Motion Control Products
Products That Satisfy
Product performance means more than just a specification. It’s also the confidence that your machines will work as expected, in a way that consistently outperforms your competition.

Breakthrough performance- Your machine functions at a level that can’t be achieved with other automation solutions.

A competitive price- You can provide an effective, trustworthy solution at a cost that makes your machine an exceptional value.

Quality, right out of the box- Your systems work as expected, the first time and every time.

Excellence in Operation
Problems with component quality, supply chain hiccups and downtime surprises are simply unacceptable. You need a partner with the operational rigor and expertise to engineer them out of existence.

Inventory for faster fulfillment- Your products are available precisely when and where you need them.

Legendary quality- Your equipment continues to operate reliably and without intervention.

Global service and support- You can rely on timely, helpful technical assistance wherever you or your equipment may be.

Engineering Expertise. Now.
Focus your engineers on their core competencies, thanks to a team of Yaskawa engineers who can instantly add value to automation design, development and support.

Motion application expertise- Call on our automation experts to assist with electromechanical design and development.

Software development- Turn to a team of automation software specialists to streamline your development process.

Engineered systems- Implement complete mechanical and electrical sub-systems that are fully supported for the life of your machine.
Power Up Your Productivity

When More is Not Enough

In a rapidly changing global marketplace, today’s achievements are tomorrow’s expectations. Your customers demand the maximum in both machine throughput and quality, regardless of mechanical and design limitations. Your job is to do it all, and at a competitive cost.

Your Need: Performance Plus

Staying ahead of competition means constantly pushing the edge of the envelope on machine performance. This extreme effort consumes your time, stresses machine mechanisms and impacts the reliability of finished products. The result is a risk of lost revenue, or of disappointing key customers.

Your world has no room for components that can’t be trusted, or for suppliers that create delays in development and delivery.

What if ...

• You could reduce...or even eliminate...the time spent optimizing your machine’s motion performance?
• Your servo system could overcome the mechanical limitations of your design?
• You could confidently achieve big improvements in throughput and effectiveness?

Your Gain: Three Productivity Boosts

Motion control systems from Yaskawa give you real impact on equipment effectiveness. This creates confidence that a machine will work as expected every time, which gives you an advantage over your competitors.

Tuning Time Savings

Yaskawa’s well earned reputation for industry-leading performance is enhanced by our Tuning-less Mode, which eliminates the need to optimize tuning gains. Vibration Suppression automatically compensates for limitations in a machine’s mechanical design, creating more consistent performance.

Initial Quality

Defining initial quality is simple: you get what you want. Yaskawa products ship on time, work right out of the box, perform as expected, and continue to do so for the life of your machine.

Competitive Price

Yaskawa maintains a #1 market share in some of the world’s most price-sensitive industries, which is proof of Yaskawa’s superior balance between operational performance and return on your investment.

Be Confident
Excellence in Operation

Resources, Responsiveness and Reliability

Today, Quality is Only the Beginning

Your machines must operate anywhere in the world, yet one expectation is universal: the need for instant gratification in product availability, flawless performance and 24/7 service and support.

Your Need: Speed and Success

When customers demand instant perfection, you can’t afford to work with ordinary suppliers. Everyone in your supply chain must be completely reliable in supply and rapid in response to any customer question.

Quality problems simply cannot be part of the equation. Nor can a shortage in engineering support in a fast-tracked machine design process.

What If ...

• You had no worries about the reliability of your automation system?
• You could reduce your machine lead time and spare parts inventory?
• You had expert service and support everywhere your machines are located?

Your Gain: Global Excellence

Yaskawa has a long track record for reliable quality, responsive support and rapid product availability. The reason behind these achievements is a simple one: our customers can’t afford to settle for anything less.

Inventory for Faster Fulfillment

Yaskawa maintains a $14M inventory of motion products in the US, for 95%+ on-time response to customer requests.

Global Service and Support

As a truly global company with locations in 25 nations worldwide, Yaskawa can offer local experts in service and support whether your machine is installed in Asia, Europe or the Americas.

Yaskawa quality is the industry benchmark.

From 2011 to 2013, Yaskawa shipped nearly 150,000 motors in North America with only 10 warranty failures.

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Engineering Expertise, Now

Insight and Innovation, Instantly.

Top Resources for Tough Problems

Today’s companies face an acute talent shortage, yet the demand for innovative technology is stronger than ever. New designs must be brought to market in months or weeks instead of years, without sacrificing efficiency, flexibility and quality.

Many companies can’t afford a large engineering staff. The few who can must compete for engineers with automation expertise.

Engineers, or Firefighters?
Your engineering staff needs to focus on your company’s core competencies. Instead, they are distracted with putting out fires when they should be creating innovations.

These limitations slow the development of new ideas, and lead to unreliable long-term operation of your machine. Trial and error in the development process is no longer an option. Nor is downtime or lost production.

