YASKAWA

SOLUTIONS FOR THE PACKAGING INDUSTRY

MOTION CONTROLLERS, SERVO-SYSTEMS, INVERTERS AND ROBOTS FOR PACKAGING

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Solutions for the Packaging Industry

Contents

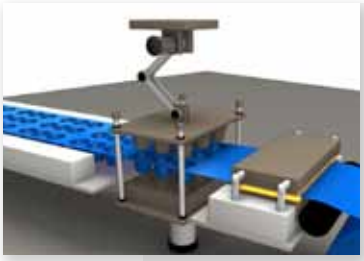
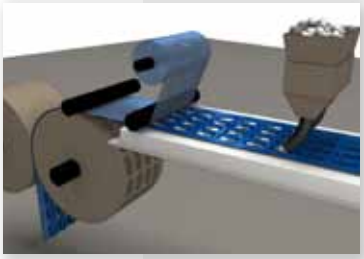
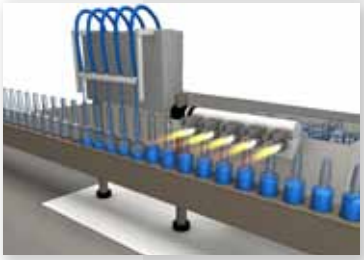
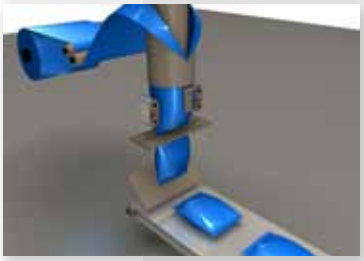
Experience & Innovation

For almost 100 years YASKAWA has been supplying mechatronic solutions and is one of the leading companies for drive and automation products and systems world-wide.
YASKAWA develops and manufactures Inverter and Servo Drives, Motion Controllers and industrial robots for a wide range of applications and has a high reputation for outstanding quality and durability.

Packaging – The Challenge

Packaging technology relies on powerful and reliable automation components. Unscheduled downtimes cannot be tolerated, especially at the end of the production chain. This applies to tubular bag and blister packaging machines as well as for cartoner or any shaping, filling and closing machines. The smooth interaction of the individual components - from control to robotics - is crucial for a precise execution of these automated processes. The machine builder‘s life becomes simpler, more effective and less costly if he can cooperate with just one manufacturer and benefit from his partner‘s know-how.




Processes	Requirements	YASKAWA Solutions
 Form, Fill, Seal & cutting FFS Machines	Multi Axis synchronization	Scalable Servo Systems and Machine Controller up to 62 real Axes + virtual Axes + Encoder Axes
	High Performance for Motion & Logic	
 Primary Packaging Blister & Tray Packaging, Coffee Pads, Chewing Gum ...	Scalable hardware	
	Reliable and fast Automation Systems	IEC 61131-3 based Programming Enviroment for Motion & Logic
 Pharma Application Ampule Filling and Washing, Blister Packaging ...	One software for both Motion Control and Logic	
	Easy programming	Realtime Ethernet based Fieldbus
 Primary Packaging Bag Packing Machines	Flexibility and faster machine changeovers	
	Reusable machine modules	Servo System for Packaging supports Rotary and Linear Motors
 Secondary Packaging Cartoning, Sleeve Packaging	Rapid realization of machine functions	
	Hardware with Safety Standards	Including Safety Functions like STO, SLS, SS1, SS2
 Palletizing Robots & Robot Solutions for mixed Packaging (sorting)	Linear motor modules	

YASKAWA - One Stop Shop for Packaging Solutions

What makes us a leader

YASKAWA specializes in developing and applying advanced automation technology to improve packaging processes. These advancements include eliminating downtime, reduced maintenance, increased production rates, e-stop recovery and higher quality products. YASKAWA has experience in packaging machinery solutions from simple variable speed control to 84 synchronized axes of motion.

