YASKAWA

Machine Controller and AC Servo Drive
Solutions Catalog

i³-Mechatronics

MP3000

Σ-7

YASKAWA

Ever Forward, Ever Better

100 Years Together with Our Customers

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, first for factory automation, and today, for mechatronics and robotics.

Today, Yaskawa is striving to make effective use of its technologies developed in the motion control, robotics, and system engineering sectors, and is also taking on the challenges of achieving the highly efficient utilization of natural energy and the creation of a society in which people and robots exist side-by-side.

Throughout our extensive 100-year history, we have consistently sought to develop the world's leading technologies and applications that would best delight and be most useful to our customers. Yaskawa will continue to treasure the results, technologies, and reputation we have achieved thus far, and look ahead to create "e-motional solutions" for emerging global challenges.

Motion Control

Robotics

System Engineering

1915   1930   1990   2015

2025

2015

1915
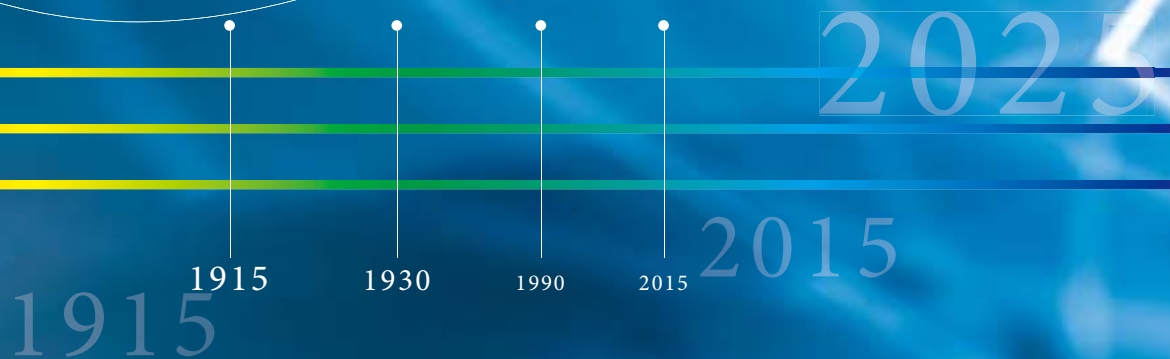
Environmental Energy

Robotics Human Assist

Mechatronics Solutions

i³-Mechatronics

Changing Motion, Changing the World

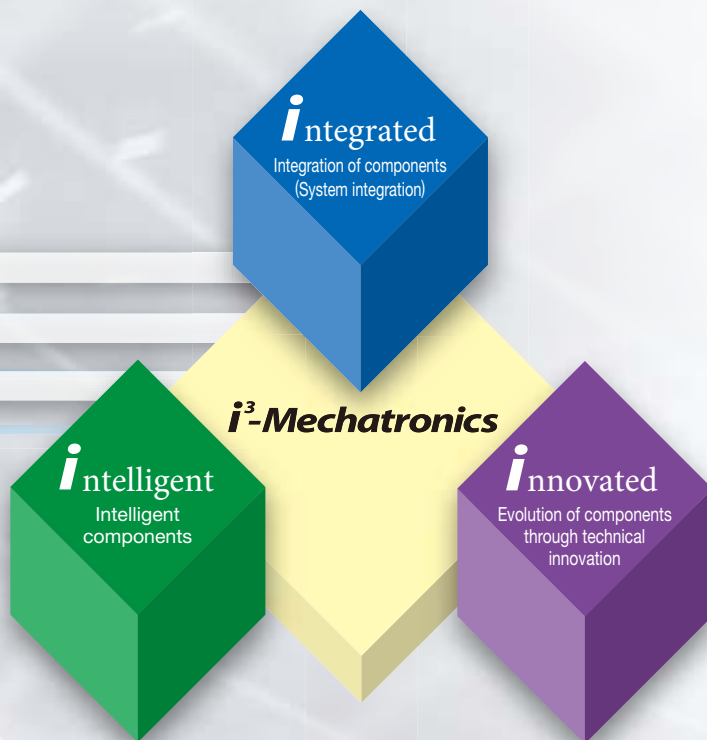Yaskawa is committed to developing innovative mechatronics products and offering new solutions to the world.

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. In addition to industrial sectors, our motion technology has a nearly limitless range of applications, including familiar sectors such as lifestyles, medicine, and welfare. Changing the motions performed by motors creates new concepts and products that can change the world.

Motion Control Solution

i³-Mechatronics

integrated
Integration of components
(System integration)

intelligent
Intelligent
components

innovated
Evolution of components
through technical
innovation

Yaskawa carries out Motion & Control Business activities based on the concept of **i³-Mechatronics** (Integrated, Intelligent, and Innovated).

● Semiconductor
● Electronic parts
● Liquid crystal
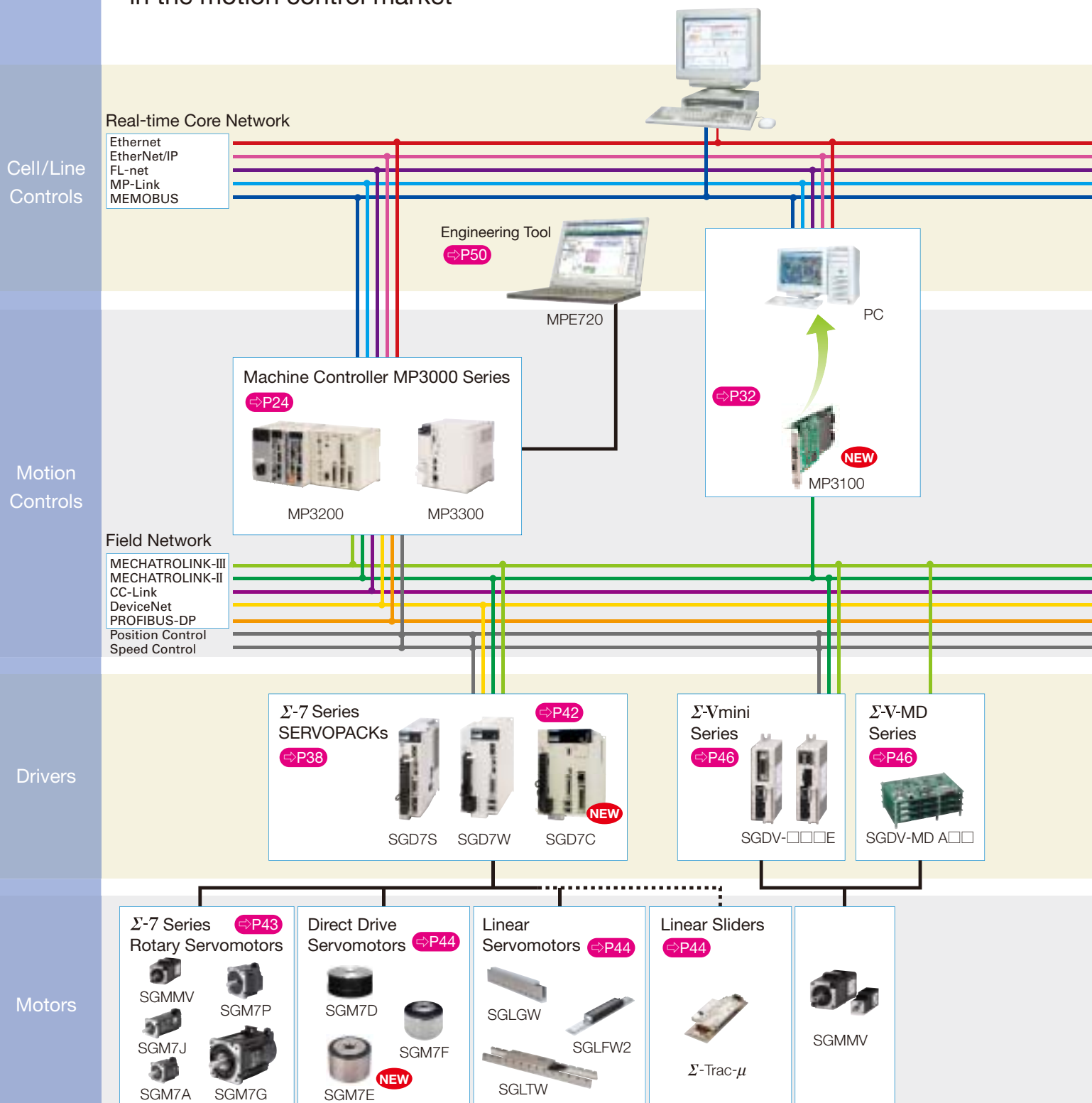● Machine tools

● Food/packing
● Transfer
● Textile

● Injection/molding
● Material processing
● Robots

The advantage of Yaskawa's mechatronics systems in the motion control market

Cell/Line Controls

Real-time Core Network

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

Engineering Tool
⇨P50

MPE720

⇨P32

PC

Motion Controls

Machine Controller MP3000 Series
⇨P24

MP3200   MP3300

NEW

MP3100

Field Network
- MECHATROLINK-III
- MECHATROLINK-II
- CC-Link
- DeviceNet
- PROFIBUS-DP
- Position Control
- Speed Control

Drivers

Σ-7 Series SERVOPACKs
⇨P38   ⇨P42

SGD7S   SGD7W   SGD7C
                        NEW

Σ-Vmini Series
⇨P46

SGDV-□□□E

Σ-V-MD Series
⇨P46

SGDV-MD A□□

Motors

Σ-7 Series Rotary Servomotors ⇨P43

SGMMV
SGM7P
SGM7J
SGM7A   SGM7G

Direct Drive Servomotors ⇨P44

SGM7D
SGM7F
SGM7E NEW

Linear Servomotors ⇨P44

SGLGW
SGLFW2
SGLTW

Linear Sliders ⇨P44

Σ-Trac-μ

SGMMV

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

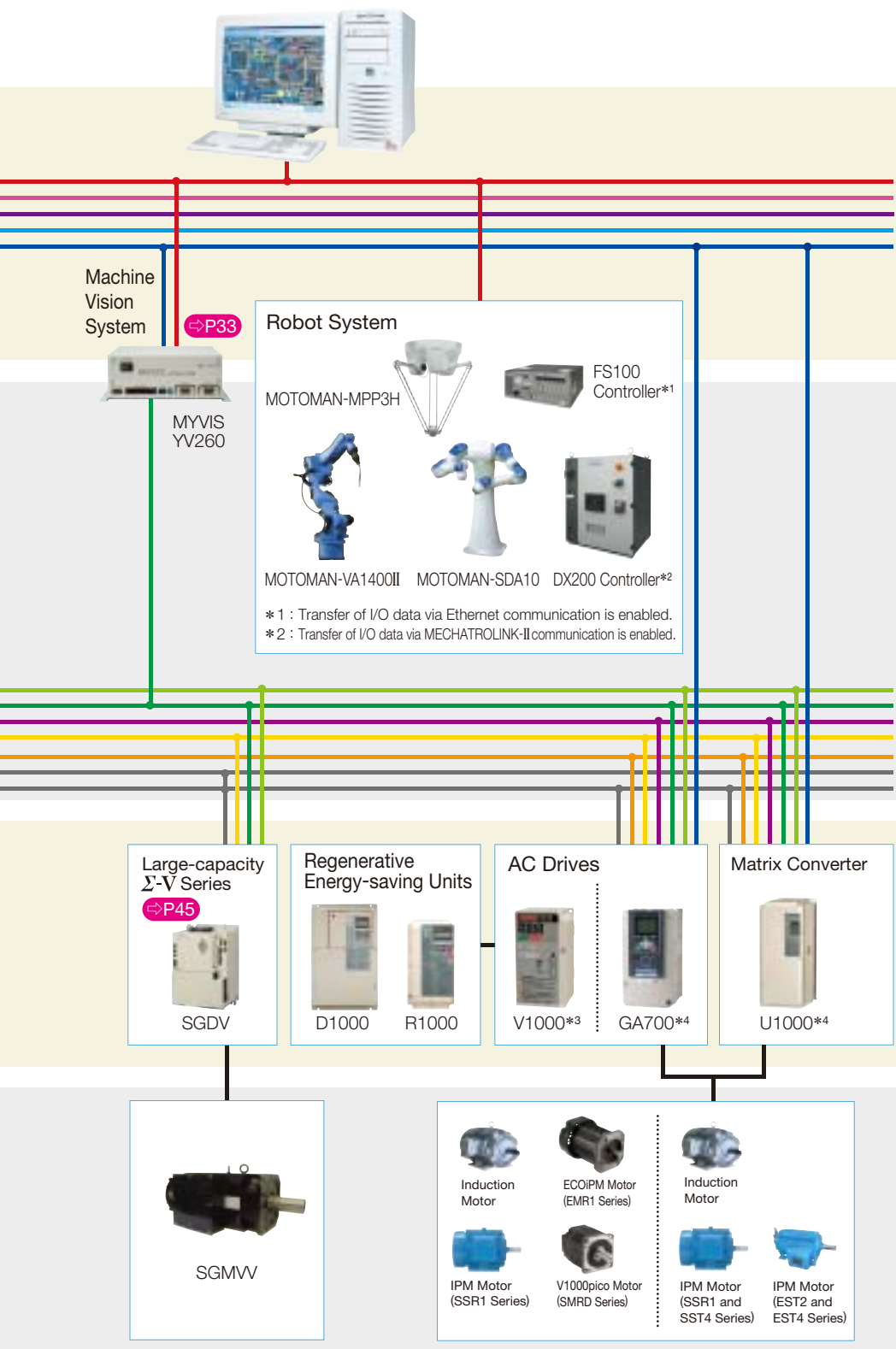## Support for industrial standard networks for open system architecture

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.
　Real-time core networks : Ethernet, MODBUS (MEMOBUS), FL-net, EtherNet / IP
　Field networks 　　　　　: MECHATROLINK-III, MECHATROLINK-II (Consult with Yaskawa for information on support for other networks.)

CONTENTS

Machine Vision System ⇨P33

MYVIS YV260

Robot System

MOTOMAN-MPP3H

FS100 Controller*1

MOTOMAN-VA1400Ⅱ   MOTOMAN-SDA10   DX200 Controller*2

∗1 : Transfer of I/O data via Ethernet communication is enabled.
∗2 : Transfer of I/O data via MECHATROLINK-Ⅱ communication is enabled.

Large-capacity Σ-V Series ⇨P45

Regenerative Energy-saving Units

AC Drives

Matrix Converter

SGDV

D1000   R1000

V1000*3   GA700*4

U1000*4

SGMVV

Induction Motor

ECOiPM Motor (EMR1 Series)

Induction Motor

IPM Motor (SSR1 Series)

V1000pico Motor (SMRD Series)

IPM Motor (SSR1 and SST4 Series)

IPM Motor (EST2 and EST4 Series)

∗3: Compatible with CompoNet and CANopen
∗4: Compatible with CANopen and LONWORKS

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 : 250μs and higher; transmission distance : 50 m max.
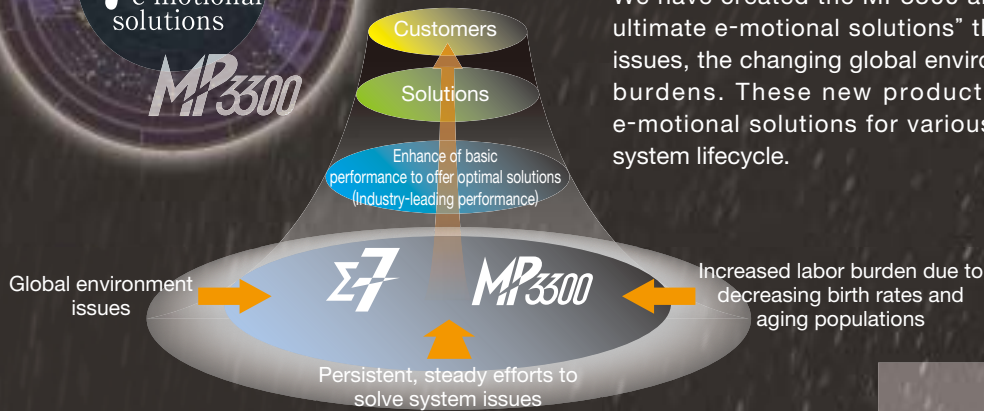   MECHATROLINK-Ⅲ : Transmission speed : 100 Mbps, Communication cycle : 125μs and higher; transmission distance : 75 m between stations
    Note: The communication specifications of MECHATROLINK differ depending on the specifications of the Machine Controllers,
        SERVOPACKs, and AC Drives used. For further details, check the communication specifications of each equipment.

MP3300 & Σ-7

7 ultimate e-motional solutions

MP3300

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.

Customers

Solutions

Enhance of basic performance to offer optimal solutions (Industry-leading performance)

Σ-7   MP3300

Global environment issues

Increased labor burden due to decreasing birth rates and aging populations

Persistent, steady efforts to solve system issues

Seven ultimate solutions

Selection
Developers and designers

Major advantages

Enables selection from wide variety of products.

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 **P10**
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 **P14**
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 ●MP3300 ●Rotary/Direct Drive/Linear Motors ●Partner's Products **P18** ●Optimize applications **P10** Σ-7-EX/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 **P19** ●Mounting compatibility **P19** ●Application compatibility **P19**

Design	Trial production	Production	Operation	Maintenance
Developers and designers	Developers and designers	Manufacturers	Operators	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 P10 ●Optimal functions for each application P10	●Vibration suppression P10			
●Self-configuration P12	●Multi-axis tuning P12 ●Tuning-less P12 ●Integrated tracing			●Traceability P17
●List of specifications			●Energy-saving functions P14 ●2-axis SERVOPACKs P14	
●Safety functions ●Supports SIL3 specification requirements			●Momentary power interruptions ●Temperature protection P15	
●Downloading of CAD data ●Self-configuration P12		●Build-To-Order service P16	●Visual identification of operating statuses P14 (Monitoring by controller)	●Traceability P17 ●Data logging ●Lifespan diagnostics P17

The superlative performance of our existing products has reached newer heights. System performance is given another lift by utilizing new solutions.
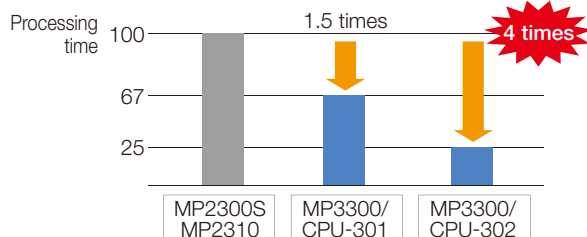
MP3300

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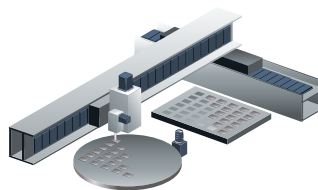★ MECHATROLINK-III provided as a standard feature

Fastest in the industry

Improved CPU performance*

Processing time

100
67
25

1.5 times
4 times

| MP2300S MP2310 | MP3300/ CPU-301 | MP3300/ CPU-302 |

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

Double-precision real-number, 64-bit integer data for higher precision

With double-precision real-number, 64-bit integer data, rounding errors during arithmetic calculations are reduced, and control at higher levels of precision can be achieved.

