet/IP	JAPMC -CM2304-E	EtherNet/IP (Scanner and adapter) port × 1
264IF-01 EtherCAT	JAPMC -CM2305-E	Port for EtherCAT slave × 2 (1 circuit)
265IF-01 CompoNet	JAPMC -CM2390-E	CompoNet port × 1
215AIF-01 MPLINK	JAPMC -CM2360-E	MPLINK communication/ RS-232C
215AIF-01 CP-215	JAPMC -CM2361	CP-215 communication/ RS-232C
266IF-01 PROFINET	JAPMC -CM2306-E	PROFINET master*
266IF-02 PROFINET	JAPMC -CM2307-E	PROFINET slave
269IF-01 CC-Link	JAPMC -CM2308-E	CC-Link IE Field Slave

*: Estimates are required before ordering this product. Contact your Yaskawa representative for more information.
Note: One CPU can control up to 8 modules.
For RS-232C communications, 16 ports can be used.

Machine Controller

MP3000 Series

The MP3000 series includes an extensive lineup of Machine Controllers and develop the most ideal system scale and meet motion requirements. In addition, diversified functions, performances, and services are available to support customer needs throughout the entire machine lifecycle.

Features

1 Ultimate system performance

Equipped with the fastest CPU, the MP3300 Machine Controller makes it simple to construct a high-speed, high-accuracy, and multi-axis system by connecting units that support MECHATROLINK-Ⅲ.

2 Ultimate ease of use

The adjustments to a multi-axis system can be completed in a short time using the MPE720 Ver. 7 engineering tool. It is also easy to add a motion system to an existing sequence system.

3 Ultimate environmental performance

The power consumption of the motion system can be monitored, which helps to conserve energy.

4 Safety and security

- Any system temperature abnormalities can now be pinpointed at an early stage using temperature sensors standard-equipped to the product to ensure safety and security.
- Security has been strengthened to prevent the outflow of know-how that is problematic when exporting.
- Product and equipment abnormalities can now be detected using digital data collected from facilities and equipment at production sites.

⇒For details, see pages 10, 11, 20 and 21.

5 Ultimate support

The support available from Yaskawa now makes it easier to handle large-volume data, such as system operation statuses. This improves traceability at the production site. New support services such as Yaskawa's MechatroCloud service make it even more convenient for users to store and manage product information.

6 Ultimate lineup

In addition to the Σ-7 series of AC Servo Drives, a strong lineup of products is also available from Yaskawa's partners.

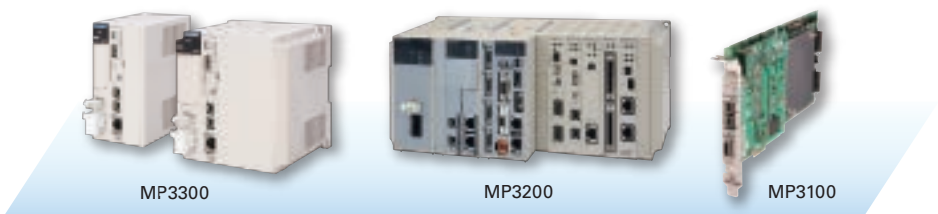
7 Ultimate compatibility

Program applications for the MP2000 series can be converted and used with the MP3000 series.

MP3000

Machine Controller MP3000

Control the entire system, including servos, inverters, I/O, and touch panels.



Specification Comparison of MP3000 Series

●: Applicable ×: Not applicable

Items		MP3100		MP3200		MP3300	
							
CPU		MP3100 (16 axes)	MP3100 (32 axes)	CPU-201	CPU-202	CPU-301 (16 axes) CPU-302 (16 axes)	CPU-301 (32 axes) CPU-302 (32 axes)
Performance comparison of CPU Module (when compared to MP2310/CPU-02)		4.0	4.0	4.0	6.0	CPU-301: 1.5 CPU-302: 4.0	CPU-301: 1.5 CPU-302: 4.0
Number of slots (on main rack)		-		3/5/8		1/3/8	
Rack expansion		●		●		●	
Multi-CPU configuration		●		● (Up to 5 modules, including the main CPU module)		×	
Communication I/F		-		Ethernet × 2 ports (built-in HUB function): 100 Mbps		Ethernet × 1 port: 100 Mbps	
USB I/F		Provided (for storage device)					
MECHATROLINK I/F		MECHATROLINK-III Provided Minimum communication cycle: 125 μs		MECHATROLINK-III Provided Minimum cycle: 250 μs	MECHATROLINK-III Provided Minimum cycle: 125 μs	MECHATROLINK-III Provided Minimum communication cycle: CPU-301: 250 μs, CPU-302: 125 μs	
Number of controlled axes	SVC	16 axes	32 axes	32 axes		16 axes	32 axes
	SVR	16 axes	32 axes	32 axes		16 axes	32 axes
	Maximum number of controlled axes	256 axes (when optional modules are used, or when racks are expanded)					
Program memory capacity	Data tracing	256 K words	1 M words	1 M words		256 K words	1 M words
	Table data	1 M bytes	3 M bytes	3 M bytes		1 M bytes	3 M bytes
	M registers	1 M words					
	User memory	15 M bytes	31 M bytes	31 M bytes		15 M bytes	31 M bytes
Optional modules		MP3000 and MP2000 series optional modules available					
MotomanSync-MP		Ethernet/MP3000 bus connection		Ethernet/MP3000 bus connection		Ethernet connection	
Basic functions	Number of ladder programs	High-speed scan DWGs: max. 1000, Low-speed scan DWGs: max. 2000, User function DWGs: max. 2000, Motion programs: max. 512					
	Register types	S/M/G/I/O/C/D/#					
	Data types	B/W/L/Q/F/D/A					
	Index registers	Subscripts I /J, and array registers					
	Register capacity	M registers: 1 M words, G registers: 2 M words					
Motion control functions	Slave functions	●					
	Slave CPU synchronization	●					
Communication functions	Automatic reception	-		● (Maximum number of automatic reception connections: 10)			
	File transfer reception	-		● (FTP server/client)			
Data tracing functions	Number of groups	1, 2, 4 (selectable)					
	Trace memory	256 K words/ 4 groups	1 M words/ 4 groups	1 M words/4 groups		256 K words/ 4 groups	1 M words/ 4 groups
	Traceable data points	16 points/group					
Data logging functions		Number of groups: 4 Number of log files: Built-in RAM disk (max. 8 MB), or USB memory device (4 GB*) Data logging points: 64 points					
USB memory functions		Backup/restore of project files, data logging, import/export of register data					
Linkage functions for Σ-7 Servo Drives	Servo tracing	●		●		●	
	Monitoring	●		●		●	

*: When using recommended USB memory device

MP3100

A controller capable of high-speed, high-capacity data processing in systems that use computers.
A rich set of motion APIs have been prepared so that motion control can be freely executed using PC applications such as VC++, C#, and VB.NET.

[Catalog No. KAEPC88073215]

The general-purpose, high-function MP3100

The MP3100 Machine Controllers enable data access and motion control from a PC with a rich API. The MP3100 Machine Controllers are compatible with the MP2100 Series with improved functionality and ease of application. The MP3100 has no battery and requires virtually no maintenance.

Super-high-speed application processing

① Greater CPU performance

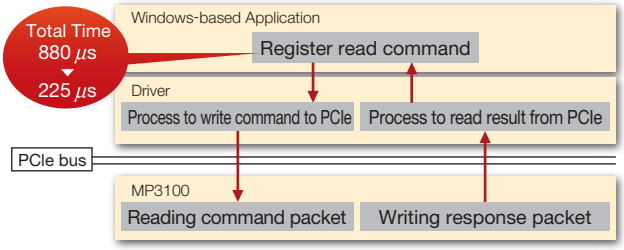
The processing speed is four times faster than the MP2100.
The high-speed scan time can be set to as low as 125 μs.

② MECHATROLINK-Ⅲ

A 125-μs communications cycle enables detailed commands to be sent at high speeds and improves processing precision and tracking accuracy.

③ PCI Express

Faster data communications between the Machine Controller and PC reduces takt time.



④ High-speed I/O (5 inputs and 4 outputs)

A High-speed I/O Module is built in to provide I/O service with a high-speed scan of 125 μs.

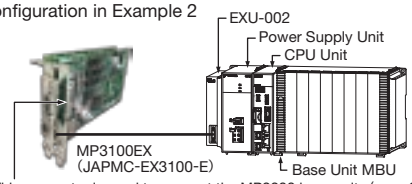
⑤ Sub-CPU configuration provides high-speed processing

The sub-CPU configuration based on the MP3100EX boards speeds up the entire system through load balancing. The MP3100 can also be used as a sub-CPU.

・Configurable combinations

Example	Main CPU	Sub CPU
1	MP3100+MP3100EX	MP3100+MP3100EX
2		MP3200+EXU002
3	MP3200+EXU-001	MP3100+MP3100EX

・Configuration in Example 2



This connector is used to connect the MP2200 base units (max. 3) with the EXIOIF module.

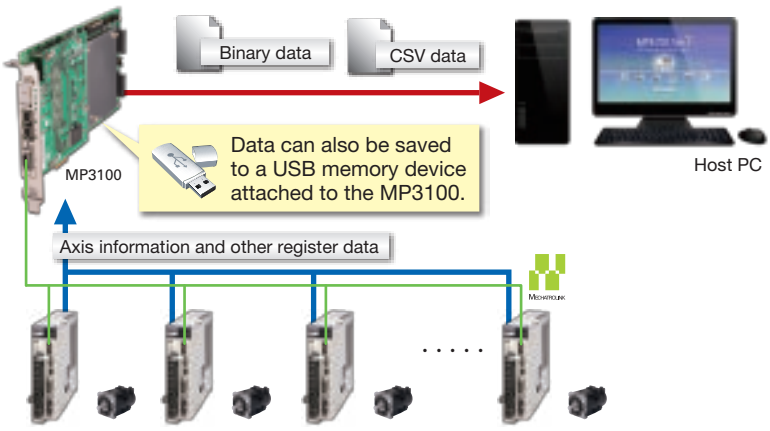
Improved traceability for large-scale systems

① Easily collect large quantities of data

Save logs of the equipment operation conditions in the computer's HDD or USB memory device. The large quantities of data that have been collected can be used effectively for production management and preventive maintenance.

② High-precision troubleshooting

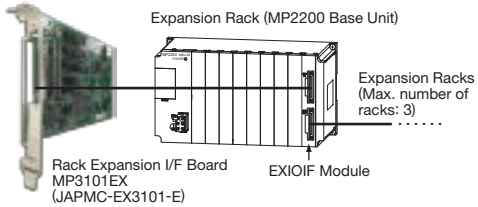
Find problems that may have been missed with high-speed logging that is synchronized with the scan.



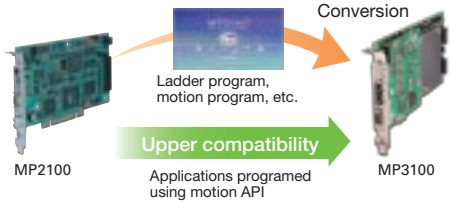
Easy system configuration

・Easy rack expansion

The MP3100 can be connected to a maximum of three MP2200 base units by adding the Rack Expansion I/F Board MP3101EX. (A maximum of 27 option modules can be used in this system.)



・MP2100 applications that can be used without modifications



The MP3110 with high-speed SoftMotion

The MP3110 and MP3110M achieve motion functionality on a PC. A high-speed architecture called SoftMotion is used to increase motion control speed by using the processing speed of the PC. The high-speed PCI Express bus is also supported for even greater speed. User applications written in C language call Motion API functions to operate MECHATROLINK-Ⅲ-compatible devices, such as Servo Drives and Distributed I/O Devices, that are connected to the MP3110 or MP3110M PC Board-type Machine Controller.

MP3110
MECHATROLINK-Ⅲ
1 circuit type

MP3110M
MECHATROLINK-Ⅲ
2 circuits type

• SoftMotion

The architecture that drives the motion functions on the PC is called SoftMotion. The MP3110 and MP3110M use SoftMotion. The motion performance of the MP3110 and MP3110M depends on the processing speed of the PC. If your equipment requires high performance, use a high-performance PC. If you want to balance cost with performance, use a less-expensive PC. It's all up to you.

• Control cycle of 125 μs

The use of SoftMotion and the PCI Express bus enables controlling MECHATROLINK-Ⅲ-compatible devices with the fastest control cycle on the planet: 125 μs.

• Realtime OS support

The Motion API* runs on a realtime OS. By using a realtime OS, you can achieve motion control that synchronizes I/O boards, video boards, and other devices with the MP3110 or MP3110M. If you use a realtime OS that runs together with Windows (i.e., a hybrid OS), you can achieve HMI control and motion control on one PLC to reduce equipment costs.

• Motion network

A MECHATROLINK-Ⅲ communications interface is provided, one channel for the MP3110 and two channels for the M3110M. Normally the number of PCI Express slots on a PC is restricted, so Yaskawa provides a lineup that lets you maximize limited resources.

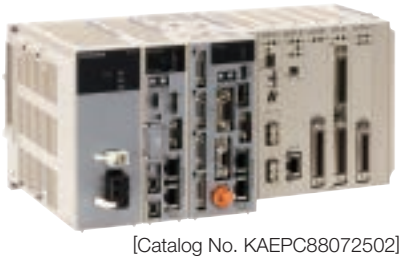
*: The Motion API is a software interface that controls the MP3110 or MP3110M from an application on a PC. It allows you to easily perform motion control from a PC.

Comparison

Items		MP3100		MP3110	
Abbreviations		MP3100 (16 axes)	MP3100 (32 axes)	MP3110	MP3110M
Model		JAPMC-MC3100-1-E	JAPMC-MC3100-2-E	JAPMC-MC3110-E	JAPMC-MC3130-E
Hardware specifications	PCI Express standards	PCI Express 1.1 (Gen1)		PCI Express 1.1 (Gen1)	
	MECHATROLINK-Ⅲ	1 circuit with 2 ports		1 circuit with 2 ports	2 circuits with 4 ports
	USB	USB 2.0, Type A host, 1 port Compatible devices: USB storage		–	
	Input and output signals	Inputs: DI×5 inputs Outputs: DO×4 outputs		–	
	Outer dimensions	PCI Express half size		PCI Express half size	
Integrated functions	Motion control	SVC/SVR	SVC32/SVR32	SoftMotion	
	Number of controlled axes	16 axes	32 axes	32 axes	64 axes
	Program memory capacity	15 MB	31 MB	–	
	Ladder program	Applicable		–	
	Motion program	Applicable		–	
	Data tracing	Applicable		–	
	Data logging	Applicable		–	

MP3200

The MP3200 is the flagship model of the MP3000 series that integrates motion, vision, and robotics systems to provide the most optimal machine performance. Adjustments, design, and maintenance can be also centrally controlled using the MPE720 Ver. 7 system integrated engineering tool.



[Catalog No. KAEPC88072502]

A Complete lineup

With the MP3200, you can select the Power Supply Units, CPU Units, and Base Units according to the control scale of your equipment. You can easily handle a multi-axis system by adding Rack Expansion Interface Units and Modules.

Power supply unit	
PSA-12	PSD-12
Input voltage: 85 VAC to 276 VAC	Input voltage: 24 VDC
	

CPU unit	
CPU-201	CPU-202
Communication cycle: 250 μs	Communication cycle: 125 μs
	

Base unit		
MBU-B08	MBU-B05	MBU-B03
8 slots	5 slots	3 slots
		

・Option

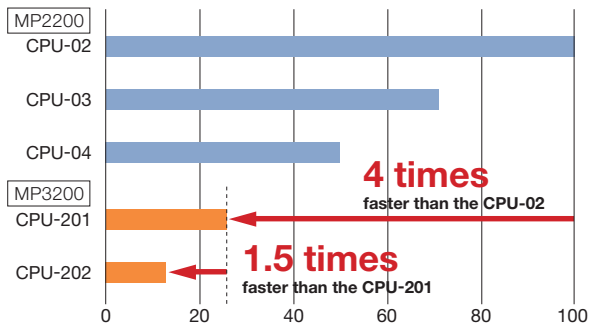
Rack Expansion Interface Unit	
EXU-001	EXU-002
For main rack	For expansion rack
	

Ultra-high-speed CPU

Fastest application processing in the industry: 4-axis, 125 μs

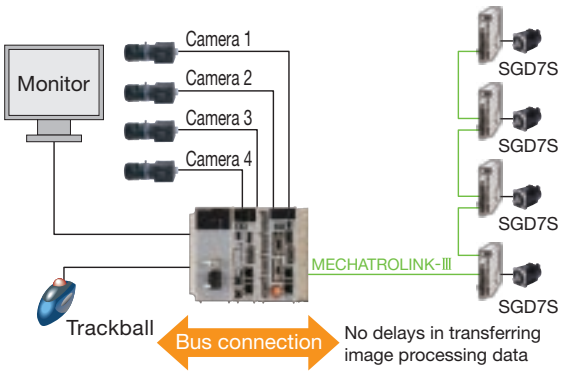
Arithmetic processing must be performed at higher speeds for systems to work faster. The MP3200 features the CPU-202, an ultra-high-speed CPU that runs 1.5 times faster than the CPU-201, to improve takt times.

When the scan time of the CPU-02=100



Integration of motion and vision system

The CPU Unit and Vision Unit are connected using a high-speed bus which enables motion processing and vision processing to be executed with absolutely no communication delays. Four digital interface cameras, each with a different format, can be connected.