YASKAWA also provides complete control solution packages. The motion control products are developed to control all functions in machine process control including motion control, PLC functionality, I/O, sequential logic and process algorithms. Controller integration lowers system cost, increases performance, reduces required panel space and unifies programming.

Process monitoring and diagnostics are inherent features of this platform. These advancements increase product throughput, and reduce machine downtime. Productivity increases exceeding 200% have been achieved. Smoother running and e-stop recovery routines lessen mechanical wear and reduce down time.

Machine Controllers

- up to 62 axes
- IEC61131-3 Standards

Servo Systems

- Comprehensive motor range
- Outstanding performance

Inverter Drives

- from 0.1 to 630 kW
- Open and closed loop

Robots

- from 2 to 12 Axes
- from 1,200 to 3,000 mm range

Open and flexible .....

The MP Series controller hardware integrates YASKAWA's powerful motion engine with the IEC61131-3 and PLCopen programming standards. These controllers include a built-in web server for easy maintenance and Ethernet connectivity compatible with the most popular network protocols. Expanded I/O can be attained through EtherNet/IP, Modbus/TCP, and/or MECHATROLINK network I/O modules from YASKAWA or third parties. The open and flexible architecture provides also an easy integration of third party HMI. Standard Safety functions like STO, SS1, SS2 and SLS available.

YASKAWA Packaging Machine Controllers

The YASKAWA MP Controller series facilitate a new realm of possibilities in the world of machine control. Governed by internationally standardized functions, the IEC based MP series are machine controllers with a potent motion engine at its core. It includes a built-in web server and is compatible with international network protocols.

MP3200iec High Performance

The new high performance machine controller MP3200iec provides a solution for machines with high complexity. With eight open slots for local I/O modules it combines many proven technologies into one platform.

Features

- 62 axis of synchonized control
- IEC61131-3 language with PLCopen function blocks
- Advanced camming and gearing functions and camming
- Open EtherNet-based network: 100 Mbps
- A multitude of options
  Choose from ten option cards offered for the expansion slot to accomodate most machine requirements
- Communication protocols
  open standards EtherNet/IP and Modbus TCP to connect to many HMI and PLC in the market

MP2300Siec and MP2310iec - Compact and Flexible

MP2300Siec models have one open slot for local I/O modules, while the MP2310iec models have three open slots.

Features

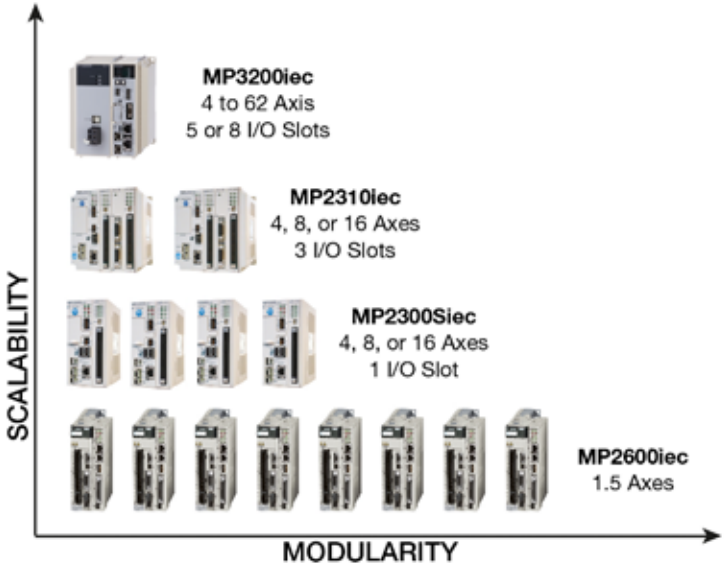
- Compact, flexible machine controller for medium complexity machines
- IEC61131-3 Programing with PLCOpen function blocks and YASKAWA Tool box including e.g. kinematic calculations or PackML to implement Packaging standards
- Machine controller solution up to 16 Axes

Side-by-Side Mounted MP2600iec

YASKAWA's Sigma-5 Servo series has been enhanced with the introduction of the MP2600iec single axis motion controller. The compact controller/servo combination provides standardized programming on YASKAWA's latest high quality servo system.

