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
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.
Yaskawa carries out Motion & Control Business activities based on the concept of i²-Mechatronics (Integrated, Intelligent, and Innovated).
Product Lineup

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

Motion Controls

Field Network
- MECHATROLINK-III
- MECHATROLINK-II
- CC-Link
- DeviceNet
- PROFINET-PP
- Position Control
- Speed Control

Drivers

- 7 Series SERVOPACKs
  - SGD7S
  - SGD7W
  - SGD7C

- MVmini Series
  - SGDV-MD E

- MV-MD Series
  - SGDV-MD A

Motors

- 7 Series Rotary Servomotors
  - SGM7V
  - SGM7P
  - SGM7J
  - SGM7A
  - SGM7G

- Direct Drive Servomotors
  - SGM7D

- Linear Servomotors
  - SGLGW
  - SGLF2
  - SGLTW

- Linear Sliders
  - Trac-μ

Note: These linear sliders must be used with MV 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.)
MECHATROLINK, the motion network from our motion control expertise

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

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

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.
System performance

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

Seven ultimate solutions

<p>| | |</p>
<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>System performance</td>
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<td>2</td>
<td>Ease of use</td>
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<td>3</td>
<td>Environmental performance</td>
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<td>4</td>
<td>Safety and security</td>
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<tr>
<td>5</td>
<td>Support</td>
</tr>
<tr>
<td>6</td>
<td>Lineup</td>
</tr>
<tr>
<td>7</td>
<td>Compatibility</td>
</tr>
</tbody>
</table>

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.
Enhance performance and preventive safety measures to increase safety and security.

- Industry-leading performance
- Optimal functions for each application
- Self-configuration
- List of specifications
- Safety functions
- Supports SIL3 specification requirements
- Downloading of CAD data
- Self-configuration

Avoid wasted time with stable and vibration-free operation without tuning.

- Multi-axis tuning
- Tuning-less
- Integrated tracing

Ship products with specified parameters to facilitate assembly.

- Energy-saving functions
- 2-axis SERVOPACKs
- Momentary power interruptions
- Temperature protection
- Build-To-Order service
- Visual identification of operating statuses (Monitoring by controller)

Monitor temperatures directly using built-in temperature sensors to increase safety and security.

- Traceability
- Data logging
- Lifespan diagnostics

Easily collect and manage product data to enhance service.

- Traceability

Developers and designers

Manufacturers

Operators

Maintenance staff
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

- **Improved CPU performance**

<table>
<thead>
<tr>
<th>Processing time</th>
<th>100</th>
<th>67</th>
<th>25</th>
</tr>
</thead>
<tbody>
<tr>
<td>MP2300S/MP2310</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MP3300/MP3300/</td>
<td>15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CPU-301/CPU-302</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*: 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

**Σ-7W**
- 2-axis SERVOPACKs (200 W x 2 axes to 1 kW x 2 axes)
- 3.1 kHz response frequency
- Improved vibration suppression

**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.

**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)

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

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

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

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

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.

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

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

Dramatically improve the vibration suppression. (Refer to Issue 2.)

Camera 2
Camera 1
Camera 2
Camera 1

Before positioning correction
After positioning correction

Position command speed
Positioning Completion signal

Vibration occurs
Vibration at the edge of equipment
Position deviation

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

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

Highest performance in the industry

Highest performance in the industry

Σ-7 Servos
(3.1 kHz response frequency)
Improved vibration suppression

Σ-7 Servo Drives

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

Just the trick!
Ease of use

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

<table>
<thead>
<tr>
<th>Features of Σ-7</th>
<th>Features of MP3300</th>
</tr>
</thead>
</table>

**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.

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

<table>
<thead>
<tr>
<th>Σ-V Series</th>
<th>Σ-7 Series</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allowable load moment of inertia ratio</td>
<td>30 times (max.)</td>
</tr>
<tr>
<td>Max. control gain</td>
<td>Speed loop gain 40 Hz (approx.)</td>
</tr>
</tbody>
</table>

**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)

**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.

- Using the DIP Switch
- Using the MPE720 support tool

Multi-axis one-parameter tuning screen (Using MPE720 Ver.7) Under development
Save time and reduce costs with Yaskawa's ideal motion control system

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

Positioning Systems that Use PLC

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

Positioning System with MP3300
The same motion control programs can be used by applying the MP3000 Series, which can be connected to the PLC of each company.

Solution

PLC connection with a simple setup and easy programming

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.

Easy connection to PLC!
Satisfies specifications for use overseas and in harsh operating conditions

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

*: Derating required.

Waterproof protective structure upgrade to IP67 rating

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

Protective Structure (IEC60034-5)

IP 67

- Rating for protection from water:
The units can be used even when they are immersed in water under specific conditions (immersed at a depth of 1 m below the surface of the water for 30 minutes).
- Rating for protection from contact and entry of solid foreign objects:
Safe dust-proof structure
Structure is completely protected from the entry of dust.

Saves energy with effective use of regenerative energy

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.

Supports energy conservation 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.
Safety and security

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

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

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

Several kinds of powerful functions to prevent unauthorized access

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

The SigmaTouch! smartphone application can be used to enhance product lifecycle management and maintenance service. The product manufacturing information used specifically by each customer can easily be saved and displayed at any time.

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.

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**Single or multiple orders possible after specifying parameters (BTO)**

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
    - Writing the parameters for each unit means time is wasted
  - Assembly

**Solution**

- **The Σ-7 SERVOPACKs are delivered with the customer-specified parameters already written prior to shipment.**
  - This reduces the man-hours involved in system assembly work.
  - The names of the axes are printed on the boxes in which the products are delivered. This ensures that these are no mistakes made when installing the axes.

No need to write the parameters
### Product management and maintenance service

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

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

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

### Easier and faster troubleshooting options

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.

<table>
<thead>
<tr>
<th>Issue</th>
<th>Production cycle</th>
<th>Solution</th>
<th>Production cycle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Problem occurs ⇒ Production steps</td>
<td></td>
<td>Immediate recovery! Actual cause traced quickly</td>
<td></td>
</tr>
<tr>
<td>Time is lost and losses are incurred.</td>
<td></td>
<td>Less downtime!</td>
<td></td>
</tr>
<tr>
<td>There is no manual… We have no idea what the real cause is… How long will we be stuck like this…</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Features:**
- QR reading
- Troubleshooting details will be displayed by holding a smartphone up to the product.
- Less downtime
- 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

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.