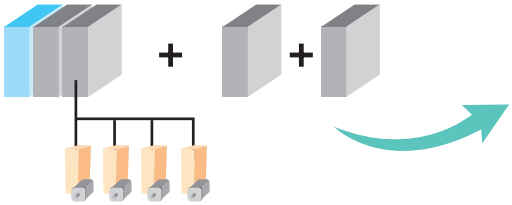
Note: Estimates are required before ordering the Vision Unit. Contact your Yaskawa representative for more information.

Ideal for high-level automation

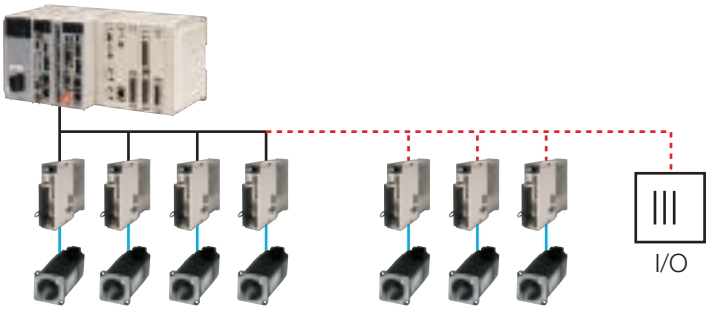
Control of 32 axes; systems expansion at no additional module

You can connect up to 42 stations (with up to 32 Servo Drives) to one MECHATROLINK-Ⅲ channel, which provides leeway even for a large-scale system.

Previously, modules had to be added when a system was expanded.



With the MP3200, axes can be added with no additional modules (internal SVC.)



42 stations max. (Number of servo axes are 32 axes max.)

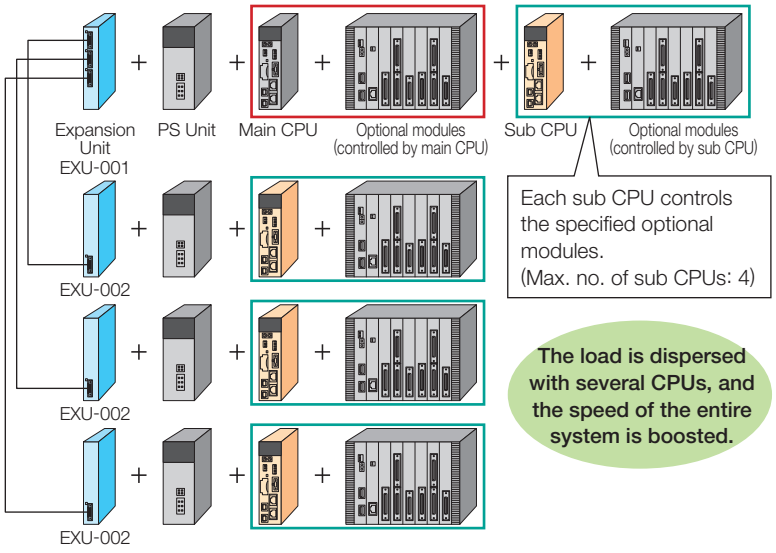
Sub CPU Units to distribute the load and achieve a high-speed, high-precision system

A maximum 4 sub CPUs can be arranged by using Rack Expansion Interface Unit. Because both the main CPU and sub CPUs control optional modules, high-speed processing can be achieved even with large programs.

Sub CPU functions

Item	Sub CPU function
Connection method	MP3000 bus connection
Max. number of CPUs	5 CPUs (1 main CPU + 4 sub CPUs)
Data update cycle between CPUs	125 μs, 250 μs, ···32 ms
Max. CPU interface register size	Input: 2048 W Output: 2048 W
Servo connection for sub CPUs	For the servo connections on the sub-CPU side, 32 axes can be connected with the built-in SVC.

Example of program configuration



MP3300

The MP3300 Machine Controller makes it possible to freely combine the Base Unit and CPU modules to match the customer's control scale and control panel size. Combination with the Σ-7 series of AC Servo Drives realizes e-motional motion control in the customer's system.

[Catalog No. KAEPC88072503]

A complete lineup

With the MP3300, you can select the CPU Unit type and MBU type according to the control scale of your equipment. There are a total of 16 possible combinations with 4 types of CPU Units and 4 types of MBUs.

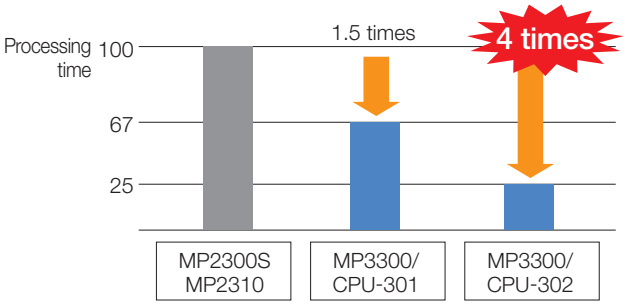
Mount Base Unit			
MBU-301	MBU-302	MBU-303	MBU-304
85 VAC to 276 VAC 8 slots	24 VDC 8 slots	24 VDC 3 slots	24 VDC 1 slot
			

CPU Module	
CPU-301/-302	
16 axes control User memory 15 MB	32 axes control User memory 31 MB
	

Enhanced control performance

The MP3300 delivers high-speed and high-level performances, and expands program capacity. The MP3300 is also capable of high-speed, synchronized communication with MECHATROLINK-Ⅲ compatible Servo Drives and AC Drives.

Improved CPU performance*



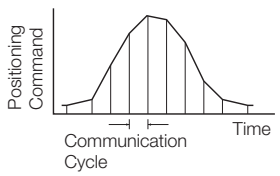
*: Ladder operation speed where the scan time of the MP2300S/MP2310=100

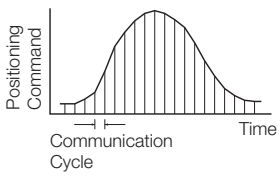
Fastest transmission cycle: 125 μs (4 stations)

The MECHATROLINK-Ⅲ motion network, which is among the fastest in the industry, is provided with the main unit CPU of the MP3300 as a standard option. The smoother motion control results in higher levels of precision.

MECHATROLINK-Ⅲ		
Transmission Speed	Transmission Cycles (Number of Connected Stations)	
100 Mbps	125 μs (4 stations)	500 μs (14 stations)
	250 μs (8 stations)	1.0 ms (16 stations)*

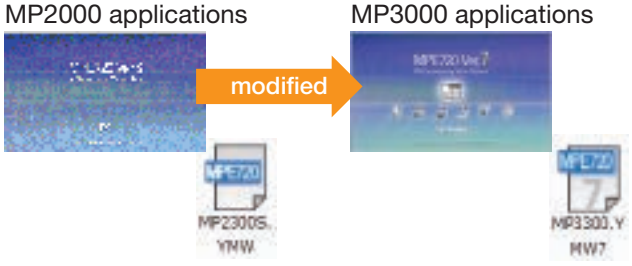
*: The maximum number of stations, including I/O, is 21.





Complete upper compatibility with the MP2000 series

The full lineup of optional modules and application programs for the MP2000 series can be used with the MP3300. This enables a completely hassle-free upgrade from the MP2000 series to the MP3300, which easily enhances system performance and functions.

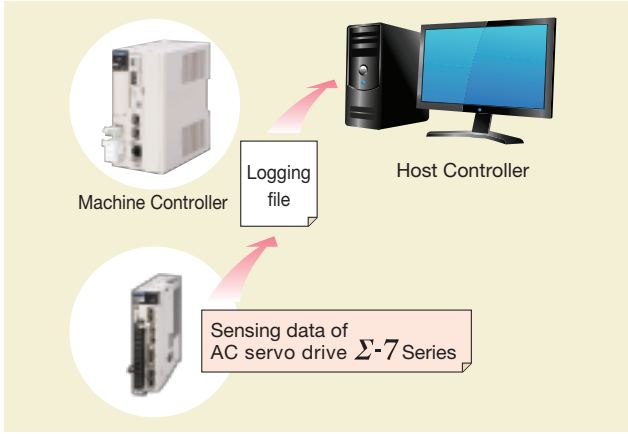


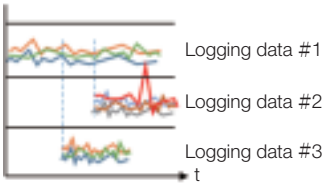
Improved monitoring accuracy

Traditionally, a substantial amount of time was required to identify and verify the causes of defects in products found during the inspection process.
However, the data logging function of the MP3300 time stamps control data of equipment in μs units for identification purposes so that it can be utilized to shorten the amount of time required to pinpoint the causes of equipment or device abnormalities.

Logging data (image)

No.	Date/Time	SubSeconds (0.01μs)	MW0000	MW0001	GW0000	GW0002
0	yyyy/mm/dd hh:mm:ss	34512500	15544	1	49992	15544
1	yyyy/mm/dd hh:mm:ss	34525000	15545	2	49992	15545
2	yyyy/mm/dd hh:mm:ss	34537500	15546	3	49993	15546
3	yyyy/mm/dd hh:mm:ss	34550000	15547	4	49994	15547
4	yyyy/mm/dd hh:mm:ss	34562500	15548	5	49995	15548
5	yyyy/mm/dd hh:mm:ss	34575000	15549	6	49996	15549
	Conventional time stamp (count by seconds)	Time stamp in μs units				





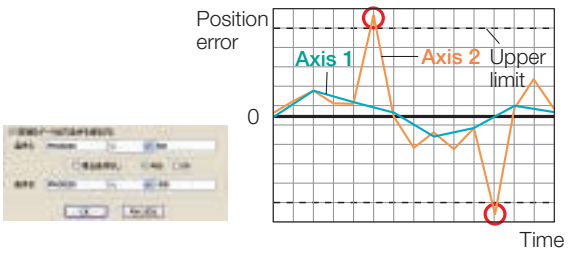
Improve precision analysis by accurately setting times for multiple logging data

Enhanced maintainability

A storage USB port is provided on the CPU Unit as a standard option. A data logging function also allows the system's operation statuses to be saved in the internal RAM or on a USB memory device. This makes it possible to acquire large volumes of data such as the system's operation statuses, and vastly improves traceability on the production site.

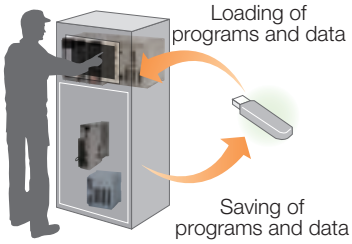
Data logging function

Settings can be selected for the conditions under which the logs are output. The logging data is saved only if the values of the specified registers fail to meet the output conditions. This enables a rapid response when trouble occurs.



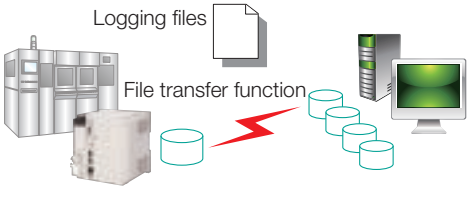
Loading/saving function of program and data

Operations can be performed using the DIP switches on the CPU Unit body. Even in places where a PC cannot be brought in, you can update the versions of the equipment and back up the data on-site with ease.



File transfer function

By transferring the system's operation data (logging data and register data) at the specified synchronization, large volumes of operation data can be acquired with no fear that the data may be unexpectedly damaged. As a result, the traceability at the production site is vastly improved.



AC Servo Drives

The AC Servo Drives Σ series guarantees maximum performance as the core components of systems.

Yaskawa introduced its AC Servo Drives to the market in 1983, and further marketed the Σ series in 1992. Since then, Yaskawa has continued to develop the Σ series, focusing on making these products compact, and enhancing performance and ease of use. As a result of these efforts, the total shipments of AC servomotors reached 10 million units in March 2012.

Yaskawa will continue to develop world-class AC Servo Drives to provide even greater satisfaction to its customers.

The Σ-7 series delivers a leading performance based on the concept of "7 ultimate e-motional solutions." These Servo Drives also support a variety of new needs, such as further enhancing safety and incorporating environmentally friendly designs.

∗: Applied upon order

Super-compact, ultra-small capacity servomotor

Σ-7mini

These work-ready servomotors retain the leading performance, functionality and ease of use of the Σ-7-series packed into the size of a business card.

Lineup of AC/DC input types:
- Flange size of 15 mm × 15 mm: 3.3 W to 11 W
- Flange size of 25 mm × 25 mm: 11 W to 33 W

Lineup Page 39

SERVOPACK

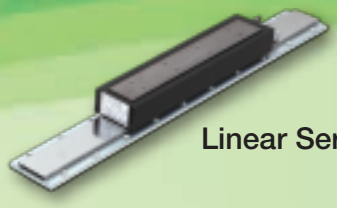
Σ-7S Σ-7W Σ-7C

Single-phase, 100 VAC	50 W to 400 W		
Three-phase, 200 VAC	11 W to 15 kW	200 W to 1.0 kW	200 W to 1.0 kW

Servomotor

Direct Drive Servomotors

Rotary Servomotors



Linear Servomotors

Board-type (DC power input)

Σ-V-MD

The board-type SERVOPACKs enable multi-axis control of Σ-V mini servomotors (SGMMV model). Machine size, weight, and wiring can be reduced by incorporating this SERVOPACK into the moving parts of chip mounters and other equipment.

3 W to 30 W

Σ-S

These servo drives have been developed under the concept of "easy, compact, and low price" to replace pneumatic equipment with an electric actuator.

30 W, 50 W

Separated converter type

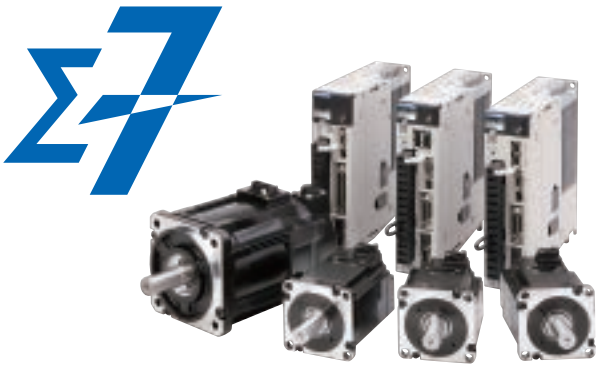
Large-capacity Σ-V

These servo drives feature superlative performance, simple startup, and outstanding ability to expand. By combining these servo drives with the power-regeneration converters, you can achieve a high energy-saving system.

22 kW to 55 kW

The Σ-7 series delivers a world-leading performance based on the concept of "7 ultimate e-motional solutions." These Servo Drives also support a variety of new needs, such as further enhancing safety and incorporating environmentally friendly designs. This makes it possible to offer solutions that can satisfy a wide range of conditions throughout the system lifecycle.

【Catalog No. KAEPS80000123】



Features

1 Ultimate system performance

Σ-7 series SERVOPACKs can achieve a high-speed response frequency of 3.1 kHz. Vibration suppression functions have also been enhanced. The motors incorporate 24-bit, high-resolution encoders that further increase system takt times and achieve a high throughput.

2 Ultimate ease of use

Tuning-less function stability has been increased to approximately twice that of the Σ-V series. This enables swift movement with no vibration or gain adjustment.

3 Ultimate environmental performance

- Specifications have been improved to allow installation in a wider range of environments. These new safe and secure designs enable use even in harsh environments where previously prohibited, such as altitudes of 2,000 m or ambient temperatures of 60°C*1.
- Regenerative servo energy inside the system can also be effectively used with 2-axis integrated SERVOPACKs or by connecting multiple axes with a DC bus connection.

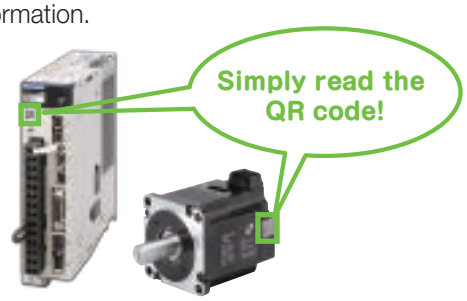
4 Ultimate safety and security

- Σ-7 Servo Drives satisfy of SIL3 the functional safety standard IEC61508 (first certification in Japan*2).
- Temperature sensors are incorporated as a standard feature, and signs of abnormalities can be caught at an early stage by monitoring the temperature from a host controller.
- Setting data detection functions for SERVOPACKS have been enhanced. (Ver.002C and later)

⇒For details, see pages 10, 11, 20 and 21.

5 Ultimate support

- Build-To-Order service (BTO)
  Products can be shipped from the factory with the specified parameters, which helps to reduce system production lead times.
- Product control and maintenance support
  Product QR codes can be read using Yaskawa's SigmaTouch! smartphone application. This allows users to view manuals and troubleshooting information.



6 Ultimate lineup

In addition to Yaskawa's products, our partner companies in the MECHATROLINK Members Association (MMA) offer an extensive lineup of I/O devices and sensors, and provide all the components needed to construct equipment motion systems.

7 Ultimate compatibility

Mounting compatibility with the Σ-V series is ensured, and Σ-V parameters can be converted simultaneously to Σ-7 parameters using the SigmaWin+ parameter converter.

*1: Derating required.
*2: As investigated by Yaskawa.