The single-axis MP2600iec rounds out the MP2000iec controller family, allowing applications to scale up from single to multi-axis control within a standard IEC61131-3 programming environment, MotionWorks IEC. Built-in Ethernet/IP and Modbus/TCP (master and slave) connect to most PLCs and expanded I/O. PLCopen function blocks within MotionWorks IEC simplify programming, while a diagnostic web server reduces field maintenance time. An optional OPC server allows for HMI or data acquisition. All of these features compliment the enhanced autotuning and vibration suppression algorithms standard in the Sigma-5 Servo Amplifier, providing "IEC on the Drive" for a wide range of applications from 50 W to 15 kW.

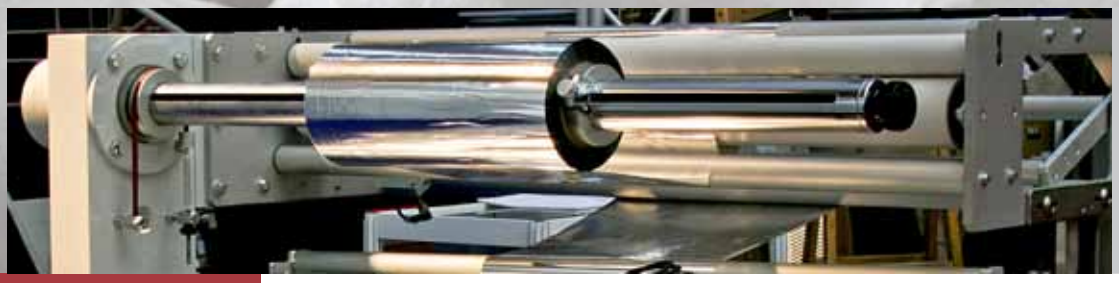
Scalability



MP3200iec
High performance machine controller for high complexity machines

MP2310iec and MP2300Siec
Compact, flexible, machine controller for medium complexity machines

MP2600iec
Side-by-side mounted controller



Machine Controller Software

Many programming languages exist today. Only a few languages provide an environment for simply coding all of the functionality of a modern automated machinery. That's where YASKAWA's IEC61131-3 programming environment shines. MotionWorks® IEC encourages the programmer to take advantage of the best of several programming languages within one development package.

Programming Environment MotionWorks IEC

Ladder Logic is perfect for representing digital sensory data. Structured Text is a great solution for mathematical algorithms and assignments, while Function Block Diagrams are best suited for motion control. These languages seamlessly and predictably cooperate with one another. Variables and outputs from a program structure can be referenced by other programs, providing the ultimate automation development environment.

Features

- Ladder Diagram
- Function Block Diagram
- Instruction List
- Structured Text
- Sequential Function Chart

Tasks

- Motion task
- 16 tasks for plc program

Fastest task = motion task

Standard Programming Languages

MotionWorks® IEC Software complies to the IEC 61131-3 standard, assuring that programs can be developed and executed with predictable behavior.

PLCopen Function Blocks

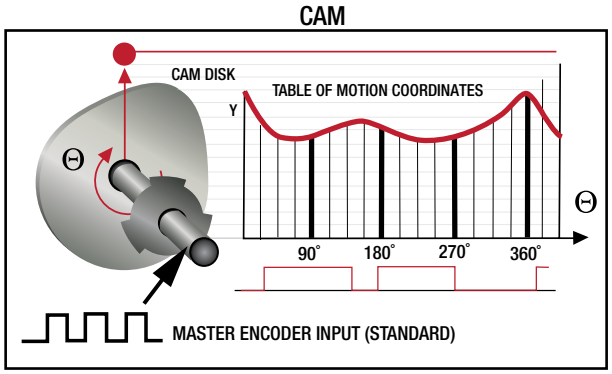
YASKAWA developed the motion control interface to comply with PLCopen, yet preserved the motion algorithms developed over decades of accumulated motion control experience.