<table>
<thead>
<tr>
<th>Issue</th>
<th>Production cycle</th>
<th>Solution</th>
<th>Production cycle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regular maintenance So there is no need to replace the SERVOPACK at this time?</td>
<td></td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>A problem has occurred in a part that is reaching the end of its service life ⇒ Production stops.</td>
<td></td>
<td>Operation continues with no losses.</td>
<td></td>
</tr>
<tr>
<td>We should have monitored the maintenance requirements of the replacement parts!</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Features:**
- The operating statuses of the motion system can be monitored using the MP3300.
- Service Life Monitor
Rich lineup of products offered by Yaskawa’s partner companies

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

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.

Controller Network
- Supported open networks
  - FL-net
  - EtherNet/IP
  - Ethernet
  - RS-232C, RS-422/485

Motion Network
- Open network
  - MECHATROLINK-III
  - MECHATROLINK-II

Field Network
- Supported open networks
  - DeviceNet
  - PROFIBUS
  - PROFINET
  - CC-Link
  - CompoNet
  - EtherCAT

- Supported closed networks
  - MP-LINK
  - HLS (Manufactured by M-System Co., Ltd.)
  - A-net/A-Link (By Algo System Co., Ltd.)
  - CLnet (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.
- RKIC 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

Controller Network
- Option modules for MP2000 and MP3000 series

Rich lineup of products offered by Yaskawa’s partner companies
## 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.

### External sizes and installation

**Compatible with MP2000 series**

<table>
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<tr>
<th>Machine Controller</th>
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</thead>
<tbody>
<tr>
<td>External sizes and installation</td>
</tr>
<tr>
<td>Parameters and applications</td>
</tr>
</tbody>
</table>

- **Same size**
  - **MP2000 Series**
  - **MP3000**

**Installation interchangeability with the models in the Σ-V SERVOPACK 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-V bottom**
- **Mounting holes on Σ-7 top**
- **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.

### Parameters and applications

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

<table>
<thead>
<tr>
<th>SERVOPACK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installation interchangeability with the models in the Σ-V SERVOPACK 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.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Servomotor</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Σ-7 SERVOPACKs are compatible with models of the same capacity in the Σ-V series SERVOPACKs.</td>
</tr>
</tbody>
</table>

- **Σ-V**
  - 200 W □60 mm
- **Σ-7**
  - 200 W □60 mm
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.

### BTO Service

You can order customized SERVOPACKs from the website!

**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.

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.

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

MechatroCloud is available in Japan only.

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+. 

Example of Nameplate

Model : SGDS7-R70A20A000000B
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.
**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.

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**Easy troubleshooting with SigmaTouch!**

**Anytime, Anywhere**

*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.

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.
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.
Machine Controller

MP3000 Series

Modular Type

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.

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

MP3300

Unit Connection Type

Machine Controller

MP3200

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

MP3100

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.

NEW
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.

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

**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 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 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 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 ?**

<table>
<thead>
<tr>
<th>PLC</th>
<th>Machine Controller</th>
</tr>
</thead>
<tbody>
<tr>
<td>I/O</td>
<td>I/O</td>
</tr>
<tr>
<td>I/O</td>
<td>I/O</td>
</tr>
<tr>
<td>I/O</td>
<td>I/O</td>
</tr>
<tr>
<td>Servomotor</td>
<td>Servomotor</td>
</tr>
<tr>
<td>Controller</td>
<td>Controller</td>
</tr>
<tr>
<td>Bulk of the work</td>
<td>Part of the work</td>
</tr>
<tr>
<td>Part of the work</td>
<td>Bulk of the work</td>
</tr>
</tbody>
</table>

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

Position Control
- Advances to the target position, and stops or holds.

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

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

Switch between any of the modes while online

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

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

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.

The MP3000 Series Brings a Cornucopia of Solutions
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.

**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

<table>
<thead>
<tr>
<th>Controller Name</th>
<th>MP2200 (Conventional)</th>
<th>MP3200</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of high-speed scan drawings</td>
<td>200 DWGs</td>
<td>1000 DWGs</td>
</tr>
<tr>
<td>No. of low-speed scan drawings</td>
<td>500 DWGs</td>
<td>2000 DWGs</td>
</tr>
<tr>
<td>No. of user function drawings</td>
<td>500 DWGs</td>
<td>2000 DWGs</td>
</tr>
</tbody>
</table>

○ Fast times reference

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

**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.

<table>
<thead>
<tr>
<th>Controller Name</th>
<th>MP2200</th>
<th>MP3200</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of high-speed scan drawings</td>
<td>200 DWGs</td>
<td>1000 DWGs</td>
</tr>
<tr>
<td>No. of low-speed scan drawings</td>
<td>500 DWGs</td>
<td>2000 DWGs</td>
</tr>
<tr>
<td>No. of user function drawings</td>
<td>500 DWGs</td>
<td>2000 DWGs</td>
</tr>
</tbody>
</table>

○ 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.

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.

**New memory area increases the speed of applications**

A capacity 16 times larger than the MP2000

<table>
<thead>
<tr>
<th>Item Specifications</th>
<th>CPU-201</th>
<th>CPU-202</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performance</td>
<td>250 μs to 32.0 ms</td>
<td>125 μs to 32.0 ms</td>
</tr>
<tr>
<td>No. of axes controlled</td>
<td>32 axes</td>
<td>32 axes</td>
</tr>
<tr>
<td>Communication interface</td>
<td>Ethernet 1BASE-T/100BASE-TX port × 2 (hub)</td>
<td></td>
</tr>
</tbody>
</table>
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.

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.