Σ-7S

Single-axis SERVOPACK
100 VAC/200 VAC
11 W to 15 kW

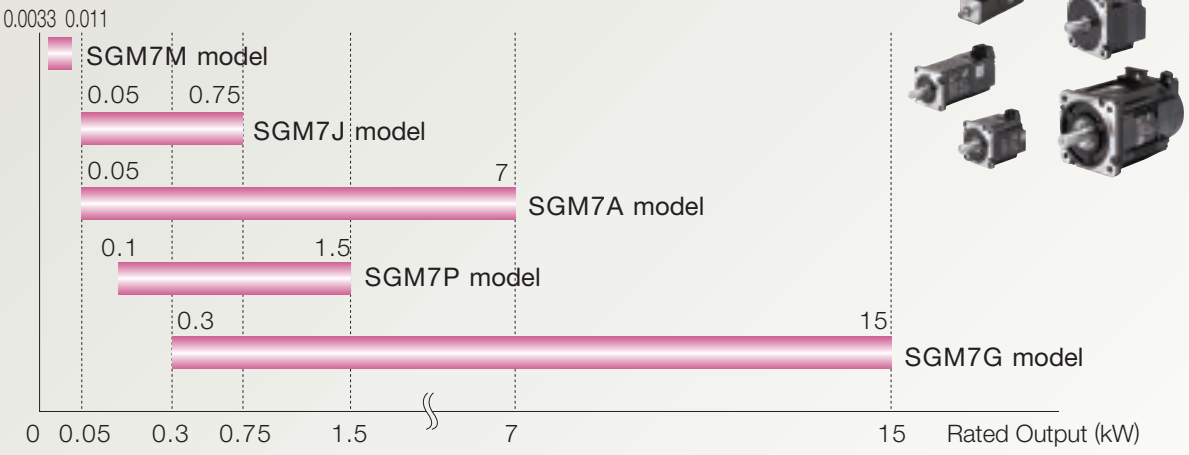
Σ-7W

Two-axis SERVOPACK
200 VAC
200 W to 1.0 kW

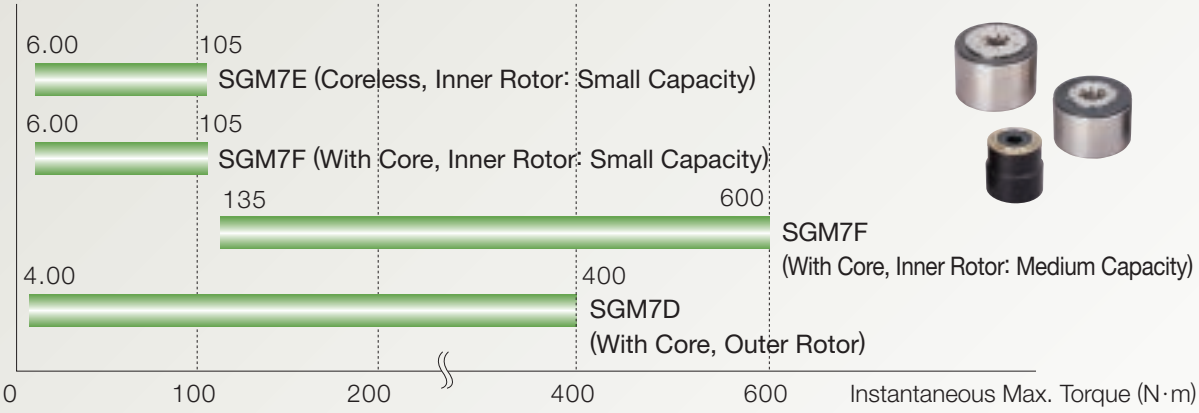
Σ-7C

Two-axis SERVOPACK
with built-in Controller
200 VAC
200 W to 1.0 kW

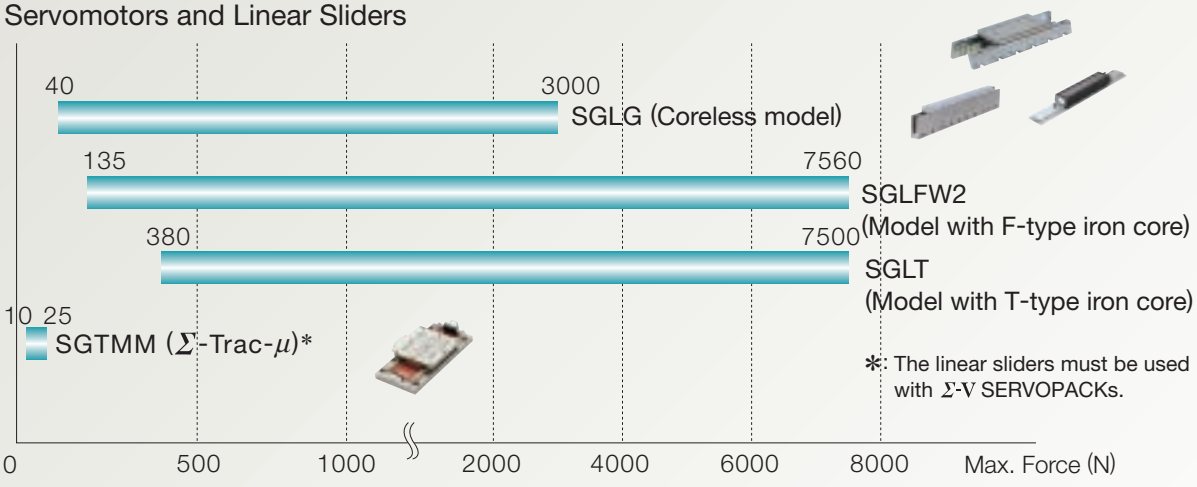
Rotary Servomotors



Direct Drive Servomotors



Linear Servomotors and Linear Sliders



SERVOPACKs

MECHATRONLINK-4/III/II Communications Reference

◎High-precision motion control

The SERVOPACK when connected to the host controller in the MECHATROLINK-4/III/II network provides not only torque, position, and speed control, but also synchronized phase control that requires advanced control technology. The control mode can be changed online so that the machine can move smoothly in complex motions with great efficiency.

◎Monitors vast amounts of data such as vibration, disturbance, positioning, communication quality, and temperature

Various types of data can be collected without the need to add sensors, enabling real-time detection of deteriorating equipment or changes in the operating environment.

Name	 Σ-7S (Single-axis) MECHATROLINK-4 communications reference	 Σ-7S (Single-axis)  Σ-7W (Two-axis) MECHATROLINK-III communications reference	 Σ-7S (Single-axis) MECHATROLINK-II communications reference
Communications protocol	MECHATROLINK-4	MECHATROLINK-III	MECHATROLINK-II
Physical layer	Ethernet	Ethernet	Same as RS-485
Baud rate	100 Mbps	100 Mbps	10 Mbps
Transmission cycle	125 μs to 4 ms	Σ-7S : 125 μs to 4 ms, Σ-7W : 250 μs to 4 ms	250 μs to 4 ms
Number of transmission bytes	16 or 80 bytes/station	32 or 48 bytes/station	17 or 32 bytes/station
Number of slaves	127 max.	62 max.	30 max.
Maximum transmission distance	50 m between stations	75 m between stations	50 m total (100 m with Repeater)
Minimum distance between stations	30 cm	20 cm	50 cm

Analog Voltage/Pulse Train Reference

Analog voltage/ pulse train reference

Analog voltage reference	Speed control	Reference voltage	Max. input voltage	± 12 V (forward speed reference with positive reference)
			Factory setting	6 VDC at rated speed (Input gain setting can be changed.)
	Torque control	Reference voltage	Max. input voltage	± 12 V (forward torque reference with positive reference)
			Factory setting	3 VDC at rated torque (Input gain setting can be changed.)
Pulse train reference	Position control	Reference pulse	Type	Select one: Sign + pulse train, CW + CCW pulse train, or two-phase pulse train with 90° phase differential
			Form	For line driver, open collector
			Max. input pulse frequency*	Line driver: Sign + pulse train, CW + CCW pulse train: 4 Mpps; Two-phase pulse train with 90° phase differential: 1 Mpps
				Open Collector: Sign + pulse train, CW + CCW pulse train: 200 kpps; Two-phase pulse train with 90° phase differential: 200 kpps
		Clear signal (Position error clear)		For line driver, open collector

*: If the maximum reference frequency exceeds 1 Mpps, use a shielded cable for I/O signals and ground both ends of the shield. Connect the shield at the SERVOPACK to the connector shell.

Command Option Attachable Type

Command Option Attachable Type

◎SERVOPACKs can interface with various communication formats by using attachable optional modules for commands.

Note: Be sure to use INDEXER or DeviceNet optional modules for the command option attachable type SERVOPACKs. They will not work without these modules.

➡ See pages 41 and 42 for SERVOPACKs with option modules and details on these option modules.

◎Optimal expandability can be achieved by attaching an optional module to the SERVOPACK.

Combination of SERVOPACKs and Option Modules

✓: Possible ×: Not Possible

SERVOPACK (Model Number)			Option Module	
			Fully-Closed Module (SGDV-OFA01A)	Safety Module (SGDV-OSA01A)
Analog Voltage and Pulse Train Reference (Single Axis: SGD7S-□□□□00A)			✓ *1	✓ *1
MECHATROLINK-II Communications Reference (Single Axis: SGD7S-□□□□10A)			✓ *1	✓ *1
MECHATROLINK-III Communications Reference (Single Axis: SGD7S-□□□□20A)			✓ *1	✓ *1
MECHATROLINK-III Communications Reference (Two Axis : SGD7W-□□□A20A)			×	×
SERVOPACK with Option Module (Set Model Number)	SERVOPACK (Model Number)	Command Option Module (Model Number)	✓	×
INDEXER Module-Mounted Type (SGD7S□□□□E0A□□□10□)	Command Option Attachable Type (Single Axis: SGD7S-□□□□E0A)	INDEXER (SGDV-OCA03A)		
DeviceNet Module-Mounted Type (SGD7S□□□□E0A□□□50□)*2 (SGD7S□□□□E0A□□□60□)*3		DeviceNet*2 (SGDV-OCA04A)	✓	×
		DeviceNet*3 (SGDV-OCA05A)	✓	×

*1 : You cannot use a Fully-Closed Module and a Safety Module together.
*2 : Driven by SERVOPACK control power supply. *3 : Driven by external power supply.

INDEXER Module

Simple

◎ Interactive methods for everything from adjustment to programming are available with the setup support tool SigmaWin+ for Windows (Ver.5.72 or later).
◎ Simple connection to the host controller can be established with the I/O module.

Program Table Editing Window

Smart

◎ Special languages are not required, because required operation patterns are easily made by simply setting the data for position and speed in program tables. Optimum operation method supports your application. For positioning, up to 256 steps can be programmed.

〈Operation〉 Program tables,
Position and speed tables (station positioning),
Registration (positioning by external signals),
Serial communication

◎ Various functions, including external positioning, JOG table operation, homing, and programmable signal outputs are provided.

Speedy

◎ Reliable high-speed, high-precision positioning when combined with high-performance Σ-7S SERVOPACKs.
◎ Motion control is accomplished without using motion controllers.

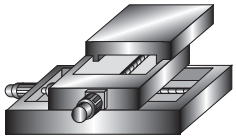
Note: The INDEXER module can be used in combination with the Fully-Closed Module.

Specifications

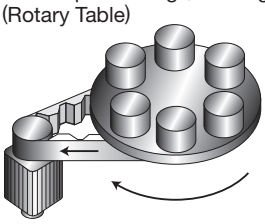
Function	Specifications
Stations for Program Table Operation	256
JOG Speed Setting	16
ZONE Signal Output	32
Serial Communication	HR: ASCII; max. axes: 16 MEMOBUS: Binary
Homing Methods	3
Equally-dividing and Indexing Positioning (Station Positioning Command)	Rotary machine and tool setting

Application Examples

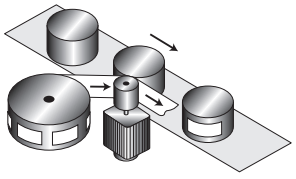
Point-to-point positioning (X-Y Table)



Station positioning (Indexing) (Rotary Table)



Feeding (Labeling Machine)



Using Commands — DeviceNet Module

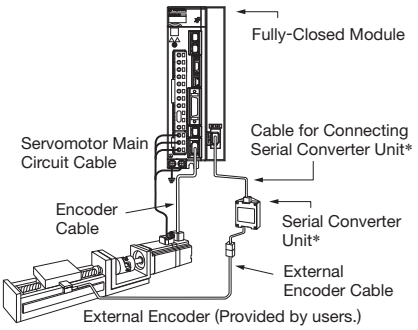
◎ Compliant with the communication specifications of the DeviceNet open field network.
◎ Maintainability improved by the host controller using DeviceNet to monitor the operating conditions of servo drives, alarm status, and other information.
◎ Full range of positioning functions featured including simple positioning, homing, continuous speed operation, positioning after continuous speed operation, and programmed operation.
◎ Round micro-connectors used for the connectors.
◎ Modules can be driven by two different power-supply methods: servo control power or external power.

Note: The DeviceNet module can be used in combination with the Fully-Closed Module.

With Feedback — Fully-Closed Module

◎ High-precision and high-response positioning by using feedback from detector (such as an external encoder) installed on the machine.
◎ High resolution with external encoders (linear scales).

✻ : Not required depending on the type of the external encoder.
Note: The Fully-Closed Module can be used in combination with the INDEXER module or DeviceNet module.



With Safety Functions — Safety Module

The Safety Module complies with EN ISO13849-1 (the standards harmonized with EU Machinery Directive 2006/42/EC) and has safety functions equivalent to those stipulated in IEC61800-5-2. By using Σ-7S SERVOPACKs with the safety module, optimum safety designs can be created for mechanical systems to better meet the needs of the industry.

◎ The first product for AC servo drives in Japan that has safety functions equivalent to the following ones stipulated in the international standard IEC
Safe Torque Off (STO), Safe Stop 1 (SS1), Safe Stop 2 (SS2), Safely-Limited Speed (SLS)
◎ Two safety functions (A and B) are provided and stopping functions can be allocated individually to these safety functions.
◎ With the attachable Safety Modules for SERVOPACKs, system configurations are simplified and compact.

■Compliance with Safety Standards

Safety Standards	Applicable Standards	Products	
		SERVOPACK	SERVOPACK + Safety Module
Safety of Machinery	EN ISO13849-1: 2015 IEC 60204-1	○	○
Functional Safety	IEC 61508 Series IEC 62061 IEC 61800-5-2	○	○
EMC	IEC 61326-3-1	○	○

■With Functions Defined by IEC61800-5-2

By using the Hard Wire Base Block function (HWBB) of SERVOPACKs, the following four safety functions can be achieved.

Safety Function	Description	Products	
		SERVOPACK	SERVOPACK + Safety Module
Safe Base Block Function (SBB function)	This safety function is equivalent to the STO function. It shuts OFF the power supply to the motor.	○	○
Safe Base Block with Delay Function (SBB-D function)	This safety function is equivalent to the SS1 function. It shuts OFF the power supply to the motor after monitoring the deceleration of the motor for the specified length of time.	—	○
Safe Position Monitor with Delay Function (SPM-D function)	This safety function is equivalent to the SS2 function. It monitors the deceleration of the motor for the specified length of time and the position after the motor has stopped.	—	○
Safely Limit Speed with Delay Function (SLS-D function)	This safety function is equivalent to the SLS function. It monitors the deceleration of the motor for the specified length of time and the motor speed to make sure it is within the allowable range.	—	○

Choose the Best SERVOPACK for the Application

The know-how we have acquired in every market has resulted in the creation of a lineup of SERVOPACKs with FT specifications that have added functions to optimally suit a variety of applications.