YASKAWA Toolbox

This toolbox provides templates for users to create function blocks on their own. The templates provide suggested information and formats for effective function block creation. Other specialized functions developed by YASKAWA Engineers are periodically added to this toolbox.

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. These are customized by YASKAWA 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:



Cam Data Management
- Y_CamFileSelect
- Y_CamStructSelect
- Y_ReleaseCam

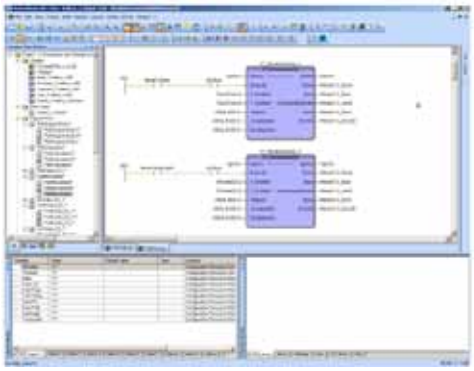
Cam Engagement
- Y_CamIn
- Y_CamOut

On-the-Fly Adjustments
- FY_CamShift
- Y_CamScale
- Y_SlaveOffset

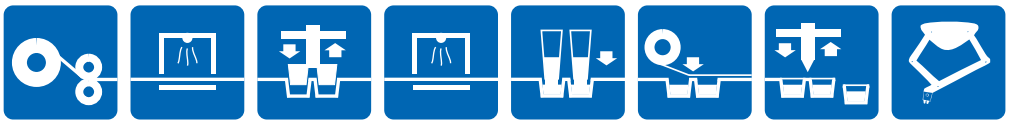
Cam Data Transfer
- Y_ReadCamTable
- Y_WriteCamTable

Software Modularity

YASKAWA supports the customer in the development of new specific function blocks.



- Reusable program code
- Rapid realization of machine functions
- Reliability by validated function blocks
- Libraries enable import and reuse of previously developed logic

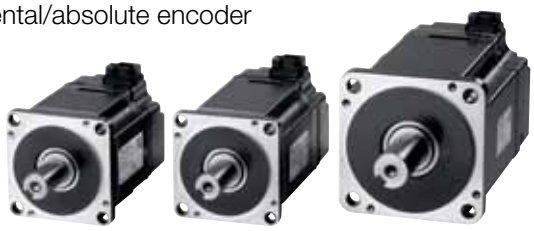


Sigma-5 Servo Systems for Packaging with comprehensive Range

The Sigma-5 servo system best suits motion applications demanding high dynamic and accuracy, fast positioning and perfect multi-axes synchronisation.

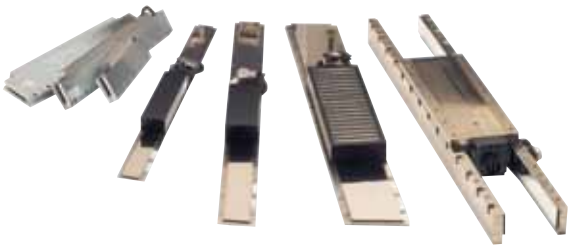
Rotary Servo Motors

- 5 different rotary motor series in low and medium inertia
- 200 V class, 50 W to 1.5 kW, 0.5 Nm to 14.3 Nm
- 400 V class, 200 W to 15 kW, 5.8 Nm to 224 Nm
- Direct Drive Motors, 200 V class, 6 Nm to 600 Nm
- Encoder electronic nameplate
- Motor vibration resistance 5 G
- Incremental/absolute encoder



Linear Servo Motors

- 3 different linear motor series
- 200 V/400 V class, iron core,from 86 N to 5400 N peak force
- 200 V class, iron less, from 40 N to 3000 N peak force
- 400 V class, iron core with attraction cancellation, from 600 N to 7500 N peak force
- Incremental/absolute linear scale



Servo Amplifiers

- 200 V class, 50 W to 1.5 kW
- 400 V class, 500 W to 15 kW
- Analog/Pulse, Mechatrolink-2 embedded, Mechatrolink-3 embedded
- Safety STO on board
- Feedback: Encoder, EnDat, Hiperface, SinCos