<table>
<thead>
<tr>
<th>Item</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performance</td>
<td>Rate of improved operation</td>
</tr>
<tr>
<td>Image processing</td>
<td>Blob analysis</td>
</tr>
<tr>
<td></td>
<td>Template matching</td>
</tr>
<tr>
<td>Image input</td>
<td>Camera interface</td>
</tr>
<tr>
<td></td>
<td>No. of pixels</td>
</tr>
<tr>
<td>Monitor output</td>
<td>Monitor interface</td>
</tr>
<tr>
<td></td>
<td>Display colors</td>
</tr>
<tr>
<td>Operating interface</td>
<td>Trackball</td>
</tr>
<tr>
<td>Communication interface</td>
<td>Ethernet</td>
</tr>
<tr>
<td>Memory</td>
<td>Image capture memory</td>
</tr>
<tr>
<td></td>
<td>Image analysis memory</td>
</tr>
<tr>
<td></td>
<td>Image display memory</td>
</tr>
<tr>
<td></td>
<td>External memory</td>
</tr>
<tr>
<td>I/O</td>
<td>Trigger input</td>
</tr>
<tr>
<td></td>
<td>Flashlight output</td>
</tr>
<tr>
<td>Programming methods</td>
<td>Image processing programs</td>
</tr>
<tr>
<td></td>
<td>User window creation</td>
</tr>
</tbody>
</table>

*: Compared with the MYVIS YV260
*²: Under development
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.

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*

<table>
<thead>
<tr>
<th>Processing time</th>
<th>MP2300S</th>
<th>MP3300/ CPU-301</th>
<th>MP3300/ CPU-302</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 ms</td>
<td>1.5 times</td>
<td>1 times</td>
<td>1 times</td>
</tr>
</tbody>
</table>

* 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.

<table>
<thead>
<tr>
<th>MECHATROLINK-III</th>
<th>Transmission Speed</th>
<th>Transmission Cycles (Number of Connected Stations)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 Mbps</td>
<td>125 μs (4 stations)</td>
<td>500 μs (14 stations)</td>
</tr>
<tr>
<td></td>
<td>250 μs (8 stations)</td>
<td>1.0 ms (16 stations)*</td>
</tr>
</tbody>
</table>

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

Expanded program capacity

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

* 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.

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.

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

<table>
<thead>
<tr>
<th>Items</th>
<th>MP3300</th>
<th>MP3200</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Performance comparison of CPU Module</strong>&lt;sup&gt;1&lt;/sup&gt;</td>
<td></td>
<td></td>
<td>*1: When compared to MP2310 and MP2200/CPU-02</td>
</tr>
<tr>
<td>Number of slots (on main rack)</td>
<td>1/3/8</td>
<td>3/5/8</td>
<td></td>
</tr>
<tr>
<td>Rack expansion</td>
<td>Possible</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multi-CPU configuration</td>
<td>Not possible</td>
<td>Possible&lt;sup&gt;2&lt;/sup&gt;</td>
<td>*2: Up to 5 modules, including the main CPU module</td>
</tr>
<tr>
<td>Ethernet</td>
<td>100Base-TX ×1 port</td>
<td>100Base-TX × 2 ports (HUB)&lt;sup&gt;3&lt;/sup&gt;</td>
<td>*3: Built-in HUB function</td>
</tr>
<tr>
<td>USB I/F</td>
<td>Provided (for storage device)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### MECHATROLINK I/F

| SVC | CPU-301 250 μs, CPU-302 125 μs<sup>4</sup> | Provided (125 μs<sup>5</sup>) | *4: Minimum communications cycle |
| SVR | 16 axes | 32 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
- **Table data**: 1 MB | 3 MB |
- **M registers**: 1 M words |
- **User memory**: 15 MB | 31 MB |

#### Optional modules

All MP2000 series optional modules available

#### MotomanSync-MP

- **Ethernet connection**: Supported
- **Ethernet MP3000 bus connection**: Supported

#### Basic functions

- **Number of ladder programs**: High-speed scan DWGs: max. 1000, Low-speed scan DWGs: max. 2000, User function DWGs: max. 2000, Motion programs: max. 512
- **Register types**: S/M/G/I/O/C/D/#
- **Data types**: B/W/L/Q/F/D/A
- **Index registers**: Subscripts I/J, and array registers
- **Register capacity**: M registers: 1 M words, G registers: 2 M words

#### Motion control functions

- **Slave functions**: Supported
- **Slave CPU synchronization**: Supported

#### Communications functions

- **Automatic reception**: Supported (Maximum number of automatic reception connections: 10)
- **File transfer functions**: Supported (FTP server/client)

#### Data tracing functions

- **Number of groups**: 1, 2, 4 (selectable)
- **Trace memory**: 256 K words/4 groups | 1 M words/4 groups |
- **Traceable data points**: 16 points/group

#### Data logging functions

- **Number of groups**: 4
- **Number of log files**: Built-in RAM disk (max. 8 MB), or USB memory device (4 GB<sup>6</sup>)
- **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
- **Monitoring**: Supported
- **Multi-axis tuning**: Development planning<sup>6</sup> |

<sup>1</sup>: When compared to MP2310 and MP2200/CPU-02

<sup>2</sup>: Up to 5 modules, including the main CPU module

<sup>3</sup>: Built-in HUB function

<sup>4</sup>: Minimum communications cycle

<sup>5</sup>: When using recommended USB memory device

<sup>6</sup>: 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.

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SVC-01</td>
<td>MECHATROLINK-III × 1 channel</td>
</tr>
<tr>
<td>SVB-01</td>
<td>MECHATROLINK-II × 1 channel</td>
</tr>
<tr>
<td>SVA-01</td>
<td>Analog-output 2-axis servo control</td>
</tr>
<tr>
<td>PO-01</td>
<td>Pulse-output 4-axis servo control</td>
</tr>
</tbody>
</table>

Note: One CPU can control up to 16 modules.

**I/O Modules**

Provides digital or analog I/O interface.