✓ : Possible — : Not Possible

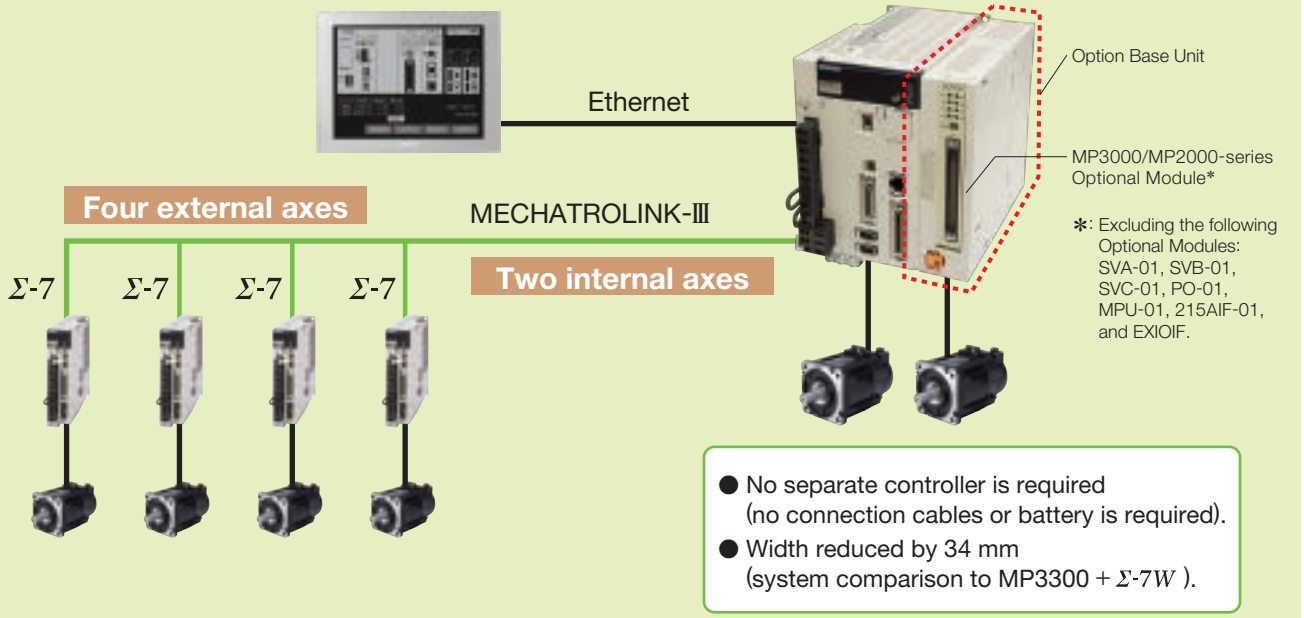
FT Specifications	Applications	Additional Functions	Features*	Interface		
				A/P	M-Ⅱ	M-Ⅲ
FT19	Tracking	Built-in Less Deviation Control	Little delay in motor operations for position references as a result of built-in less deviation control. Ideal for applications that require reference tracking performance (high position accuracy) during movement. [Catalog No. CHEPS80000187]	✓	—	✓
FT21	Machining and Cutting	Feed Shaft Supporting	Improved tracking ability and high-accuracy machining operations with the use of clearance (constant distance) control, predictive control, and quadrant projection compensation functions. [Catalog No. CHEPS80000218]	—	—	✓
FT40	Press and Injection Molding	Pressure Feedback	Highly accurate pressure control with input of pressure sensor signals directly to the SERVOPACK. [Catalog No. CHEPS80000194]	—	—	✓
FT41	Press and Injection Molding	Pressure Feedback	Highly accurate pressure control by feeding back the signals of the pressure sensors directly to the SERVOPACK through the MECHATROLINK-I/O system. [Catalog No. CHEPS80000201]	—	—	✓
FT60	Conveyance	Three-Point Latching	The host controller can detect the orientation of the workpiece or offsets in multiple workpieces based on the information on the three positions input to the SERVOPACK. [Catalog No. CHEPS80000217]	—	—	✓
FT62	Conveyance and Alignment	Triggers at Pre-set Positions and Rotational Coordinate System	Addition of pass-through signals for designated points to enable coordinated operations with the use of trigger signals. Turntables can be easily controlled with innitelength coordinates. [Catalog No. CHEPS80000195]	—	—	✓
FT63	Conveyance	Built-in Semi-Closed/ Fully-Closed Loop Control Online Switching Function	Allows loop control to be switched between semi-closed/fully-closed while online. [Catalog No. CHEPS80000227]	✓	—	✓
FT70	Gantry	Built-in Optimal Gantry Control	Three built-in functions (Position correction table, Synchronized stopping during alarms, and the Position deviation between axes overflow detection) effective for driving gantries. [Catalog No. CHEPS80000229]	—	—	✓
FT77	Conveyance	Built-in Torque/Force Assistance	Multiple SERVOPACKs can be used for applications that require more than one axis to easily build a system which will increase the torque or force up to five times. [Catalog No. CHEPS80000200]	✓	—	✓
FT79	Indexing	Built-in INDEXER	Convenient positioning functions (ZONE signal outputs, job speed table, homing, other) added for high-precision and high-speed positioning without a motion controller. [Catalog No. CHEPS80000188]	✓	—	—
FT82	For Special Motors	SGM7D Motor Drive	SERVOPACKs with high torque, high precision, and a user-friendly design for SGM7D motors. [Catalog No. KAEPS80000123]	✓	✓	✓
FT83	For Special Motors	SGM7D Motor Drive	SERVOPACKs with built-in INDEXER for SGM7D motors. [Catalog No. KAEPS80000123]	✓	—	—

*: Refer to the separate catalogs shown in the table above.

New Two-Axis SERVOPACKs with Built-in Controllers!

Yaskawa's newest two-axis SERVOPACKs with built-in controllers offer the ideal configuration to control small-scale equipment and mechanisms to meet the increasing needs of component downsizing, equipment modularization, and system distribution.

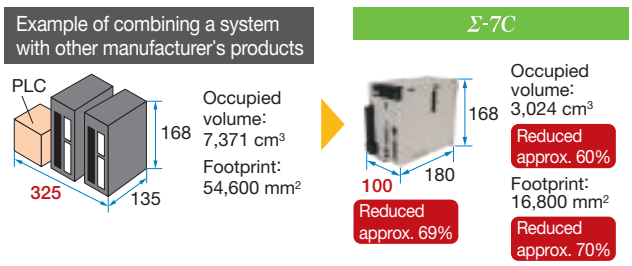
Simple, All-in-One System Configuration



Features

Less system space required

◎ Configure up to six axes.
◎ Build small-scale equipment system without PLC using one SERVOPACK.
◎ Expand functionality by mounting an Option Base Unit.



Equipment modularization and distributed control system

◎ Reduce burden of designing software when part of the equipment changes.

High-Speed Response

◎ High-speed response frequency of 3.1 kHz has been achieved.
◎ High-speed I/O used for the Controller Function Module.
◎ The command/response delay is minimized with the two internal axes.
These axes can be synchronized with the external axes.

Easier Maintenance

◎ No battery is required for the Controller Function Module, which reduces the time and cost of periodic replacement.
◎ Protective functions have been improved for outputs to the Controller Function Module.

Rotary Servomotors

	Rated output	Rated speed/ Max. speed (min^{-1})

SGM7M model (Low inertia, ultra-small capacity)

11 W to 33 W*1	3000/7000
3.3 W to 33 W*2	3000/7000*3

◎ Contributes to machine downsizing
◎ Mounted high-resolution serial encoder: 20 bits

*1: 200 VAC input
*2: 24/48 VDC input
*3: Some models are 6000 min^{-1}

SGM7J model (Medium inertia, high speed)

50 W to 750 W | 3000/6000

◎ Instantaneous peak torque: 350% of rated torque
◎ Protective structure: IP67
◎ Mounted high-resolution serial encoder: 24 bits
◎ Cable installation direction is possible both of the toward load, and away from load.

SGM7A model (Low inertia, high speed)

50 W to 7 kW | 3000/6000

◎ Instantaneous peak torque: 350% of rated torque (For motors of less than 1 kW)
◎ Protective structure: IP67 (IP22 for 7.0 kW motor)
◎ Mounted high-resolution serial encoder: 24 bits
◎ Cable installation direction is possible both toward load and away from load. (For motors of less than 1 kW)

SGM7P model (Medium inertia, flat type)

100 W to 1.5 kW | 3000/6000

◎ Flat type
◎ Mounted high-resolution serial encoder: 24 bits

SGM7G model (Medium inertia, large torque)

300 W to 15 kW | 1500/3000

◎ Protective structure: IP67
◎ Mounted high-resolution serial encoder: 24 bits

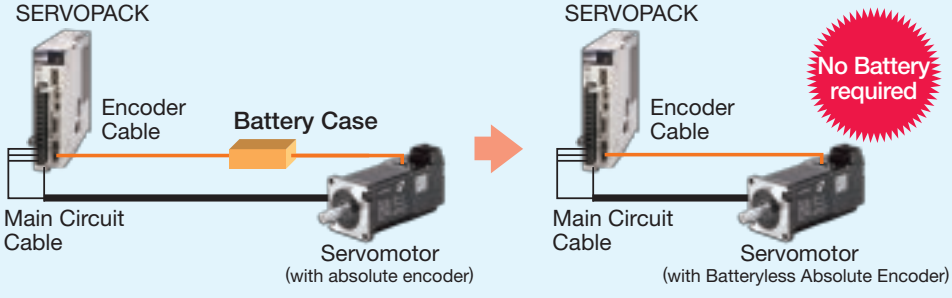
Servomotors with Batteryless Absolute Encoders (Except SGM7M model)

You can eliminate Batteries and Battery Cases used for individual Servo Drives or on the host controller to simplify wiring in the control panel.

Maintenance-free

Easier Wiring

Σ-7-Series Applicable models
- SGM7J
- SGM7A
- SGM7P
- SGM7G



Direct Drive Servomotors

Coreless, Inner Rotor (SGM7E)

Outer Diameter (mm)	Rated Torque (N·m)	Max. Torque (N·m)
135 to 290	2 to 35	6 to 105

Ideal for applications that require smooth movement without speed fluctuations.

◎ Built-in 24-bit encoder.
◎ Low cogging with a core-less system provides smooth operation free from speed variations.

With Core, Inner Rotor (SGM7F)

100 to 360	2 to 200	6 to 600

Ideal for applications that require downsizing and a shorter takt time.

◎ Built-in 24-bit encoder. ◎ Compact design with small rotor diameter.
◎ High-speed, high-frequency positioning. ◎ Low inertia. ◎ Low heat generation.

With Core, Outer Rotor (SGM7D)

107 to 264	1.3 to 240	4 to 400

Ideal for applications that require high torque, high precision, and high rigidity.

Compatible with former Yokogawa Electric DYNASERV Motors.

◎ Built-in 24-bit encoder. ◎ Application to large loads possible with a high allowable load moment of inertia ratio.
◎ Large center aperture design provides more space available for wiring connections. ◎ High rigidity.

Linear Servomotors

SGLG (Coreless model)

Type	Max. speed (m/s)	Rated force (N)	Peak force (N)
Standard	4 to 5	12.5 to 750	40 to 3000
High force	4.2	57 to 255	230 to 1080

◎ Direct-feed mechanism for high-speed and high-precision positioning
◎ Lack of magnetic attraction force helps extend the life of linear motion guides and minimizes noise.
◎ Zero cogging for minimal force ripple

SGLFW2 (Model with F-type iron core)

Standard	2.5 to 5	45 to 2520	135 to 7560

◎ Direct-feed mechanism for high-speed and high-precision positioning
◎ The large magnetic attraction force between the moving and stationary members can be used to effectively increase the rigidity by preloading the linear guide.
◎ The magnetic preloading on linear guide can help increase the system's frequency response, improving its damping and settling performances.

SGLTW (Model with T-type iron core)

Standard	2.5 to 5	130 to 2000	380 to 7500
High force	3.1 to 4.8	300 to 900	600 to 1800

◎ Direct-feed mechanism for high-speed and high-precision positioning
◎ Yaskawa's unique construction principles of the SGLTW linear motors negate the effects of the magnetic attraction force between the relative motor members.
◎ Lack of magnetic attraction force helps extend the life of linear motion guides and minimizes noise.
◎ Very little cogging

Linear Sliders

SGTMM (Σ-Trac-μ)

Standard	1.0 to 1.5	3.5 to 7	10 to 25

◎ Ultra-flat profile reduces floor space requirements.
◎ For applications requiring short strokes
◎ Vibration-free transmission device enables high-precision positioning with a repetitive positioning accuracy of ±0.5 m max.
◎ Locations of armature coils on the stator reduce the effects of heat on the table or workpiece.

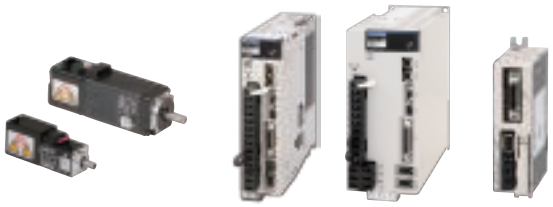
Note: These linear sliders must be used with Σ-V SERVOPACKs.

◆ Super-compact, ultra-small capacity

Σ-7*mini* Series

Super-compact, high-performance servomotor optimized for the moving parts of small precision equipment.
We have a lineup of AC/DC power input types that can also be applied to battery-driven transport systems.

[Catalog No. CHEPS80000225]



SGD7S SGD7W SGDV

SERVOPACK Models

Features

◎ Contributes to downsizing control panels and machines
◎ Smallest in the industry (length of 56 to 96 mm, business card size)
◎ Mounted 20-bit absolute serial encoder
◎ Maximum motor speed: 7,000 min^{-1}

Servomotor Specifications

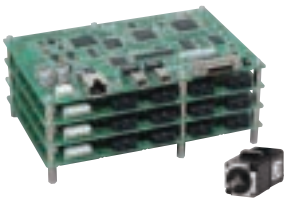
Voltage		24 VDC/48 VDC						200 VAC		
Servomotor Model SGM7M-		B3E	B5E	B9E	A1E	A2E	A3E	A1A	A2A	A3A
Flange Size		15 mm × 15 mm			25 mm × 25 mm			25 mm × 25 mm		
Motor Length	mm	56	62	96	68	78	89.5	68	78	89.5
Rated Output	W	3.3	5.5	11	11	22	33	11	22	33
Rated Torque	N·m	0.0105	0.0175	0.0350	0.0350	0.0700	0.105	0.0350	0.0700	0.105
Instantaneous Max. Torque	N·m	0.0263	0.0438	0.0875	0.105	0.210	0.306	0.105	0.210	0.315
Rated Motor Speed	min^{-1}	3000								
Max. Motor Speed	min^{-1}	7000					6000	7000		
Applicable SERVOPACKs	SGDV-	1R7E			2R9E			-		
	SGD7S-	-			-			R90A, R90F*		1R6A, 2R1F*
	SGD7W-	-			-			1R6A, 2R8A		

∗: Driving with 100 VAC
Note: Contact your Yaskawa representative for models with holding brakes.

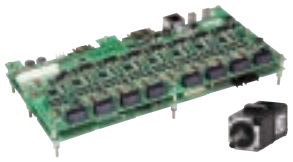
◆ Ultra-small capacity, board-type (DC power input)

Σ-V-MD Series

These board-type SERVOPACKs enable multi-axis control of Σ-V mini servomotors.
The machine size and wiring can be reduced by incorporating Σ-V-MD SERVOPACKs into the moving parts of chip mounters and other equipment.
Two types are available: the A01 that enables easy expansion of the number of axes (4, 8, or 12 axes), and the 8-axis integrated type A02.

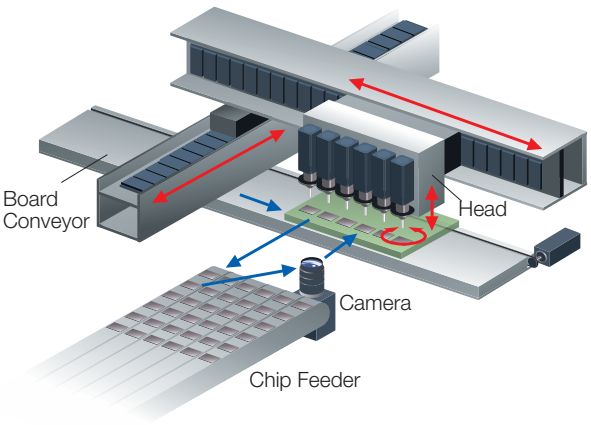


A01(12 axes)
[Catalog No. CHEPS80000152]



A02(8-axis integrated type)
[Catalog No. CHEPS80000121]

Application



SERVOPACK Specifications

Model SGDV-MD (Abbreviation)	A01E□M3A (A01)	A02E□M3A (A02)
Number of Axes	4, 8, or 12	8
Interface	MECHATROLINK-III (transmission cycle: 250 μs to 4 ms)	
Input Power Supply	Main circuit: 24 VDC/ 48 VDC	
	Control circuit: 24 VDC	
Applicable Motor	SGMMV: 3.3 W to 30 W	
Dimensions (mm)	4 axes: 170×115×46	238×120×29
	8 axes: 170×115×61	
	12 axes: 170×115×76	

◆ Small capacity, board-type (DC power input)

Σ-S Series

The Σ-S series was developed to be compact, easy to use, and available at a low price, which makes it an ideal product for applications that do not conventionally use Servo Drives.