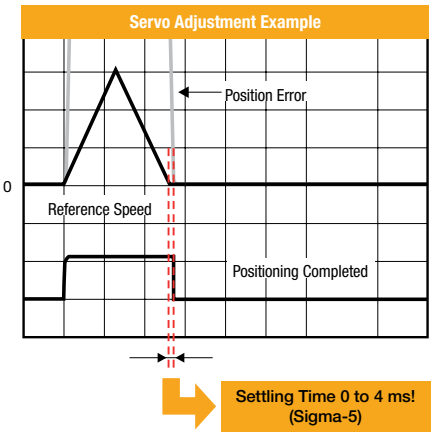
Optional

- Safety Module with STO, SS1, SS2 and SLS
- CANopen, EtherCAT, Profinet,POWERLINK, Indexer (point-to-point)
- MP2600iec (1.5 axis controller) IEC 61131-3 programming with unmatched scalability and modularity

Sigma-5 Servo Performance

Features

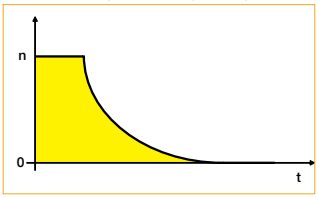
- 62.5 µs response time
- Support rotatory and linear motors
- Anti vibration suppression
- 20 % more productivity without changing the mechanics
- Ambient temperature 0 – 55 °C without “derating” possible
- Integrated Safety Category 3 Stop Category 0



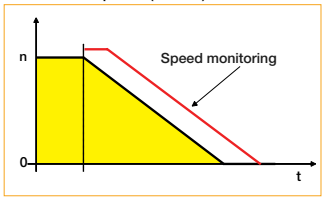
Safety

YASKAWA's Sigma-5 servo drive functionality allows for a smooth integration of the mandatory legal safety standards. The STO function is implemented by default in all Sigma-5 series servo amplifiers. The safety functions SS1, SS2 and SLS are integrated by using the SGDV-OSA01A safety module.

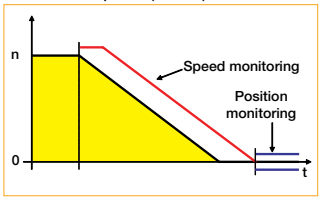
Safe Torque Off (STO)



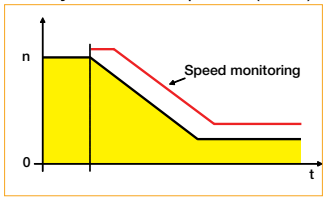
Safe Stop 1 (SS1)



Safe Stop 2 (SS2)



Safely Limited Speed (SLS)



Super compact Servo Systems with **Sigma-5 Mini**

The newest Member of the Sigma-5 family lineup introduces the super compact AC servomotor SGMMV (with models ranging from 3.3 W to 30 W) and the corresponding DC power input SGDV SERVOPACKs. These products use limited space effectively and help reduce device footprints.

Major Features (SGMMV Servomotor)

- Two flange sizes (15 and 25 mm) are available in the lineup
- Capacities from 3.3 W to 30 W
- Support for 24 VDC and 48 VDC inputs
- Supports of 200 VAC input for the 25 mm type (including brake with the standard Sigma 5 Amplifier)
- High speed (rated speed 3000 min^{-1} and maximum speed 6000 min^{-1}) improves device task time.

Sigma-5 Large Capacity

Equipped with a high-resolution encoder the Sigma-5 Large Capacity Amplifier is suitable for high precision applications and high-performance servomotors for applications like thermoforming etc.
Two versions (rated speed 800 min^{-1} or 1,500 min^{-1}) are available. Servomotors with an optimal rated speed and torque can be selected from YASKAWA's vast product lineup.

Because the converters are separated from the amplifiers power regeneration converters or shared converters can be used to improve energy efficiency.
With the new advanced autotuning function, the servo adjustment takes a shorter time. The large-capacity AC servo drive is the consistent extension of the Sigma-5 Series up to 55 kW.