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LIO-01</td>
<td>Digital input: 16 points (sink output mode)</td>
</tr>
<tr>
<td></td>
<td>Digital input: 16 points (sink output mode)</td>
</tr>
<tr>
<td></td>
<td>Pulse input: 1 point</td>
</tr>
<tr>
<td>LIO-02</td>
<td>Digital input: 16 points (source output mode)</td>
</tr>
<tr>
<td></td>
<td>Digital output: 16 points (source output mode)</td>
</tr>
<tr>
<td></td>
<td>Pulse input: 1 point</td>
</tr>
<tr>
<td>LIO-04</td>
<td>Digital input: 32 points</td>
</tr>
<tr>
<td></td>
<td>Digital output: 32 points</td>
</tr>
<tr>
<td></td>
<td>(sink output mode)</td>
</tr>
<tr>
<td>LIO-05</td>
<td>Digital input: 32 points</td>
</tr>
<tr>
<td></td>
<td>Digital output: 32 points</td>
</tr>
<tr>
<td></td>
<td>(sink output mode)</td>
</tr>
<tr>
<td>LIO-06</td>
<td>Digital input: 8 points</td>
</tr>
<tr>
<td></td>
<td>Digital output: 8 points</td>
</tr>
<tr>
<td></td>
<td>(sink output mode)</td>
</tr>
<tr>
<td></td>
<td>Analog input: 1 channel</td>
</tr>
<tr>
<td></td>
<td>Analog output: 1 channel</td>
</tr>
<tr>
<td></td>
<td>Pulse counter: 1 channel</td>
</tr>
<tr>
<td>DO-01</td>
<td>Digital input: 64 points (sink output mode)</td>
</tr>
<tr>
<td>AI-01</td>
<td>Analog input: 8 channels</td>
</tr>
<tr>
<td>AO-01</td>
<td>Analog output: 4 channels</td>
</tr>
<tr>
<td>CNTR-01</td>
<td>Pulse-input counter</td>
</tr>
</tbody>
</table>

**Communication Modules**

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

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>218F-01</td>
<td>Ethernet (10BASE-T) port × 1</td>
</tr>
<tr>
<td></td>
<td>RS-232C port × 1</td>
</tr>
<tr>
<td>218F-02</td>
<td>Ethernet (100BASE-TX) port × 1</td>
</tr>
<tr>
<td></td>
<td>RS-232C port × 1</td>
</tr>
<tr>
<td>217F-01</td>
<td>RS-232C port × 1</td>
</tr>
<tr>
<td></td>
<td>RS-422/485 port × 1</td>
</tr>
<tr>
<td>260F-01</td>
<td>DeviceNet port × 1</td>
</tr>
<tr>
<td></td>
<td>RS-232C port × 1</td>
</tr>
<tr>
<td>261F-01</td>
<td>PROFIBUS port × 1</td>
</tr>
<tr>
<td></td>
<td>RS-232C port × 1</td>
</tr>
<tr>
<td>262F-01</td>
<td>Ethernet (10BASE-TX) port × 1</td>
</tr>
<tr>
<td></td>
<td>(100BASE-TX) port × 1</td>
</tr>
<tr>
<td>263F-01</td>
<td>EtherNet/IP (Scanner and adapter) port × 1</td>
</tr>
<tr>
<td>264F-01</td>
<td>Port for EtherCAT slave × 2</td>
</tr>
<tr>
<td></td>
<td>(1 circuit)</td>
</tr>
<tr>
<td>265F-01</td>
<td>CompoNet port × 1</td>
</tr>
<tr>
<td>266F-01</td>
<td>PROFINET master</td>
</tr>
<tr>
<td>266F-02</td>
<td>PROFINET slave</td>
</tr>
<tr>
<td>215AF-01</td>
<td>MPLINK communication/RS-232C</td>
</tr>
<tr>
<td></td>
<td>CP-215 communication/RS-232C</td>
</tr>
</tbody>
</table>

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**

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IO2310</td>
<td>64-point I/O (sink mode output)</td>
</tr>
<tr>
<td>IO2330</td>
<td>64-point I/O (sink mode output)</td>
</tr>
<tr>
<td>PL2900</td>
<td>Reversible counter</td>
</tr>
<tr>
<td>PL2910</td>
<td>Pulse output</td>
</tr>
<tr>
<td>AN2900</td>
<td>Analog input</td>
</tr>
<tr>
<td>AN2910</td>
<td>Analog output</td>
</tr>
<tr>
<td>IO2900</td>
<td>16-point input</td>
</tr>
<tr>
<td>IO2910</td>
<td>16-point output</td>
</tr>
<tr>
<td>IO2920</td>
<td>8-point I/O</td>
</tr>
<tr>
<td>IO2950</td>
<td>Relay output</td>
</tr>
</tbody>
</table>

**MECHATROLINK-III Compatible Modules**

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MTD2310</td>
<td>64-point input (sink/source input)</td>
</tr>
<tr>
<td></td>
<td>64-point output (sink/source input)</td>
</tr>
<tr>
<td>MTA2900</td>
<td>Analog input (8 channels)</td>
</tr>
<tr>
<td>MTA2910</td>
<td>Analog output (4 channels)</td>
</tr>
<tr>
<td>MTP2900</td>
<td>Pulse input: 2 channels</td>
</tr>
<tr>
<td>MTP2910</td>
<td>Pulse output: 4 channels</td>
</tr>
</tbody>
</table>

**Connection Module**

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

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXIOIF</td>
<td>Expansion Interface Module</td>
</tr>
</tbody>
</table>

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

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

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

3. 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.

4. 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).

Improved Traceability for Large-Scale Systems

1. Easily Collect Large Quantities of Data
   Save logs of the equipment operation conditions in the computer’s HDD or USB memory device.

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.

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.

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

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of cameras connected</td>
<td>4</td>
</tr>
<tr>
<td>Camera interface</td>
<td></td>
</tr>
<tr>
<td>Analog</td>
<td>300,000 to 1,250,000 pixel (1280 x 960)</td>
</tr>
<tr>
<td>Digital (camera link)</td>
<td>300,000 to 5,000,000 pixel (2440 x 2048)</td>
</tr>
<tr>
<td>Simultaneous image capture</td>
<td>4 (2 for 5,000,000 pixel)</td>
</tr>
<tr>
<td>External trigger input</td>
<td>4 simultaneous or individual inputs</td>
</tr>
<tr>
<td>Preprocessing</td>
<td>Inter-frame operation, convolution filter (3 x 3), Morphology (Dilation / Erosion)</td>
</tr>
<tr>
<td>Monitor output</td>
<td>VGA or XGA</td>
</tr>
<tr>
<td>External interface</td>
<td></td>
</tr>
<tr>
<td>Field network</td>
<td>MECHATROLINK-II</td>
</tr>
<tr>
<td>Ethernet</td>
<td>10BASE-T/100BASE-TX</td>
</tr>
<tr>
<td>Serial communications</td>
<td>RS-232C x 2 channels (115.2 kbps max.)</td>
</tr>
<tr>
<td>Parallel I/O</td>
<td>General purpose output 16 points + alarm 2 points + trigger input 1 point</td>
</tr>
<tr>
<td>Trackball</td>
<td>USB mouse interface</td>
</tr>
<tr>
<td>Program development</td>
<td>C language (SH-C compiler Ver. 9 or later)</td>
</tr>
</tbody>
</table>
The AC Servo Drives \( \Sigma \) 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 \( \Sigma \) series in 1992. Since then, Yaskawa has continued to develop the \( \Sigma \) series, focusing on making these products compact, and enhancing performance and ease of use. As a result of these efforts, the total shipments of AC servomotors reached 10 million units in March 2012.