Σ-7S

★ 3.1 kHz response frequency
★ FT specifications to optimize applications (to be released)
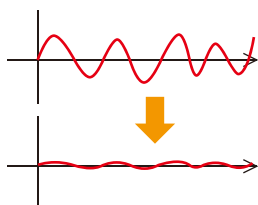★ Improved vibration suppression

Fastest in the world

Σ-7W

★ 2-axis SERVOPACKs (200 W x 2 axes to 1 kW x 2 axes)
★ 3.1 kHz response frequency
★ Improved vibration suppression

Fastest in the world

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

★ 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)

Smallest in the industry

Highest in the industry

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-V series
20 bits =
1 million pulses/rev (approx.)

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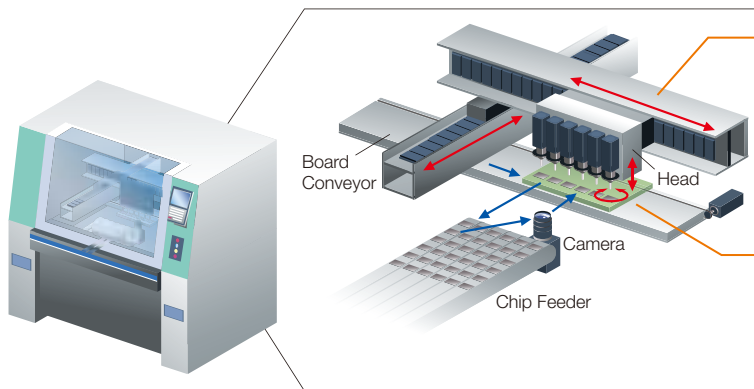16 million pulses/rev (approx.)

16 times higher!

Solution for 50-W or greater models

The superlative performance of our products and the broad spectrum of their functions will resolve whatever issues you may have.

Board Conveyor

Head

Camera

Chip Feeder

◎ 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.
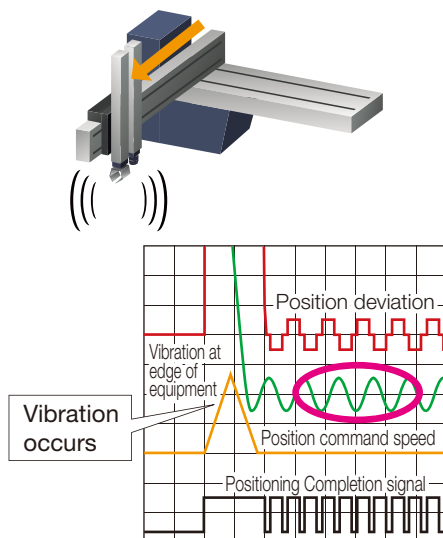
◎ Alignment Solutions

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.
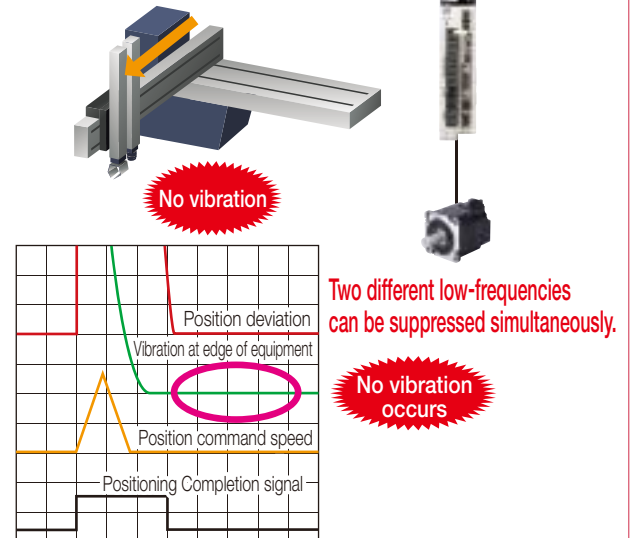
Problem

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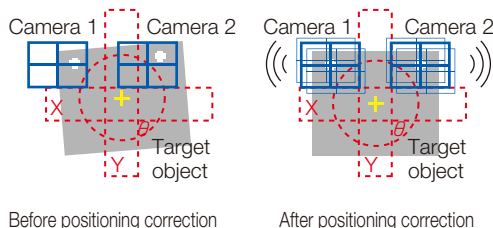
Vibration occurs

Position deviation

Vibration at edge of equipment

Position command speed

Positioning Completion signal

Solution

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

No vibration

Two different low-frequencies can be suppressed simultaneously.

No vibration occurs

Position deviation

Vibration at edge of equipment

Position command speed

Positioning Completion signal

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.

Camera 1　Camera 2　Camera 1　Camera 2

X

θ

Y

Target object

X

θ

Y

Target object

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.

Camera 1　Camera 2

X

θ

Y

Target object

Just the trick!

Vibration when stopped. ± 10nm level also possible.

Note: This will depend on the installation conditions.

Highest performance in the industry

◎ Σ-$7S$ SERVOPACKs
・3.1 kHz response frequency
・Improved vibration suppression

◎ Σ-7 Servomotors (High-resolution encoders)
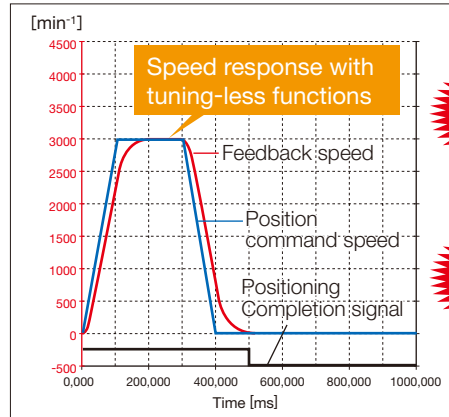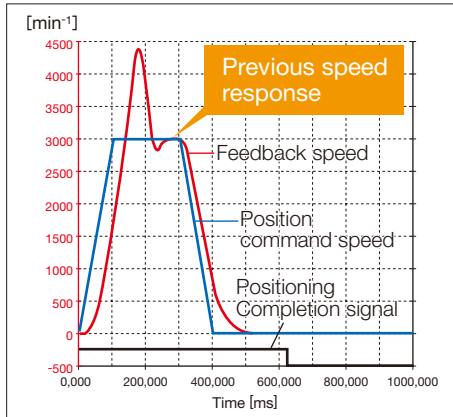24 bits = 16,777,216 pulses/rev.
For 20 mm lead ball screws
1.2 nm resolution

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:

[min^{-1}]

Previous speed response

Feedback speed

Position command speed

Positioning Completion signal

Time [ms]

[min^{-1}]

Speed response with tuning-less functions

Feedback speed

Position command speed

Positioning Completion signal

Time [ms]

Setup time reduced

Takt time reduced

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
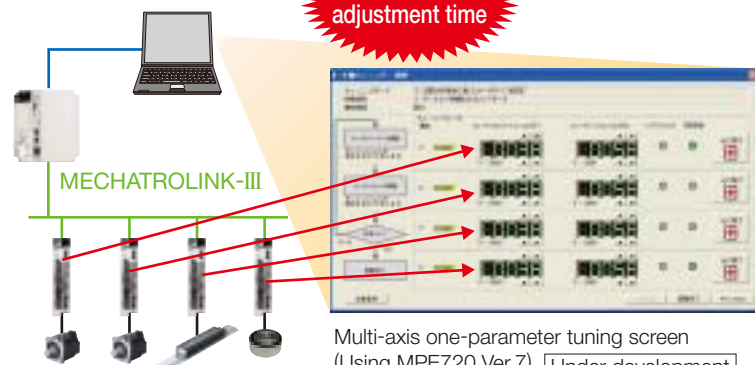

● Using the MPE720 support tool

Multi-axis tuning possible on one screen MP3300

Issue

It is difficult to set up and perform adjustments for units with many axes. We must connect a PC tool to the SERVOPACK and perform the adjustments for each individual axis, which means we are wasting a large amount of man-hours.

Solution

Instead of opening an adjustment screen for each axis, multi-axis tuning can be performed on one screen, which dramatically reduces the setup time.

Reduced servo adjustment time

MECHATROLINK-III

Multi-axis one-parameter tuning screen (Using MPE720 Ver.7) Under development

# Save time and reduce costs with Yaskawa's ideal motion control system MP3300

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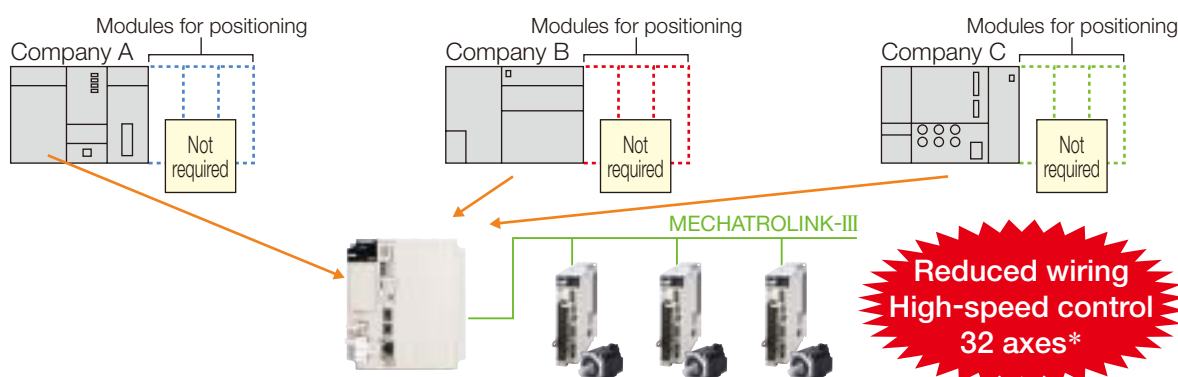
Positioning Systems that Use PLC

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

Modules for positioning
Company A

Modules for positioning
Company B

Modules for positioning
Company C
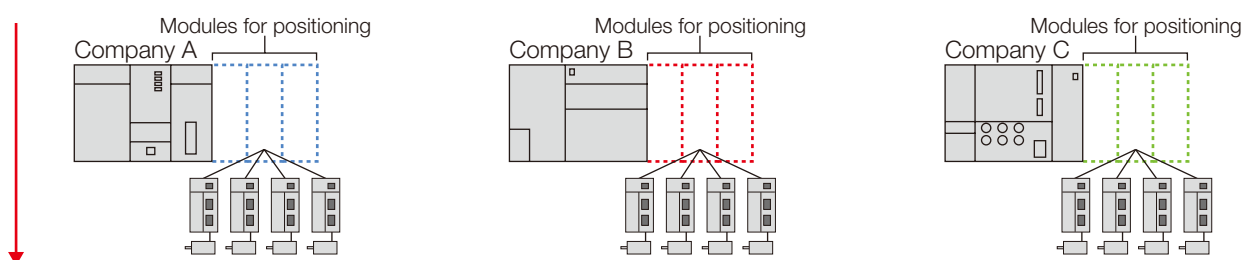
Positioning System with MP3300

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

Modules for positioning
Company A — Not required

Modules for positioning
Company B — Not required

Modules for positioning
Company C — Not required

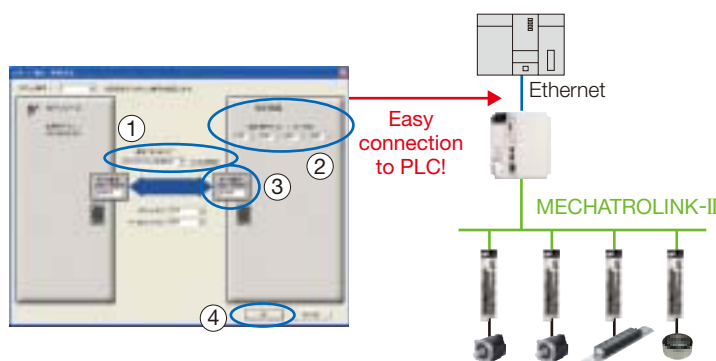MECHATROLINK-Ⅲ

**Reduced wiring
High-speed control
32 axes***

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

PLC connection with a simple setup and easy programming MP3300

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.

Ethernet

Easy
connection
to PLC!

MECHATROLINK-Ⅲ

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.

Satisfies specifications for use overseas and in harsh operating conditions [MP3300] [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℃*

∗ : Derating required.
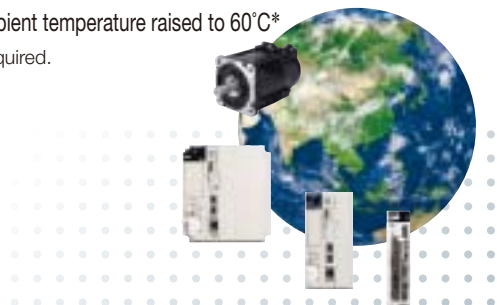
Waterproof protective structure [Σ-7] upgrade to IP67 rating

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

Protective Structure (IEC60034-5)

I P 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.
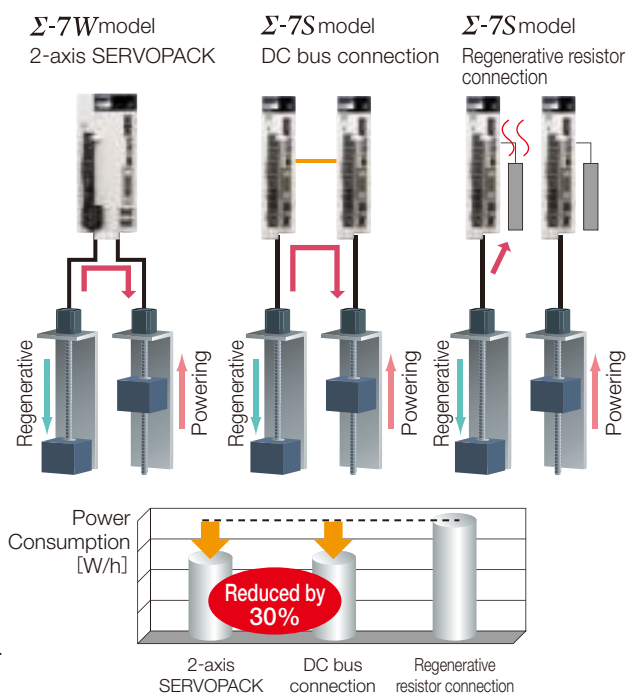
Saves energy with effective use of regenerative energy [Σ-7]

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.

Σ-7W model
2-axis SERVOPACK

Σ-7S model
DC bus connection

Σ-7S model
Regenerative resistor connection

Power Consumption [W/h]

Reduced by 30%

2-axis SERVOPACK | DC bus connection | Regenerative resistor connection

Supports energy conservation [MP3300] [Σ-7] with visual motion system

A power monitor for the motion system connected to the MP3300 is provided. This feature supports the monitoring of the power on a day-to-day basis and annual plans for reducing the level of power used.
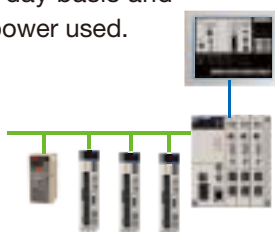
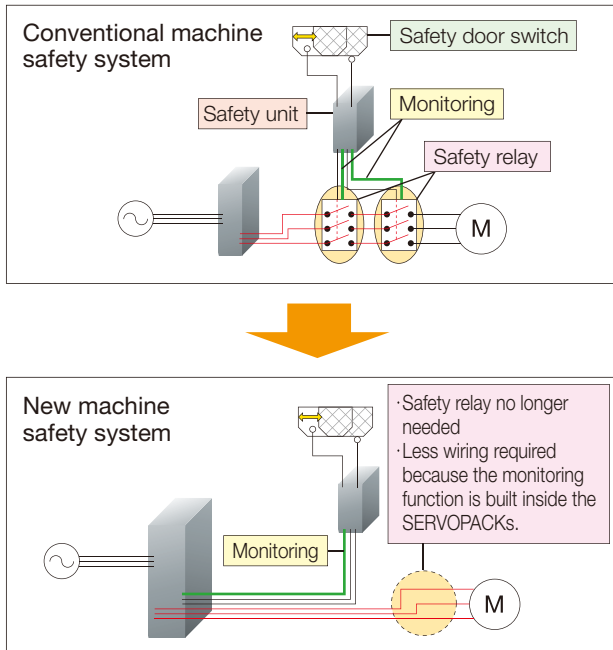Monitoring of the amount of energy used enabled

Monitoring display (image)

4 Safety and security

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

e-motional solution

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

Conventional machine safety system
- Safety door switch
- Safety unit
- Monitoring
- Safety relay
- M

New machine safety system
·Safety relay no longer needed
·Less wiring required because the monitoring function is built inside the SERVOPACKs.
- Monitoring
- M

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.

Built-in temperature sensor

Protection from abnormal temperatures

Temperature monitoring display (image)

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.

15

Yaskawa supports our customers in all their decisions, from product selection to production maintenance, and offers solutions that are always 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.

MP3300 Σ-7

Selection	Design	Trial Production	Production	Operation	Maintenance

SigmaSize+	SigmaWin+					SigmaTouch!	Cloud Service
Electrical machinery products and capacity selection	Design information	Parameter settings	Monitoring	Test operation	Servo adjustments	Service life diagnosis	Troubleshooting	Production maintenance and control

MechatroCloud

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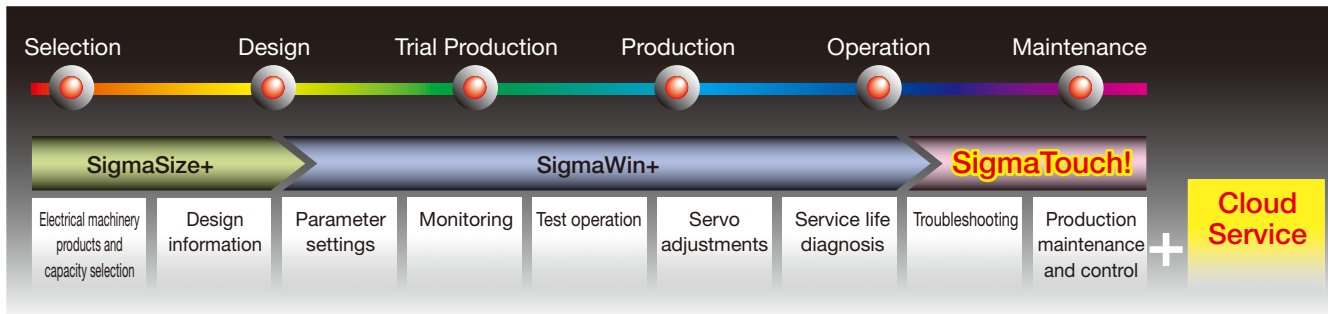
MechatroCloud is a new cloud service provided by the Yaskawa Electric.