Inverter for Packaging

Today YASKAWA produces more than 1.8 million inverters per year. Considering this, YASKAWA is probably the biggest inverter manufacturer in the world.
With the V1000 and A1000, YASKAWA continues its tradition of developing innovative solutions in drive technology.
The YASKAWA inverters set standards in terms of user friendliness and process orientation.
The development of the V1000 focuses on all aspects of packaging application, installation, operation and maintenance.

Safety Standards: Safe Torque Off (STO according to IEC 61800-5-2)
Open Flexibility: Fieldbus options like CANopen, EtherCat, Profinet, Powerlink, DeviceNet etc.
Extendability: Easy integration of PLC functionality

V1000 Compact Inverter Drive for Packaging Applications

YASKAWA V1000 is a general purpose inverter drive covering the demands of a wide range of applications including Open-Loop-Vector functionality and the usage of PM motor without feedback.

Features

- High flux braking for 50 % reduction of braking time without braking resistor
- Quick response on load and speed changes to improve machine performance
- Online Auto-Tuning for optimisation of improved motor performance at low speed
- Open Loop Vector Control for PM motor operation

A1000 High Performance Inverter Drive for Packaging Applications

The A1000 is the premium inverter from YASKAWA. It provides great operation reliability, environmental benefits and energy savings as well as many other user oriented operational features that make it a first class choice.

Features

- Encoder less operation of PM motors with full torque at zero speed
- Advanced Auto-tuning functions to automatically adjust motor settings and continuously analyse changes during motor operation to achieve highest machine performance
- Advanced energy-saving control technology which improves efficiency and machine productivity in combination with induction and synchronous motor operation.
- Available with special features like winding, positioning and electronic line shaft. Electronic line shaft (ELS) function allows to precisely follow a master encoder (PG) signal in speed, direction, and phase.

Fast, flexible and reliable

YASKAWA robots can deliver staggering increases to line speed as they can move very quickly without wasting movement or handle several products in a single cycle using a multiple gripper.
YASKAWA robots can easily be adapted for different packing requirements, simply by creating a different program. Robot programming is an easy task aimed at technician's level so anybody can do this. Setting up time between different packing applications is much faster than for any dedicated packing machine, which means more productivity for you.
Given the flexibility of the robot it can also be used for other tasks within the same packing line such as labelling, grouping of product and case erecting. This means that no additional investment is required in dedicated machinery.

MOTOMAN MPP3 - Handling, Palletizing, Picking and Packing

The MOTOMAN MPP3 4-axis high-speed robot with parallel kinematic system combines the speed of the delta design with a high payload capacity and a large working range.

- 140 cycles per minute with 3 kg payload
- 230 cycles per minute with 1 kg payload
- High-precision, high-speed conveyor tracking

MOTOMAN MPK2 - Picking and Packing

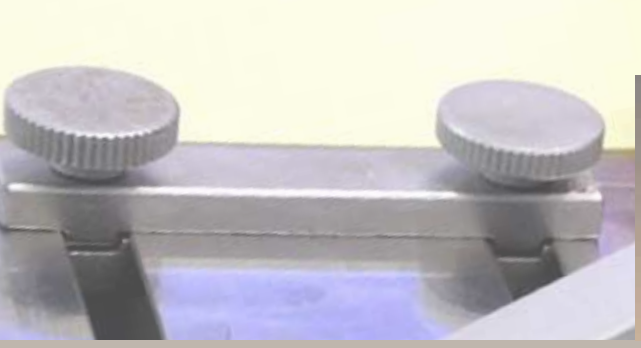
The MOTOMAN-MPK2 is high-speed, 5-axis picking robot that provides superior performance and reliability for food handling, picking, packing and other high-speed material handling applications.