SERVOPACK
Model SGPSS

Servomotor
Model SGMSL

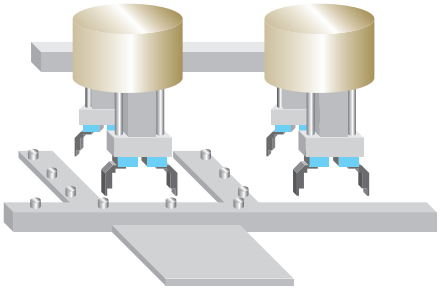
CE TÜV

Potential applications of the Σ-S Series in pneumatic equipment

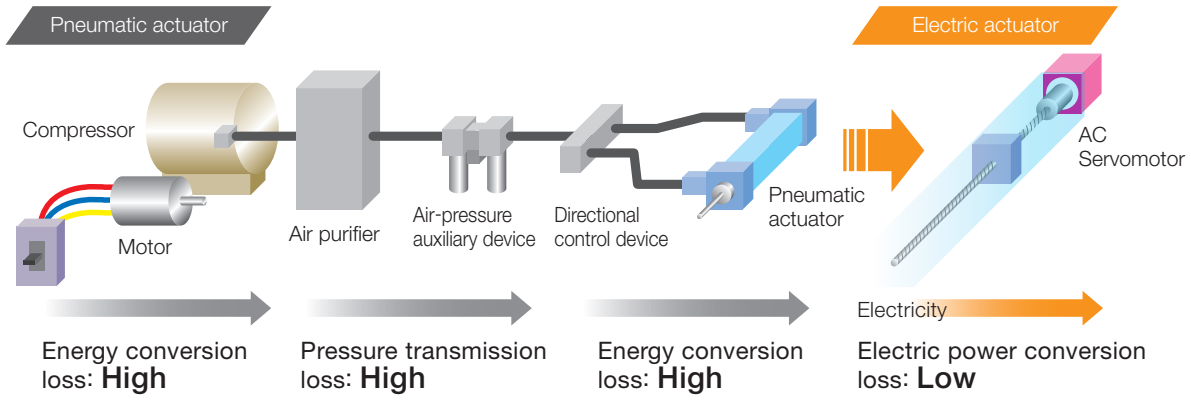
Advantages of the Σ-S Series

◎ Impressive reference tracking capability and reductions in takt time
◎ Easy adjustment of chucking holding power using torque limit
◎ Energy savings achieved and running costs reduced
◎ Multi-point positioning enabled (expanded range of applications)
◎ Low-level operating noise

■ Suggestion 1: Electric chuck



■ Suggestion 2: Electric actuator



Features

1. Hold-in-place operation
Workpiece can be held in place at any torque.

2. Multi-point positioning
Positions can be set according to the size of the workpiece.

3. Program tables
Programming can be simplified by setting numerical values in the tables provided.

4. ZONE output
Users can recognize that the actuator is operating within the specified range.

5. Acceleration/deceleration control
Impacts on the workpiece can be reduced.

SERVOPACK Specifications

- Power supply: 24 VDC (Common input for main circuit and control circuit)
- Reference interfaces (2 types):
  ① Contact commands (program table method)
  ② Pulse train references
- Dimensions: 80 mm × 123 mm

Servomotor Specifications

Model SGMSL-	Rated Output (W)	Rated Motor Speed/ Max. Motor Speed (min^{-1})	Encoder	Square Flange Dimensions (mm)	Total Length (mm)
A3	30	3000/6000	Incremental, 10 bits	25	85
A5	50	3000/3000		40	92

◆ Separated converter type

Large-capacity Σ-V Series

These products can improve precision, energy savings, and environmental cleanliness for servo systems. Lineup of two models servomotors with different rated speeds (1500 min^{-1} and 800 min^{-1})

[Catalog No. KAEPS80000086]

Servomotor
Model SGMVV

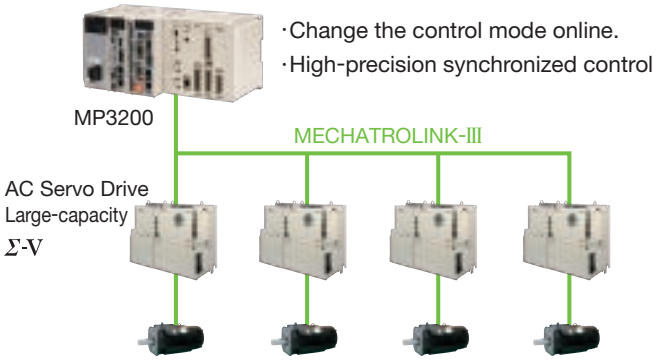
SERVOPACK
Model SGDV

Combinations

Combinations		200 V			400 V				
	Rated output	22 kW	30 kW	37 kW	22 kW	30 kW	37 kW	45 kW	55 kW
Servomotor SGMVV-		2BA	3ZA	3GA	2BD	3ZD	3GD	4ED	5ED
SERVOPACK SGDV-		121H	161H	201H	750J		101J	131J	
Converter SGDV-COA		2BAA	3GAA		3ZDA		5EDA		

Upgraded by combining a Machine Controller

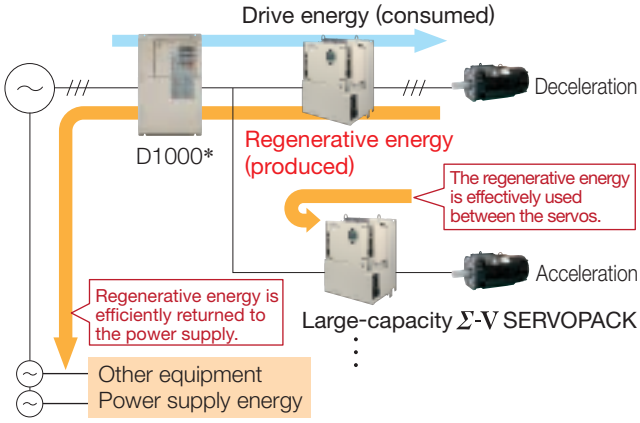
◎ High torque can be generated with synchronized control of multiple axes.
◎ The high-precision synchronized control of multiple axes (roller, winding, etc.) increases quality.
◎ Seamless switching between position control and torque control improves machine takt time.



Easily build an energy-saving system

By separating the converter, optimal support can be provided for a power regeneration converter or common converter. This paves the way for broad-based energy savings in the systems with, for instance, the regeneration of the energy produced during motor deceleration at the power supply side.

■Energy-saving Application Example



∗: D1000 is the sine-wave PWM converter able to regenerate power. In combination with an AC drive, realizes high power factor operation, and entirely eliminates problems of power source harmonics.

Application Examples

■Machine Tools
Helps meet speed and capacity demands of feed and spindle motors in high-speed, heavy-duty machining applications.

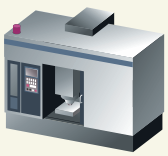
■Rotary Cutters
Outstanding acceleration/deceleration torque for high-speed tracking

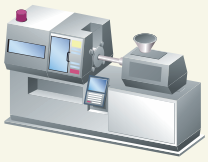
■Transfer Presses
The large-capacity servo drives bring better levels of performance to today's large, high-speed machinery, improving operations with digitalization and making them quieter than ever.

■Servo Presses
To attain cleaner and more efficient operation, servo presses are now being driven electrically instead of hydraulically. Energy savings in servo presses are also achieved thanks to the use of power regeneration converters.

■Injection Molding Systems
High-resolution encoders for higher levels of precision in injection control.

■Wire Saws
With a greater cutting force due to the high torque, saws can now cut hard materials. When combined with the MP series, it is possible to synchronize roller shafts, wind-up shafts and other such parts to a high level of precision.





Servo Capacity Selection Software

SigmaSize+

Supported OS: Windows Vista/7

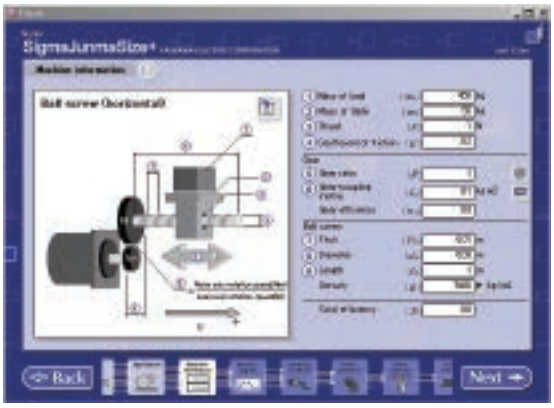
SigmaSize+ is a Web-based software application used to easily select the optimal YASKAWA servo drives for your machinery. SigmaSize+ is available from our website at http://www.e-mechatronics.com.

Features

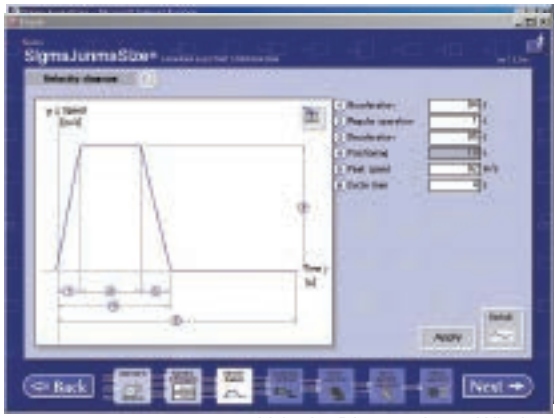
1. A wide range of the latest information.
2. A wizard system with a conversational mode to select optimal servo drives.
3. View SigmaSize+ in your browser wherever internet access is available.
   (Enhanced security measures with cryptographics)
4. Available to view and reuse previously input and stored data.

■Servo Selection Screen

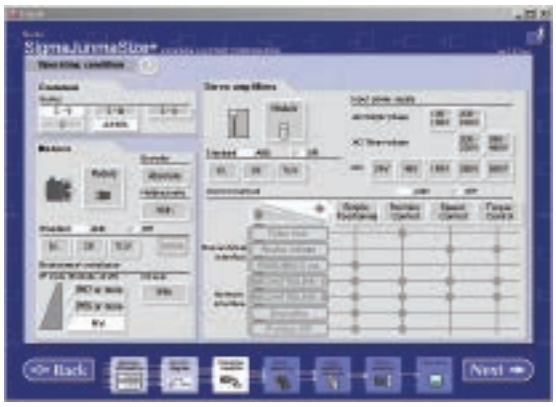
Application Selection Window



Machine Information Input Window



Velocity Diagram Input Window



Operating Condition Selection Window

Motor Selection Window

SERVOPACK Selection Window

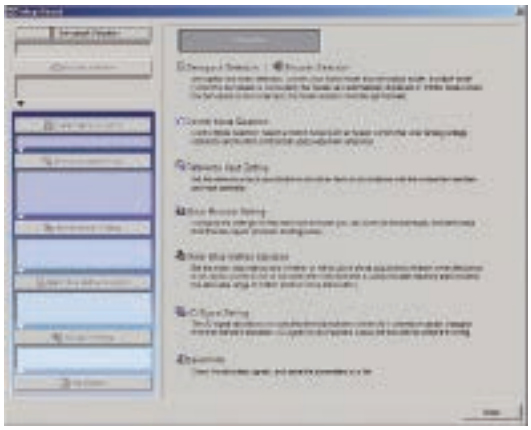
PC Software for AC Servo Drive Support

SigmaWin+

Supported OS: Windows 10/8.1/8/7

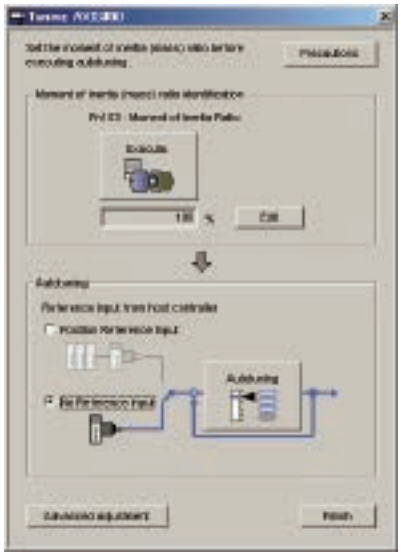
SigmaWin+ is a Windows-based engineering PC tool with various monitoring functions to make quick and easy adjustments to the settings for Yaskawa servo drives. SigmaWin+ supports a wide-range of operations from setting parameters to trial operation.

Setup using Wizard

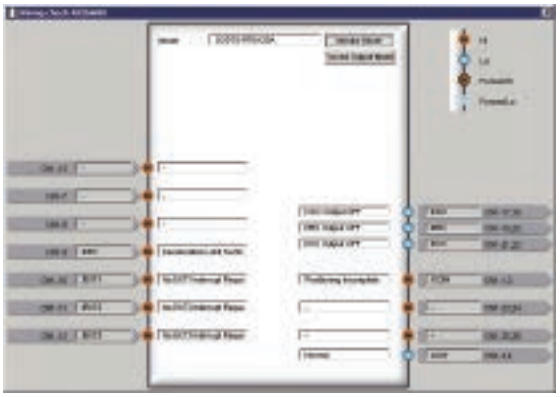


Parameter Edit (at online)

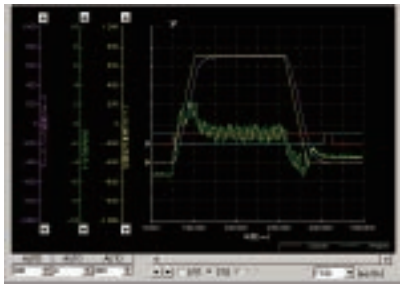
Tuning



Check Wiring



SERVOPACK internal data can be displayed in the monitor just like an oscilloscope.



Calculating Moment of Inertia and Measuring Vibration Frequency

Alarm Display and Alarm Diagnostic Function

MPE720 Ver.7

Compatible with Windows 10 64-bit edition

Supported OS
Windows 10/8/8.1/7

A one-stop solution for strengthening the integration environment and system design!

The MPE720 Ver.7 engineering tool integrates the engineering environments for servo, inverter, and I/O devices into a single software package. This enables all-in-one engineering from setup to maintenance of drive units connected to an MP3000 series machine controller via the MECHATROLINK network.

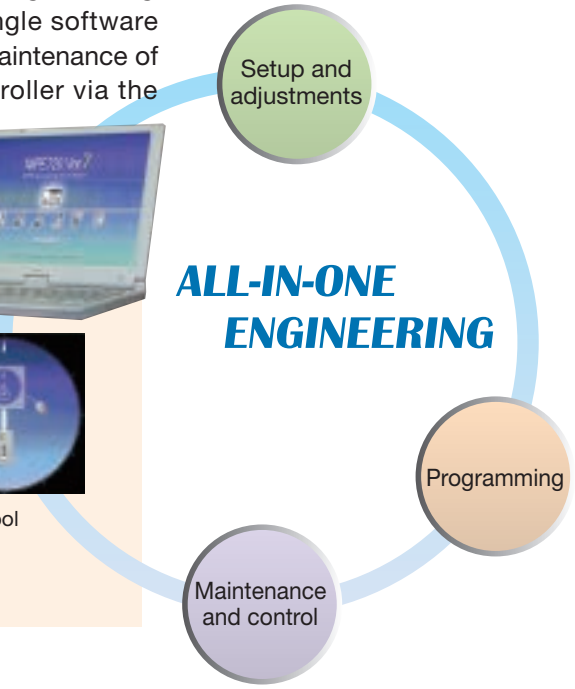
【Catalog No. KAEPC88076100】

Engineering Tool
MPE720 Ver.7

AC servo drive engineering tool
SigmaWin+

Inverter support tool
DriveWizard Plus

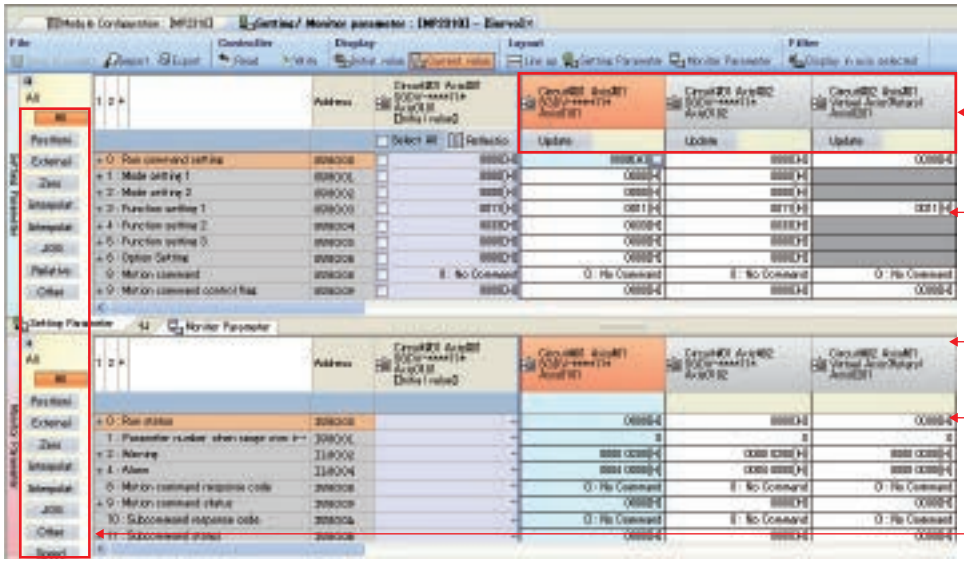
I/O unit setting tool
IoWin



Execution of parameter settings and monitoring enabled for multiple axes simultaneously

The parameter settings and monitor windows of the drive units can be executed for a multiple number of axes simultaneously. Establishing the settings for the entire system is a simple job, and comparing the monitors on an axis-by-axis basis is also easy.

MC-Configurator



Simultaneous settings for more than one axis e.g., virtual axis, axis 1, and axis 2

Single display for all settings and monitor windows

Single glance to check status of operations between multiple axes in monitor windows.

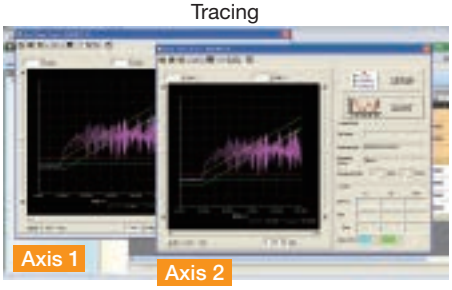
Select control mode to view **only parameters in use**

Adjustment work supported by a variety of adjustment functions

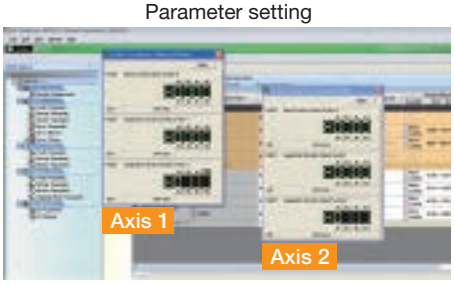
A wide variety of functions required for servo adjustments are provided, and these functions support the adjustment work.

