

A Complete Solution to the Greatest Challenges  
of Motion Control and Machine Safety



# OMRON Motion Control and Safety Solutions







## An Introduction to Motion Control and Machine Safety

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Motion control refers to the technology and systems used to control the movement and positioning of machines and equipment in manufacturing processes. It involves the precise control of motors, drives, and other components to achieve desired motion profiles and ensure accurate positioning.

Machine safety, on the other hand, focuses on implementing measures to ensure the safety of operators and prevent accidents in the manufacturing environment. This includes the use of safety devices, such as light curtains and safety interlocks, to detect and mitigate potential hazards. Machine safety also involves the implementation of safety protocols and procedures to minimize the risk of accidents and injuries.

In a manufacturing environment, motion control systems and machine safety work together to optimize productivity while maintaining worker safety. By integrating safety features into motion control systems, real-time adjustments can be made to machines without stopping production, increasing overall equipment effectiveness (OEE) and minimizing downtime. Safety-rated servos enable adjustments to be made while ensuring operator safety.

Additionally, machine safety measures, such as safety interlocks and protective measures, are implemented to mitigate potential hazards and minimize the risk of accidents. These safety features are often integrated with motion control systems to ensure that machines operate safely and in compliance with industry regulations and standards.

In order to understand the impact that a complete motion control and machine safety solution has, we need to understand the areas where challenges are addressed.

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# CUSTOMER CHALLENGES

Integrating Motion Control and  
Machine Safety

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Key Areas OMRON Addresses our  
Customers Greatest Challenges



# Key Areas OMRON Addresses our Customers Greatest Challenges

## What are the Biggest Challenges Faced by Customers When it Comes to Motion Control and Machine Safety, and how does OMRON solve these challenges?

### System Integration:

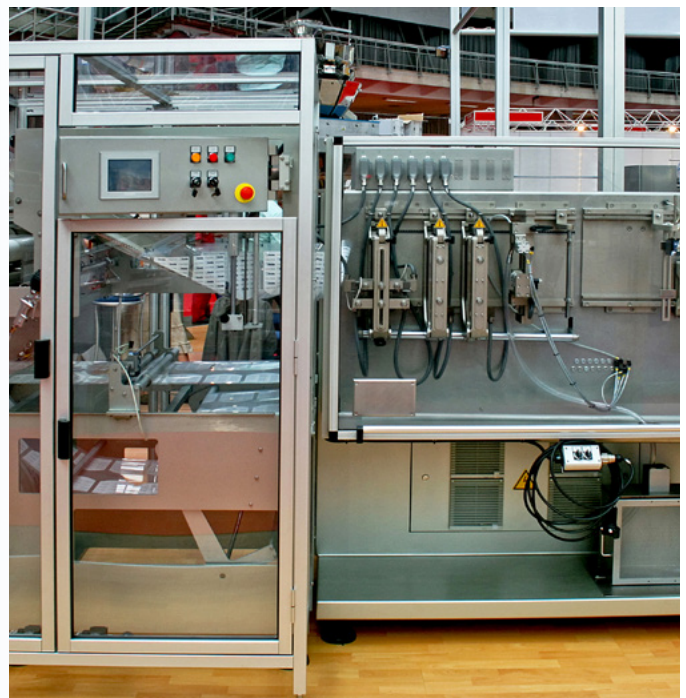
Manufacturing processes often involve multiple machines and equipment that need to work together seamlessly. The integration of motion control and safety functions can be challenging, leading to design discontinuity, complex commissioning, and troubleshooting efforts.

OMRON's integrated machine control systems provide a unified platform for controlling and coordinating the motion and safety functions of these machines. This integration reduces design discontinuity, simplifies commissioning, and minimizes troubleshooting efforts, resulting in improved system integration and overall operational efficiency.

### Overall Equipment Efficiency (OEE):

Maximizing productivity while ensuring worker safety is a key challenge. Frequent machine stoppages for adjustments or maintenance can impact OEE. Finding solutions that allow real-time adjustments without stopping the machine is crucial.

OEE is a key performance indicator that measures the effectiveness of manufacturing equipment. By utilizing safety-rated servos, real-time adjustments can be made to the machine without the need for stopping, ensuring continuous operation and maximizing productivity. This capability not only enhances OEE but also contributes to worker safety by eliminating the need for frequent machine stoppages.



# Key Areas OMRON Addresses our Customers Greatest Challenges

## What are the Biggest Challenges Faced by Customers When it Comes to Motion Control and Machine Safety, and how does OMRON solve these challenges?

### Machine Maintenance and Troubleshooting:

Machine maintenance and troubleshooting can be time-consuming and result in production downtime. Streamlining the troubleshooting process and reducing downtime is a significant challenge for customers.