- Wash-down (IP67) ready (wrist and body) for applications where cleanliness is important
- Up to 133 picks/minute
- Optional vision and conveyor tracking

MOTOMAN-MPK50 - Palletizing

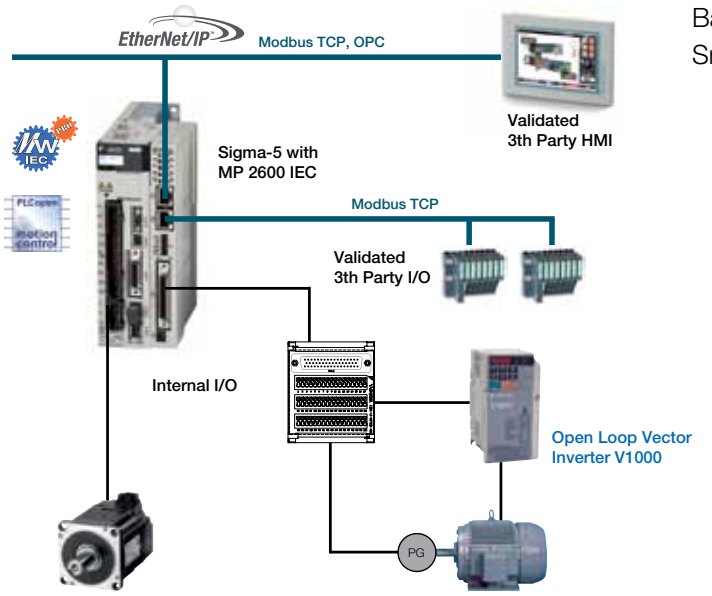
The MOTOMAN-MPK50 is a high-speed 4-axis robot that provides superior performance and reliability for packaging, palletizing and other material handling applications. The MPK50 robot offers a large work envelope with full 360-degree rotation.

- Large, 360 degree work envelope with minimum interference radius
- Heaviest payload (50 kg) in its class with highest axis speeds,wrist ratings
- IP54 arm with IP67 wrist. IP65-rated body optional

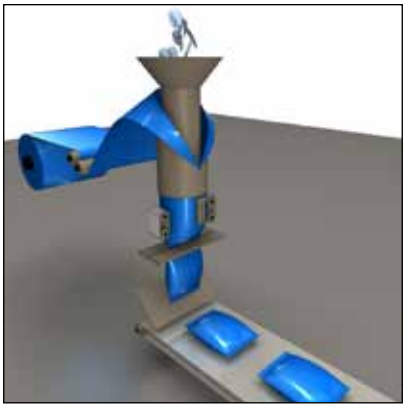


Application Examples

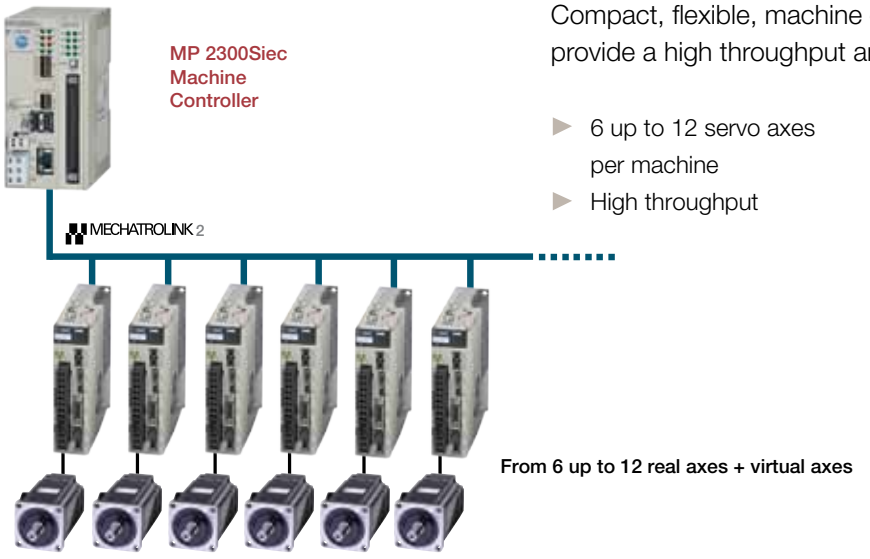
Bag Packer Machine



Bag Packer with single axis motion controller MP2600iec. Smart architecture and high throughput of products.