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

The \( \Sigma\)-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.

\( \Sigma\)-S Series

Easy, compact, and low price!
The \( \Sigma\)-S series is recommended for applications that do not conventionally use Servo Drives, and enables servo control of pneumatic and other equipment.
Large-capacity AC Servo Drives feature superlative performance, simple startup, and outstanding expand ability. These drives also help achieve considerable energy savings.

The powerful Σ-V mini 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.

Large-capacity Σ-V Servo Drives feature superlative performance, simple startup, and outstanding expand ability. These drives also help achieve considerable energy savings.
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. KAES80000123]

**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 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*. 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-7 Servo Drives satisfy of SIL3 the functional safety standard IEC61508 (first certification in Japan*2). Temperature sensors are incorporated as a standard feature, and signs of abnormalities can be caught at an early stage by monitoring the temperature from a host controller.

**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-7 series is ensured, and Σ-7 parameters can be converted simultaneously to Σ-7 parameters using the SigmaWin+ parameter converter.
**Rotary Servomotors**

<table>
<thead>
<tr>
<th>Model</th>
<th>Rated Output (kW)</th>
<th>Max. Force (N·m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SGMJ</td>
<td>0.3</td>
<td>0.01</td>
</tr>
<tr>
<td>SGM7A</td>
<td>0.75</td>
<td>0.05</td>
</tr>
<tr>
<td>SGM7B</td>
<td>1.5</td>
<td>0.1</td>
</tr>
<tr>
<td>SGM7C</td>
<td>15</td>
<td>0.3</td>
</tr>
</tbody>
</table>

**Direct Drive Servomotors**

<table>
<thead>
<tr>
<th>Model</th>
<th>Instantaneous Max. Torque (N·m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SGM7 (Coreless, Inner Rotor: Small Capacity)</td>
<td>6.00 105</td>
</tr>
<tr>
<td>SGM7F (With Core, Inner Rotor: Small Capacity)</td>
<td>4.00 400</td>
</tr>
<tr>
<td>SGM7D (With Core, Outer Rotor)</td>
<td>135 600</td>
</tr>
</tbody>
</table>

**Linear Servomotors and Linear Sliders**

<table>
<thead>
<tr>
<th>Model</th>
<th>Max. Force (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SGLG (Coreless model)</td>
<td>3000 7560</td>
</tr>
<tr>
<td>SGLFW2 (Model with F-type iron core)</td>
<td>380 7500</td>
</tr>
<tr>
<td>SGLT (Model with T-type iron core)</td>
<td>10 25</td>
</tr>
<tr>
<td>SGTMM (Σ-Trac-μ)*</td>
<td>40 500</td>
</tr>
</tbody>
</table>

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

■ 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.

<table>
<thead>
<tr>
<th>Communications protocol</th>
<th>MECHATROLINK-III</th>
<th>MECHATROLINK-II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical layer</td>
<td>Ethernet</td>
<td>Same as RS-485</td>
</tr>
<tr>
<td>Baud rate</td>
<td>100 Mbps</td>
<td>10 Mbps</td>
</tr>
<tr>
<td>Transmission cycle</td>
<td>2-7S: 125 µs to 4 ms, 2-7W: 250 µs to 4 ms</td>
<td>125 µs to 4 ms</td>
</tr>
<tr>
<td>Number of transmission bytes</td>
<td>32 or 48 bytes/station</td>
<td>17 or 32 bytes/station</td>
</tr>
<tr>
<td>Number of slaves</td>
<td>62 max.</td>
<td>30 max.</td>
</tr>
<tr>
<td>Maximum transmission distance</td>
<td>75 m between stations</td>
<td>50 m total (100 m with Repeater)</td>
</tr>
<tr>
<td>Minimum distance between stations</td>
<td>20 cm</td>
<td>50 cm</td>
</tr>
</tbody>
</table>

■ Analog Voltage/Pulse Train Reference

<table>
<thead>
<tr>
<th>Reference voltage</th>
<th>Speed control</th>
<th>Max. input voltage</th>
<th>Factory setting</th>
<th>Max. input voltage</th>
<th>Factory setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analog voltage reference</td>
<td></td>
<td>±12 V (forward speed reference with positive reference)</td>
<td>6 VDC at rated speed (Input gain setting can be changed.)</td>
<td>±12 V (forward torque reference with positive reference)</td>
<td>3 VDC at rated torque (Input gain setting can be changed.)</td>
</tr>
<tr>
<td>Torque control</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Position control</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Reference pulse</th>
<th>Type</th>
<th>Form</th>
<th>Max. input pulse frequency*</th>
<th>Clear signal (Position error clear)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analog voltage reference</td>
<td>Select one: Sign + pulse train, CW + CCW pulse train, or two-phase pulse train with 90° phase differential</td>
<td>For line driver, open collector</td>
<td></td>
<td>For line driver, open collector</td>
</tr>
<tr>
<td>Torque control</td>
<td>Sign + pulse train, CW + CCW pulse train, Two-phase pulse train with 90° phase differential</td>
<td>For line driver, open collector</td>
<td>1 Mpps</td>
<td>Based on line driver, open collector</td>
</tr>
<tr>
<td>Position control</td>
<td>Sign + pulse train, CW + CCW pulse train, Two-phase pulse train with 90° phase differential</td>
<td>For line driver, open collector</td>
<td>200 kpps</td>
<td>Based on line driver, open collector</td>
</tr>
</tbody>
</table>

* 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 Z-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.

See pages 39 and 40 for SERVOPACKs with option modules and details on these option modules.
Optimal expandability can be achieved by attaching an optional module to the SERVOPACK.