What If ...
- You could add expert automation engineers to your staff at the exact moment you need them?
- Responsibility for automation design and support could be handed off to someone you trusted?
- Your engineering staff was free to focus on areas where they can truly add value?

Your Gain: Effective Innovation
For the past 100 years of industrial history, Yaskawa engineers have learned to work as an extension of your engineering staff to create elegant, reliable automation.

The Yaskawa commitment begins by listening, fully understanding your application and process, your time frame, cost structure and the results you need to achieve. This effort sets us apart, and it results in tangible benefits that go directly to your engineering bottom line.

Motion Application Expertise
Yaskawa’s engineering expertise can be applied to any stage of machine development.
- System concept design
- Component selection
- Electrical design
- Mechatronic design
- Machine start-up
- Programming
- Optimization
- Troubleshooting

Software Development
Software design and development can be the key to the success or failure of an automated machine. Yaskawa software expertise makes the difference, thanks to a staff with equal expertise in software design and real-world machine operation.

Engineered Systems
Under the banner of Engineered Systems, Yaskawa offers a range of advanced products and services. They include complete machine retrofits, enclosure design and manufacturing, electromechanical assembly design, and integration of Yaskawa servo technology into a “purpose built” mechanism for your application.

You no longer have the luxury of a large engineering staff.

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# Global Overview

**Yaskawa—World Leader in Automation, Drive Technology, and Robotics**

Yaskawa is the world’s largest manufacturer of motion control devices, AC drives and robotics. Since 1915, we have been a pioneer in the drive to optimize the productivity and efficiency of machines and industrial systems.

- $4B/year in global sales
- 1 million servo motors per year
- 800,000 servo amplifiers per year
- 1.8 million inverters per year
- 20,000 robots per year
- Over 14,500 associates worldwide
- Yaskawa Sales, Service, and Manufacturing companies in 25 countries

## Yaskawa Global Locations

<table>
<thead>
<tr>
<th>North America &amp; South America</th>
<th>Africa</th>
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<td>U.S.A.</td>
<td>South Africa</td>
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<td>Turkey</td>
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Over the past 30 years, Yaskawa has produced more than 10 million servo amplifiers, 18 million variable frequency drives, and 300,000 robots.

## Product Portfolio: Total System Solutions

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td><strong>Software</strong></td>
<td>MotionWorks® IEC, Yaskawa’s IEC61131-3 programming environment, gives a programmer the best of several programming languages in one development platform.</td>
</tr>
<tr>
<td><strong>Machine Controllers</strong></td>
<td>MPiec Machine Controllers integrate Yaskawa’s powerful motion engine with the IEC61131-3 and PLCopen programming standards, for control from 1 to 62 axes.</td>
</tr>
<tr>
<td><strong>I/O</strong></td>
<td>Yaskawa SLIO is one of the most effective and modern decentralized I/O systems available, providing exceptional usability in an extremely compact and functional design.</td>
</tr>
<tr>
<td><strong>Sigma Series Servo Systems</strong></td>
<td>Rotary, Linear and Direct Drive servos from 3 W to 55 kW offer advanced features, including Tuning-less Mode, vibration suppression, ripple and friction compensation.</td>
</tr>
<tr>
<td><strong>Inverter Drives</strong></td>
<td>Yaskawa drives incorporate the latest technological advancements in variable speed AC motor control, with power ranges from fractional HP to 2250 HP.</td>
</tr>
<tr>
<td><strong>Robotics</strong></td>
<td>The Yaskawa Robotic product portfolio ranges from 4-15 axis industrial robots to special machines, devices and turnkey systems.</td>
</tr>
</tbody>
</table>
Yaskawa Control: What You Gain

With easy-to-learn MotionWorks® IEC software and MPiec hardware, your engineers start programming quicker and stay connected more easily.

The result? Faster machine commissioning and more rapid machine delivery to market.

A Familiar Programming Standard

MotionWorks IEC complies with IEC61131-3, and provides five globally recognized standard programming languages. It includes motion function blocks that adhere to the PLCopen standard. Experienced control engineers will find this software comfortably familiar, and learning to program with MotionWorks IEC has never been easier.

Built-in Yaskawa Toolboxes

Yaskawa toolboxes make programming common functions so easy, it’s like having a Yaskawa engineer working by your side. Standard code elements are already written and ready for use, reducing development time.

A Reusable Code Library

Import and re-use previously developed logic to speed up new projects. Re-use your own work or use logic created by others.

Easy Connectivity, Worldwide

An MPiec controller is your gateway to full remote control of a machine at any location with internet access. Keep a constant finger on the pulse of machine operation, from your own factory floor or from poolside worldwide.

Web Server Updates

MPiec controllers allow loading of programs and updating of firmware from any web browser, with no other software required. Browser-based controller status data helps reduce maintenance time and cost.