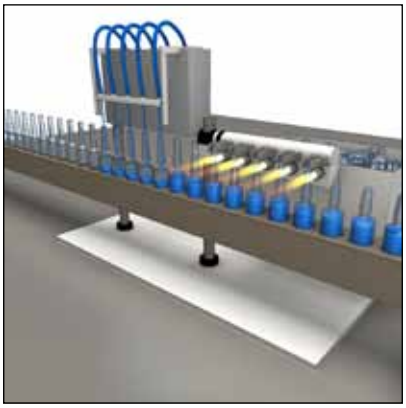


Pharma Liquid Filling Machine



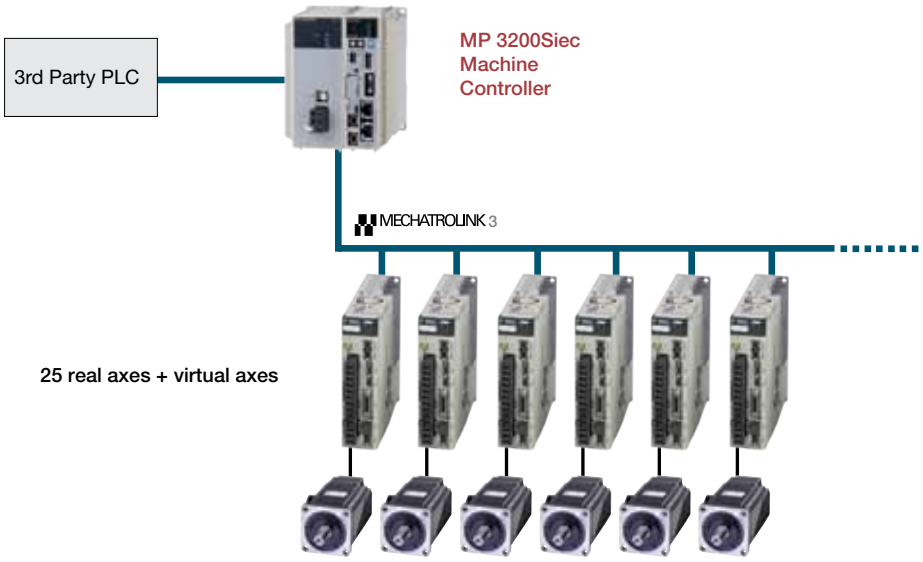
Compact, flexible, machine controller for pharma machines, provide a high throughput and rapid realization of machine functions.

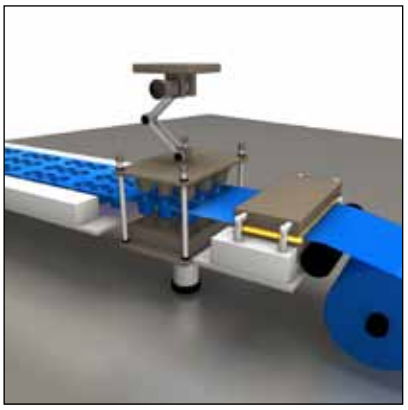
- 6 up to 12 servo axes per machine
- High throughput



Thermoforming Machine

YASKAWA motion controller provide a solution for thermoforming machines. High performance for the manufacturing process of packaging material.





Shrink Wrapping Machine with Inverters

The challenge: “Shrink Wrapping” machines without a PLC

Benefits

- Programmable inverters V1000 and A1000

DriveWorksEZ visual programming interface

- Simple drag and drop icons for complete customization of your drive
- Creating special recognition sequences and function, then downloading to the drive

Safety

- With „Safe Torque Off“ on board ready for:
- EN ISO 13849-1 PLd, EN 61508 SIL 2

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International Standards

Safety Standards

ST0, SSL, ST1, ST2

RoHS Directive

RoHS Directive stands for the EU directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment

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