MechatroCloud is available in Japan only.
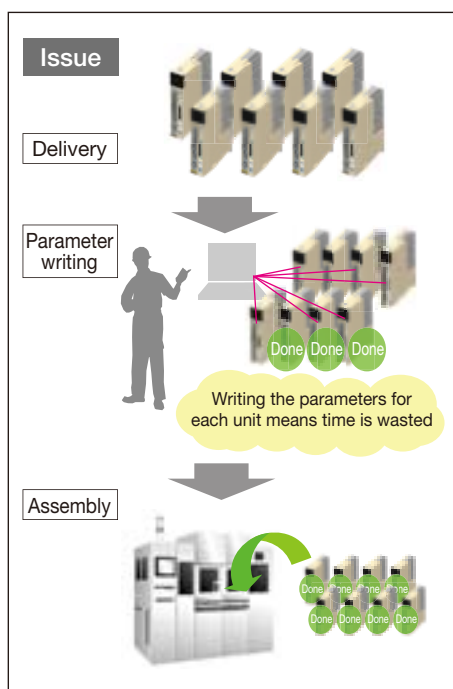✻See page 20 for the details on MechatroCloud.

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.

Issue

Delivery

Parameter writing

Done Done Done

Writing the parameters for each unit means time is wasted

Assembly

Done Done Done Done
Done Done Done Done

Solution

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

Done Done Done Done
Done Done Done Done

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

No need to write the parameters

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.

Done Done Done Done
Done Done Done Done

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.
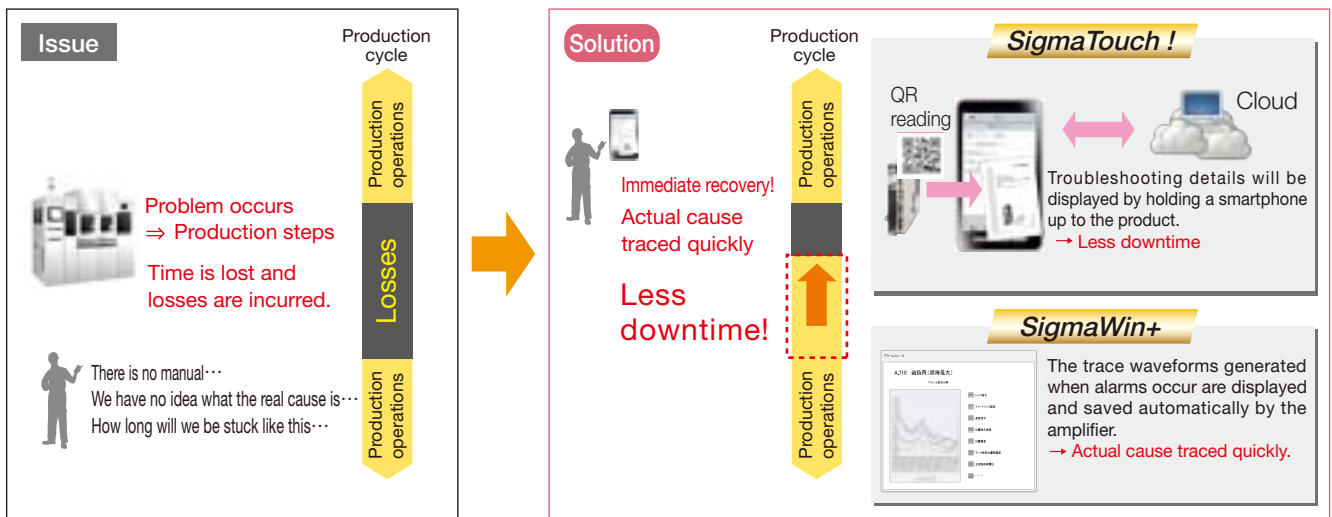· MechatroCloud can also be used with SigmaWin+.

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.

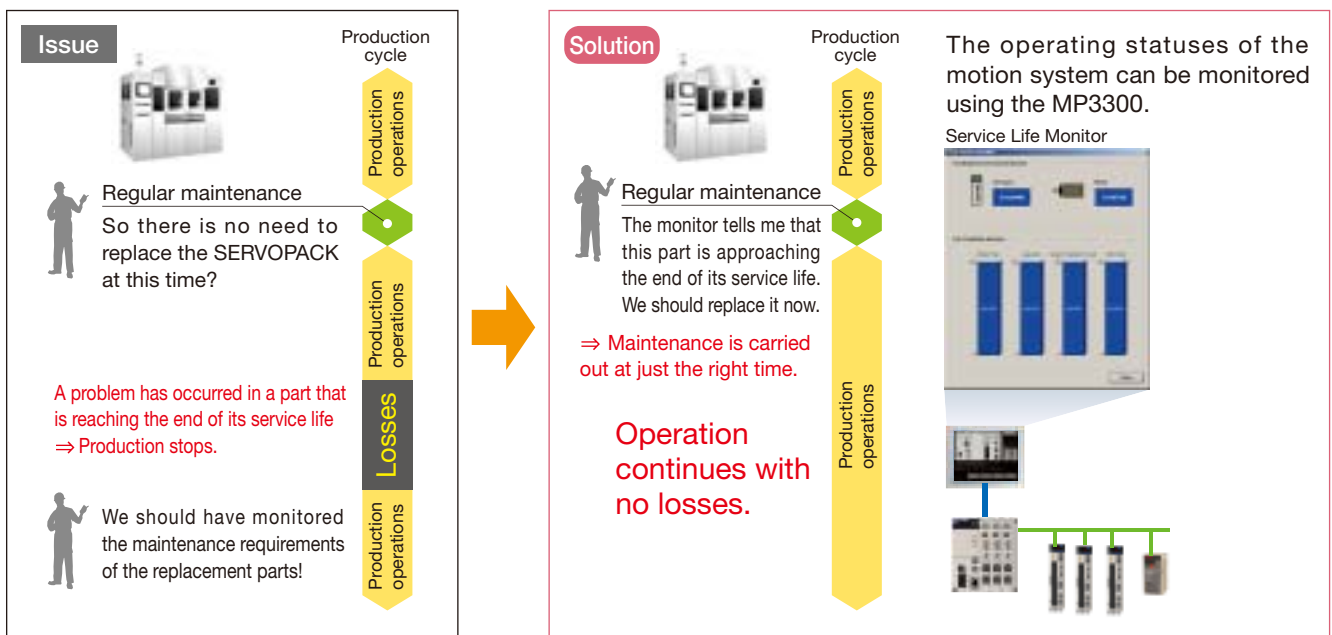Note: QR code is a registered trademark of Denso Wave Incorporated.

Read QR code with a smartphone

Industry first cloud-based service

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.
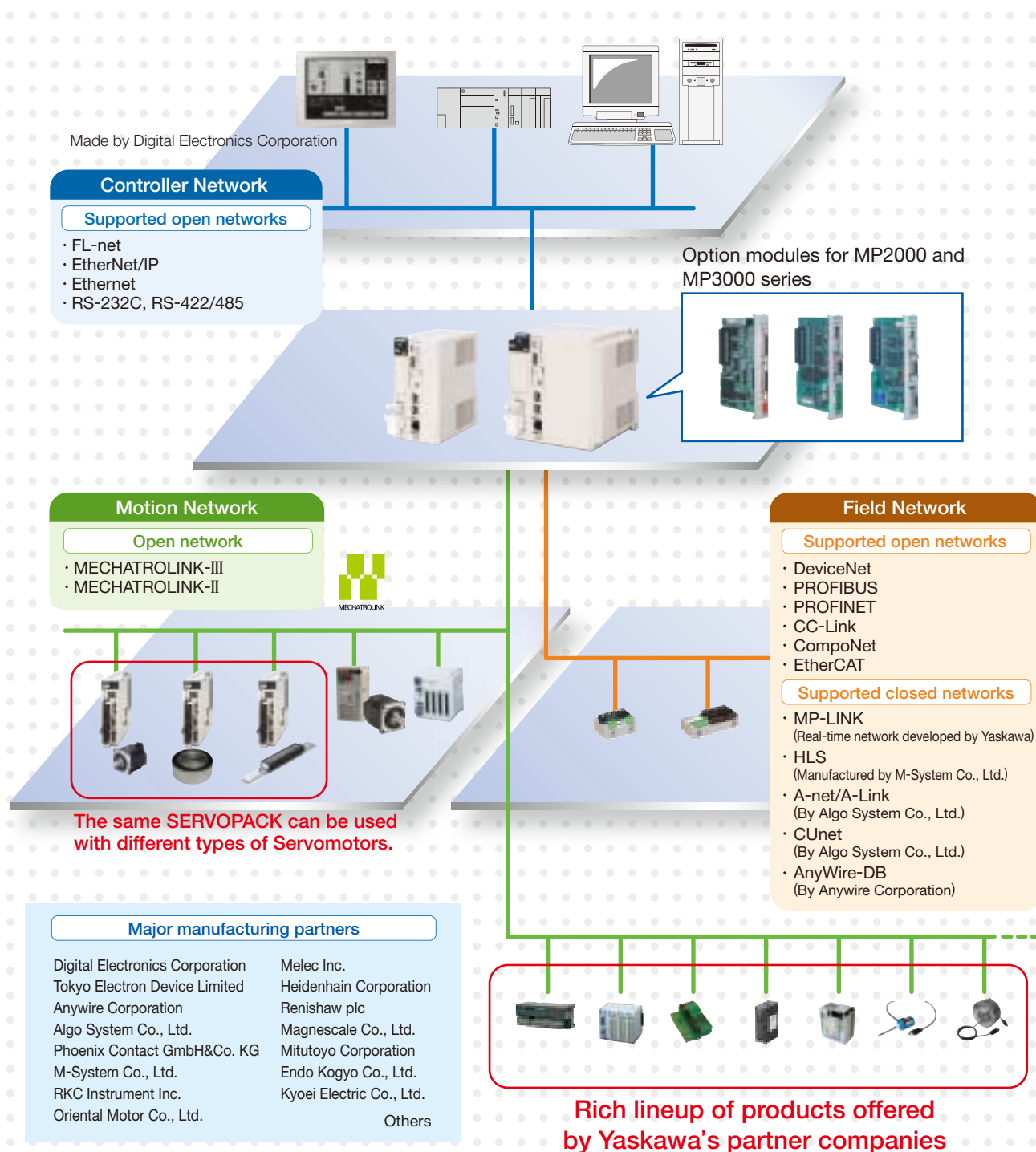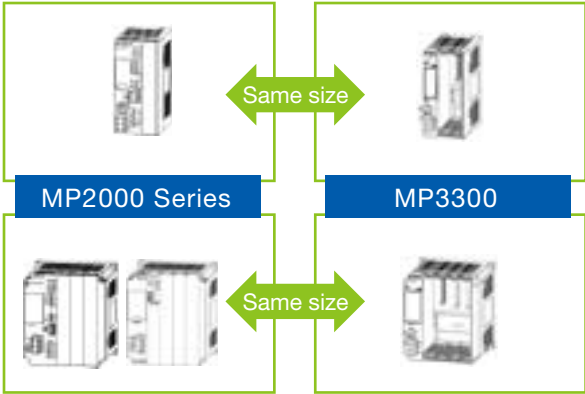
Issue

Production cycle

Production operations

Losses

Production operations

Problem occurs
⇒ Production steps

Time is lost and losses are incurred.

There is no manual···
We have no idea what the real cause is···
How long will we be stuck like this···

Solution

Production cycle

Production operations

Production operations

Immediate recovery!
Actual cause traced quickly

Less downtime!

SigmaTouch !

QR reading   Cloud

Troubleshooting details will be displayed by holding a smartphone up to the product.
→ Less downtime

SigmaWin+

The trace waveforms generated when alarms occur are displayed and saved automatically by the amplifier.
→ Actual cause traced quickly.

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.

Issue

Production cycle

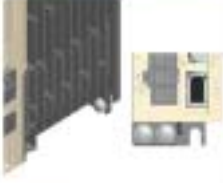Production operations

Production operations

Losses

Production operations

Regular maintenance
So there is no need to replace the SERVOPACK at this time?

A problem has occurred in a part that is reaching the end of its service life
⇒ Production stops.

We should have monitored the maintenance requirements of the replacement parts!

Solution

Production cycle

Production operations

Production operations

Regular maintenance
The monitor tells me that this part is approaching the end of its service life. We should replace it now.

⇒ Maintenance is carried out at just the right time.

Operation continues with no losses.

The operating statuses of the motion system can be monitored using the MP3300.

Service Life Monitor

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.

Made by Digital Electronics Corporation

Controller Network

Supported open networks

· FL-net
· EtherNet/IP
· Ethernet
· RS-232C, RS-422/485

Option modules for MP2000 and MP3000 series

Motion Network

Open network

· MECHATROLINK-III
· MECHATROLINK-II

MECHATROLINK

The same SERVOPACK can be used with different types of Servomotors.

Field Network

Supported open networks

· DeviceNet
· PROFIBUS
· PROFINET
· CC-Link
· CompoNet
· EtherCAT

Supported closed networks

· MP-LINK
  (Real-time network developed by Yaskawa)
· HLS
  (Manufactured by M-System Co., Ltd.)
· A-net/A-Link
  (By Algo System Co., Ltd.)
· CUnet
  (By Algo System Co., Ltd.)
· AnyWire-DB
  (By Anywire Corporation)

Major manufacturing partners

Digital Electronics Corporation
Tokyo Electron Device Limited
Anywire Corporation
Algo System Co., Ltd.
Phoenix Contact GmbH&Co. KG
M-System Co., Ltd.
RKC Instrument Inc.
Oriental Motor Co., Ltd.

Melec Inc.
Heidenhain Corporation
Renishaw plc
Magnescale Co., Ltd.
Mitutoyo Corporation
Endo Kogyo Co., Ltd.
Kyoei Electric Co., Ltd.
Others

Rich lineup of products offered by Yaskawa's partner companies

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.

	External sizes and installation	Parameters and applications
Machine Controller	Compatible with MP2000 series Same size **MP2000 Series** — **MP3300** Same size	Program applications for the MP2000 series can be converted and used with the MP3300. Modified MP2000 applications — MP3000 applications
SERVOPACK	Installation interchangeability 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	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. SigmaWin+
Servomotor	The Σ-7 SERVOPACKs are compatible with models of the same capacity in the Σ-V series SERVOPACKs. Σ-V — Σ-7 200 W □60 mm — 200 W □60 mm	

MechatroCloud is available in Japan only.

MechatroCloud is a cloud service offered by the Motion Control Division of Yaskawa Electric. With this service, it is now easier and more convenient to use Yaskawa's motion control products. A wide range of services are now available through Yaskawa's website, smartphone applications, and QR codes.

Note: "QR code" is a registered trademark of DENSO WAVE, Inc.

Troubleshooting
SigmaTouch! smartphone application

MechatroCloud

Product Management
Cloud server

BTO Service
Website

BTO Service
You can order customized SERVOPACKs from the website!

Σ-7

Use BTO for free!

Parameter settings can be customized for your equipment when ordering!

With the ready-to-use parameter settings, you can reduce the time required to assemble your equipment.

See page 16 for an example of how BTO can be used.

Example of Nameplate

Model : SGD7S-R70A20A000000B
The last digit (14th) is "B".

BTO No. : ← Indicates BTO products with customized specifications.

012345-000001
Company code   Serial number

Text (equipment name, etc.) : XX inspection equipment
Text (axis name, etc.)   : Transfer axis A

Text can be added here.

In the BTO (build to order) service available from Yaskawa, parameters for SERVOPACKs are set to the values specified by customers when placing orders. Customers can order customized SERVOPACKs by simply registering parameter specifications on the website. If customers must assemble multiple pieces of the same equipment and/or different equipment on site at one time, they can eliminate the time to write over parameters by simply ordering SERVOPACKs with customized parameters through the BTO service.

Note: To use MechatroCloud service, you must register your name under the corporate membership of the e-mechatronics website, the Yaskawa Electric website for product and technical information.

Standard product   Parameter file specified by customer*   BTO product

.USRS

Parameter values are set to customer specifications.

Text, such as "Axis name", can be printed on the nameplate.

✱ : Use a parameter file for version 5.71 or later versions of SigmaWin+.

MechatroCloud Introduction Videos – Now on YouTube

Use the standard bar code reader on your smartphone to read these codes and view videos on YouTube.

"YouTube" is a trademark or a registered trademark of Google Inc.

BTO service

SigmaTouch!

Easy troubleshooting with SigmaTouch!
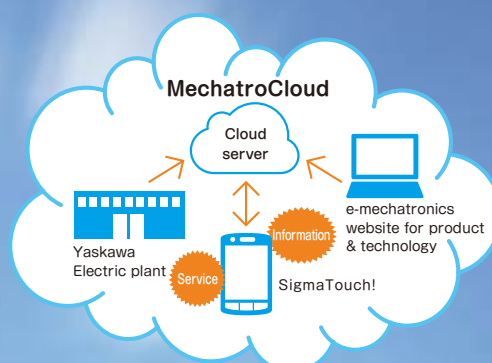## Anytime, Anywhere

MP 3300 **Σ-7**

MechatroCloud

Cloud server

Yaskawa Electric plant

Information

Service

SigmaTouch!

e-mechatronics website for product & technology

Use SigmaTouch! for **free!**

Innovative service that links users to cloud data!

Simply read the QR code!

Easily search for product information using SigmaTouch!

See page 17 for examples of how SigmaTouch! can be used.

SigmaTouch! can be downloaded from Google Play Store, the contents distribution service for Android.
"Android" and "Google Play " are trademarks or registered trademarks of Google Inc.

"SigmaTouch!" is a smartphone application for MechatroCloud. Product information, such as manufacturing information and parameter lists, can be viewed by simply reading the QR codes of Yaskawa Electric's products with a smartphone camera. Alarm details and troubleshooting information can also be viewed on the smartphone, which can greatly reduce recovery time.

Note: The QR codes can be read with Android OS 4.0.3 or later versions. The Android must be connected to the network to use this service.

QR code

SigmaTouch!

Product manuals

Inquiries

Alarm list

Parameter list

etc.

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

MP3000 Series

Modular 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.

Unit Connection Type

Machine Controller
MP3200

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

Board Type

Machine Controller
MP3100

NEW

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.

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

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.

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.

Ultimate environmental performance

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

Ultimate safety and security

Security measures have been enhanced to prevent the outflow of know-how. In addition, temperature sensors installed in the MP3300 enable early identification of abnormal temperatures in the system.

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.

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.
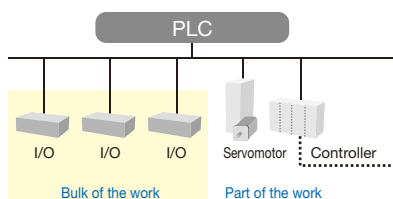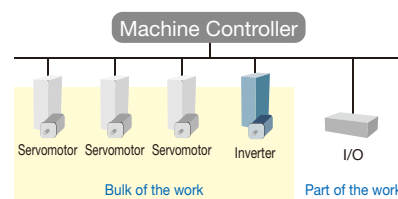
Ultimate compatibility

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

Machine Controller and PLC (Programmable Logic Controller) : How do They Differ ?