### Combination of SERVOPACKs and Option Modules

<table>
<thead>
<tr>
<th>SERVOPACK (Model Number)</th>
<th>Option Module</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analog Voltage and Pulse Train Reference</td>
<td>✓</td>
</tr>
<tr>
<td>MECHATROLINK-II Communications Reference</td>
<td>✓</td>
</tr>
<tr>
<td>MECHATROLINK-III Communications Reference</td>
<td>✓</td>
</tr>
<tr>
<td>MECHATROLINK-III Communications Reference (Two Axes)</td>
<td>×</td>
</tr>
</tbody>
</table>

### Specifications

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

### Application Examples

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

**Using Commands**

- 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**

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

* : Not required depending on the type of the external encoder.

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

**With Safety Functions**

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**

<table>
<thead>
<tr>
<th>Safety Standards</th>
<th>Applicable Standards</th>
<th>Products</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety of Machinery</td>
<td>EN ISO13849-1: 2015</td>
<td>SERVOPACK + Safety Module</td>
<td>This safety function is equivalent to the STO function. It shuts OFF the power supply to the motor.</td>
</tr>
<tr>
<td></td>
<td>IEC 60204-1</td>
<td></td>
<td>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.</td>
</tr>
<tr>
<td>Functional Safety</td>
<td>IEC 61508 Series</td>
<td></td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td>IEC 62061</td>
<td></td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td>IEC 61800-5-2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EMC</td>
<td>IEC 61326-3-1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**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.

<table>
<thead>
<tr>
<th>Products</th>
<th>Description</th>
</tr>
</thead>
</table>
| SERVOPACK + Safety Module | }
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.

Choose the Best SERVOPACK for the Application

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.

### FT Specifications

<table>
<thead>
<tr>
<th>Applications</th>
<th>Additional Functions</th>
<th>Features</th>
<th>Interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>FT19 Tracking</td>
<td>Built-in Less Deviation Control</td>
<td>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.</td>
<td>✓</td>
</tr>
<tr>
<td>FT21 Machining and Cutting</td>
<td>Feed Shaft Supporting</td>
<td>Improved tracking ability and high-accuracy machining operations with the use of clearance (constant distance) control, predictive control, and quadrant projection compensation functions.</td>
<td>✓</td>
</tr>
<tr>
<td>FT40 Press and Injection Molding</td>
<td>Pressure Feedback</td>
<td>Highly accurate pressure control with input of pressure sensor signals directly to the SERVOPACK.</td>
<td>✓</td>
</tr>
<tr>
<td>FT41 Press and Injection Molding</td>
<td>Pressure Feedback</td>
<td>Highly accurate pressure control by feeding back the signals of the pressure sensors directly to the SERVOPACK through the MECHATROLINK-I/O system.</td>
<td>✓</td>
</tr>
<tr>
<td>FT60 Conveyance</td>
<td>Three-Point Latching</td>
<td>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.</td>
<td>✓</td>
</tr>
<tr>
<td>FT62 Conveyance and Alignment</td>
<td>Triggers at Pre-set Positions and Rotational Coordinate System</td>
<td>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.</td>
<td>✓</td>
</tr>
<tr>
<td>FT77 Conveyance</td>
<td>Built-in Torque/Force Assistance</td>
<td>Multiple SERVOPACKs can be used for applications that require more than one axis to easily build a system that will increase the torque or force up to five times.</td>
<td>✓</td>
</tr>
<tr>
<td>FT79 Indexing</td>
<td>Built-in INDEXER</td>
<td>Convenient positioning functions (ZONE signal outputs, job speed table, homing, other) added for high-precision and high-speed positioning without a motion controller.</td>
<td>✓</td>
</tr>
<tr>
<td>FT82 For Special Motors</td>
<td>SGM7D Motor Drive</td>
<td>SERVOPACKs with high torque, high precision, and a user-friendly design for SGM7D motors.</td>
<td>✓</td>
</tr>
<tr>
<td>FT83 For Special Motors</td>
<td>SGM7D Motor Drive</td>
<td>SERVOPACKs with built-in INDEXER for SGM7D motors.</td>
<td>✓</td>
</tr>
</tbody>
</table>
New Two-Axis SERVOPACKs with Built-in Controllers!

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

Simple, All-in-One System Configuration

Features

Less system space required
- Configure up to six axes.
- Build small-scale equipment system without PLC using one SERVOPACK.
- Expand functionality by mounting an option 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.

MP2000-series
Optional Module*

Option Unit

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 EX03IF.
Rotary Servomotors

**SGMMV model (Low inertia, ultra-small capacity)**
- Instantaneous peak torque: 350% of rated torque
- Protective structure: IP67
- Mounted high-resolution serial encoder: 24 bits
- Cable installation direction is possible both toward load and away from load.

<table>
<thead>
<tr>
<th>Rated output</th>
<th>Rated speed/Max. speed (min⁻¹)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 W to 30 W</td>
<td>3000/6000</td>
</tr>
</tbody>
</table>

**SGM7J model (Medium inertia, high speed)**
- Instantaneous peak torque: 350% of rated torque
- Protective structure: IP67
- Mounted high-resolution serial encoder: 24 bits
- Cable installation direction is possible both toward load and away from load.

<table>
<thead>
<tr>
<th>Rated output</th>
<th>Rated speed/Max. speed (min⁻¹)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 W to 750 W</td>
<td>3000/6000</td>
</tr>
</tbody>
</table>

**SGM7A model (Low inertia, high speed)**
- 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)

<table>
<thead>
<tr>
<th>Rated output</th>
<th>Rated speed/Max. speed (min⁻¹)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 W to 7 kW</td>
<td>3000/6000</td>
</tr>
</tbody>
</table>

**SGM7P model (Medium inertia, flat type)**
- Flat type
- Mounted high-resolution serial encoder: 24 bits

<table>
<thead>
<tr>
<th>Rated output</th>
<th>Rated speed/Max. speed (min⁻¹)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 W to 1.5 kW</td>
<td>3000/6000</td>
</tr>
</tbody>
</table>

**SGM7G model (Medium inertia, large torque)**
- Protective structure: IP67
- Mounted high-resolution serial encoder: 24 bits

<table>
<thead>
<tr>
<th>Rated output</th>
<th>Rated speed/Max. speed (min⁻¹)</th>
</tr>
</thead>
<tbody>
<tr>
<td>300 W to 15 kW</td>
<td>1500/3000</td>
</tr>
</tbody>
</table>