Scalability

All our single-axis to multi-axis MPiec controllers utilize the same MotionWorks IEC software platform, making programming and maintenance consistent for all machine sizes.

Three Networks to Choose From

MPiec controllers include the MECHATROLINK motion network, plus Modbus TCP and EtherNet/IP communication networks at no extra cost. This ensures an economical way of connecting to all the devices in your machine.

All your machines need to feel and function in exactly the same way.
A controller that gets you to the position you want, when you want it:

- Deterministic high speed MECHATROLINK network
- MECHATROLINK retry function
- Dedicated CPU for your motion needs
- High CPU scan rate

Program all of your controllers the same way every time:

- Standard IEC 61131-3 programming languages
- Reusable PLCopen function blocks
- Reusable standard Yaskawa toolboxes
- Decades of high quality motion experience

Your entire machine at your fingertips with Yaskawa controllers:

- Sigma-7 servos via MECHATROLINK
- Built-in web server
- OPC server
- EtherNet/IP
- Modbus TCP
- Wide range of HMIs and I/Os
Yaskawa uses decades of motion experience to create toolboxes with pre-developed code for specific applications, minimizing programming time and effort. Libraries also enable re-use of logic you’ve previously developed, saving even more time on subsequent projects.

Sequential Function Chart
Sequential Function Chart (SFC), one of the standardized languages available in IEC 61131-3, is supported in the Professional version of MotionWorks® IEC.

SFC allows the programmer to graphically represent program elements, for easier organization of steps, actions and transitions. Active steps are indicated in red to simplify troubleshooting of complex operations.

Camming Function Blocks
Electronic camming controls the positional relationship of a pair of axes based on a master/slave lookup table. MotionWorks IEC includes 10 function blocks dedicated to camming. Yaskawa creates customizations based on the PLCopen specification, previous controller cam technology, and decades of synchronized motion experience. The function blocks fall into one of four functional topics:

- Standard Programming Environment
- On-the-fly Adjustments
- Cam Data Management
- Cam Engagement

MotionWorks IEC software complies with the IEC 61131-3 standard. It also has motion function blocks that adhere to the PLCopen standard, assuring that programs will be developed and executed with predictable behavior.

Cam Editor
A Cam Editor built into MotionWorks IEC Pro creates, edits, exports and imports Cam profiles, and converts Cam tables back and forth from ST code for programming use.
Controller Hardware

You need powerful processing to prepare for tomorrow’s innovations, without sacrificing today’s cost effectiveness and ease of use. MPiec machine control offers both, plus extra features that add user flexibility.

All MPiec Machine Controllers are equipped with the MECHATROLINK motion network. MECHATROLINK combines the speed of modern motion networks with unmatched noise immunity and robust performance. MECHATROLINK responds to a communication error by automatically resending the faulty packet within the same cycle, minimizing data gaps even in extremely high noise environments.

Without this function, the master must retransmit at a higher rate to compensate for dropped information. The result can be poor quality in machined parts, as shown in the test data at right.

Controller-Centric Commissioning
MECHATROLINK allows configuration from a single location with one software tool, minimizing commissioning time.

Remote I/O
Interface using Yaskawa’s own MECHATROLINK I/O, SLIO I/O, or third-party remote I/O modules from Phoenix, Wago or Opto 22 via MECHATROLINK or Ethernet.

Local I/O
MPiec controller hardware can be expanded with your choice of eight option cards to suit any automation requirement.

IEC on the Drive
The MP260iec Option Card, combined with a SERVOPACK amplifier, offers a compact controller/amplifier combination for programming Yaskawa’s latest high quality servo systems.

Scalability
The use of one software platform for all MPiec Machine Controllers enables users to easily scale up their applications from single to multi-axis control.

Programmable Amplifier Outputs
The controller can operate local outputs on a SERVOPACK, reducing panel cost and saving panel space when only a few outputs are necessary.

Web-based System Access
MPiec Machine Controllers have a built-in web interface for better system access. Plug into a local network and adjust parameters using any web browser, or log in anywhere in the world via a secure internet connection.

• Monitor vital control status, diagnostic and alarm information
• Change settings or update firmware remotely
• Connect via cable and enjoy on-site control with your favorite browser, or access from any remote location
• Connect via Ethernet on a computer, an Android™ or Apple® tablet

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Controller Hardware

MPiec Machine Controllers offer a wide range of hardware for applications ranging from 1 to 62 axes. All controllers are equipped with the reliable MECHATROLINK motion network.