PLC

I/O   I/O   I/O   Servomotor : Controller

Bulk of the work   Part of the work

Machine Controller   MP3000 Series

Servomotor Servomotor Servomotor   Inverter   I/O

Bulk of the work   Part of the work

◎ Excellent at controlling I/O.
◎ Focuses more on connectability to various I/O devices than axes synchronization.
◎ Most are modules.

◎ Ideal for controlling machines and devices.
◎ Focuses on precise synchronous and high-speed control on multiple motors.
◎ The optimal controller models can be selected based on the device requirements.

Four all-in-one control modes

Every aspect of control from simple to complex operations can be achieved using one CPU without adding optional modules for each kind of control.

Synchronous Phase Control

Speed control with position compensation (electronic shaft) or position control with 100% speed feed forward (electronic cam). Multi-axis servomotors can be controlled synchronously.
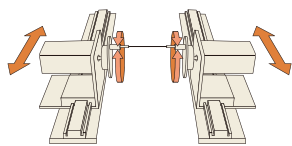
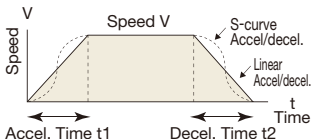0.3 mm dia. mechanical pencil lead does not break.

Torque Control

Generates a constant torque, regardless of speed.

Torque   When T1=T2

T1
Load Torque   Time
T2
Motor Speed   Time
Speed   Time
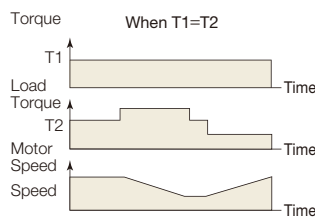
Position Control

Advances to the target position, and stops or holds.

V
Speed   Speed V   S-curve Accel/decel.
                                Linear Accel/decel.
                                t
                                Time
Accel. Time t1   Decel. Time t2
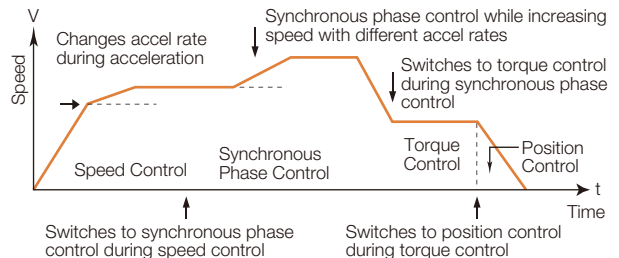
Speed Control

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

V
Speed   Speed at Movement V
                                t
   Time
Accel. Time t1   Decel. Time t2
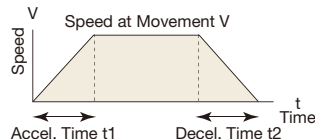
Switch between any of the modes while online

The MP3000 series can switch between these four modes while online.

V
Speed   Changes accel rate during acceleration   Synchronous phase control while increasing speed with different accel rates

Switches to torque control during synchronous phase control

Speed Control   Synchronous Phase Control   Torque Control   Position Control

t
Time

Switches to synchronous phase control during speed control   Switches to position control during torque control

● Packaging machines

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

Rotation by position control

Synchronous control according to the workpiece speed
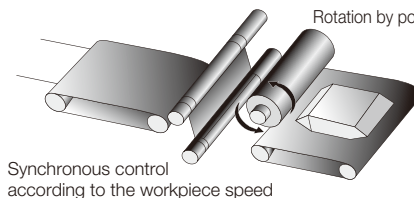
● Injection molding machines

Switching from position control to torque control can be executed without deceleration.

Ejection motor

Injection motor

Plasticizing motor
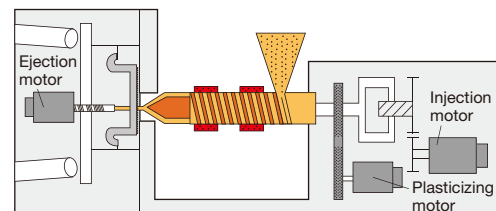
Injection (torque control)   Integration with nozzle (position control)

Return operation (positioning)

The MP3000 Series Brings a Cornucopia of Solutions

■Gantry Mechanism and Alignment Stage Mechanism

These mechanisms comprise the basic system used in devices for the manufacturing and the inspection of semi-conductor chips, LCDs, and other components. High precision as well as high acceleration and deceleration are required for these processes. Two axes must be synchronized to control and operate the gantry mechanism.

Advantage Achieves complete synchronous multi-axis control and online adjustment.

■Solution for Conveyance

Provides a solution for the control mechanism that allows workpieces to be processed in accordance with the speed of the production line.

Advantage Allows the slave axes to follow master axis operation when the inverter is used as the master axis and both the inverter and servo drives are connected through a network.

■Solution for Winder

Provides a solution for the control mechanism where a winder winds and a feeder unwinds.

Advantage Achieves high-precision winding, feeding, dancer control, and tension control with standard servo drives and inverters. Line control can be constructed easily with user functions set in advance.

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.
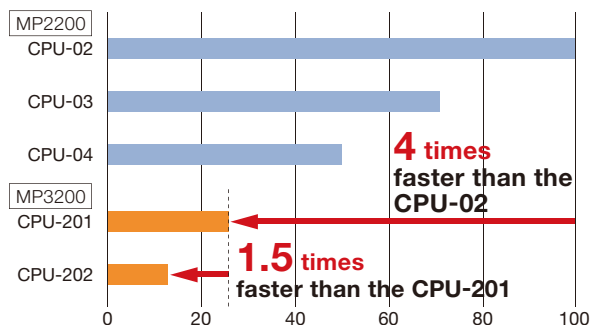
[Catalog No. KAEPC88072502]

Takt times improved by ultra-high-performance CPU

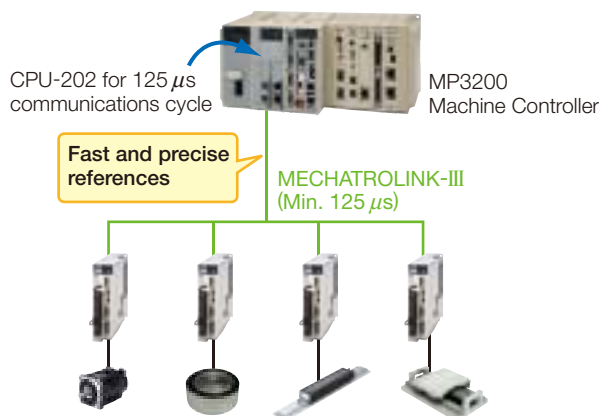◎ Fastest application processing in the industry: 4-axis, 125 μs

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

MP2200
CPU-02
CPU-03
CPU-04

MP3200
CPU-201
CPU-202

4 times faster than the CPU-02

1.5 times faster than the CPU-201

0   20   40   60   80   100
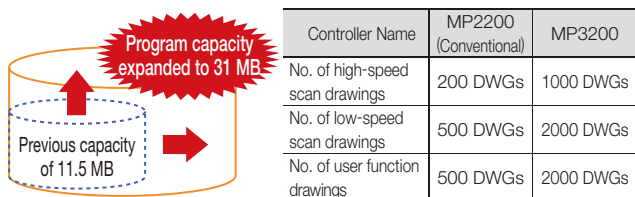
◎ MECHATROLINK-III: 125 μs communications cycle

Revolutionize machine accuracy and tracking control precision by combining the CPU-202 module for 125μs communications cycle and the Σ-7 SERVOPACKs.

CPU-202 for 125 μs communications cycle

MP3200 Machine Controller

Fast and precise references

MECHATROLINK-III (Min. 125 μs)
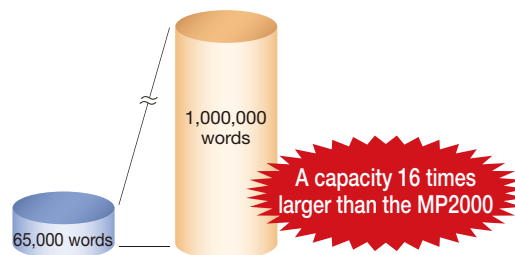
Varied applications by expanding program capacity

◎ Application program capacity: 31 MB

The program capacity has been dramatically expanded to 31 MB (over the previous capacity of 11.5 MB) to support large-scale control systems. The number of application drawings has also been increased significantly to support many different kinds of applications.

Program capacity expanded to 31 MB

Previous capacity of 11.5 MB

Controller Name	MP2200 (Conventional)	MP3200
No. of high-speed scan drawings	200 DWGs	1000 DWGs
No. of low-speed scan drawings	500 DWGs	2000 DWGs
No. of user function drawings	500 DWGs	2000 DWGs

◎ New memory area increases the speed of applications

G register: New capacity of 2 M words

A new G register, a general-purpose register (with no battery backup) has been added, making it possible to process even complex applications at higher speeds.

Previous general-purpose register

G register (with no battery backup)

Higher speeds

FAST

◎ M register capacity: 1 M words

The capacity of the M register (general-purpose register with backup capability) has been greatly expanded for use with system recipes in diversified small-quantity production.
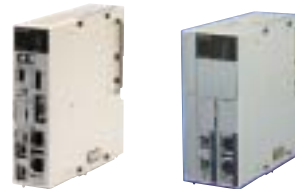
1,000,000 words

A capacity 16 times larger than the MP2000

65,000 words

CPU Unit (CPU-201/202)

Item		Specifications	
		CPU-201	CPU-202
Performance	Communications cycle	250μs to 32.0 ms	125μs to 32.0 ms
	Minimum scan time setting	0.125 ms	
No. of axes controlled	Built-in CPU	32 axes (MECHATROLINK-III)	
	Virtual	32 axes	
	Maximum	256 axes	
Communication interface	Ethernet	10BASE-T/100BASE-TX port × 2 (hub)	
Memory	Program capacity	32 MB	

Enhanced Usability and Traceability

◎ USB memory interface provided as a standard feature.
◎ Maintainability and traceability improved by the incorporation of the FTP server/client function and logging function.

Flexible System Construction

◎ MECHATROLINK-Ⅲ and Ethernet provided as standard features.
◎ All MP2000 series optional modules* supported.
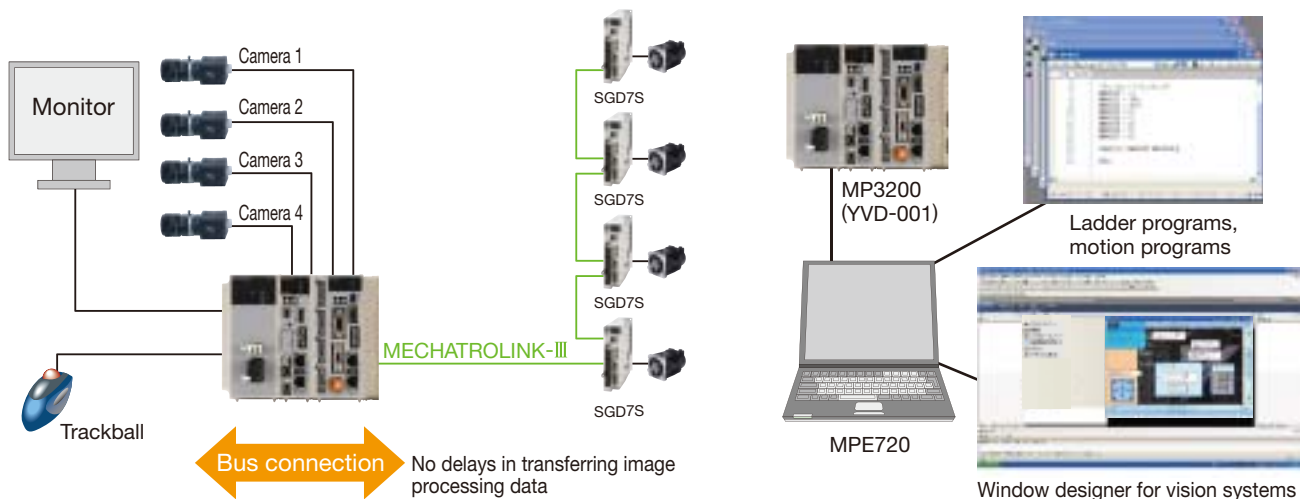✻: See "Optional Modules" on page 31.

Integration of Motion and Vision Systems

◎ Processing with zero delays
The CPU Unit and Vision Unit are connected using a high-speed bus (an industry first), 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.

◎ All image processing executed using combinations of the basic 4 vision commands.
◎ Development of motion-vision system using MPE720.
◎ Easy customization of vision systems with window designer.

Monitor

Camera 1
Camera 2
Camera 3
Camera 4

SGD7S
SGD7S
SGD7S
SGD7S

MECHATROLINK-Ⅲ

Trackball

Bus connection No delays in transferring image processing data

MP3200
(YVD-001)

MPE720

Ladder programs, motion programs

Window designer for vision systems

Vision Unit (YVD-001)

Item		Specifications
Performance	Rate of improved operation	Double*1
Image processing	Blob analysis	Feature extraction and measurement using binary images
	Template matching	Normalized correlation pattern matching
Image input	Camera interface	Mini Camera Link (PoCL) × 4
	No. of pixels	640 × 480 to 2440 × 2048 (5 megapixels)
Monitor output	Monitor interface	VGA 15-pin D-sub connector
	Display colors	Graphics: 64 colors, Images: 256 gray levels
Operating interface	Trackball	USB mouse interface
Communication interface	Ethernet	100BASE-TX port × 2 (hub)
Memory	Image capture memory	64 MB
	Image analysis memory	32 MB
	Image display memory	64 MB
	External memory	USB memory (2 GB) of CPU unit
I/O	Trigger input	4 points
	Flashlight output	4 points
Programming methods	Image processing programs	Programming at CPU side (ladder language, motion language)
	User window creation	Programming-free (using MPE720 window designer*2 for vision systems)

✻1 : Compared with the MYVIS YV260
✻2 : Under development

27

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.
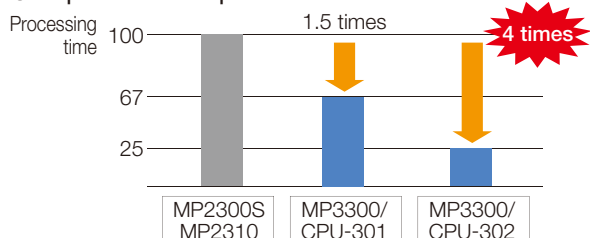
[Catalog No. KAEPC88072503]

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*

Processing time

1.5 times
4 times

100
67
25

| MP2300S MP2310 | MP3300/ CPU-301 | MP3300/ CPU-302 |

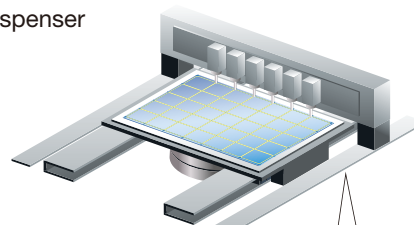＊: Ladder operation speed where the scan time of the MP2300S/MP2310=100

◎ Double-precision real-number, 64-bit integer data for higher precision

Dicer

With double-precision real-number, 64-bit integer data, rounding errors during arithmetic calculations are reduced, and control at higher levels of precision can be achieved.

◎ **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.

Positioning Command

time
Communication Cycle

Positioning Command

time
Communication Cycle

◎ Expanded program capacity

・ Application program capacity

31 MB

15 MB
11.5 MB
7.5 MB
5.5 MB

| MP2300S | MP2310 | MP3300/ CPU-301 CPU-302 (16 axes) | MP3300/ CPU-301 CPU-302 (32 axes) |

・ Number of drawings

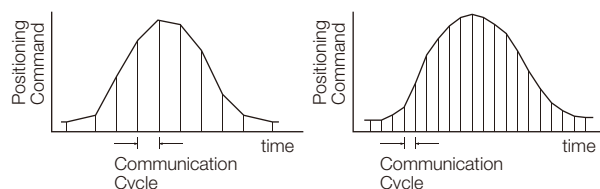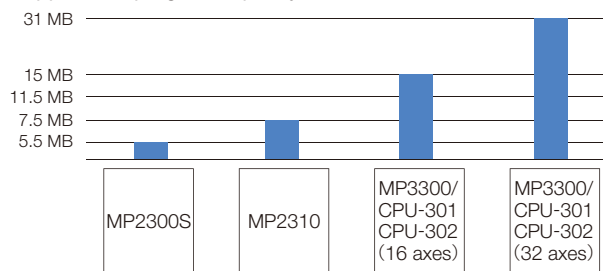| Number of drawings	MP2000 series	MP3300/CPU-301/CPU-302
For high-speed scan	200 drawings	1000 drawings
For low-speed scan	500 drawings	2000 drawings
For user function	500 drawings	2000 drawings

Dispenser

Controlling the path performance in the corner areas is an issue. However, implementing path control with a higher level of precision enhances dispensing quality.
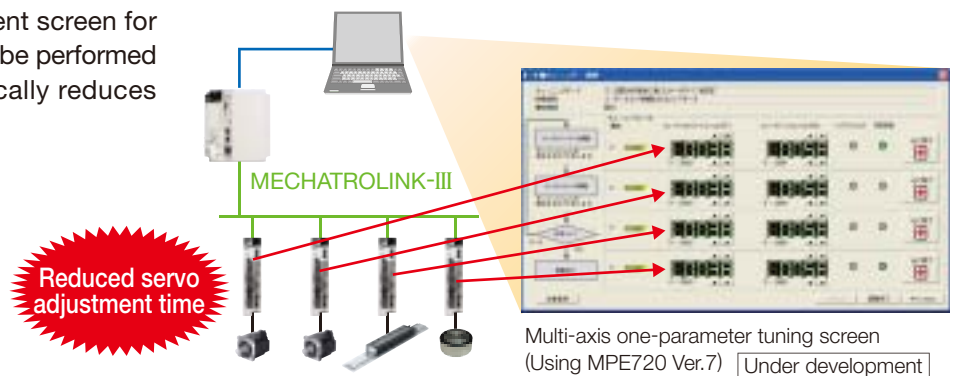
CPU module (CPU-301/302)

Item	Specifications
Model (Abbreviation)	JAPMC-CP3301-1-E [CPU-301(16 axes)]
	JAPMC-CP3301-2-E [CPU-301(32 axes)]
	JAPMC-CP3302-1-E [CPU-302(16 axes)]*
	JAPMC-CP3302-2-E [CPU-302(32 axes)]*
High-speed scan time setting	Min. 250 μs (CPU-301) Min. 125 μs (CPU-302)
Flash memory	16 axes: 24 MB (User memory 15 MB) 32 axes: 40 MB (User memory 31 MB)
SRAM	16 axes: 4 MB, 32 axes: 8 MB
DRAM	256 MB
MECHATROLINK	・ MECHATROLINK-Ⅲ × 2 ports ・ Master function
Ethernet	10BASE-T/100BASE-TX × 1 port
Calendar	Seconds, minutes, hour, day, week, month, year, day of week, and timing (battery backup)
USB	・ USB 2.0 Type-A host × 1 port ・ Compatible devices: USB storage

＊: CPU-302 Module uses 2 slots, CPU Slot and Option Slot 1 for the Base Unit.