Executed from
MC-Configurator

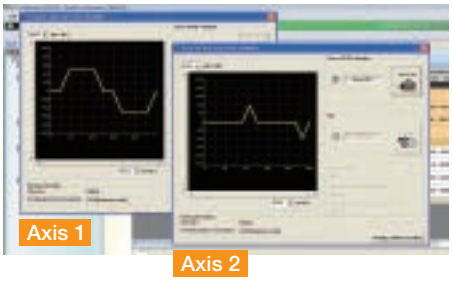
Tracing



Parameter setting



Program JOG



Multi-tasking

Efficiency improved by choosing the programming method that works best for the user

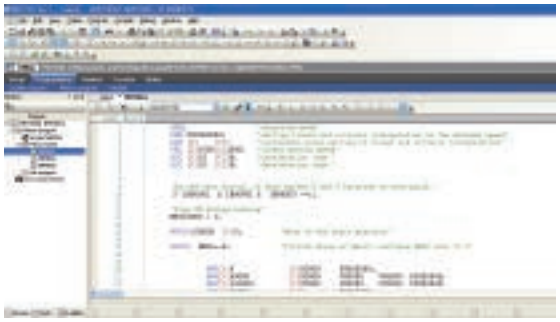
Ladder programming

- A new user interface (UI) enables operations to be undertaken easily by anybody.
- All types of control including position, speed, torque, and phase control are supported.
- Arithmetic expressions in the ladders have been made even simpler by boosting the EXPRESSION instructions.

This system is recommended for:

- Users who are using a PLC

Motion programming



- Positioning and interpolation instructions can be described using single instructions.
- Programs can be very easily edited using expressions in a text format.
- New variable programming can provide PC-like programming.

This system is recommended for:

- Users of PC-based devices and in-house fabricated boards (C language, BASIC language)

MECHATROLINK was created based on technology developed by Yaskawa as a specialized network for motion control, and has been made available as an open field network.

Yaskawa helped found the MECHATROLINK Members Association (MMA) in 2003 as a member of the MMA Board Committee. Yaskawa has continued to work with the MMA to promote the use of MECHATROLINK.

MECHATROLINK acquired certification for IEC61784 and IEC61158 international standards from the IEC in August 2014.
IEC61784 and IEC61158 are international standards for specifying industrial computer network protocols.
It is expected that the adoption of MECHATROLINK as a standard by the IEC will help promote the worldwide use of MECHATROLINK and contributing greatly to improving the productivity of manufacturing sites around the world.

MECHATROLINK Members Association (MMA)

MMA was established to promote the MECHATROLINK open field network for high-speed motion. The MMA consists of members that develop compatible products and the users of those products. There are five membership ranks: Board Members, Executive Members, Regular Members, User Members, and Registered Members.

There are nine Board Member companies in the MMA: M-System Co., Ltd., Oriental Motor Co., Ltd., Keyence Corporation, Schneider Electric Japan Holdings Ltd., NEC Corporation, Yaskawa Electric Corporation, YE DIGITAL CORPORATION, Yokogawa Electric Corporation, and Texas Instruments Inc. These companies are responsible for the management of the MMA.
The MMA provides global support to its members with branch offices in Germany, the U.S., South Korea, China, Taiwan, India, and ASEAN. These offices offer technical support and conduct promotional activities tailored to the local conditions in each country.

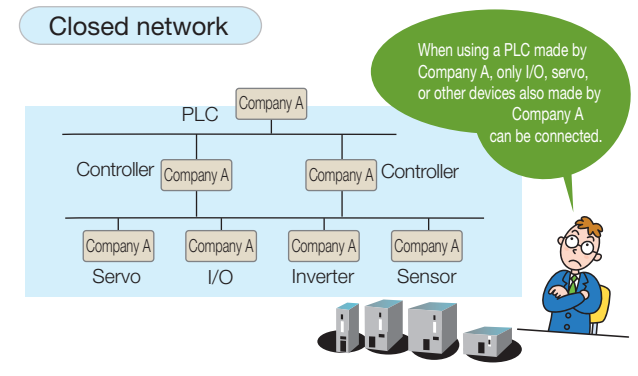
MECHATROLINK Members Association website: http://www.mechatrolink.org

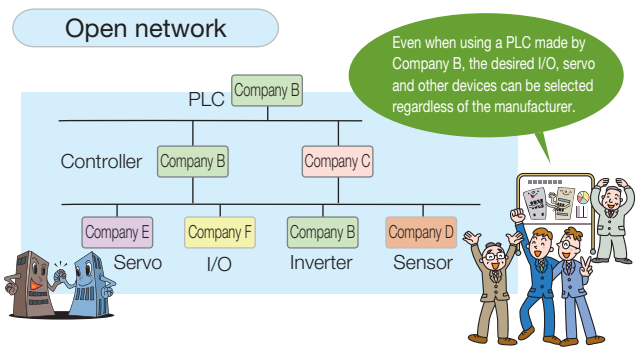
Open
Wide variety of available products

The most important point in freely constructing systems is a wide variety of available products.

MECHATROLINK adopts open and standardized communication specifications to enable connections between equipment made by different device manufacturers. Customers can arbitrarily select products made by different manufacturers based on criteria such as design, functionality, and cost. By ensuring that their products comply with applicable standards, device manufacturers can also access a larger market.

Difference between an open and closed network



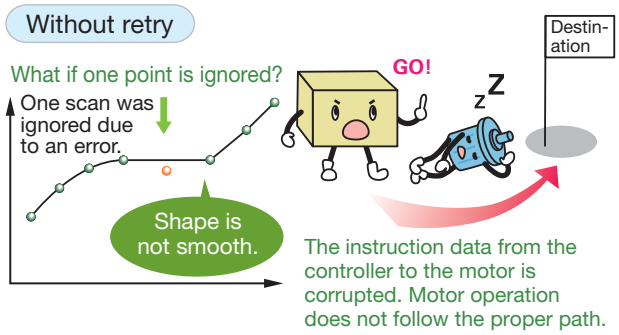


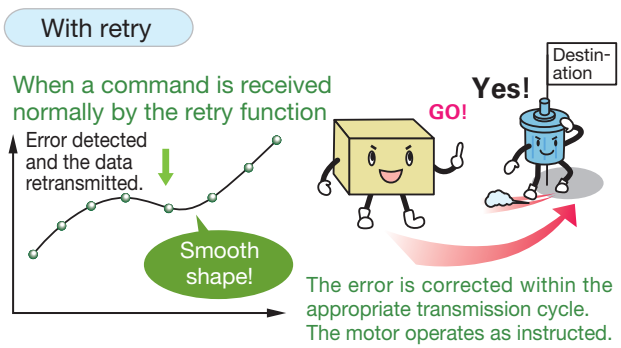
Reliable
Guaranteed high communications performance

The most important point in communications is to reliably transmit accurate data.

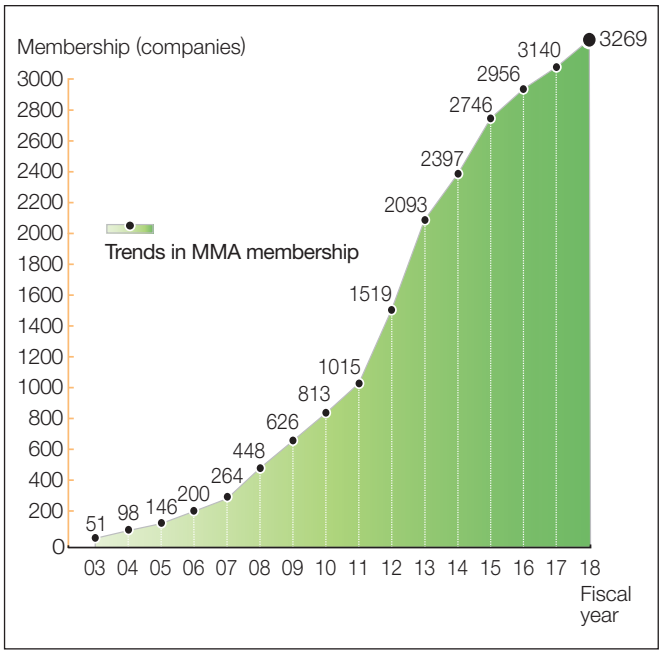
When transmitting digital data in particular, an error in transmitting even 1 bit can corrupt the entire communications data. MECHATROLINK has a retry function that automatically detects command and response communication errors and retransmits the data. Retry is performed within the same transmission cycle, so there is no loss of synchronicity.
New industrial connectors and cables are also used, and anti-vibration and noise measures have been enhanced.

Retry function

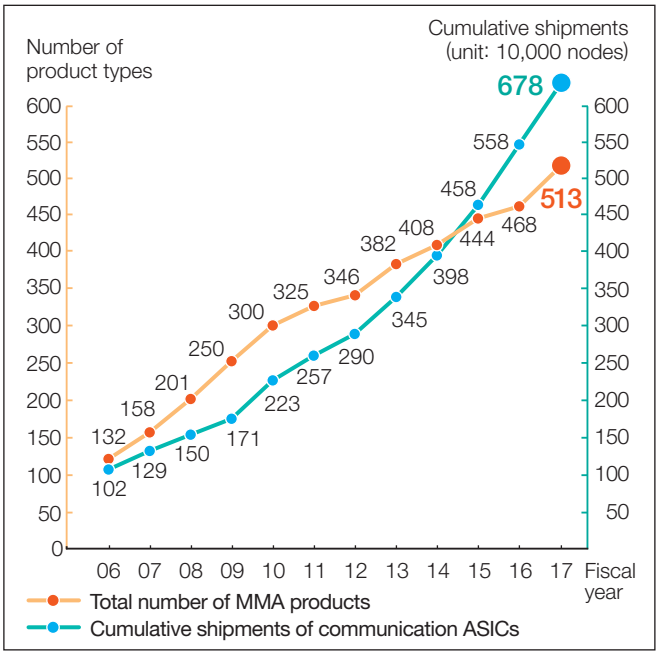




Expanding MECHATROLINK family



Increasing numbers of product types and nodes



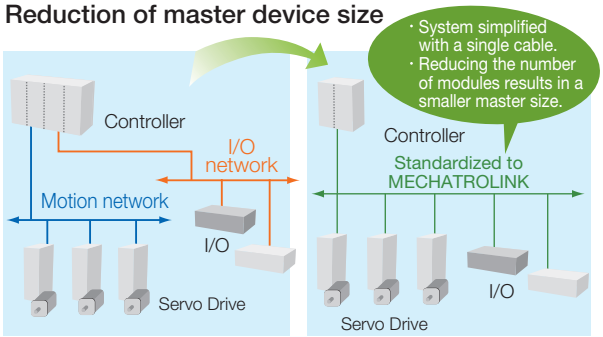
Simple

Low cost, easy maintenance, and expandability

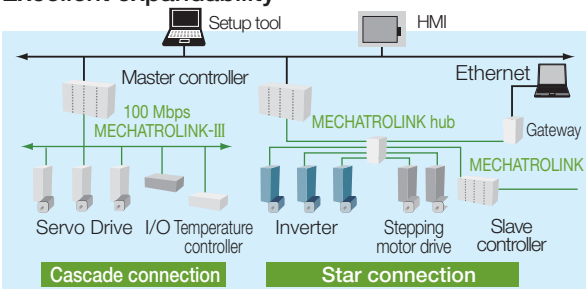
A key point for constructing a low-cost system is to reduce the wiring.

MECHATROLINK can connect a master device with each slave device using a single cable. MECHATROLINK also enables a reduction in the number of master device modules and cables by integrating the motion control network and I/O network into a single wiring system. This reduces costs and facilities maintenance and system expansion.

Reduction of master device size



Excellent expandability



Speedy

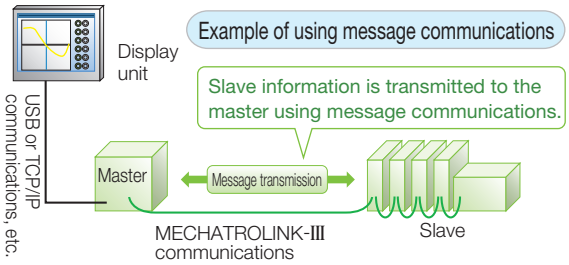
Simultaneous control of multiple axes and high-capacity message communications

Faster network speeds are required to enhance productivity and increase system scales.

MECHATROLINK-III has a communication speed of 100 Mbps and a transmission cycle of 31.25 μs, which is the best in the industry. This shortens the cyclic communications cycle and enables communications with more slaves per unit time to achieve simultaneous control of up to 62 axes. High-capacity message communication is also possible.

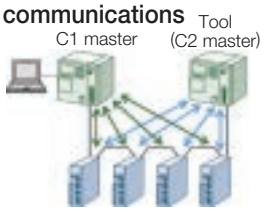
Promotion of message communication

The MMA aims to popularize the use of message communications to improve the ease of maintenance. To achieve this, the MMA actively encourages members to use various compatible product setup tools that comply with MECHATROLINK-III.



MECHATROLINK-III message communications

The C1 master supports message communications. The C2 master can also control the parameters, alarm history, and other data of each slave as a tool master.



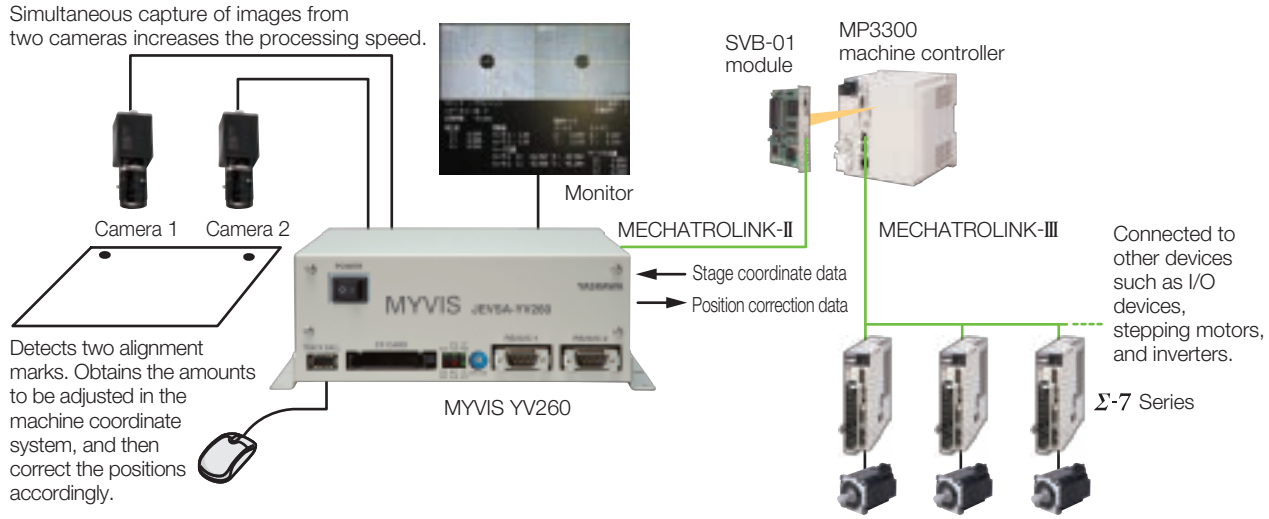
MYVIS YV260
Network Machine Vision System

In this example, the MYVIS YV260 is connected to the open motion network MECHATROLINK.
With MECHATROLINK communications, the MYVIS can receive data on the current position of the motor's axes in succession. Using this data, the necessary adjustments are determined for high-accuracy calibration of the machine coordinate system.

Features

1 Compatible with high-resolution camera
  · Digital camera (300,000 to 5,000,000 pixels)
  · Analog camera (300,000 to 1,250,000 pixels)
2 High-speed preprocessing of image quality improvement by hardware
3 Possible to simultaneously capture images from four cameras
4 Compatible with color camera
5 Compatible with MECHATROLINK-Ⅱ and 100-Mbps Ethernet communications

Example of System Configuration



Item			For Analog Cameras	For Camera Link
Model			JEVSA-YV260□1-E	JEVSA-YV260□2-E
Image Processing			Gray scale pattern matching, binary image analysis etc.	
Memory	Application Program		512 Kbytes (flash memory)	
	Backup Memory		256 Kbytes CMOS (for saving parameters)	
	Template Storage Memory		CF cards (2 Gbytes max.)	
	Image Memory	Frame Memory	4096 × 4096× 8 bits × 4 images (Can be used for 640 × 480 × 8 bits × 192 images)	
		Template Memory	16 Mbytes	
Image Input	Camera Interface		New EIAJ 12-pin connector × 4 VGA (640 × 480) to SGXA (1280 × 960) Four B&W, 8-bit A/D-converter circuits	Camera Link (MDR 26 pins) × 4 VGA (640 × 480) to QSXGA (2440 × 2048), Base Configuration, PoCL-compatible
	Camera Power Supply		Single camera: 12 V, 400 mA, Total: 1.2 A	
	Camera Sync Mode		Internal/external sync	Internal sync
	Random Shutter Supported		Sync-non reset, sync-reset, single VD or V reset	
	Simultaneous Image Capture		Four cameras	
	Input Image Conversion		Gray level conversion (LUT), mirror mode	
Monitor	Monitor Output		VGA, XGA (color), 15-pin D-sub	
	Image Display		A full-screen or a partial-screen for one camera, simultaneous screen reduction for two or four cameras, gray level conversion (binary image display supported)	
I/F	Field Network		MECHATROLINK-I/Ⅱ	
	LAN (Ethernet)		10BASE-T/100BASE-TX	
	General-purpose Serial		RS-232C × 2 channels (115.2 kbps)	
	Parallel I/O		16 general-purpose outputs (4 of these are also used for stroboscope) +2 outputs exclusive for alarms (24 VDC, photocoupler isolation) 16 general-purpose inputs (4 of these are also used for trigger) +3 inputs exclusive for mode switchings +1 input exclusive for trigger (24 VDC, photocoupler isolation)	
	Track Ball		USB mouse	
Power Supply			100/200 VAC, 24 VDC, 30 W	

IoT/M2M Communication Adapter

YE DIGITAL CORPORATION

These devices can be used to transmit data collected from various equipment over the cloud using a secure closed network or via the Internet.