**MP2600iec**
- Option card for a SERVOPACK amplifier
- Motion Networks Speed: As fast as 1 ms
- Motion Network: MECHATROLINK-III
- Motion Network Capability: OPC, EtherNet/IP, Modbus TCP
- Axis Count: 4, 8 or 16
- Option Card Slots: 1 or 3

**MP3200iec**
- Processor Speed: 400/800 MHz
- Motion Network: MECHATROLINK-II
- Motion Networks Speed: As fast as 0.2 ms
- Motion Network Capability: OPC, EtherNet/IP, Modbus TCP
- Axis Count: 4, 8, 16, 32 or 62
- Option Card Slots: 3, 5 or 8

**MP3300iec**
- Processor Speed: 1 GHz
- Motion Network: MECHATROLINK-III
- Motion Networks Speed: As fast as 0.25 ms
- Motion Network Capability: OPC, EtherNet/IP, Modbus TCP
- Axis Count: 4, 8, 16, 32 or 62
- Option Card Slots: 3, 5 or 8

**MECHATROLINK-III Network Components**

<table>
<thead>
<tr>
<th>Description</th>
<th>Part Number</th>
<th>Notes</th>
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<tbody>
<tr>
<td>CPU Module</td>
<td>PM3-UPM330x</td>
<td>00: Maximum number of MECHATROLINK Axes: 04: 4 • 08: 8 • 16: 16 • 32: 32 • 62: 62</td>
</tr>
<tr>
<td>Power Supply Module</td>
<td>PM3-UPMPS-330x</td>
<td></td>
</tr>
<tr>
<td>Option Module Rack</td>
<td>PM3-UPM330x</td>
<td>03: Slot number: 3 • 5 Slots • 8: 8 Slots</td>
</tr>
</tbody>
</table>

**Option Cards**

- **MP3200iec**
  - Option Card Slots: 1 or 3
  - Axis Count: 4, 8, 16, 32 or 62
- **MP3300iec**
  - Option Card Slots: 3, 5 or 8
  - Axis Count: 4, 8, 16, 32 or 62
- **MP3210iec**
  - Option Card Slots: 1 or 3
  - Axis Count: 4, 8, 16, 32 or 62

**System Components**

**MECHATROLINK-II Network Components**

<table>
<thead>
<tr>
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<tr>
<td>Controller/ SERVOPACK</td>
<td>SGZV-IEC100020000300</td>
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**Terminals Block Conversion Kits**

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<tbody>
<tr>
<td>CBK-U-MP2A</td>
<td>For LIO-04/05/06/MP2600iec</td>
<td>00: Cable Length: 50.0 m • 150.0 m • 50.0 m</td>
</tr>
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</table>

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Software

- MotionWorks IEC OPC
- MotionWorks IEC Pro
- MotionWorks IEC OPC Server
- Option Module Rack
- Software Version: A: 1 • B: 0.1 • C: 0.1 • D: 0.2 • E: Electronic

Electronic license only available for version 2 of OPC Server

---

Input Power

- D: 24 VDC • A: 100/200 VAC

Number of slots: 4: 1 slot DC, 3: 3 slots DC, 2: 8 slots DC, 1: 8 slots AC

---

Cable Length: A: 0.5 m • B: 3.0 m • C: 5.0 m • D: 10.0 m • E: 20.0 m
If you’ve wished that Input/Output could be FASTER and EASIER, SLIO is for you. Yaskawa’s decentralized I/O system is full of features that make connection simpler and I/O function more efficient.

Easy Web Interface
SLIO diagnostic and status information is accessible through a web interface, linking a standard browser to any EtherNet/IP or Mechatrolink-III fieldbus module.

High Speed Backplane Bus
Achieve reaction times as fast as 20 microseconds with SLIO’s high speed backplane bus. Connect as many as 64 modules at a time, while maintaining speeds up to 48 Mbit/s.

One-touch Hardware Configurator
SLIO puts an end to hours of tedious manual I/O configuration. The MotionWorks IEC SLIO Hardware Configurator sets up a complete I/O system with the touch of a single button.

Installer Friendly Design
Engineered for error-free installation, SLIO can be installed by an average technician without consulting a machine designer or installation engineer.

• Easy, safe assembly with no tools required
• Staircase-shaped wiring level saves space, eases connection
• Clamp terminal assignment is clearly printed on each module
• Labeling strips clearly indicate module function, replace easily after a reconfiguration

The SLIO system is designed for customers who want to modularize and standardize, yet retain a sense of flexibility. SLIO can help reduce setup time and minimize user errors.

Reconfigure Without Rewiring
Updating or amending a SLIO system is as easy as removing an existing module and snapping in a new one. System functions can be changed without removing the wiring from the contact block.
M Piec Machine Controllers

SLIO I/O

Modular Construction for Quick Assembly
Compact: Width 12.9 mm, height 109 mm, depth 76.5 mm
Standardized: Direct mounting on 35 mm standard profile rail
Extendable: The flexible design of SLIO makes it easy to expand as needed; add up to 64 signal and function modules per interface.