Better usability

Instead of opening an adjustment screen for each axis, multi-axis tuning can be performed on one screen, which dramatically reduces the setup time.

MECHATROLINK-Ⅲ

Reduced servo adjustment time

Multi-axis one-parameter tuning screen
(Using MPE720 Ver.7) Under development

Enhanced maintainability

A storage USB port is provided on the CPU Unit as a standard option, which makes it easy to update the version of the equipment, back up data, and import and export large-volume data. A data logging function also allows the system's operation statuses to be saved in the internal RAM or on a USB memory device. The logging data can be easily accessed from remote host systems. 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.

Loading/Saving of programs 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.

Loading of programs and data

Saving of programs and data
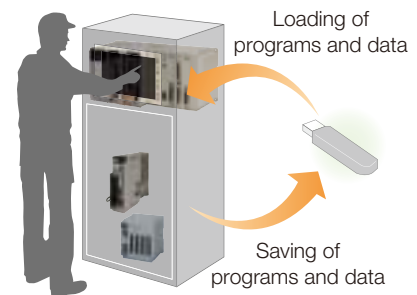
Data logging

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.

Position error
Axis 1 Axis 2
Upper limit
0
Time
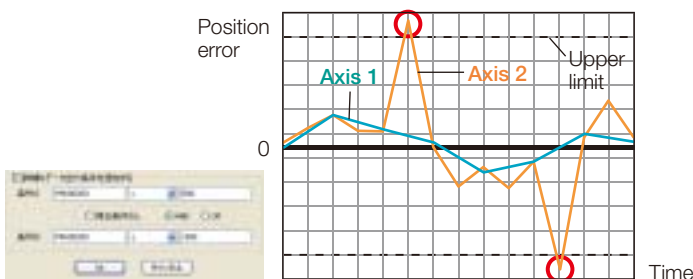
File transferring

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.

Logging files
File transfer function
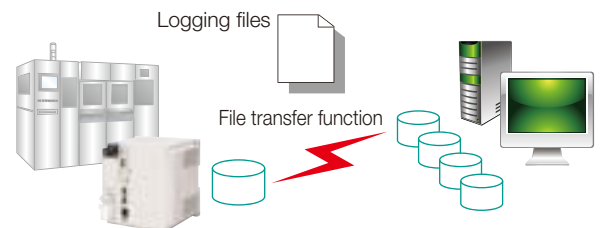
Complete upper compatibility with the MP2000 series

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, and enhances system performance and functions.

Specification Comparison of MP3200 and MP3300

Items	MP3300 CPU-301 (16 axes) CPU-302 (16 axes)	MP3300 CPU-301 (32 axes) CPU-302 (32 axes)	MP3200 CPU-201	MP3200 CPU-202	Remarks
Performance comparison of CPU Module*1	CPU-301: 1.5 CPU-302: 4.0	CPU-301: 1.5 CPU-302: 4.0	4.0	6.0	*1: When compared to MP2310 and MP2200/CPU-02
Number of slots (on main rack)	1/3/8		3/5/8		
Rack expansion	Possible				
Multi-CPU configuration	Not possible		Possible*2		*2: Up to 5 modules, including the main CPU module
Ethernet	100Base-TX ×1 port		100Base-TX × 2 ports (HUB)*3		*3: Built-in HUB function
USB I/F	Provided (for storage device)				
MECHATROLINK I/F	Provided (CPU-301 250 µs, CPU-302 125 µs*4)		Provided (250 µs*4)	Provided (125 µs*4)	*4: Minimum communications cycle
Number of controlled axes — SVC	16 axes		32 axes		
Number of controlled axes — SVR	16 axes		32 axes		
Number of controlled axes — Maximum number of controlled axes	256 axes (when SVB-01 or SVC-01 optional modules are used, or when racks are expanded)				
Program memory capacity — Data tracing	256 K words		1 M words		Battery backup
Program memory capacity — Table data	1 MB		3 MB		
Program memory capacity — M registers	1 M words				
Program memory capacity — User memory	15 MB		31 MB		
Optional modules	All MP2000 series optional modules available				
MotomanSync-MP	Ethernet connection		Ethernet MP3000 bus 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				
Basic functions — Register types	S/M/G/I/O/C/D/#				
Basic functions — Data types	B/W/L/Q/F/D/A				
Basic functions — Index registers	Subscripts I /J, and array registers				
Basic functions — Register capacity	M registers: 1 M words, G registers: 2 M words				
Motion control functions — Slave functions	Supported				
Motion control functions — Slave CPU synchronization	Supported				
Communications functions — Automatic reception	Supported (Maximum number of automatic reception connections: 10)				
Communications functions — File transfer functions	Supported (FTP server/client)				
Data tracing functions — Number of groups	1, 2, 4 (selectable)				
Data tracing functions — Trace memory	256 K words/4 groups	1 M words/4 groups			
Data tracing functions — Traceable data points	16 points/group				
Data logging functions — Number of groups	4				*5: When using recommended USB memory device
Data logging functions — Number of log files	Built-in RAM disk (max. 8 MB), or USB memory device (4 GB*5)				
Data logging functions — 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	Supported				
Linkage functions for Σ-7 Servo Drives — Monitoring	Supported				
Linkage functions for Σ-7 Servo Drives — Multi-axis tuning	Development planning*6				*6: Under development

Optional Modules

■Motion Modules

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

Name	Description
SVC-01	MECHATROLINK-III × 1 channel
SVB-01	MECHATROLINK-II × 1 channel
SVA-01	Analog-output 2-axis servo control
PO-01	Pulse-output 4-axis servo control

Note: One CPU can control up to 16 modules.

■I/O Modules

Provides digital or analog I/O interface.

Name	Description
LIO-01	Digital input: 16 points (sink output mode) Digital output: 16 points (sink output mode) Pulse input: 1 point
LIO-02	Digital input: 16 points (source output mode) Digital output: 16 points (source output mode) Pulse input: 1 point
LIO-04	Digital input: 32 points Digital output: 32 points (sink output mode)
LIO-05	Digital input: 32 points Digital output: 32 points (source output mode)
LIO-06	Digital input: 8 points Digital output: 8 points (sink output mode) Analog input: 1 channel Analog output: 1 channel Pulse counter: 1 channel
DO-01	Digital output: 64 points (sink output mode)
AI-01	Analog input: 8 channels
AO-01	Analog output: 4 channels
CNTR-01	Pulse-input counter

■Communication Modules

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

Name	Description
218IF-01	Ethernet (10BASE-T) port × 1 RS-232C port × 1
218IF-02	Ethernet (100BASE-TX) port × 1 RS-232C port × 1
217IF-01	RS-232C port × 1 RS-422/485 port × 1
260IF-01	DeviceNet port × 1 RS-232C port × 1
261IF-01	PROFIBUS port × 1 RS-232C port × 1
262IF-01	FL-net (100BASE-TX) port × 1 (10BASE-TX) port × 1
263IF-01	EtherNet/IP (Scanner and adapter) port × 1
264IF-01	Port for EtherCAT slave × 2 (1 circuit)
265IF-01	CompoNet port × 1
266IF-01	PROFINET master
266IF-02	PROFINET slave
215AIF-01	MPLINK communication/RS-232C CP-215 communication/RS-232C

Note: One CPU can control up to 8 modules.

■ Distributed I/O Modules

I/O devices can be installed in a decentralized manner.

MECHATROLINK-II Compatible Modules

Name	Description
IO2310	64-point I/O (sink mode output)
IO2330	64-point I/O (source mode output)
PL2900	Reversible counter
PL2910	Pulse output
AN2900	Analog input
AN2910	Analog output
IO2900	16-point input
IO2910	16-point output
IO2920	8-point I/O
IO2950	Relay output

MECHATROLINK-III Compatible Modules

Name	Description
MTD2310	64-point input (sink/source input) 64-point output (sink/source input)
MTA2900	Analog input: 8 channels
MTA2910	Analog output: 4 channels
MTP2900	Pulse input: 2 channels
MTP2910	Pulse output: 4 channels

■ Connection Module

Used to connect the Base Unit to the Connection Modules or connect between the Connection Modules.

Name	Description
EXIOIF	Expansion Interface Module

Machine Controller MP3000 Series

MP3100

MP3100 is the perfect controller for machines connected to a personal computer.
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.

Super-High-Speed Application Processing

Better Performance

［Catalog No. CHEPC88072524］

❶ 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.

❷ MECHATROLINK-Ⅲ

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

❸ 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.

❹ PCI Express

Faster data communications between the Machine Controller and PC reduces takt time.
For example, 500 words of register data can be read with only about a third of the register access time (in comparison to the MP2100).

Total Time 880 μs ▼ 225 μs

Windows-based Application
Register read command

Driver
Process to write command to PCIe | Process to read result from PCIe

PCIe bus

MP3100
Reading command packet | Writing response packet
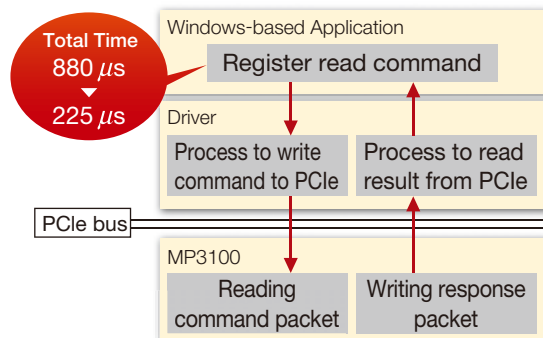
Improved Traceability for Large-Scale Systems

Easier to Use

Binary data   CSV data

Host PC

Data can also be saved to a USB memory device attached to the MP3100.

MP3100

Axis information and other register data

MECHATROLINK

・・・・・
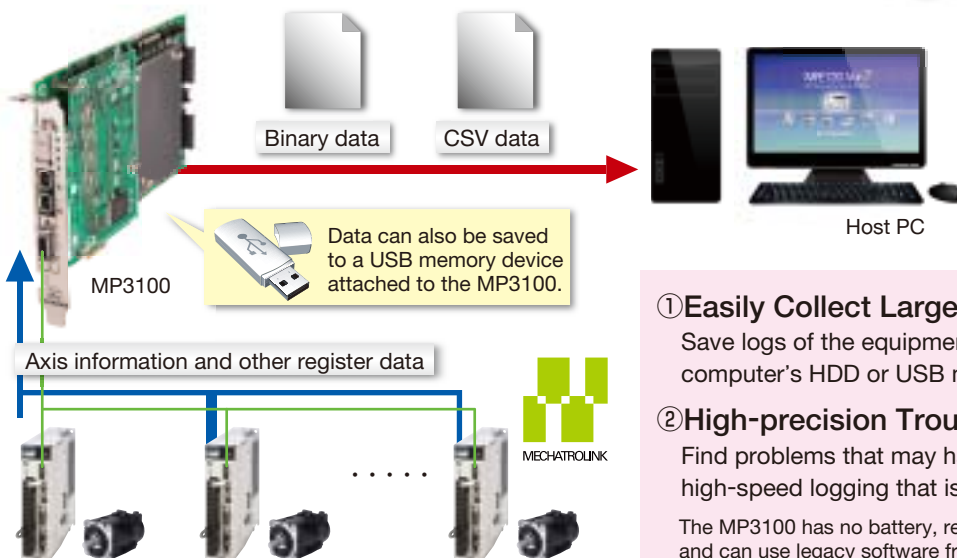
①**Easily Collect Large Quantities of Data**

Save logs of the equipment operation conditions in the computer's HDD or USB memory device.

②**High-precision Troubleshooting**

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

The MP3100 has no battery, requires essentially no maintenance, and can use legacy software from the MP2000 Series.
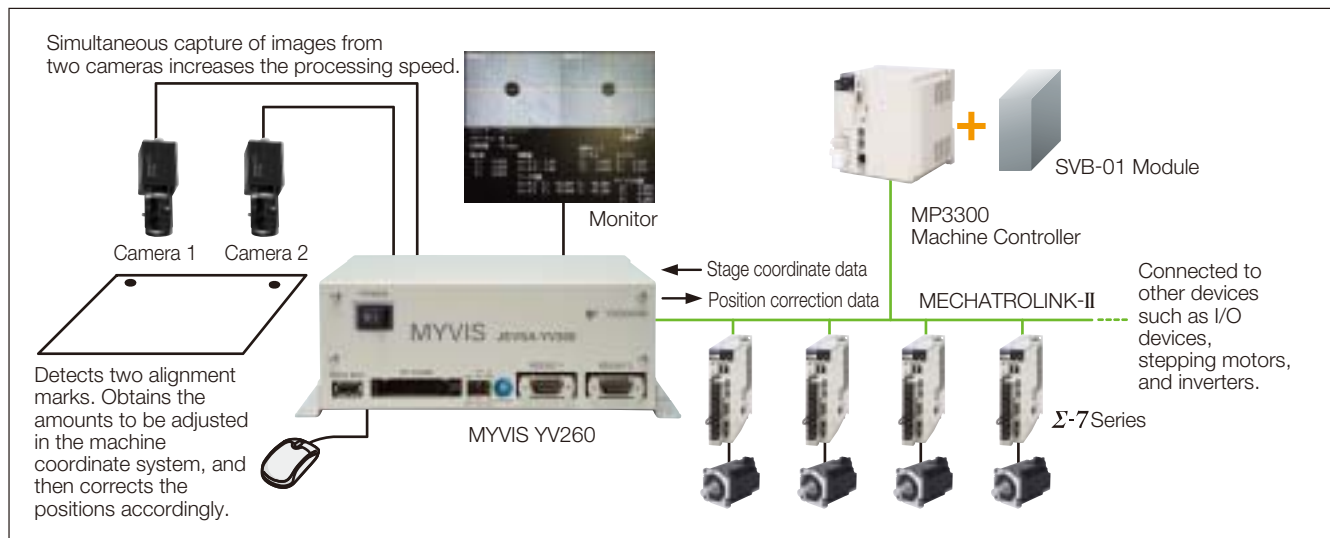
MYVIS YV260 Network Machine Vision System

The MYVIS is a high-performance vision system that combines advanced image processing technologies with many of the servocontrol technologies developed by Yaskawa over the years as a pioneer in the field of servo drives.

[Catalog No. KAEPC86077500]

Example of System Configuration

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.

Simultaneous capture of images from two cameras increases the processing speed.

Camera 1   Camera 2

Monitor

SVB-01 Module

MP3300 Machine Controller

Stage coordinate data
Position correction data

MECHATROLINK-II

Connected to other devices such as I/O devices, stepping motors, and inverters.

Σ-7 Series

Detects two alignment marks. Obtains the amounts to be adjusted in the machine coordinate system, and then corrects the positions accordingly.

MYVIS YV260

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

Specifications

Item		Description
Number of cameras connected		4
Camera interface	Analog	300,000 to 1,250,000 pixel (1280 × 960)
	Digital (camera link)	300,000 to 5,000,000 pixel (2440 × 2048)
	Simultaneous image capture	4 (2 for 5,000,000 pixel)
	External trigger input	4 simultaneous or individual inputs
Preprocessing		Inter-frame operation, convolution filter (3 × 3), Morphology (Dilation / Erosion)
Monitor output		VGA or XGA
External interface	Field network	MECHATROLINK-II
	Ethernet	10BASE-T/100BASE-TX
	Serial communications	RS-232C × 2 channels (115.2 kbps max.)
	Parallel I/O	General purpose output 16 points + alarm 2 points General purpose input 16 points + mode change 3 points + trigger input 1 point
	Trackball	USB mouse interface
Program development		C language (SH-C compiler Ver. 9 or later)

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.

Σ-7 Series

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.

CE

RoHS compliant

c UL us LISTED

UL CERTIFIED SAFETY US-CA E147823

c RU us

KC *

*: Applied upon order

NEW CONCEPT Σ-S Series

Easy, compact, and low price!
The Σ-S series is recommended for applications that do not conventionally use Servo Drives, and enables servo control of pneumatic and other equipment.
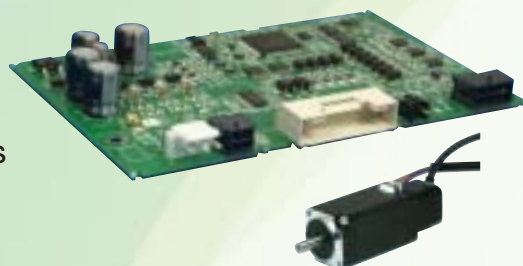
Lineup ▶ Page 37

SERVOPACK

Σ-7S   Σ-7W   Σ-7C

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

Servomotor

Direct Drive Servomotors

Rotary Servomotors
10 W to 15 kW

Linear Servomotors

3.3 W to 30 W

Σ-Vmini / Σ-V-MD

The powerful Σ-Vmini Servo Drives retain all the leading performance, functionality and ease of use of the Σ-V series in a palm-size package.

These board-type SERVOPACKs enable multi-axis control.

Σ-Vmini   Σ-V-MD

22 kW to 55 kW

Large-capacity Σ-V

Large-capacity Σ-V Servo Drives feature superlative performance, simple startup, and outstanding expand ability. These drives also help achieve considerable energy savings.

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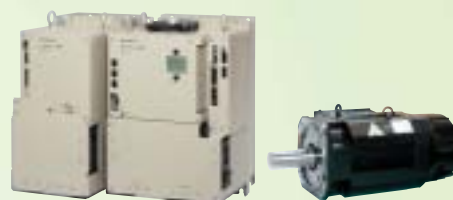
The Σ-7 series delivers a world-leading performance based on the concept of "7 ultimate e-motional solutions." These Servo Drives also support a variety of new needs, such as further enhancing safety and incorporating environmentally friendly designs. This makes it possible to offer solutions that can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

【Catalog No. KAEPS80000123】
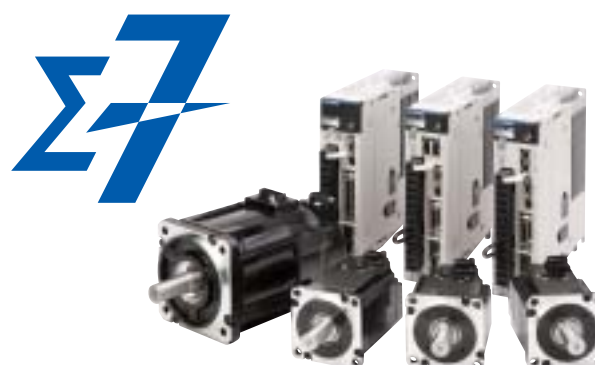
Features

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.

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.

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.

Ultimate safety and security

Σ-V 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.

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.

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.

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

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.