MMLink-3G, Global Communication Adapter

This IoT communications device can be used to remotely monitor and control equipment installed in overseas locations.

Features
1 Supports connection to 2G and 3G networks.
2 Data transfer possible over wide areas
3 Equipped with GPS navigation system
4 Supports Modbus/MEMOBUS/MC protocols, which feature excellent connectivity with industrial equipment

MMLink-GWL, Multi-carrier LTE-compatible Communications Adapter

This LTE gateway with multi-carrier support is ideal for FA equipment and Modbus-enabled industrial equipment.

Features
1 Supports multi-carrier LTE (Docomo and au networks).
2 A compact size that can be easily incorporated into equipment (93×90×27 (mm)).
3 Redundancy through dual SIM cards (failover)
4 Supports Modbus/MEMOBUS/MC protocols, which feature excellent connectivity with industrial equipment

MMLink-Lite LTE, LTE-compatible Industrial USB Communications Adapter

This USB communications adapter is capable of TCP/UDP communications with low-end equipment and host systems that lack PPP protocols.

Features
1 For use with LTE lines up to 75 Mbps
2 A compact and lightweight device compatible with various installation environments.
3 Equipped with GPS positioning function
4 Easy to install with USB cable interface
5 Support for emergency notifications and disaster/evacuation information via "Emergency Notification Emails"

IoT Cloud Service

YE DIGITAL CORPORATION

MMCloud, IoT Platform

IoT Platform MMCloud

This platform enables data collected from equipment or sensors to be accumulated and used for information management, maintenance, analysis, etc. Enables small starts and quick adoption of IoT.

Features
1 Rate schedules that make small starts possible:
By providing standard cloud services, lead time can be shortened and initial start-up costs can be minimized.
2 A wide range of standard-equipped functions:
Comes standard-equipped with a variety of functions. In addition to remote monitoring, information management, maintenance, analysis, etc., are also possible.
3 Global support ideal for monitoring equipment worldwide:
Local time difference management for wherever the equipment is installed and English user screen are provided making it possible for your business to go global.

MMPredict, Failure Prediction

MMPredict is a service that uses artificial intelligence techniques to predict failures of equipment using accumulated sensor data.

Features
1 Failures can be predicted to a high degree of accuracy with our proprietary techniques.
2 Failure points can be estimated from information provided by sensors.

Failure Prediction MMPredict Paradigm Inside

Website http://www.ye-digital.com/en

Programmable Display

Schneider Electric Japan Holdings Ltd.

Pro-face GP4000 Series

The GP4000 series display features a touch screen that can be connected directly, without using any application programs, to control devices, such as controllers, servo drives, and AC drives. Current conditions of these devices is displayed on the screen so that they can be set up, adjusted, and maintained on site. Users can easily check operational status, edit registers, identify errors, and update or backup application programs without using a computer. The GP4000 series supports Proface Remote HMI, the remote monitoring software for mobile devices. This allows users to view product information on tablets and smartphones anytime, anywhere.

Supports the Visualization Function for the MP3000 Series Machine Controller

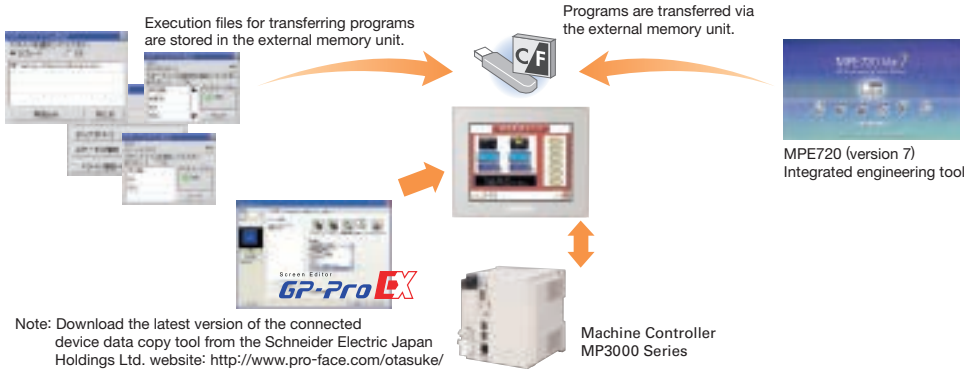
The cockpit parts can be downloaded from the homepage of Schneider Electric Japan Holdings Ltd.: http://www.pro-face.com/otasuke/

▲ Main Window (with Symbolic and Pictorial Parts) ▲ System Error Status ▲ System I/O Error Status

▲ Module Information ▲ Programs being Executed ▲ Axis Information

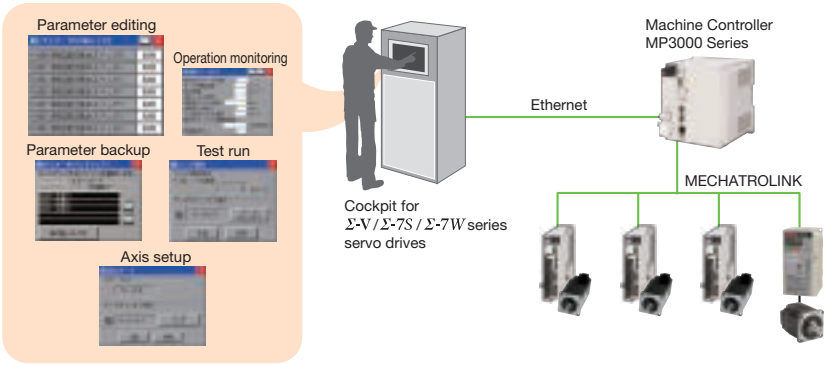
Engineering Support Function

● Program Transfer with an External Memory Unit!



Note: Download the latest version of the connected device data copy tool from the Schneider Electric Japan Holdings Ltd. website: http://www.pro-face.com/otasuke/

● Adjustment and Maintenance of Servo Drives and Inverters Right on the Touch Panel!



Website http://www.proface.co.jp/product/hmi/gp4000.html

IP Core

Tokyo Electron Device Limited

MECHATROLINK-Ⅲ Master/Slave IP Core

Model: Master: TIP-ML3MST-PROJ･･･Supports Xilinx, Inc. Spartan-6 LX/LXT FPGAs and Zynq-7000 SoCs.
Slave: TIP-ML3SLV-PROJ･･･Supports Xilinx, Inc. Spartan-6 LX/LXT FPGAs (single slave and multi-slave functions).

This original IP core for FPGAs manufactured by Xilinx, Inc. significantly reduces the number of components on a board.
This reduces development costs and time required for development can be significantly reduced.

- Supports MECHATROLINK-Ⅲ master and slave functions.
- Delivers a high-speed host interface synchronized with a 66 MHz clock (max.).
- Enables flexible system configuration by using FPGA fabrics.

Website http://ppg.teldevice.co.jp

I/O Module

M-System Co., Ltd.

MECHATROLINK-I- and -Ⅱ-compliant Remote I/O

Model: R7ML series, R7K4FML, R7K4DML, R7G4HML


R7ML Base Module

- Can handle 16 to 32 discrete I/O signals, 4 analog input, and 2 analog output signals.
- Analog and discrete signals can be mixed.
- 3M screw terminals (2-piece configuration) are used for power supply and I/O terminal blocks. Saves space because relay terminal is not required.
- R7K4DML-B used with e-CON connectors for I/O connection is also available.

MECHATROLINK-Ⅲ-compliant Remote I/O

Model: R7G4FML3, R7G4HML3, R7F4HML3, R7K4FML3, R7K4JML3


R7G4FML3-6

- Can handle 16 to 64 discrete I/O signals and 4 analog output signals (max.).
- Equipped with discrete I/O, DC input and output, temperature input, and rotary encoder input.
- High-speed A/D conversion unit (conversion speed: 200 μs) and Strain Gauge Input Module are available.
- 3M screw terminals (2-piece configuration) are used for power supply and I/O terminal blocks. Saves space because relay terminal is not required.
- R7K4JML3-E used with spring clamp connectors for I/O connection and R7F4HML3-D used with MIL connectors are also available.

Master Module

HLS (High-speed Link System) Master Module

Model: MPHLS-01

- Master module that can be used with MP2200, MP2300, and MP3300 series machine controllers.
  Note: When using this module with a MP3200 machine controller, attach a MP2000 base unit (optional) to the machine controller first and install this module in the base unit.
- Wiring for discrete I/Os and analog I/Os can be reduced with M-System's rich product lineup of remote I/O modules (R7HL and R7F4DH series) that can be connected to the HLS master module.

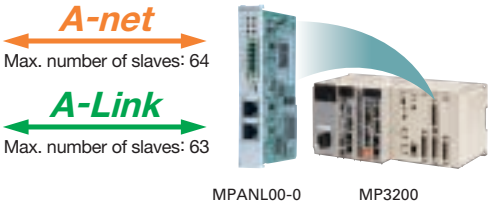
Website http://www.m-system.co.jp/

A-net/A-Link Unit

ALGO System Co., Ltd.

A-net/A-Link Master Unit Module
Model: MPANL00-0

This A-net/A-Link master unit module can be directly attached to the MP3000 series Controller. The resulting system needs less wiring and conforms to SEMI E54.17.



Features
1 Two H8S units by Renesas Technology Corp. can be added maximum.
2 Max. 4032 points can be scanned in 0.95 ms (at 12 Mbps).
Note: The case using two A-Link channels (1 channel: 2016 points/system, 0.95 ms at 12 Mbps).
3 Shared memory of 512 Bytes (response speed: 2.36 ms) with A-net.
4 Self-diagnostic function.

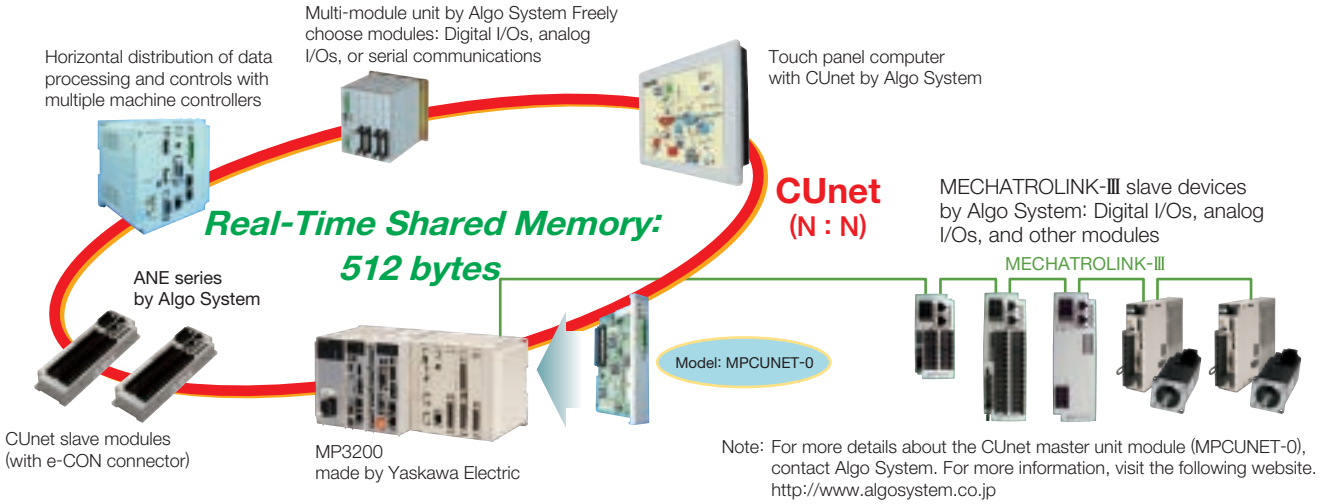
Website http://www.algosystem.co.jp/

Master Unit Module

CUnet Master Unit Module
Model: MPCUNET-0

The master module for CUnet communications that can be directly connected to the MP3000 Series Controllers.

Features
1 Pre-mounted H8S unit (By Renesas Electronics).
2 Large shared memory of 512 bytes (Response speed: 2.36 ms).
3 Distributed control in real time.



Note: For more details about the CUnet master unit module (MPCUNET-0), contact Algo System. For more information, visit the following website. http://www.algosystem.co.jp

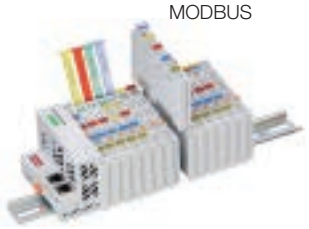
Website http://www.algosystem.co.jp/

I/O Module

WAGO Company of Japan, Ltd.

WAGO-I/O-SYSTEM 750 Series
Model No. 750-346: Compatible with the 260IF-01 DeviceNet Communication Module
Model No. 750-352: Compatible with the 263IF-01 EtherNet/IP Communication Module and 218-01/-02 Ethernet Communication Module.

WAGO-I/O-SYSTEM 750 series I/Os are module-type remote I/Os. Nodes can be constructed by combining a communication unit (bus coupler) with a function module of your choice. Various communication units that are compatible with a wide range of open fieldbus are available. Yaskawa Electric's MP series machine controllers can be connected via DeviceNet, Ethernet/IP, and Modbus-TCP Ethernet networks. Instruction manuals contain information on easy ways to connect the machine controller.
Function modules are available for a wide range of I/O signal types: digital I/O (2 to 16 channels), analog I/O (±10 V, 0 to 20 mA, thermocouples), serial communications, counter I/O, etc.


Example of Node Configuration (Bus coupler + Module)

Website http://www.wago.co.jp/io

Module for MP3300, and I/O Terminal

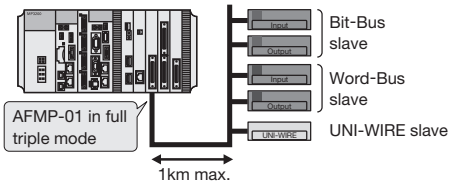
Anywire Corporation

AnyWire DB Master Module
Model: AFMP-01

The AnyWire DB master module can be connected directly to the machine controllers in the MP3000 series. This module is equipped with the master functions of the AnyWire DB A40 series and is compatible with a variety of I/O terminals in the same series.


AFMP-01

System Configuration: Full Triple Mode Transmission



Note: For more details on the AFMP-01 module, contact the Anywire Corporation or visit its web site, http://www.anywire.jp.

Features

1. The AnyWire system saves space and reduce costs because fewer cables are reduced and low-cost, general-purpose cables can be used. Time required for wiring is also reduced.
2. Highly efficient transmission is achieved with the Dual-Bus system. Analog inputs/outputs (128 words max) can be connected without adversely affecting the digital input/output signal transmission (512 points max).
3. General-purpose robot cables, cableveyor, slip rings can be used with the product. This is an ideal module to reduce wiring at drive sections.

CC-Link interface board
Models: AFMP-02-C, AFMP-02-CA

These slave interface boards connect the machine controllers in the MP3000 series to the CC-Link master. One CC-Link master can be connected to a maximum of 16 machine controllers in the MP3000 series through the CC-Link when the PLC in the Q series (manufactured by Mitsubishi Electric Corporation) is used as a master station. Costs can be reduced and space saved by using the AFMP-02-CA board equipped with wire-saving DB ports.

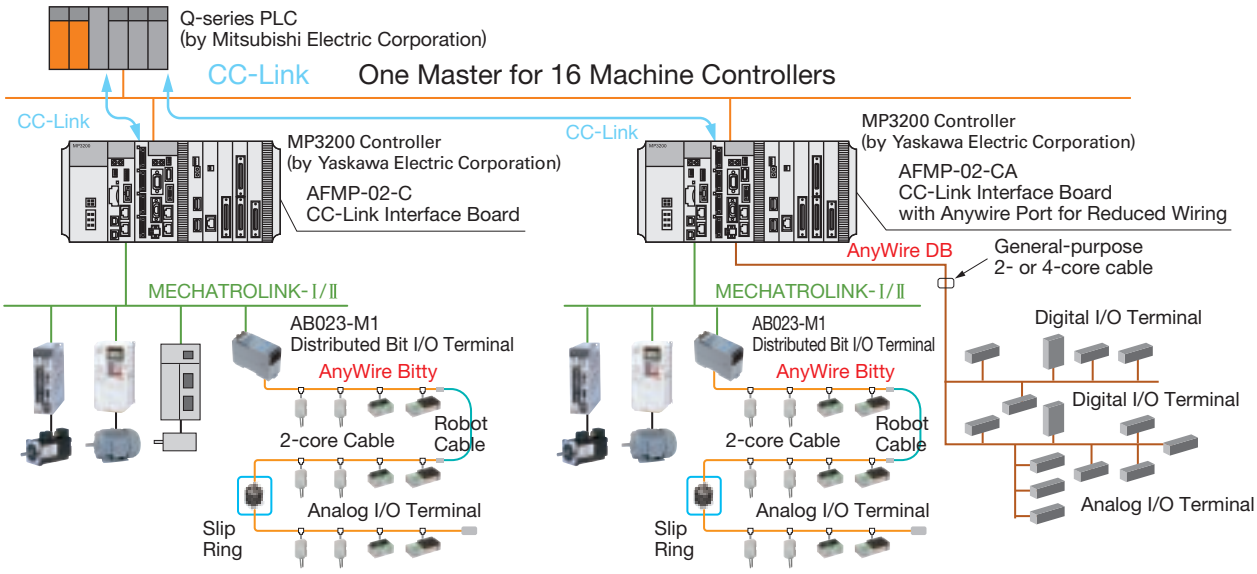

AFMP-02-CA

Features

1. A single CC-Link master station, a PLC from the Q series by Mitsubishi Electric Corporation, can be connected to 16 MP3200 controller with the CC-Link.
2. The setup time can be greatly reduced by the self-configuration function of the MP3200.
3. Anywire port for reduced wiring saves costs and space.