Interchangeable Function Modules
Choose from >120 interchangeable signal and function modules, ready to snap into an existing contact block for instant reconfiguration to a new function.
• Analog and digital inputs and outputs
• Communication processor modules
• Coupler modules
• Potential distributor modules
• Power modules
• Temperature modules
• Future modules add tomorrow’s functions with the same snap-in interconnection

Features
EtherCAT® 10 A (2 A bus supply)
Mechatrolink-II 10A (2 A bus supply)
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Width 12.9 mm, height 109 mm, depth 76.5 mm
Standardized:
Direct mounting on 35 mm standard profile rail
Extendable:
The flexible design of SLIO makes it easy to expand as needed; add up to 64 signal and function modules per interface.

Potential Distribution Modules
8X DC 24V Clamps
8X DC 0V Clamps
4X DC 24, 4X DC 0V Clamps

Power Modules
Fieldbus Module Power DC 24V
DC 24V, 10A
DC 24V, 4A (DC 5V, 2A)

Digital Input Modules
DC 24V
DC 24V 10 A Inputs
DC 24V Active Low Inputs (NPN)
DC 24V 0.5mA
DC 24V Wiring Diagnosis

Digital Output Modules
DC 24V 3 A
DC 24V, 0.5 A
DC 24V 0.5 A Active Low Inputs (NPN)
DC 30V/AC 250V 3A Relay
DC 30V/AC 250V 1.5A Relay
DC 24V, 0.5 A PWA
DC 30V/AC 250V/3A Relay (Relay)

Analog Input Modules
Load Cell 4 or 6 Wire 10 A
Load Cell 4 or 6 Wire 20 A
DC 24V 10 A
DC 24V 20 A
DC 24V 0.5 A
Thermocouple, 16 Bit
D-3000 0-10V, 16 Bit
D 4 to 20mA, 12 Bit
D 0 to 10V, 12 Bit

Analog Output Modules
0 to 10V, 12 Bit
0 (4) to 20mA, 12 Bit
±10 V, 12 Bit
0 to 10V, 16 Bit
0 (4) to 20mA, 16 Bit
±10 V, 16 Bit

Communication Modules
RS232 Interface
RS422/485 Interface

Functional Modules
Counter DC 24V 12 Bit
Counter DC 5V 12 Bit
Counter DC 24V 24 Bit

Supported by MotionWorks® IEC

Modules Supported by MotionWorks® IEC
Simplify your machine design while improving its overall effectiveness.

Sigma Series: More Built-In Tuning Power

We’ve packed 25 years of innovation and five generations of servo expertise into our Sigma Series tuning features. The complete package works together to deliver higher speed, greater precision and faster throughput than any servo on the market.

Tuning-less Mode

Every Sigma Series SERVOPACK is equipped with a tuning-less function that is enabled from the moment you pull it out of the box. This function allows the amplifier to detect load inertia and automatically adjust servo gains at the update rate of the position loop (a lightning fast 62.5 microseconds). You may never need to tune a Yaskawa servo; not at installation and never again over years of precise, productive operation.

Vibration Suppression

Sigma Series SERVOPACKs neutralize vibration, both from the motor’s motion artifacts and from resonances within the machine. It detects actual vibration frequencies and cancels them out of the motion command, creating a new machine cycle that is quicker, quieter and more efficient.

Fight friction, resonance, ripples

Every Sigma Series SERVOPACK is equipped with a complete set of compensation algorithms that virtually eliminate the mechanical impediments which rob a servo of speed, accuracy and smoothness of movement.

- Anti-resonance compensation counteracts the effects of a machine’s natural mechanical resonances
- Ripple compensation eliminates the oscillations caused by motor cogging and other motor-based vibration effects
- Friction model compensation automatically corrects for changes in machine operation caused by component wear and other friction effects over time

Better Noise Protection

Sigma Series servos are equipped with nine discrete filters to protect against electrical noise, vibration and resonance. The result is more reliable performance, faster response and greater accuracy despite long cable runs, noisy equipment and everyday variations in a machine’s mechanical condition.
Packed with Performance

More torque in less space, for an easier fit in your tightest application

- Yaskawa’s segmented stator core design and automated winding techniques pack nearly twice the copper into the stator gap, for much more torque output from every square millimeter of space
- Encapsulated windings prevent shorts between windings, improving heat dissipation
- Precise machining is used to minimize the air gap between rotor magnets and stator windings, for higher running torque and reduced cogging torque
- By reducing the space taken up by the end turns of the winding, overall motor length is significantly reduced
- Neodymium-Iron-Boron rotor magnets optimize flux density in the motor

Eliminate Mechanical Breakdowns
Simplify your machine’s design, decrease part counts and cut assembly time by replacing mechanical linkages with reliable, flexible servo control.

- Designed to accommodate up to a 30:1 inertia mismatch
- Reduce gearbox size, or eliminate gearboxes altogether
- Eliminate maintenance points in machinery and improve safety

Sigma Series Servo Motors
Packed with Performance

7 Sigma Advantages
The new generation of Sigma Series servo motors offer power, precision and reliability unmatched by anything in the automation industry. Better still, the newest Sigma-7 motors are completely compatible with Yaskawa’s industry-leading Sigma-5 products. An easy replacement can lead to an instant boost in machine productivity.