OMRON's comprehensive Sysmac software package integrates both safety and non-safety control systems, streamlining the troubleshooting process and reducing production downtime. With a single software platform controlling all motion control and safety equipment, maintenance personnel can easily diagnose and resolve issues, leading to faster repairs and improved machine uptime.

Machine safety is of paramount importance in manufacturing environments. OMRON's motion control and safety solutions incorporate safety features and functions to ensure worker safety. By implementing safety-rated servos, safety interlocks, and other protective measures, potential hazards can be mitigated, and the risk of accidents minimized. This focus on machine safety aligns with industry regulations and standards, creating a safer working environment for operators.

By providing integrated machine control systems, safety-rated servos, and comprehensive software packages, OMRON simplifies the integration process, enhances operational efficiency, reduces downtime, and ensures worker safety. These solutions are essential for optimizing manufacturing processes and maintaining a competitive edge in the industry.







# SUCCESS STORY

## Odecopack Customer Success Story



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Showcasing the Full OMRON  
Motion Control and Machine  
Safety Solution

**OMRON**

# Odecopack Customer Success Story

## Showcasing the full OMRON Motion Control and Safety Solution



Odecopack  
Machine Builder  
7115 Belgold Dr, ste. C  
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odecopack.com



# 20% ↓

The OMRON Motion Control & Safety solution saves  
about 20% programming & development time



[Click to learn more about Odecopack](#)

Odecopack is a machine builder specialized in transportation and automation systems for end-line processes. They provide valuable solutions to end users in the F&C and Pharmaceutical industries across the Americas.

Odecopack has chosen OMRON Sysmac platform as the solution for their machines, including Automation, Motion and Safety controllers. In addition, sensors, light curtains, frequency inverters, and other components were added in the bundle solution.

An OMRON Machine Automation Controller (MAC) is integrated to servo drivers and safety controller using the EtherCAT network to control the movement of the axes. Multiple Frequency Inverters are used to control the speed of conveyors that transport boxes and dispense pallets.

A sensor detects the arrival of boxes on the conveyor and the cartesian system is responsible for picking and placing the boxes until the entire pallet is formed. The cartesian system has 4 axis that move simultaneously and synchronized to use the best route to reduce cycle time.

For some Odecopack Palletizer models, there are additional operations to dispense and wrap pallets automatically (these operations are also controlled by OMRON Machine Automation Controller). Then, the complete pallets are made available for collection and shipping to the warehouse. The pallet supply entrances are protected by Light Curtains which are monitored by the Safety controller. In case of operator detection, the Safety Light Curtain sends a safety signal to the Safety Controller to stop the axis and conveyors. Odecopack uses the FSoE (Functional Safe over EtherCAT) feature of the 1S Servos to ensure safe emergency stop and meet safety standards.



# Odecopack Customer Success Story

## Showcasing the full OMRON Motion Control and Safety Solution

### Customer Challenges

- 1 Industry-Specific Solutions:** To stand out in the competitive industrial landscape, the customer needed solutions tailored to specific industry needs rather than merely focusing on cost-cutting.
- 2 High-Performance:** As a company that always wants to go one step further, performance enhancement was a key priority. To achieve this, it was necessary to find an integrated solution that offered high performance in motion control and safety without increasing programming complexity.
- 3 Flexibility and Adaptability:** Changing layout requirements demanded flexible solutions that could adapt to evolving needs.

### Solution Benefits



**Reducing Commissioning Time:** One of the immediate goals was to reduce commissioning time. The customer quickly embraced the Sysmac platform, finding it intuitive and efficient for programming. This transition streamlined the commissioning process, ensuring that the solution could be up and running faster than ever before. The result was a significant reduction in downtime and increased productivity, in addition to facilitating possible changes to the machine layout.

Left: Main palletizing control panel

# Odecopack Customer Success Story

## Showcasing the full OMRON Motion Control and Safety Solution

### Solution Benefits

**Optimizing Control Performance:** The Sysmac platform also played a crucial role in optimizing control performance. By consolidating motion, safety, and control features into one software package, the team was able to harmonize and synchronize the

operation of the palletizer's four axes. This synchronization not only improved accuracy but also made troubleshooting more efficient, ultimately saving valuable time that would have been spent searching for issues.

**Leveraging EtherCAT network:** The integration of EtherCAT network in the Sysmac platform further improved motion accuracy, safety, and control due to its exceptional real-time performance, high-speed communication, and Safety over EtherCAT (FSoE) feature which enables the integration of safety-related functions into the same network. This reduces the need for separate safety networks, simplifying the overall system architecture.