---

**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.

*Easier Wiring*

<table>
<thead>
<tr>
<th>Σ-7-Series Applicable models</th>
</tr>
</thead>
<tbody>
<tr>
<td>- SGM7J</td>
</tr>
<tr>
<td>- SGM7A</td>
</tr>
<tr>
<td>- SGM7P</td>
</tr>
<tr>
<td>- SGM7G</td>
</tr>
</tbody>
</table>

**SERVOPACK**

- Encoder Cable
- Battery Case
- Main Circuit Cable
- Servomotor (with absolute encoder)

**SERVOPACK**

- Encoder Cable
- Main Circuit Cable
- Servomotor (with Batteryless Absolute Encoder)

---

**Maintenance-free**

- No time or effort for replacement
- No inventory management
- No Battery is required
Direct Drive Servomotors

- **Coreless, Inner Rotor (SGM7E)**
  - Ideal for applications that require smooth movement without speed fluctuations.
  - Built-in 24-bit encoder.
  - Low cogging with a core-less system provides smooth operation free from speed variations.

- **With Core, Inner Rotor (SGM7F)**
  - Ideal for applications that require downsizing and a shorter takt time.
  - Built-in 24-bit encoder.
  - Compact design with small rotor diameter.
  - High-speed, high-frequency positioning.
  - Low inertia.
  - Low heat generation.

- **With Core, Outer Rotor (SGM7D)**
  - Ideal for applications that require high torque, high precision, and high rigidity.
  - 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.

<table>
<thead>
<tr>
<th>Linear Servomotors</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SGLG (Coreless model)</strong></td>
</tr>
<tr>
<td>Type</td>
</tr>
<tr>
<td>Standard</td>
</tr>
<tr>
<td>High force</td>
</tr>
</tbody>
</table>

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

- **SGLFW2 (Model with F-type iron core)**
  - Standard | 2.5 to 5 | 45 to 2520 | 135 to 7560 |
  - Direct-feed mechanism for high-speed and high-precision positioning
  - The large magnetic attraction force between the moving and stationary members can be used to effectively increase the rigidity by preloading the linear guide.
  - The magnetic preloading on linear guide can help increase the system’s frequency response, improving its damping and settling performances.

- **SGLTW (Model with T-type iron core)**
  - Standard | 2.5 to 5 | 130 to 2000 | 380 to 7500 |
  - Direct-feed mechanism for high-speed and high-precision positioning
  - Yaskawa’s unique construction principles of the SGLTW linear motors negate the effects of the magnetic attraction force between the relative motor members.
  - Lack of magnetic attraction force helps extend the life of linear motion guides and minimizes noise.
  - Very little cogging

Linear Sliders

- **SGTMM (Σ-Trac-μ)**
  - Standard | 1.0 to 1.5 | 3.5 to 7 | 10 to 25 |
  - Ultra-flat profile reduces floor space requirements.
  - For applications requiring short strokes
  - Vibration-free transmission device enables high-precision positioning with a repetitive positioning accuracy of ±0.5 m max.
  - Locations of armature coils on the stator reduce the effects of heat on the table or workpiece.

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

Combinations

<table>
<thead>
<tr>
<th>Combinations</th>
<th>200 V</th>
<th>400 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Servomotor SGMVV</td>
<td>22 kW</td>
<td>30 kW</td>
</tr>
<tr>
<td>SERVOPACK SGDV</td>
<td>2BAA</td>
<td>3ZAA</td>
</tr>
<tr>
<td>Converter SGDV-COA</td>
<td>121H</td>
<td>161H</td>
</tr>
</tbody>
</table>

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.

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

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

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

\( \Sigma \cdot V \) 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]

### 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

<table>
<thead>
<tr>
<th>Model</th>
<th>Rated Output (W)</th>
<th>Rated Motor Speed/Max. Motor Speed (min(^{-1}))</th>
<th>Square Range Dimensions (mm)</th>
<th>Total Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B3E</td>
<td>3.3</td>
<td>3000/6000</td>
<td>15</td>
<td>58</td>
</tr>
<tr>
<td>B5E</td>
<td>5.5</td>
<td></td>
<td>64</td>
<td></td>
</tr>
<tr>
<td>B9E</td>
<td>11</td>
<td></td>
<td>98</td>
<td></td>
</tr>
<tr>
<td>A1E</td>
<td>10</td>
<td></td>
<td>70</td>
<td></td>
</tr>
<tr>
<td>A2E</td>
<td>20</td>
<td></td>
<td>80</td>
<td></td>
</tr>
<tr>
<td>A3E</td>
<td>30</td>
<td></td>
<td>90</td>
<td></td>
</tr>
</tbody>
</table>

### Application

These board-type SERVOPACKs enable multi-axis control of \( \Sigma \cdot V \) mini servomotors.

The machine size and wiring can be reduced by incorporating \( \Sigma \cdot V \)-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.

### SERVOPACK Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>SGDV-MD A01</th>
<th>SGDV-MD A02</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Axes</td>
<td>4, 8, or 12</td>
<td>8</td>
</tr>
<tr>
<td>Interface</td>
<td>MECHATROLINK-III (transmission cycle: 250 ( \mu )s to 4 ms)</td>
<td></td>
</tr>
<tr>
<td>Input Power Supply</td>
<td>Main circuit: 24 VDC/48 VDC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Control circuit: 24 VDC</td>
<td></td>
</tr>
<tr>
<td>Applicable Motor</td>
<td>SGMMV: 3.3 W to 30 W</td>
<td></td>
</tr>
<tr>
<td>Dimensions (mm)</td>
<td>4 axes: 170×115×46</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8 axes: 170×115×61</td>
<td></td>
</tr>
<tr>
<td></td>
<td>12 axes: 170×115×76</td>
<td></td>
</tr>
<tr>
<td></td>
<td>238×120×29</td>
<td></td>
</tr>
</tbody>
</table>
The \( \Sigma-S \) 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** SG PSS
**Servomotor Model** SGMSL

### Potential applications of the \( \Sigma-S \) Series in pneumatic equipment

#### Advantages of the \( \Sigma-S \) 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

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

<table>
<thead>
<tr>
<th>Model</th>
<th>SGMSL</th>
<th>Rated Output (W)</th>
<th>Rated Motor Speed/Max. Motor Speed (min⁻¹)</th>
<th>Encoder</th>
<th>Square Range (Dimensions) (mm)</th>
<th>Total Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A3</td>
<td>30</td>
<td>3000/6000</td>
<td>Incremental, 10 bits</td>
<td>25</td>
<td>85</td>
<td></td>
</tr>
<tr>
<td>A5</td>
<td>50</td>
<td>3000/3000</td>
<td>Incremental, 10 bits</td>
<td>40</td>
<td>92</td>
<td></td>
</tr>
</tbody>
</table>
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
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
A one-stop solution for strengthening the integration environment and system design!