1. 20% more compact in size, for an easier fit in more applications
2. 16x better resolution radically improves positional accuracy
3. Nearly double the bandwidth yields faster speed, more throughput
4. New thermal sensors detect application problems before they affect motor life
5. Withstands ambient temperatures to 60°C for trustworthy performance in extreme environments
6. High-altitude friendly with full function assured at elevations of 2000 meters and above
7. IP67 rated for total protection against dust and the effects of water immersion to a depth of 1 m
Reduce Downtime
By eliminating gear reduction and creating a direct coupling to the machine load, direct drive motors simplify your machine’s design. Eliminating transmission components leads to fewer breakdowns and long-term reliability you can trust.

Reduce Size and Cost
Directly coupling a compact direct drive servo motor to your machine load will save physical space, which can lead to a more compact machine. When precision gearheads and other transmission components are gone, the cost of your machine will go down as well.

Boost the Quality of Your Design
Implementing direct drive motor technology leads to a host of improvements in the quality of a machine’s design.
- Less audible noise
- Reduced need for preventive maintenance of mechanical transmissions
- Overall efficiency and performance can be significantly increased, leading to a lower long term cost

Yaskawa offers a full range of linear servo products that are designed to handle the most demanding applications

Typical Applications
- Rotary Table
- XY Table
- Semiconductor Handling Robot
- Semiconductor
- Handling Robot
- Rotary Table
- XY Table
- Semiconductor Handling Robot
- Semiconductor

Sigma Series Servo Motors

Direct Drive Servo Motors

Linear Servo Motors

Yaskawa linear servo motors replace the backlash, friction, inertia and wear of mechanical linkages with smooth, precise, high performance linear motion in a compact footprint. Any product in the Yaskawa linear servo family offers plug-and-play connection with Sigma-7 and Sigma-5 series SERVOPACK amplifiers, using automatic motor recognition and serial encoder technology to make implementation trouble free.

SGLG Coreless
Achieve smooth linear motion with an ironless design that eliminates motor cogging.
- 200 V windings
- 40 to 3000 N of peak force
- Standard and high force magnetic ways
- Zero cogging for minimal force ripple

SGLF2 Iron Core
Second generation iron core design that delivers high force and speed in a compact form.
- 200 V or 400 V windings
- 135 to 7560 N of peak force
- 5 m/s peak speed

SGLT Dual Magnet Iron Core
An iron core design featuring dual magnets, producing high output in a compact footprint.
- 200 V or 400 V windings
- 380 to 7500 N of peak force
- 5 m/s peak speed
- Very little cogging

Sigma Trac II
Ready-to-run linear stage solution featuring the latest linear motor technology for high performance and repeatability with excellent reliability.
- 200V or 400V windings
- Length up to 1.55 m
- Peak force up to 540 N

Need for Speed?
If your application requires linear speeds and accelerations that go beyond the capabilities of traditional mechanisms, take a look at Yaskawa linear motors.

More Performance
Direct coupling to the machine load eliminates mechanical linkages, significantly improving responsiveness and reliability.

Engineered Solutions
The Sigma Trac linear motor stage reduces machine design complexity and commissioning time.
SERVOPACKs with features that amp up productivity

Product Overview

Sigma Series SERVOPACKs

A "Smarter" Amplifier for Extra Productivity

Every Yaskawa servo motor has a companion SERVOPACK amplifier, with built-in control software that simplifies setup, fine tunes performance and boosts automation efficiency.

The Yaskawa Tuning Suite

Yaskawa equips each SERVOPACK with a suite of software commissioning and tuning tools, designed to achieve full functioning right out of the box. This superior performance continues in spite of all the vibration, resonance, friction and noise that a modern automated machine can dish out.

Get rid of effects that steal away performance

Unwanted mechanical effects rob a servo system of the quick, smooth and precise movement you need. Yaskawa SERVOPACKs are equipped with suppression features that automatically eliminate harmful artifacts.

Vibration

Machine vibrations are eliminated by Yaskawa Vibration Suppression, which samples your equipment's natural oscillations and uses compensating frequencies to cancel them out.

Ripples

Motor cogging effects are removed by Ripple Compensation, an especially important effect for systems that require minimum settling time and exceptionally precise positioning.

Resonance

Sigma-7 amplifiers have twice as many anti-resonance filters to more effectively repress a servo system's natural medium-frequency resonances.

Friction

Coulomb friction and viscosity-related variables are effectively addressed by Friction Model Compensation, which effectively elicits smooth start-up action in low speed or high rigidity machines.

Electromagnetic interference

The number of interference filters has been increased by 225% to counteract losses caused by data dropouts, EMI interference and artifacts from long cable runs.