System Configurations

If a Q-series PLC made by Mitsubishi Electric Corporation is connected to a Machine Controller through CC-Link, only one CC-Link master allows you to connect to 16 controllers including MP3200 Controller.



MECHATROLINK bit-type distributed I/O terminal
Model: AB023-M1

The MECHATROLINK bit-type distributed I/O terminal reduces the wiring required for drive systems that use MECHATROLINK-Ⅰ and -Ⅱ. The introduction of this I/O terminal into a MECHATROLINK open-network system significantly reduces total costs and increases system reliability because the MECHATROINK I/O terminal can be used with any transmission media, such as robot cables and slip rings.
The AnyWire Bitty series for I/O terminals from AnyWire can be connected to this distributed I/O terminal to increase the flexibility in transmissions by supporting the connection of cables for signals from sensors and actuators in the system. It is possible to increase the number of I/O points to 432 by connecting I/Os with a bus that reduces the amount of wiring required.

Website http://www.anywire.jp

Sensor

RKC Instrument Inc.

Module-type Digital Temperature Controller

Model: SRZ ·Communications converter module COM-MY
·Temperature control module Z-TIO
·Digital I/O module Z-DIO

·Easily construct a multi-channel temperature control system by connecting the MECHATROLINK-compliant communications converter module to the temperature control modules.
·A single temperature control module can control temperatures of four points or two points. Also, 16 modules can be connected for temperature control of maximum 64 points.
·Digital I/O modules to output temperature alarms and to switch operation modes by using contact signals can also be connected.

Website http://www.rkcinst.com

Sensor

Azbil Corporation

K1G Series High-accuracy Position Sensors

Model: MECHATROLINK-Ⅲ-compatible K1G-C04M

Performance and functions that far exceed conventional norms, allowing you to make the measurements you want.

Features

1 See what you previously couldn't
Minute variations not visible with conventional sensors can now be reliably detected.
2 Easily mounts anywhere
Compact dimensions are achieved by slim sensor head design.
3 Less wasted time
Comes with a full range of functions to help cut job time for design, installation, and maintenance.
Support for MECHATROLINK-Ⅲ also opens up a host of new applications and advantages.

Website http://www.azbil.com

Stepping Motor Drive

Oriental Motor Co., Ltd.

Network Converter for Controlled Motors

Model: NETC01-M2 for MECHATROLINK-Ⅱ
NETC01-M3 for MECHATROLINK-Ⅲ

·These network converters convert the MECHATROLINK communication protocol to Oriental Motor's original RS-485 communication protocol. Oriental Motor's products that support the RS-485 protocol (up to 16 axes) can be controlled in MECHATROLINK communications.
·Only a single MECHATROLINK communication cable is required for wiring, reducing the number of wires and saving space.
·Parameters can be set by using an OPX-2A module or MEXE02 software (both sold separately.)

AZ Series Multi-axis Driver for Motors Equipped with Mechanical Absolute Encoders

Model: AZD□A-KM3

· This α STEP AZ series driver, for use with motors equipped with battery-free mechanical absolute encoders, now supports MECHATROLINK-Ⅲ communications.
· Because an external sensor is not required, you can save on wiring and reduce maintenance.
· The motor will not miss steps, even under rapid load fluctuations or rapid acceleration, and highly responsive positioning is possible without tuning and hunting.
· AZ series DC power supply input motors and actuators can be connected to this multi-axis driver for two to four axes.

Website http://www.orientalmotor.com

Slip Ring

Endo Kogyo Co., Ltd.

Slip ring for communications and control
Model: SRP-MLⅡ-3

The SRP-ML slip ring enables communications with and control of drive units and systems that include rotating devices.
・Compact and highly durable structure
・Improved reliability with the new brush system that enables uninterrupted communications
・Connected directly by using MECHATROLINK-Ⅱ cables

Website http://www.endo-kogyo.co.jp/japanese/sr/con-index.html

Slip Ring

Kyoei Electric Co., Ltd.

Slip ring system for MECHATROLINK-Ⅱ communications
Model: SRC120-MLⅡ

This highly functional slip ring transmits data through MECHATROLINK communications from a fixed device to a rotating device.
・Can be packaged with a power device, such as power supply for a motor.
・Complies with RoHS Directive.

Website http://www.kyoeidenki.jp

Slip Ring

NSD Corporation

Slip-ring system for MECHATROLINK-Ⅱ communications
Model: 3TEϕ17-7P

This slip-ring system achieves your intended measurements with unprecedented performance and functionality.

Features
1 A small (43 mm dia.× 87 mm), lightweight slip-ring that supports MECHATROLINK-Ⅱ communications.
2 Can be used without maintenance for up to 50 million rotations at a maximum speed of 700 min^{-1}.
3 Can simultaneously supply power (200/220 VAC 3A) and transmit data. Power can also be supplied to a servo amplifier by combining this slip-ring with our slip-ring for high currents.

Slip-ring system for MECHATROLINK-Ⅲ communications
Model: 3TEϕ17-5P-MⅢ

This slip-ring system achieves your intended measurements with unprecedented performance and functionality.

Features
1 A small (43 mm dia.× 107 mm), lightweight slip-ring that supports MECHATROLINK-Ⅲ communications.
2 Can be used without maintenance for up to 50 million rotations at a maximum speed of 700 min^{-1}.
3 Power can also be supplied to a servo amplifier by combining this slip-ring with our slip-ring for high currents.

Website http://www.nsdcorp.com

◆Incremental Linear Encoders

✓: Possible

Output Signal	Manufacturer	Linear Encoder Type	Model: Scale	Model: Sensor Head	Model: Interpolator (Serial Converter Unit)	Linear Encoder Pitch μm	Resolution nm	Maximum Speed*3 m/s	Support for Polarity Sensor Input	Application to Linear Motors	Application to Fully-Closed Loop Control
1 Vp-p Analog Voltage*1	Dr. JOHANNES HEIDENHAIN GmbH	Exposed	LIDA48□		JZDP-H003/-H006*5	20	78.1	5	✓	✓	✓
					JZDP-J003/-J006*5		4.9	2	✓	✓	✻8
			LIF48□		JZDP-H003/-H006*5	4	15.6	1	✓	✓	✓
					JZDP-J003/-J006*5		1.0	0.4	✓	✻8	✻8
	Renishaw plc*4	Exposed	RGS20	RGH22B	JZDP-H005/-H008*5	20	78.1	5	✓	✓	✓
					JZDP-J005/-J008*5		4.9	2	✓	✓	✻8
Encoder for Yaskawa's Serial Interface*2 (Σ-LINK)	Magnescale Co., Ltd.	Exposed	SL7□0	PL101-RY*6		800	97.7	10	–	✓	✓
				PL101	MJ620-T13*7				✓	✓	✻8
			SQ10	PQ10	MQ10-FLA	400	48.83	3	–	✓	✓
					MQ10-GLA				✓	✓	–
		Sealed	SR75-□□□□□LF		–	80	9.8	3.33	–	✓	✓
			SR75-□□□□□MF		–	80	78.1	3.33	–	✓	✓
			SR85-□□□□□LF		–	80	9.8	3.33	–	✓	✓
			SR85-□□□□□MF		–	80	78.1	3.33	–	✓	✓
	Canon Precision Inc.	Exposed	PS90-20160 glass	PH03-36110	–	128	62.5	12.8	–	✓	✓
			PS04-30110 SUS	PH03-36120	–	128	62.5	12.8	–	✓	✓

✻1: You must also use a Yaskawa Serial Converter Unit. The output signal will be multiplied by 8 bits (256 divisions) or 12 bits (4,096 divisions) in the Serial Converter Unit.
✻2: The multiplier (number of divisions) depends on the Linear Encoder. Also, you must write the motor constant file to the Linear Encoder in advance.
✻3: The maximum speeds given in the above table are the maximum applicable speeds of the encoders when combined with a Yaskawa SERVOPACK. The actual speed will be restricted by either the maximum speed of the Linear Servomotor or the maximum speed of the Linear Encoder (given above).
✻4: If you use the origin signals with a Linear Encoder from Renishaw plc, the origin may sometimes be falsely detected. If that occurs, use the BID/DIR signal to output the origin signal only in one direction.
✻5: Use this model number to purchase the Serial Converter Unit.
✻6: Use this model number to purchase the Sensor Head with Interpolator.
✻7: Use this model number to purchase the Interpolator.
✻8: Contact your Yaskawa representative.
Note: 1. Confirm detailed specifications, such as the tolerances, dimensions, and operating environment, with the manufacturer of the Encoder before you use it.
2. Σ-LINK is a registered trademark of YASKAWA ELECTRIC CORPORATION.

◆Absolute Rotary Encoder

The following Absolute Rotary Encoders are for fully-closed control. Can not use it to control the motor.

Output Signal	Manufacturer	Rotary Encoder Type	Model: Scale	Model: Sensor Head	Relay Device between Fully-Closed Module and Rotary Encoder	Resolution Bits	Maximum Speed*1 min-1
Encoder for Yaskawa's Serial Interface (Σ-LINK)	Magnescale Co., Ltd.	Sealed	RU77-4096ADF*2		–	20	2000
			RU77-4096AFFT01*2		–	22	2000
	Dr. JOHANNES HEIDENHAIN GmbH	Exposed	ECA4412*2		EIB3391Y	27	1600
						28	800
						29	400
		Sealed	RCN2□10*2			26	3000
			RCN5□10*2			28	800
			RCN8□10*2			29	400
			ROC2310*2			26	3000
			ROC7310*2			28	800
	Renishaw plc	Exposed	RA23Y-□□□□□□□□□*2		–	23	14600
			RA26Y-□□□□□□□□□*2		–	26	3250
			RA30Y-□□□□□□□□□*2		–	30	200

✻1: The maximum speeds given in the above table are the maximum applicable speeds of the encoders when combined with a Yaskawa SERVOPACK. The actual speed will be restricted by either the maximum speed of the Linear Servomotor or the maximum speed of the Linear Encoder (given above).
✻2: This is a single-turn absolute encoder.
Note: 1. Confirm detailed specifications, such as the tolerances, dimensions, and operating environment, with the manufacturer of the Encoder before you use it.
2. Σ-LINK is a registered trademark of YASKAWA ELECTRIC CORPORATION.

◆Absolute Linear Encoder

✓: Possible

Output Signal	Manufacturer	Linear Encoder Type	Model			Linear Encoder Pitch*2 μm	Resolution nm	Maximum Speed*3 m/s	Support for Polarity Sensor Input	Application to Linear Motors	Application to Fully-Closed Loop Control
			Scale	Sensor Head	Interpolator (Serial Converter Unit)						
Encoder for Yaskawa's Serial Interface*1 (Σ-LINK)	Magnescale Co., Ltd.	Exposed	SQ47-□□□□S□F□□□		–	20.48	5	3.33	–	✓	✓
			SQ47-□□□□T□F□□□								
			SQ47-□□□□A□F□□□		–	40.96	10	3.33	–	✓	✓
			SQ47-□□□□F□F□□□								
			SQ57-□□□□S□F□□□		–	20.48	5	3.33	–	✓	✓
			SQ57-□□□□T□F□□□								
			SQ57-□□□□A□F□□□		–	40.96	10	3.33	–	✓	✓
			SQ57-□□□□F□F□□□								
		Sealed	SR77-□□□□□LF		–	80	9.8	3.33	–	✓	✓
			SR77-□□□□□MF		–	80	78.1	3.33	–	✓	✓
			SR87-□□□□□LF		–	80	9.8	3.33	–	✓	✓
			SR87-□□□□□MF		–	80	78.1	3.33	–	✓	✓
	Mitutoyo Corporation	Exposed	ST781A		–	256	500	5	–	✓	✓
			ST782A		–	256	500	5	–	✓	✓
			ST783A		–	51.2	100	5	–	✓	✓
			ST784A		–	51.2	100	5	–	✓	✓
			ST788A		–	51.2	100	5	–	✓	✓
			ST789A*4		–	25.6	50	5	–	✓	✓
			ST1381		–	5.12	10	8	–	✓	✓
			ST1382		–	0.512	1	3.6*6	–	✓	✓
	Dr. JOHANNES HEIDENHAIN GmbH	Exposed	LIC4100 Series*5		EIB3391Y	20.48	5	10	–	✓	✓
			LIC2100 Series*5			204.8	50	10	–	✓	✓
						409.6	100	10	–	✓	✓
			LIC4190 Series		–	40.96	10	10	–	✓	✓
					–	20.48	5	10	–	✓	✓
					–	4.096	1	10	–	✓	✓
			LIC2190 Series		–	409.6	100	10	–	✓	✓
					–	204.8	50	10	–	✓	✓
		Sealed	LC115		EIB3391Y	40.96	10	3	–	✓	✓
			LC415			40.96	10	3	–	✓	✓
	RSF Elektronik GmbH	Exposed	MC15Y Series		–	409.6	100	10	–	✓	✓
					–	204.8	50	10	–	✓	✓
	Renishaw plc	Exposed	EL36Y□□050F□□□		–	12.8	50	100	–	✓	✓
			EL36Y□□100F□□□		–	25.6	100	100	–	✓	✓
			EL36Y□□500F□□□		–	128	500	100	–	✓	✓
			RL36Y□□050□□□		–	12.8	50	100	–	✓	✓
			RL36Y□□001□□□		–	0.256	1	3.6	–	✓	✓
	RLS d.o.o.	Exposed	LA11YA Series		–	2000	976.5	7	–	✓	✓
					–	2000	488.2	3.65	–	✓	✓
					–	2000	244.1	1.82	–	✓	✓
	Fagor Automation S. Coop.	Exposed	L2AK208		–	20	78.1	8.0	–	✓	✓
			L2AK211		–	20	9.8	8.0	–	✓	✓
		Sealed	LAK209		–	40	78.1	3.0	–	✓	✓
			LAK212		–	40	9.8	3.0	–	✓	✓
			S2AK208		–	20	78.1	3.0	–	✓	✓
			SV2AK208		–	20	78.1	3.0	–	✓	✓
			G2AK208		–	20	78.1	3.0	–	✓	✓
			S2AK211		–	20	9.8	3.0	–	✓	✓
			SV2AK211		–	20	9.8	3.0	–	✓	✓
			G2AK211		–	20	9.8	3.0	–	✓	✓
	Canon Precision Inc.	Exposed	PS90-20160 glass	PH03-36E00	–	128	62.5	12.8	–	✓	✓

*1: The multiplier (number of divisions) depends on the Linear Encoder. Also, you must write the motor constant file to the Linear Encoder in advance.
*2: These are reference values for setting SERVOPACK parameters. Contact the manufacturer for actual linear encoder scale pitches.
*3: The maximum speeds given in the above table are the maximum applicable speeds of the encoders when combined with a Yaskawa SERVOPACK. The actual speed will be restricted by either the maximum speed of the Linear Servomotor or the maximum speed of the Linear Encoder (given above).
*4: Contact Mitutoyo Corporation for details on the Linear Encoders.
*5: With the release of the LIC4190/LIC2190 series, the combination of the LIC4100/LIC2100 series and interface unit EIB3391Y is no longer being sold.
*6: The speed is restricted for some SERVOPACKs.
Note: 1. Confirm detailed specifications, such as the tolerances, dimensions, and operating environment, with the manufacturer of the Encoder before you use it.
2. Σ-LINK is a registered trademark of YASKAWA ELECTRIC CORPORATION.

Read Before Ordering

(1) Details of Warranty

■ Warranty Period

The warranty period for a product that was purchased (hereinafter called the “delivered product”) is one year from the time of delivery to the location specified by the customer or 18 months from the time of shipment from the Yaskawa factory, whichever is sooner.

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Yaskawa shall replace or repair a defective product free of charge if a defect attributable to Yaskawa occurs during the above warranty period.

This warranty does not cover defects caused by the delivered product reaching the end of its service life and replacement of parts that require replacement or that have a limited service life.

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1. Improper handling, abuse, or use in unsuitable conditions or in environments not described in product catalogs or manuals, or in any separately agreed-upon specifications
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4. Use of the delivered product in a manner in which it was not originally intended
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   - Systems, machines, and equipment that may present a risk to life or property
   - Systems that require a high degree of reliability, such as systems that supply gas, water, or electricity, or systems that operate continuously 24 hours a day
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4. Never use the product for an application involving serious risk to life or property without first ensuring that the system is designed to secure the required level of safety with risk warnings and redundancy, and that the Yaskawa product is properly rated and installed.
5. The circuit examples and other application examples described in product catalogs and manuals are for reference. Check the functionality and safety of the actual devices and equipment to be used before using the product.
6. Read and understand all use prohibitions and precautions, and operate the Yaskawa product correctly to prevent accidental harm to third parties.

(4) Specifications Change

The names, specifications, appearance, and accessories of products in product catalogs and manuals may be changed at any time based on improvements and other reasons. The next editions of the revised catalogs or manuals will be published with updated code numbers. Consult with your Yaskawa representative to confirm the actual specifications before purchasing a product.

Product Information

e-Mecha Site (http://www.e-mechatronics.com/en/)

To see details on Yaskawa's controllers, click Controllers on Yaskawa's Products and Technical Information website.
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MP3300 product information of e-Mecha site

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LITERATURE NO. KAEP S800001 22H <7>-0

Published in Japan March 2020
M2-01-19-08