The MPE 720 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. KAEP076100]

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.

- Tracing Parameter setting
- Multi-tasking Program JOG
- Axis 1
- Axis 2

Executed from MC-Configurator

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.

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.

Difference between an open and closed network

Closed network

Without retry

When using a PLC made by Company A, only I/O, servo, or other devices also made by Company A can be connected.

Open network

With retry

Even when using a PLC made by Company B, the desired I/O, servo, and other devices can be selected regardless of the manufacturer.

Retry function

What if one point is ignored?

One scan was ignored due to an error.

The instruction data from the controller to the motor is corrupted. Motor operation does not follow the proper path.

With retry

When a command is received normally by the retry function

The error is corrected within the appropriate transmission cycle. The motor operates as instructed.

Smooth shape!
Expanding MECHATROLINK family

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.

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.

Example of using message communications
Slave information is transmitted to the master using message 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.
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.

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.

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).

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

Remote operation and control with CDMA 1X

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.

**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.

1. Supports management of product life cycle
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/](http://www.ysknet.co.jp/)
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 are 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.

Engineering Support Function

● Program Transfer with an External Memory Unit!

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

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

● 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 Sigma series servo drives

Website: http://www.proface.co.jp/product/hmi/gp4000.html
**Main Partner Manufacturer**

**IP Core**

**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](http://ppg.teldevice.co.jp)

**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.

**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.

**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/](http://www.m-system.co.jp/)

**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.

Website: [http://www.algosystem.co.jp/](http://www.algosystem.co.jp/)
I/O Module

WAGO Company of Japan, Ltd.

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

WAGO-I/O-SYSTEM 750 series I/Os are module-type remote I/Os. Nodes can be constructed by combining a communication unit (bus coupler) with a function module of your choice. Various communication units that are compatible with a wide range of open fieldbus are available.

Yaskawa Electric’s MP series machine controllers can be connected via DeviceNet, EtherNet/IP, and Modbus-TCP Ethernet networks. Instruction manuals contain information on easy ways to connect the machine controller.

Function modules are available for a wide range of I/O signal types: digital I/O (2 to 16 channels), analog I/O (±10 V, 0 to 20 mA, thermocouples), serial communications, counter I/O, etc.

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

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

**MECHATROLINK Inline Bus Coupler**
Model: IL MII BK 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/)

**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- dispersion M- M, ARL6- dispersion M- M, ARL9- dispersion M- 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)
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: 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 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)

Controller for Stepping & Servo Motors
Model: CD-M582S/ADB5432

- 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 two axes with a relay unit and a DC drive for five-phase motors integrated in the compact design: 88.5 mm × 94 mm × 59 mm (W×D×H)

Website http://www.melec-inc.com

Slip ring for communications and control
Model: SRP-MLII-3
The SRP-ML slip ring enables communications with and control of drive units and systems that include rotating devices.
- Compact and highly durable structure
- Improved reliability with the new brush system that enables uninterrupted communications
- Connected directly by using MECHATROLINK-II cables

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

Slip ring 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

<table>
<thead>
<tr>
<th>Output Signal</th>
<th>Manufacturer</th>
<th>Linear Encoder Type</th>
<th>Linear Encoder Model</th>
<th>Linear Encoder Pitch μm</th>
<th>Resolution mm</th>
<th>Maximum Speed m/s</th>
<th>Support for Polarity Sensor Input</th>
<th>Application to Linear Motors</th>
<th>Application to Fully-Closed Loop Control</th>
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<tbody>
<tr>
<td>1 Vp-p Analog Voltage</td>
<td>Heidenhain Corporation</td>
<td>Exposed</td>
<td>LIDA48□</td>
<td>20</td>
<td>78.1</td>
<td>5</td>
<td>✓</td>
<td>✓</td>
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<tr>
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<td>RG520</td>
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## Absolute Linear Encoder

<table>
<thead>
<tr>
<th>Output Signal</th>
<th>Manufacturer</th>
<th>Linear Encoder Type</th>
<th>Linear Encoder Model</th>
<th>Linear Encoder Pitch μm</th>
<th>Resolution mm</th>
<th>Maximum Speed m/s</th>
<th>Support for Polarity Sensor Input</th>
<th>Application to Linear Motors</th>
<th>Application to Fully-Closed Loop Control</th>
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<tbody>
<tr>
<td>Encoder for Yaskawa’s Serial Interface</td>
<td>Magnescale Co., Ltd.</td>
<td>Sealed</td>
<td>SR75-□□□□□□□□LF</td>
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<td>9.8</td>
<td>3.33</td>
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<td>Mitutoyo Corporation</td>
<td>Exposed</td>
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<td>500</td>
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## Absolute Rotary Encoder

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<tr>
<th>Output Signal</th>
<th>Manufacturer</th>
<th>Rotary Encoder Type</th>
<th>Linear Encoder Model</th>
<th>Relay Device between Fully-Closed Module and Rotary Encoder Type</th>
<th>Resolution Bits</th>
<th>Maximum Speed min⁻¹</th>
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<tr>
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<td>Magnescale Co., Ltd.</td>
<td>Exposed</td>
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<tr>
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<td>400</td>
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http://www.yaskawa.co.jp/en/
In the event that the end user of this product is to be the military and said product is to be employed in any weapons systems or the manufacture thereof, the export will fall under the relevant regulations as stipulated in the Foreign Exchange and Foreign Trade Regulations. Therefore, be sure to follow all procedures and submit all relevant documentation according to any and all rules, regulations and laws that may apply.

Specifications are subject to change without notice for ongoing product modifications and improvements.

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