Σ-7S

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

Σ-7W
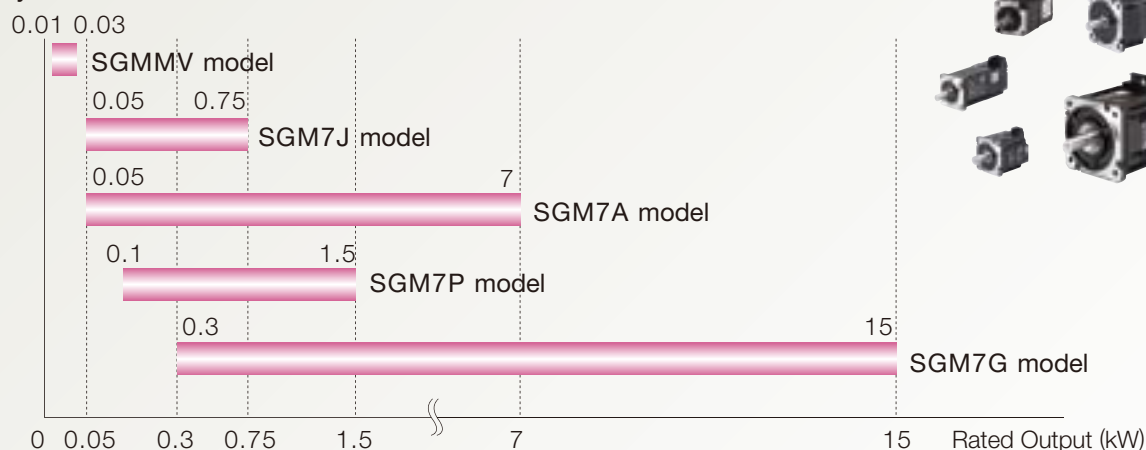
Two-axis SERVOPACK
200 VAC
200 W to 1.0 kW

Σ-7C

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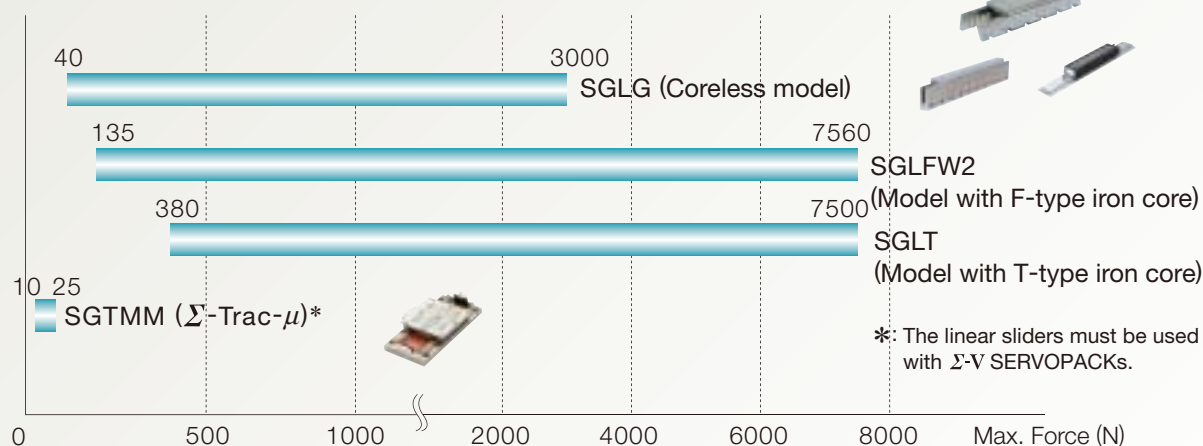with built-in Controller
200 VAC
200 W to 1.0 kW

Rotary Servomotors

Model	Range (kW)
SGMMV model	0.01 – 0.03
SGM7J model	0.05 – 0.75
SGM7A model	0.05 – 7
SGM7P model	0.1 – 1.5
SGM7G model	0.3 – 15

Axis: 0 0.05 0.3 0.75 1.5 7 15 Rated Output (kW)

Direct Drive Servomotors

Model	Range (N·m)
SGM7E (Coreless, Inner Rotor: Small Capacity)	6.00 – 105
SGM7F (With Core, Inner Rotor: Small Capacity)	6.00 – 105
SGM7F (With Core, Inner Rotor: Medium Capacity)	135 – 600
SGM7D (With Core, Outer Rotor)	4.00 – 400

Axis: 0 100 200 400 600 Instantaneous Max. Torque (N·m)
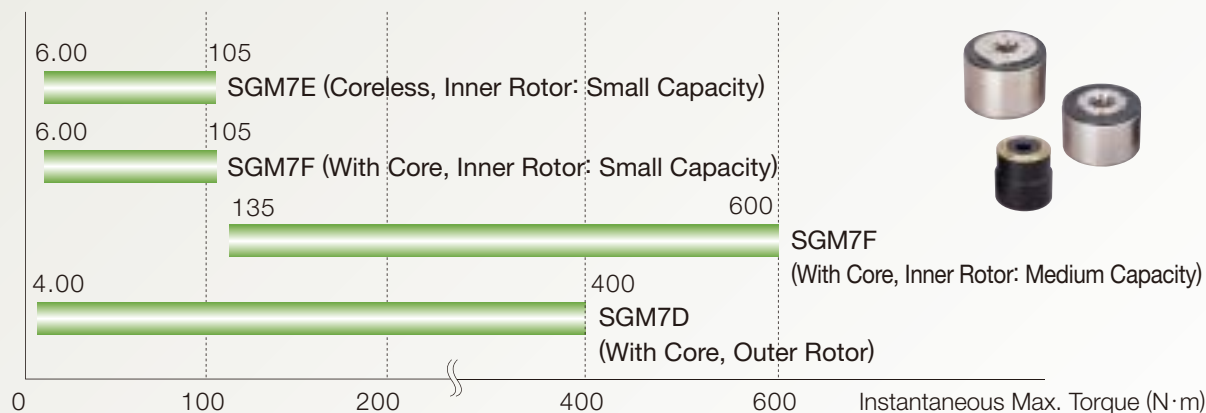
Linear Servomotors and Linear Sliders

Model	Range (N)
SGLG (Coreless model)	40 – 3000
SGLFW2 (Model with F-type iron core)	135 – 7560
SGLT (Model with T-type iron core)	380 – 7500
SGTMM (Σ-Trac-μ)*	10 – 25

Axis: 0 500 1000 2000 4000 6000 8000 Max. Force (N)

∗: The linear sliders must be used with Σ-V SERVOPACKs.

SERVOPACKs

Single-axis
MECHATROLINK-III
communications
reference Σ-7S

Two-axis
MECHATROLINK-III
communications
reference Σ-7W

Single-axis
MECHATROLINK-II
communications
reference Σ-7S

Analog voltage/
pulse train reference

Command Option
Attachable Type

■ MECHATROLINK-III/-II Communications Reference

◎Real-time communication
A high transmission speed allows real-time transmission of various data required for control.

◎Cost savings
Multiple stations can be connected to a single MECHATROLINK transmission line, so wiring costs and time are greatly reduced. Also, only one signal connector is required on the host controller. The all-digital network eliminates the need for a converter to change speed/torque references from digital to analog and for a pulse generator to create position references.

◎High-precision motion control
The SERVOPACK when connected to the host controller in the MECHATROLINK-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.

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

■ 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

◎Compatible with all features of the new Σ-V Series
◎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.

◎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 | 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.

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.
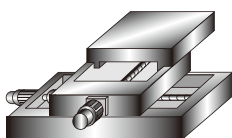◎ Motion control is accomplished without using motion controllers.

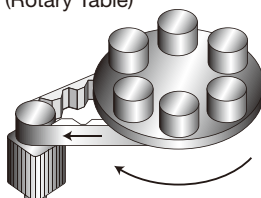Note: The INDEXER module can be used in combination with the Fully-Closed Module.

Program Table Editing Window

Specifications

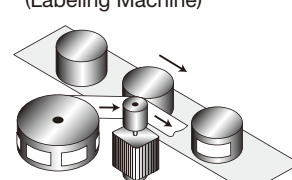| Function	Specifications
Stations for Program Table Operation	256
JOG Speed Setting	16
ZONE Signal Output	32
Serial Communication	HR: ASCII; max. axes: 16 MEMOBUS: Binary
Homing Methods	3
Equally-dividing and Indexing Positioning (Station Positioning Command)	Rotary machine and tool setting

Application Examples

Point-to-point positioning (X-Y Table)　　　Station positioning (Indexing) (Rotary Table)　　　Feeding (Labeling Machine)

SERVOPACK | With Optional Module

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.

Fully-Closed Module
Cable for Connecting Serial Converter Unit✻
Servomotor Main Circuit Cable
Serial Converter Unit✻
Encoder Cable
External Encoder Cable
External Encoder (Provided by users.)
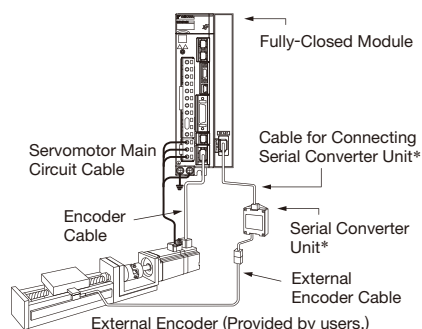
With Safety Functions — Safety Module

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	
		SERVO PACK	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	
		SERVO PACK	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.	―	○

7 ultimate e-motional solutions Σ-7

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.
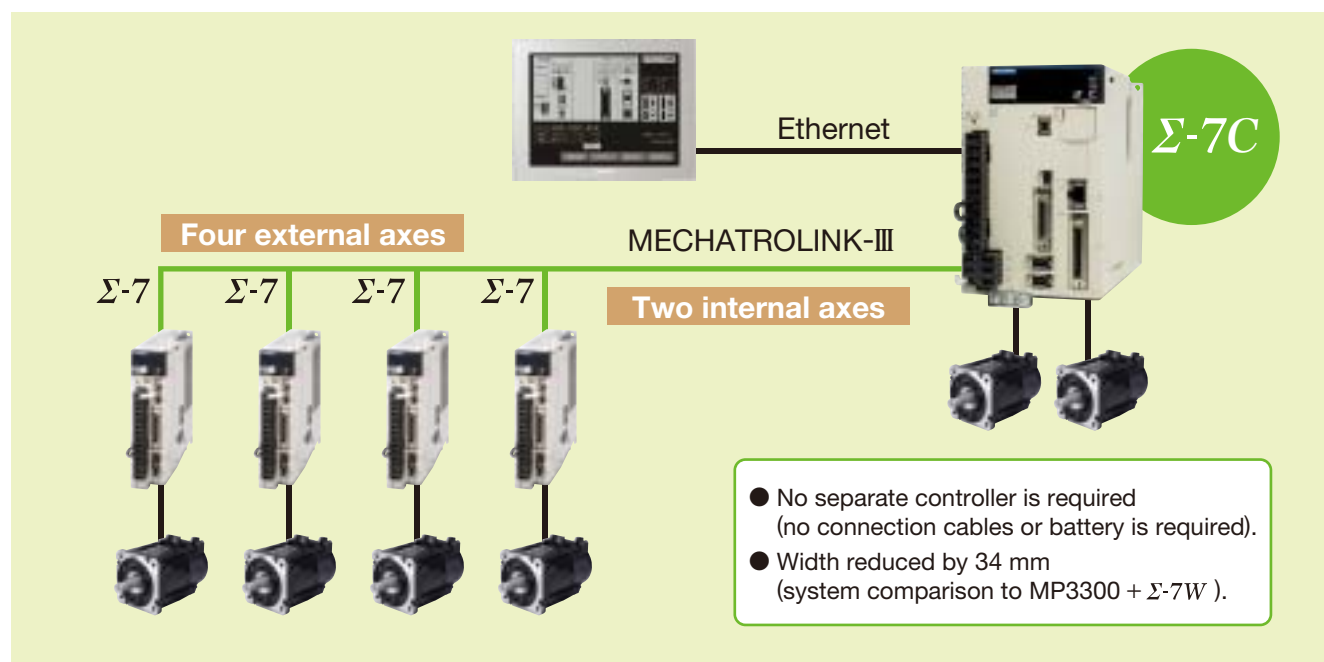
✓ : Possible   − : Not Possible

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.	✓	−	✓
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.	−	−	✓
FT40	Press and Injection Molding	Pressure Feedback	Highly accurate pressure control with input of pressure sensor signals directly to the SERVOPACK.	−	−	✓
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.	−	−	✓
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.	−	−	✓
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 infinite-length coordinates.	−	−	✓
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 will increase the torque or force up to five times.	✓	−	✓
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.	✓	−	−
FT82	For Special Motors	SGM7D Motor Drive	SERVOPACKs with high torque, high precision, and a user-friendly design for SGM7D motors.	✓	✓	✓
FT83	For Special Motors	SGM7D Motor Drive	SERVOPACKs with built-in INDEXER for SGM7D motors.	✓	−	−

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

Ethernet

Σ-7C

Four external axes

MECHATROLINK-Ⅲ

Σ-7 Σ-7 Σ-7 Σ-7

Two internal axes

● No separate controller is required (no connection cables or battery is required).
● Width reduced by 34 mm (system comparison to MP3300 + Σ-7W).

▌ 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 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.

Option Unit

MP2000-series Optional Module∗

24-V power supply connector for option
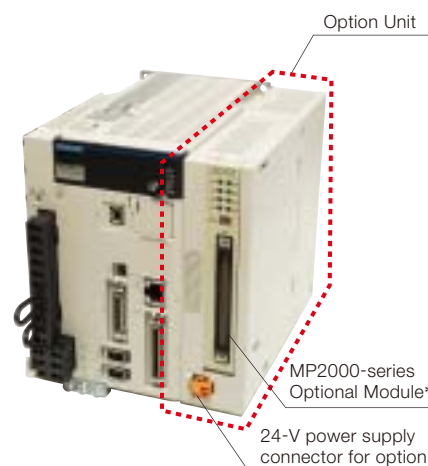
∗: Excluding the following Optional Modules: SVA-01, SVB-01, SVC-01, PO-01, MPU-01, 215AIF-01, and EXIOIF.

7 ultimate e-motional solutions

Σ-7

Rotary Servomotors

		Rated output	Rated speed/ Max. speed (min^{-1})
■ **SGMMV model** (Low inertia, ultra-small capacity)		10 W to 30 W	3000/6000

◎ Contributes to machine downsizing (flange size: 25 mm × 25 mm).
◎ Mounted high-resolution serial encoder: 17 bits

		Rated output	Rated speed/ Max. speed
■ **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.

		Rated output	Rated speed/ Max. speed
■ **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)

		Rated output	Rated speed/ Max. speed
■ **SGM7P model** (Medium inertia, flat type)		100 W to 1.5 kW	3000/6000

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

		Rated output	Rated speed/ Max. speed
■ **SGM7G model** (Medium inertia, large torque)		300 W to 15 kW	1500/3000

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

NEW

Servomotors with Batteryless Absolute Encoders

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

No time or effort for replacement

No inventory management

Easier Wiring

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

SERVOPACK

Encoder Cable

Battery Case

Main Circuit Cable

Servomotor (with absolute encoder)

SERVOPACK

Encoder Cable

Main Circuit Cable

Servomotor (with Batteryless Absolute Encoder)

No Battery is required.

Direct Drive Servomotors
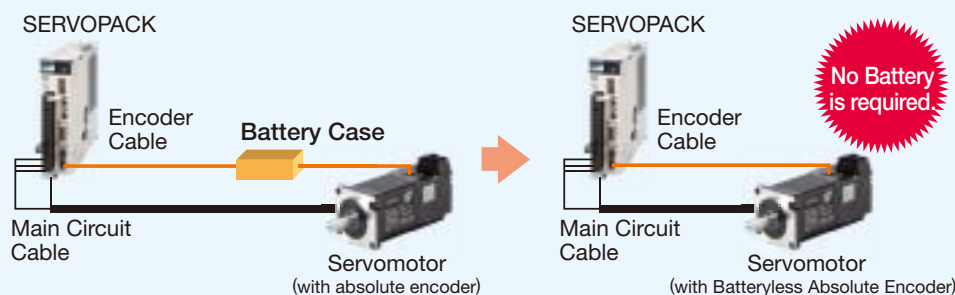
	Outer Diameter (mm)	Rated Torque (N·m)	Max. Torque (N·m)
■ **Coreless, Inner Rotor** (SGM7E)	135 to 290	2 to 35	6 to 105

> 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.

	Outer Diameter (mm)	Rated Torque (N·m)	Max. Torque (N·m)
■ **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.

	Outer Diameter (mm)	Rated Torque (N·m)	Max. Torque (N·m)
■ **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

	Type	Max. speed (m/s)	Rated force (N)	Peak force (N)
■ **SGLG** (Coreless model)	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

	Type	Max. speed (m/s)	Rated force (N)	Peak force (N)
■ **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.

	Type	Max. speed (m/s)	Rated force (N)	Peak force (N)
■ **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	Type	Max. speed (m/s)	Rated force (N)	Peak force (N)
■ **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.

AC Servo Drives
Large-capacity Σ-V Series

Announcing the debut of a large-capacity servo drive series which follows in the footsteps of the series with its superlative performance, simple startup, and outstanding expandability. Considerable energy savings enabled by using a separate converter.

【Catalog No. KAEPS80000086】

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		

SGMVV Servomotor

CE · c**N**$_{US}$ · (RoHS compliant)

SGDV SERVOPACK

CE · c(UL)$_{US}$ LISTED · (RoHS compliant) · (KC) · (Safety standard compliant)*

*: For detail, contact your Yaskawa representative.

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, takeup, etc.) increases quality.
◎ Seamless switching between position control and torque control improves machine takt time.

·Change the control mode online.
·High-precision synchronized control

MP3200

MECHATROLINK-Ⅲ

AC Servo Drive
Large-capacity
Σ-V
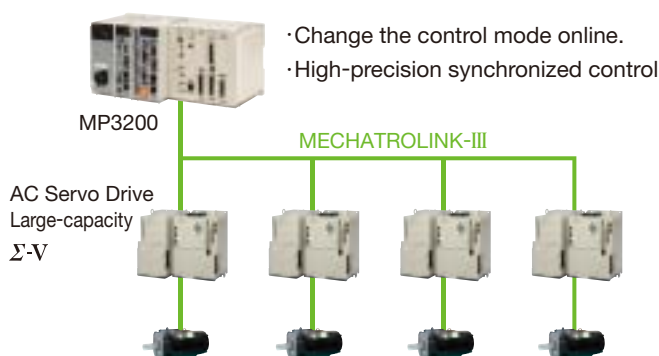
Easily build an energy-saving system

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

Drive energy (consumed)

Deceleration

D1000*

Regenerative energy (produced)

The regenerative energy is effectively used between the servos.

Regenerative energy is efficiently returned to the power supply.

Acceleration

Large-capacity Σ-V SERVOPACK

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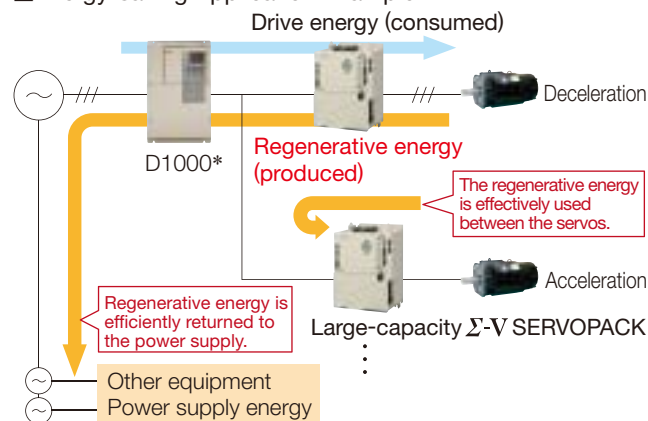
*: D1000 is the sine-wave PWM converter able to regenerate power. In combination with an AC drive, realizes high power factor operation, and entirely eliminates problems of power source harmonics.