Tuning-Less Function

Get up and running quickly

From Day One, the tuning-less function automatically compensates for mismatches in load to rotor inertia up to 30:1. Setting time: 40 ms range

Advanced Autotuning

Minimize setting time

Maximize smooth motion

Advanced auto tuning automatically adjusts nearly 20 gain and filter parameters to cancel vibration, rippling, friction and resonance. Setting time: 4 ms range

One Parameter Tuning

Precise user-driven adjustment

Improve your machine's performance even further with easy fine tuning adjustments that won't throw off your existing operating parameters. Setting time: 0 to 4 ms range

SERVOPACKs with features that amp up productivity
Feature-Packed For Your Machine

A choice of open protocol, high speed deterministic digital networks

Functional Safety
A Safe Torque Off (STO) circuit is standard equipment in every SERVOPACK. Safety functions SS1 (Safe Stop 1), SS2 (Safe Stop 2), and SLS (Safe Limited Speed) are integrated with the selection of an optional safety module.

Primary Feedback Option
- 20 Bit serial absolute encoder
- Motor data stored in the encoder
- Simplified cable design

Secondary Feedback Option (Full Closed Loop Control)
- Allows user to close position loop around secondary feedback device near the load
- Helps eliminate the effects of mechanical compliance and thermal variances
- Delivers more precise control and improved machine performance

Wide Range
A power range from 10 W to 55 kW, with 100-480 VAC operation.

Scalable as Needs Change
Switching from a single axis controller to a multi axis model is easier, due to the fact that programming from a single axis SERVOPACK can be used in any Yaskawa multi-axis controller without revision.

Simple Commissioning
An automatic motor recognition function uses data resident within Yaskawa servo motors to configure a SERVOPACK for safe and effective operation.

SGD7S Single Axis Amplifier
- 100 V, 200 V and 400 V operation
- 50 W-15 kW operating range
- Control interface options: EtherCAT, MECHATROLINK, analog

SGD7W Dual Axis Amplifier
- Control two servo axes with one amplifier
- Lower cost, component count
- 200 V or 400 V operation
- Conserves cabinet space
- Regenerative power feature conserves energy

SigmaLogic™ and SigmaLogic7 Compact with EtherNet/IP
- Add On Instructions (AOIs) for use with Rockwell PLCs
- Dual EtherNet/IP ports onboard
- Perform automation functions without learning new software
- Basic point to point moves, blended speed moves, homing, jogging, electronic gearing

Sigma-7Siec Single Axis Controller
- Motion Controller and amplifier in one device
- IEC61131-3 compatibility for predictable behavior
- Ethernet/IP, Modbus TCP/IP, and OPC server connectivity links to most PLCs and HMIs
- A built-in web server offers diagnostic info without special software
- I/O features: 7 digital inputs, 4 digital outputs

MP2600iec 1.5 Axis Controller
- Motion Controller and amplifier in one device
- IEC61131-3 compatibility for predictable behavior
- MotionWorks® IEC software provides scalability between single and multi-axis control
- EtherNet/IP, Modbus TCP connectivity links to most PLCs and HMIs
- A built-in web server offers diagnostic info without special software
- I/O features: 15 digital inputs, 11 digital outputs, 1 analog input, 1 analog output, 1 external encoder input, 1 external encoder latch
### Sigma-7

#### Standard Rotary

The world’s largest manufacturer of servo motors brings 25 years of design innovation into each Sigma-7 rotary servo. Choose from a wide range of sizes, speeds and torque ratings, then add an amplifier and an MPiec controller to create a complete motion automation system.

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Low Inertia ▼</th>
<th>Medium Inertia ▼</th>
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<tr>
<td>![Motor Image]</td>
<td>![Motor Image]</td>
<td></td>
</tr>
</tbody>
</table>

#### SERVOPACKs

- **1 Axis ▼**
  - SGD7S: 50W–15kW
  - SGD7W: 200W–1400W/axis

- **2 Axis ▼**
  - SGD7S: 50W–15kW
  - SGD7W: 75W–1.5kW/axis

Control Interface Options: EtherCAT, MECHATROLINK

(Analog 100 V SERVOPACKs available from 50-400W)

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### Sigma-7

#### Direct Drive Rotary

Direct drive products save space, eliminate backlash and cut component costs, adding extra mechanical strength to stiffen dynamic applications.

<table>
<thead>
<tr>
<th>Voltage</th>
<th>SERVOPACKs</th>
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</thead>
<tbody>
<tr>
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<td>![Motor Image]</td>
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</table>

#### Sigma-7

Direct Drive Linear

Maximum speed and acceleration for linear motion. Choose from four designs to reduce compliance, replace mechanical linkages and create a better fit for your application.