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.
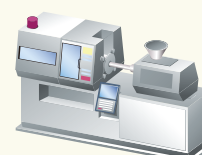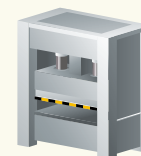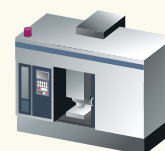
AC Servo Drives
Σ-V mini Series

These ultra-compact Servo Drives retain all the leading performance, functionality and ease of use of the Σ-V series in a palm-size package.

Σ-V mini Servo Drives operate with DC power input (main circuit power supply 24 VDC/ 48 VDC; control power supply 24 VDC), which makes them well-suited for clean room robots and clean AGVs*[1] and other battery-driven transport systems.
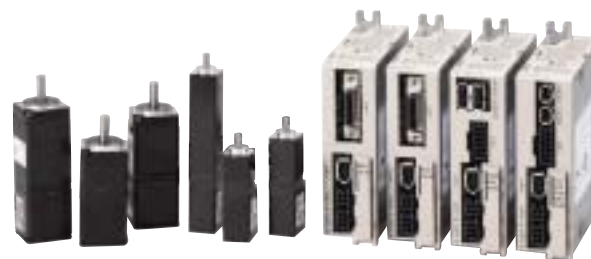
【Catalog No. KAEPS80000042】

SERVOPACK Model SGDV-□□□E
Servomotor Model SGMMV

Features

◎ Helps reduce the overall size of control boards and machinery.
Servomotor dimensions (See table on right)
SERVOPACK dimensions: 100*[2] (H) × 30 (W) × 80 (D) mm
◎ Maximum motor speed: 6000 min⁻¹; frequency response: 1.6 kHz
◎ Model tracking control, anti-vibration control, and friction compensation functions

＊1: Automated Guided Vehicle.
＊2: Size: 116 mm including the mounting base

Servomotor Specifications

Model SGMMV-	Rated Output (W)	Rated Motor Speed/ Max. Motor Speed (min⁻¹)	Square Flange Dimensions (mm)	Total Length (mm)
B3E	3.3			58
B5E	5.5		15	64
B9E	11	3000/6000		98
A1E	10			70
A2E	20		25	80
A3E	30			90

Σ-V-MD Series A01/A02

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)
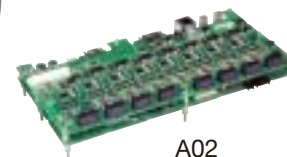
A02

SERVOPACK Model SGDV-MDA□□E□M3A
Servomotor Model SGMMV

Application

Board Conveyor
Head
Camera
Chip Feeder
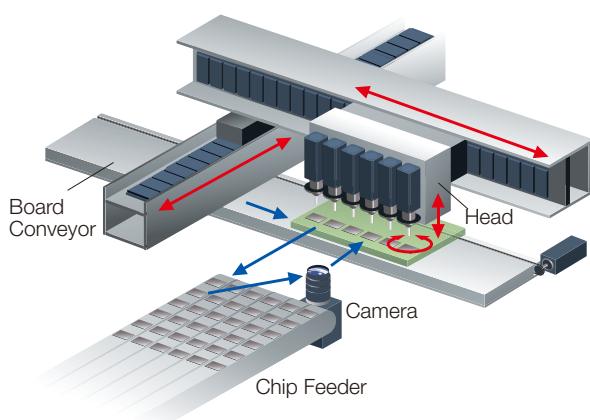
SERVOPACK Specifications

Model	SGDV-MD A01	SGDV-MD 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	

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.
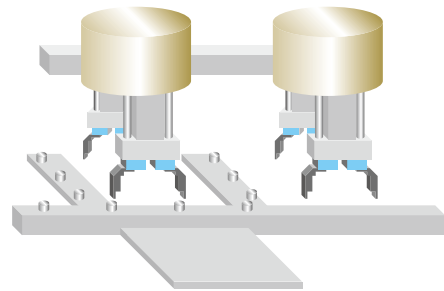

SERVOPACK Model SGPSS
Servomotor Model SGMSL

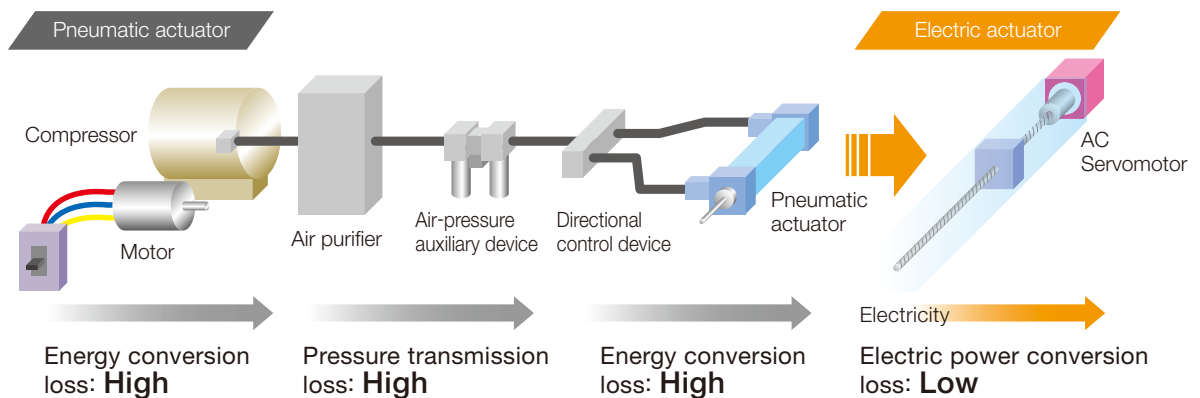**Potential applications of the Σ-S Series in pneumatic equipment**

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

Pneumatic actuator			Electric actuator

Compressor — Motor — Air purifier — Air-pressure auxiliary device — Directional control device — Pneumatic actuator — AC Servomotor

Electricity

Energy conversion loss: **High** — Pressure transmission loss: **High** — Energy conversion loss: **High** — Electric power conversion loss: **Low**

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

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
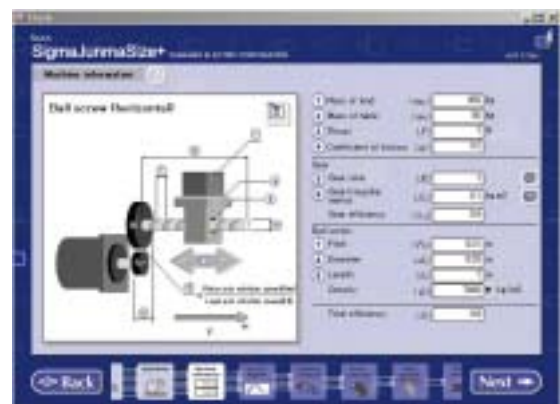
Machine Information Input Window
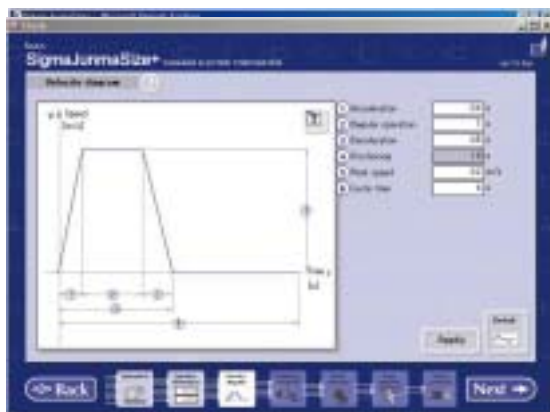
Velocity Diagram Input Window

Operating Condition Selection Window

Motor Selection Window

SERVOPACK Selection Window

48

SigmaWin+

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.
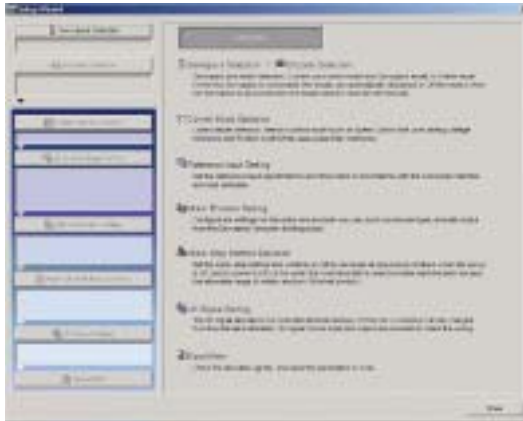
Setup using Wizard	Parameter Edit (at online)
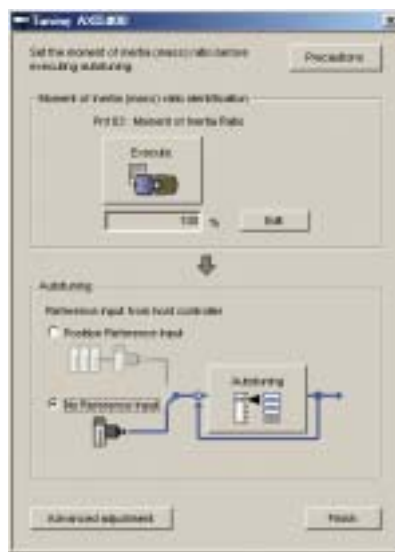
Tuning	Check Wiring

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
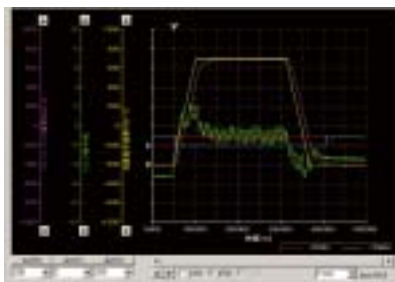
MPE720 Ver.7 Compatible with Windows 10 64-bit edition

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

ALL-IN-ONE ENGINEERING

Setup and adjustments

Programming

Maintenance and control

AC servo drive engineering tool
SigmaWin+

Inverter support tool
DriveWizard Plus

I/O unit setting tool
IoWin
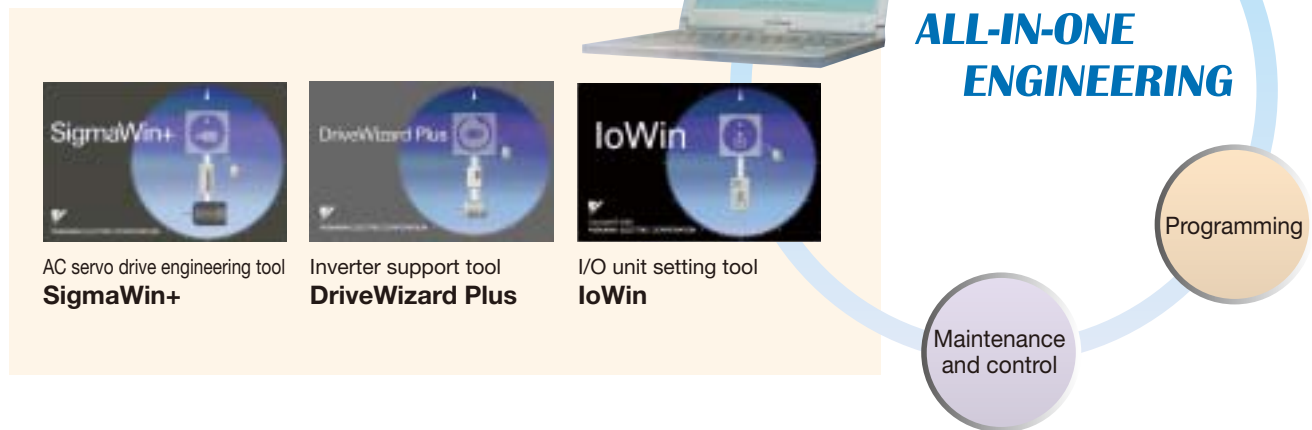
Execution of parameter settings and monitoring enabled for multiple axes simultaneously

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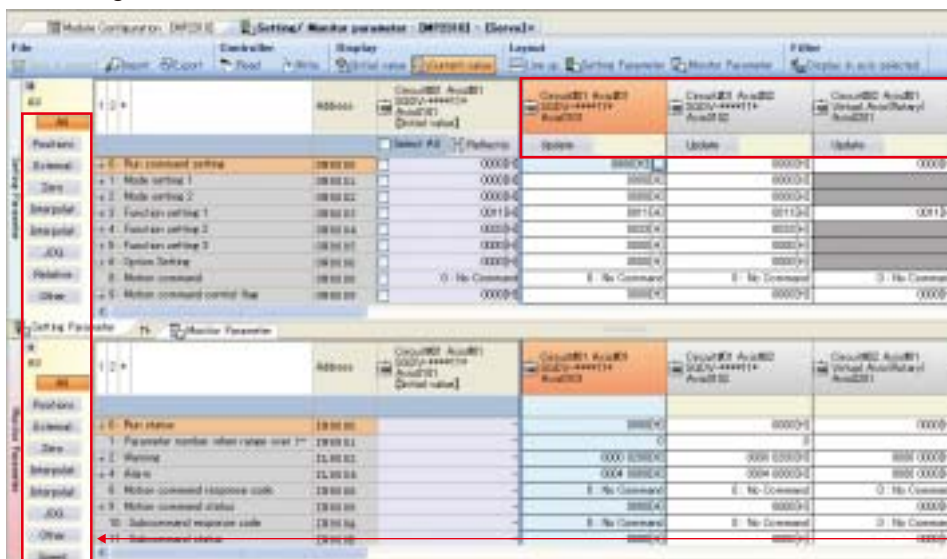
Simultaneous settings for more than one axis e.g., virtual axis, axis 1, and axis 2

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

Axis 1
Axis 2

Parameter setting

Axis 1
Axis 2

Program JOG

Axis 1
Axis 2

Multi-tasking

Parameter editing
Tracing
Program JOG

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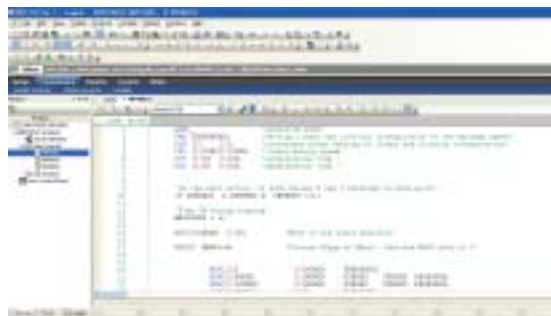
· Positioning and interpolation instructions can be described using single instructions.
· Programs can be very easily edited using expressions in a text format.
· New variable programming can provide PC-like programming.

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.
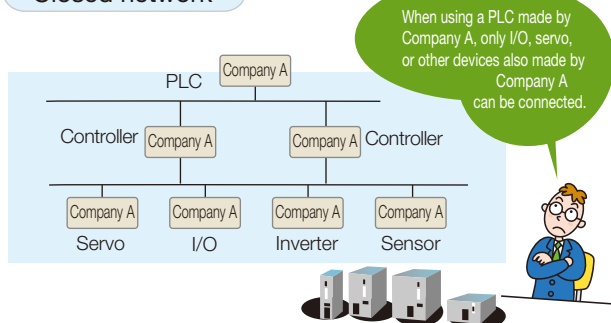
MECHATROLINK Members Association (MMA)

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 eight Board Member companies in the MMA: M-System Co., Ltd., Oriental Motor Co., Ltd., Keyence Corporation, Digital Electronics Corporation, Yaskawa Electric Corporation, Yaskawa Information Systems 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, and India. 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
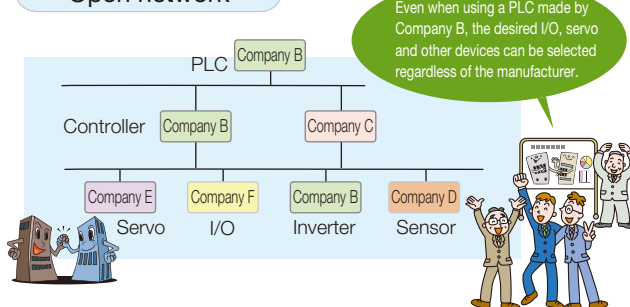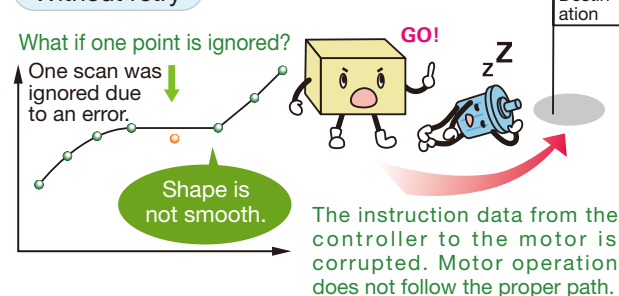

Reliable Guaranteed high communications performance

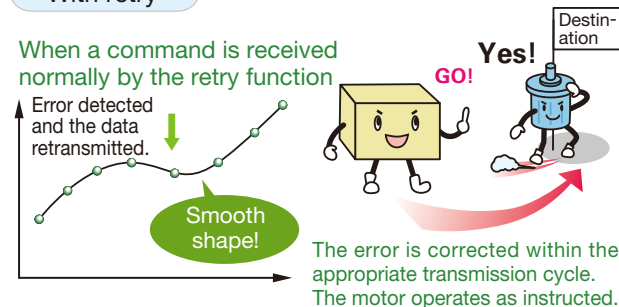**The most important point in communications is to reliably transmit accurate data.**

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
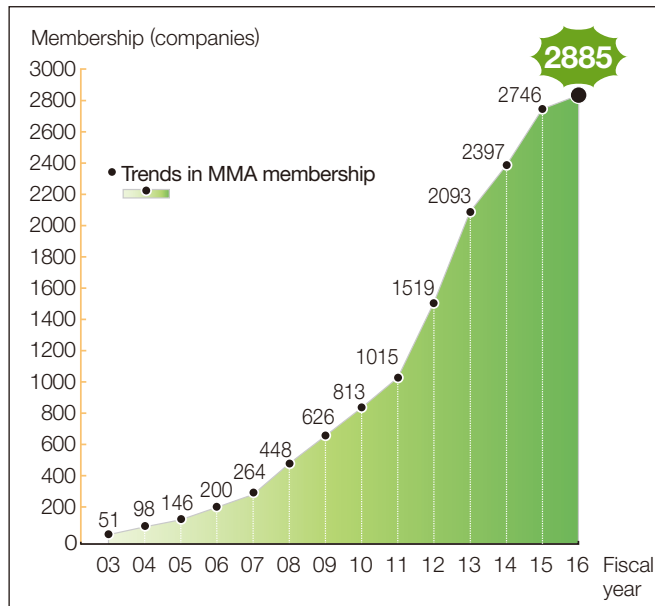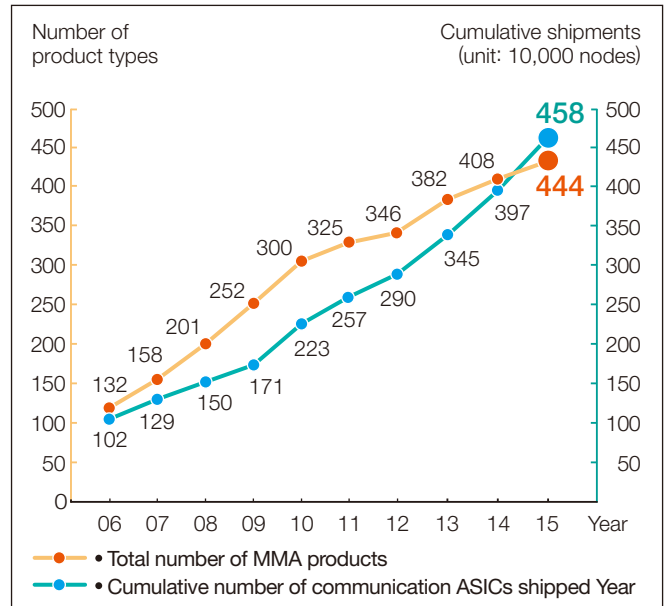
Membership (companies)

Trends in MMA membership

Fiscal year	Value
03	51
04	98
05	146
06	200
07	264
08	448
09	626
10	813
11	1015
12	1519
13	2093
14	2397
15	2746
16	2885

Increasing numbers of product types and nodes

Number of product types / Cumulative shipments (unit: 10,000 nodes)

- Total number of MMA products
- Cumulative number of communication ASICs shipped Year

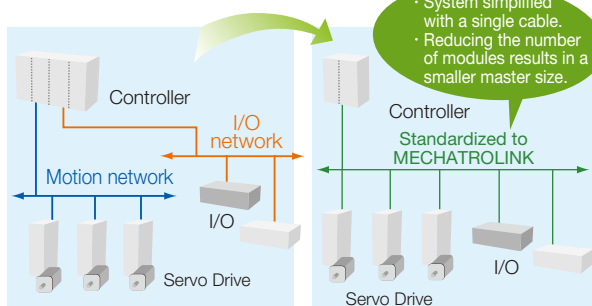| Year	Total number of MMA products	Cumulative number of communication ASICs shipped
06	132	102
07	158	129
08	201	150
09	252	171
10	300	223
11	325	257
12	346	290
13	382	345
14	408	397
15	444	458

Simple
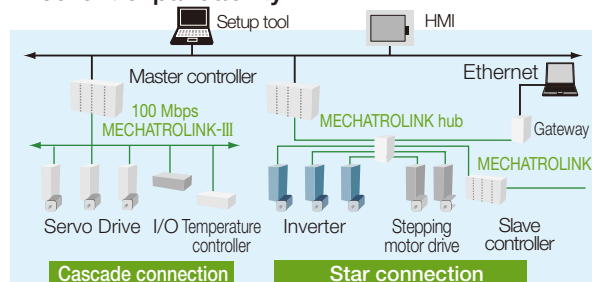Low cost, easy maintenance, and expandability

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

· System simplified with a single cable.
· Reducing the number of modules results in a smaller master size.

Controller
I/O network
Motion network
I/O
Servo Drive

Controller
Standardized to MECHATROLINK
Servo Drive
I/O

Excellent expandability

Setup tool
HMI
Master controller
Ethernet
100 Mbps MECHATROLINK-III
MECHATROLINK hub
Gateway
MECHATROLINK
Servo Drive   I/O Temperature controller   Inverter   Stepping motor drive   Slave controller

Cascade connection   Star connection
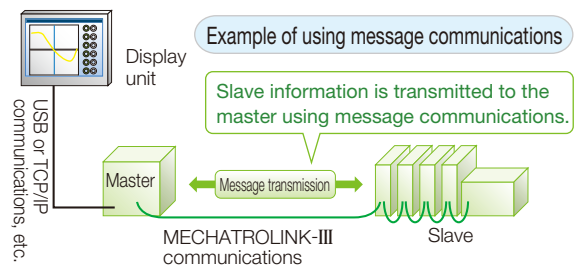

Speedy
Simultaneous control of multiple axes and high-capacity message communications

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.

Display unit
USB or TCP/IP communications, etc.

Example of using message communications

Slave information is transmitted to the master using message communications.

Master
Message transmission
Slave
MECHATROLINK-III communications

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.

C1 master
Tool (C2 master)
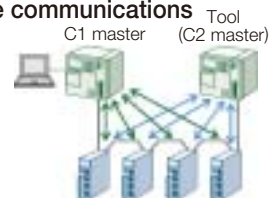
| M2M Communication Adapter | Yaskawa Information Systems Corporation |

The M2M communication adapter offers one-stop solution for remote control and monitoring as well as management of devices via mobile communications networks. The environment required for remote monitoring is offered as a set.

MMLink-3G, Global Communication Adapter

Seamless remote monitoring and control via 2G and 3G networks.

Features	1	Supports connection to 2G and 3G networks.
	2	Data transfer possible over wide areas
	3	Equipped with GPS navigation system
	4	Supports various communications protocols
	5	Easy initial settings

MMLink-G, Global Communication Adapter

Supports connections to GSM networks, the optimal solution for overseas remote monitoring.

Features	1	Supports connection to GMS networks that is a major network used overseas.
	2	Can be used with multi-operator systems (e.g. more than 100 countries).
	3	Supports LAN and serial interface.

MMLink-1X, Adapter for CDMA 1X Packet Communications

Remote operation and control with CDMA 1X

Features	1	Supports RS-232C serial and LAN interface and expands the range of applications.
	2	Easy connection to a network by simply turning the power on (Automatic OTA)
	3	Easy initial settings via browser.
	4	Earthquake early warning notifications via networks to minimize damage and injuries.

| M2M Cloud Service |

MMCloud, Cloud Service for Product Life Cycle Management Support

This is a cloud service that collects and manages the operational information of products and related information in order to support the management of the life cycle of products.

| Features | 1 | **Supports management of product life cycle** |

1 **Supports management of product life cycle**
Product information that is managed separately can be consolidated and used for work in various processes, including planning, development, sales, inspection, and maintenance.
2 **Enables ideal monitoring of equipment located in different locations around the world**
Global-scale monitoring of equipment is made possible by using internet connections and wireless communication networks for mobile phones. User environment is also globalized. Local times of different countries where equipment are used can be displayed and languages can be selected on the screen.
3 **Displays collected information in real time**
Collected data, status of customer equipment, information collected via sensors, and GPS information is displayed in graphs and maps so that equipment conditions can be checked in real time. This service can be used to monitor operation status and mobile equipment.
4 **Can start with a small-scale operation**
Customers can first use this service with a small investment and a short leadtime by using the standard cloud service. The monitoring scale can be increased in line with the expansion of the customer's business operations.
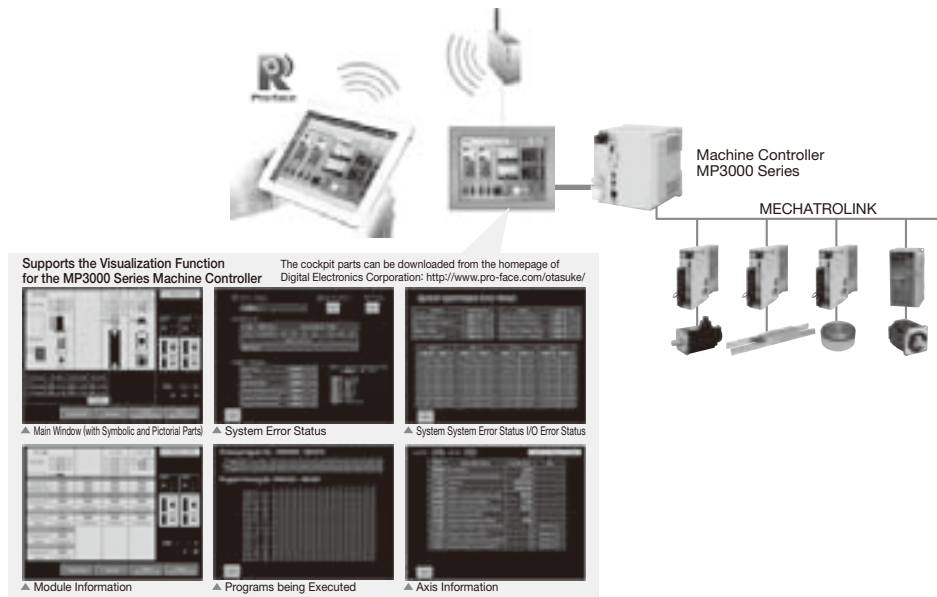
| Website | http://www.ysknet.co.jp/
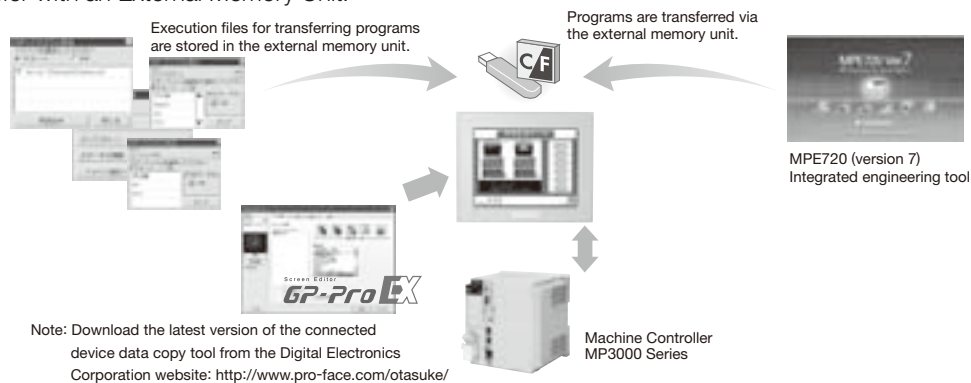
Digital Electronics Corporation

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 Pro-face Remote HMI, the remote monitoring software for mobile devices. This allows users to view product information on tablets and smartphones anytime, anywhere.
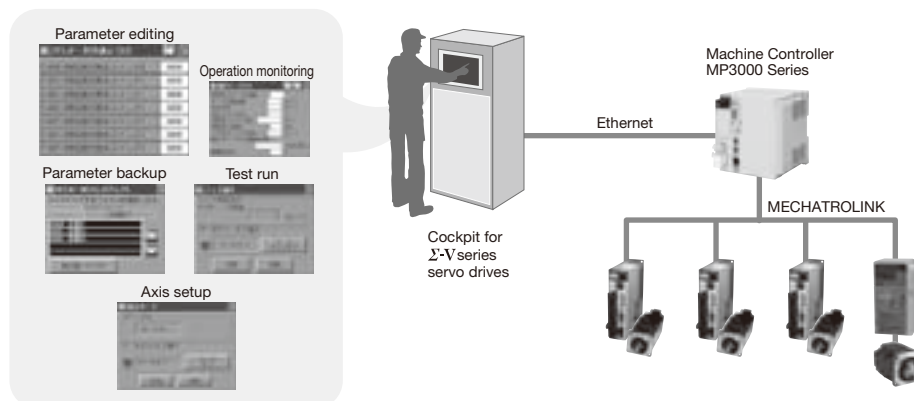
Machine Controller
MP3000 Series

MECHATROLINK

Supports the Visualization Function
for the MP3000 Series Machine Controller

The cockpit parts can be downloaded from the homepage of
Digital Electronics Corporation: http://www.pro-face.com/otasuke/

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

▲ Module Information ▲ Programs being Executed ▲ Axis Information

Engineering Support Function

● Program Transfer with an External Memory Unit!

Execution files for transferring programs
are stored in the external memory unit.

Programs are transferred via
the external memory unit.

MPE720 (version 7)
Integrated engineering tool

Note: Download the latest version of the connected
device data copy tool from the Digital Electronics
Corporation website: http://www.pro-face.com/otasuke/

Machine Controller
MP3000 Series

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

Parameter editing

Operation monitoring

Parameter backup

Test run

Axis setup

Cockpit for
Σ-V series
servo drives

Ethernet

Machine Controller
MP3000 Series

MECHATROLINK

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
       Slave: TIP-ML3SLV-PROJ

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

· 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.

R7ML Base Module

MECHATROLINK-Ⅲ-compliant Remote I/O
Model: R7G4FML3, R7G4HML3, R7F4HML3, R7K4FML3, R7K4JML3

· 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.

R7G4FML3-6

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 MP3200 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/

| 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.

756-346
for DeviceNet

750-352
EtherNet/IP
for MODBUS

Website http://www.wago.co.jp/io
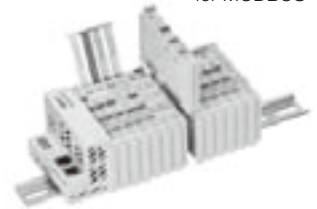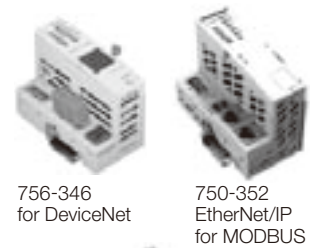
Example of Node Configuration
(Bus coupler + Module)

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.

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.

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

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Modular I/O Systems | Phoenix Contact GmbH & Co. KG

MECHATROLINK Inline Bus Coupler
Model: IL MIIBK DI8 DO4-PAC

· The Inline bus coupler, model IL MII BK DI8 DO4-PAC, has eight digital input terminals and four digital output terminals as a standard feature.
· The Inline modules for I/O signals can be expanded, and 52 modules can be connected.
· A wide range of input and output modules are available, including digital input, digital output, analog input, analog output, and temperature control modules.

Website   http://www.phoenixcontact.com/global/

Digital I/O modules   Analog I/O modules
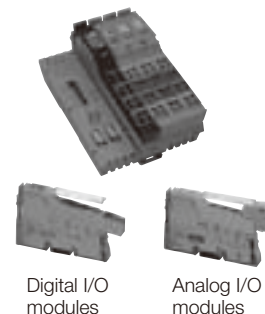
Sensor | RKC Instrument Inc.

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

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.)

No Out-of-step Stepping Motor and Driver Package
Model: ARL4☐☐☐M-☐, ARL6☐☐☐M-☐, ARL9☐☐☐M-☐

· The MECHATROLINK-II compliant α STEP stepping motor and driver in the ARL-series uses a unique closed-loop control and eliminates missed steps.
· The α STEP does not require tuning or hunting to achieve high-response positioning without any missing steps during sudden load changes or acceleration.
· Only one cable is required to connect the motor to the driver.
· A wide range of products including various types of geared motor, the EZ Limo motorized sliders, and the DG series of hollow rotary actuators can be connected and controlled with MECHATROLINK-II.

Website   http://www.orientalmotor.com

| Melec Inc.

Controller for Stepping & Servo Motors
Model: C-M581S

· Easy operation by combining I/O bit signals.
· Specially designed software enables you to make settings or confirm operation status on the personal computer.
· Individual control of four axes with compact motion controller: 88.5 mm × 94 mm × 59 mm (W×D×H)

Controller for Stepping Motors
Model: CD-M582S/ADB5432

· Easy operation by combining I/O bit signals.
· Specially designed software enables you to make settings and confirm operation status on the personal computer.
· Individual control of two axes with a relay unit and a DC drive for five-phase motors integrated in the compact
 design: 75 mm × 91 mm × 82.5 mm (W×D×H)

Website http://www.melec-inc.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

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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

◆Incremental Linear Encoders

Output Signal	Manufacturer	Linear Encoder Type	Model			Linear Encoder Pitch μm	Resolution nm	Maximum Speed[4] m/s	Support for Polarity Sensor Input	Application to Linear Motors	Application to Fully-Closed Loop Control
			Scale	Sensor Head	Interpolator (Serial Converter Unit)						
1 Vp-p Analog Voltage[1]	Heidenhain Corporation	Exposed	LIDA48□		JZDP-H003/-H006[6]	20	78.1	5	✓	✓	✓
					JZDP-J003/-J006[6]		4.9	2	✓	✓	[9]
			LIF48□		JZDP-H003/-H006[6]	4	15.6	1	✓	✓	✓
					JZDP-J003/-J006[6]		1.0	0.4	✓	[9]	[9]
	Renishaw plc[5]	Exposed	RGS20	RGH22B	JZDP-H005/-H008[6]	20	78.1	5	✓	✓	✓
					JZDP-J005/-J008[6]		4.9	2	✓	✓	[9]
Encoder for Yaskawa's Serial Interface[2]	Magnescale Co., Ltd.	Exposed	SL7□0		PL101-RY[7]	800	97.7	10	−	✓	✓
			PL101		MJ620-T13[8]				✓	✓	[9]
			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	−	✓	✓

◆Absolute Linear Encoder

Output Signal	Manufacturer	Linear Encoder Type	Model			Linear Encoder Pitch[3] μm	Resolution nm	Maximum Speed[4] 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[2]	Magnescale Co., Ltd.	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[10]		−	25.6	50	5	−	✓	✓
			ST1381		−	5.12	10	8	−	✓	✓
			ST1382		−	0.512	1	3.6[11]	−	✓	✓
	Heidenhain Corporation	Exposed	LIC4100 series		EIB3391Y[8]	20.48	5	10	−	✓	✓
		Sealed	LC115			40.96	10	3	−	✓	✓
	Renishaw plc	Exposed	EL36Y-□□050F□□□		−	12.8	50	100	−	✓	✓
			EL36Y-□□100F□□□		−	25.6	100	100	−	✓	✓
			EL36Y-□□500F□□□		−	128	500	100	−	✓	✓

*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. These are reference values for setting SERVOPACK parameters. Contact the manufacturer for actual linear encoder scale pitches.
*4. 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).

*5. 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.
*6. Use this model number to purchase the Serial Converter Unit.
*7. Use this model number to purchase the Sensor Head with Interpolator.
*8. Use this model number to purchase the Interpolator.
*9. Contact your Yaskawa representative.
*10. Contact Mitutoyo Corporation for details on the Linear Encoders.
*11. The speed is restricted for some SERVOPACKs.
Note: Confirm detailed specifications, such as the tolerances, dimensions, and operating environment, with the manufacturer of the Encoder before you use it.

◆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		Relay Device between Fully-Closed Module and Rotary Encoder Type	Resolution Bits	Maximum Speed[1] min-1
			Scale	Sensor Head			
Encoder for Yaskawa's Serial Interface[1]	Magnescale Co., Ltd.	Exposed	RU77-4096ADF[2]		−	20	2000
			RU77-4096AFFT01[2]		−	22	2000
	Heidenhain Corporation	Sealed	RCN2□10[2]		EIB3391Y	26	3000
			RCN5□10[2]			28	800
			RCN8□10[2]			29	400

*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: Confirm detailed specifications, such as the tolerances, dimensions, and operating environment, with the manufacturer of the Encoder before you use it.

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