<table>
<thead>
<tr>
<th>Voltage</th>
<th>SERVOPACKs</th>
</tr>
</thead>
<tbody>
<tr>
<td>200 V</td>
<td>![Motor Image]</td>
</tr>
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<td>![Motor Image]</td>
<td>![Motor Image]</td>
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</tbody>
</table>

Control Interface Options: EtherCAT, MECHATROLINK

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### Sigma-7

#### Direct Drive Linear

- **1 Axis ▼**
  - SGD7S: 50W–15kW
  - SGD7W: 750W–1.5kW/axis

- **2 Axis ▼**
  - SGD7S: 50W–15kW
  - SGD7W: 200W–1kW/axis

Control Interface Options: EtherCAT, MECHATROLINK

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Sigma-7 Standard Rotary

Sigma-7 Direct Drive Rotary

Sigma-7 Direct Drive Linear

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Sigma-7 Direct Drive Linear

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### Medium/Large Capacity Model Specifications

<table>
<thead>
<tr>
<th>Servo Motor Model</th>
<th>Rated Power</th>
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<th>Peak Torque</th>
<th>Rated Speed</th>
<th>Max Speed</th>
<th>Rotor Inertia</th>
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### Direct Drive Rotary Servo Specifications

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<th>Rated Power</th>
<th>Rated Torque</th>
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### Direct Drive Rotary Servo Specifications

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### Linear Servo Specifications

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<tbody>
<tr>
<td>SGLFW2</td>
<td>Iron Core Type</td>
</tr>
<tr>
<td>SGLGW</td>
<td>Coreless Type with Standard Magnetcway</td>
</tr>
<tr>
<td>SGLTW</td>
<td>Dual Magnet Iron Core Type</td>
</tr>
</tbody>
</table>

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### Motor Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>Linear Motor Stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>SGLFW2</td>
<td>Sigma Trc II</td>
</tr>
<tr>
<td>SGLGW</td>
<td>Sigma Trc II</td>
</tr>
<tr>
<td>SGLTW</td>
<td>Sigma Trc II</td>
</tr>
</tbody>
</table>

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### Additional Information

- SGMF: Medium Capacity
- SGMF: Medium Capacity
- SGLFW2: Iron Core Type
- SGLGW: Coreless Type with Standard Magnetcway
- SGLTW: Dual Magnet Iron Core Type
- SGLFW2: Sigma Trc II
- SGLGW: Sigma Trc II
- SGLTW: Sigma Trc II

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### Diagrams

- Sigma Trc II Linear Motor Stage
The Challenge: Expertise
Design and support of automation is a challenge to your resources. Your automation design must be effective immediately, and there’s no room for downtime, lost production or support difficulties down the line.

What if …
• You could add automation engineers to your staff at the exact moment you need them?
• You could hand off responsibility for designing and supporting your machine automation to someone you trusted?
• You could keep your engineering staff focused on areas where your company truly adds value?

A Portfolio of Services
The experts at Yaskawa function as an extension of your engineering staff to create elegant, reliable automation.

We begin by understanding your application and process, the results you need to achieve, your time frame and cost structure. This level of understanding is what sets Yaskawa Engineered Systems apart, and makes us Capable of More.

Motion Application Services
Yaskawa’s engineering expertise can be applied to any stage of machine development.
• System Concept Design
• Component Selection
• Electrical Design
• Mechatronic Design
• Machine Start-up
• Programming
• Optimization
• Troubleshooting

Purpose-Built Mechanisms
Yaskawa integrates servo technology into complete assemblies, including flexures, four-bar linkages, integrated ball screw motors, and direct drive systems. Each mechanism is tested and characterized, with a documented, serialized fingerprint and a full warranty provided for each assembly. Yaskawa will continue to service and support each assembly for the entire life of your machine.

Systems Engineering
Yaskawa Engineered Systems provides valuable engineering expertise, including:
• Complete electrical enclosures and custom cables
• Retrofits and training for legacy equipment
• Upgrading legacy controls/servos to the latest technologies
• 365 days a year, 24-hour support

Yaskawa works with you during the entire cycle of a systems project, from defining scope and schedule to specifying components, electrical and software design, installation and line start-up. Our engineering expertise extends to support robot, servo, PLC, VFD, and controller products from Yaskawa and a wide variety of other suppliers.

Software Development
Make Yaskawa’s programming staff your software design and development team, and get engineers who truly understand the impact of software design on real-world machine operation.

Engineered Systems
Yaskawa’s Engineered Systems group offers a range of products and services including complete machine retrofits, enclosure design/manufacturing and electromechanical assembly design, plus integration of Yaskawa technology into a “purpose built” mechanism for your application.

More than 75% of manufacturers report a moderate to severe shortage of skilled resources

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Yaskawa is the leading global manufacturer of low and medium voltage variable frequency drives, servo systems, machine controllers and industrial robots. Our standard products, as well as tailor-made solutions, are well known and have a high reputation for outstanding quality and reliability.