**Panel Size Reduction:** The customer achieved another remarkable feat by reducing the size of the control panel due to the compact size of the OMRON's controllers and servo systems. This achievement not only contributed to a more compact palletizer design but also saved on material costs.

**Ensuring Future-Proofing with Sysmac Studio software:** Sysmac Studio's ability to concentrate all system programming in a single software helped the customer to reduce machine programming development time, as well as facilitating the implementation of future improvements without additional software update costs.

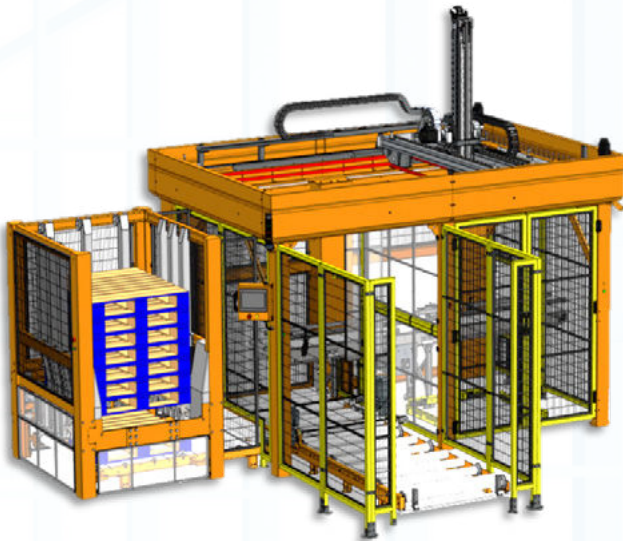




# Odecopack Customer Success Story

## Showcasing the full OMRON Motion Control and Safety Solution

### The Outcome



Above Left: Full Automatic Cartesian Palletizing Model



Above Right: Full Automatic Cartesian Palletizing Double Model

**Enhanced Value:** The solutions provided were tailored to industry needs, offering more than just cost savings.

**Improved Performance:** Control, motion, safety, and control features were seamlessly integrated and optimized, resulting in superior performance.

**Flexibility and Adaptability:** The solution's flexibility allowed the customer to adapt to changing layout requirements efficiently.

**Future-Proof Investment:** With Sysmac Studio in place, the customer ensured continued support and updates without additional costs.

**Reduced Cycle Time:** With the new architecture, an end user that acquired the Odecopack Palletizer affirmed that it could reduce their cycle time in 20%.

In this scenario, the customer's collaboration with an OMRON field application engineer emerged as a key turning point. Together, they combined knowledge to find solutions to the challenges at hand, with the aim of increasing overall value for the end user and placing the machine manufacturer in a prominent position in the industry.



# THE OMRON SOLUTION

OMRON's Solution to Motion Control and Machine Safety

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An In-depth look at the technology used in the Motion Control and Machine Safety Solution



# Key Areas OMRON Addresses our Customers Greatest Challenges

## OMRON's Solution to Motion Control and Machine Safety

OMRON offers a range of products that play a crucial role in solving the customer's problems when it comes to motion control and machine safety.

OMRON's integrated machine control platform, powered by the Sysmac controller, serves as the centerpiece of this solution. It runs EtherCAT/FSOE, CIP Safety, Ethernet/IP, and IO-Link for broad compatibility and simplified integration with existing machines. This platform also incorporates modular IO expansion and remote connections for efficient integration. The integrated development environment in Sysmac Studio, compliant with IEC611-31, accelerates program development, and motion simulation tools aid in design optimization. Safety is addressed with products like the F3SG-SR light curtains, OS32C area scanner, with a comprehensive set of advanced safety features.

OMRON's Safety Rated Servos, part of this solution, are controlled by the Sysmac controller. They offer safety features like Safe Stop 2 (SS2) and Safe Limited Speed (SLS) to ensure operator safety during machine adjustments and operation. These servos adhere to ISO and EN Safety Standards (SIL3/PLe), ensuring both reliability and machine safety.

The comprehensive single software package, which includes the Sysmac controller, HMI, and safety devices, addresses the most common problems with system integration, overall equipment effectiveness (OEE), machine maintenance and troubleshooting,

and machine safety. It allows for seamless integration and monitoring of safety equipment, ensuring that safety controllers and non-safety components work together efficiently.

OMRON's integrated hardware and software solution involves the NX502 controller with OPC UA and SQL Standard, offering enhanced performance and compatibility. The Sysmac Studio software on this controller enables automatic playback and network segmentation. IO-Link communication, safety devices, and integrated development environments like Sysmac Studio contribute to improved efficiency and complete hardware/software integration.

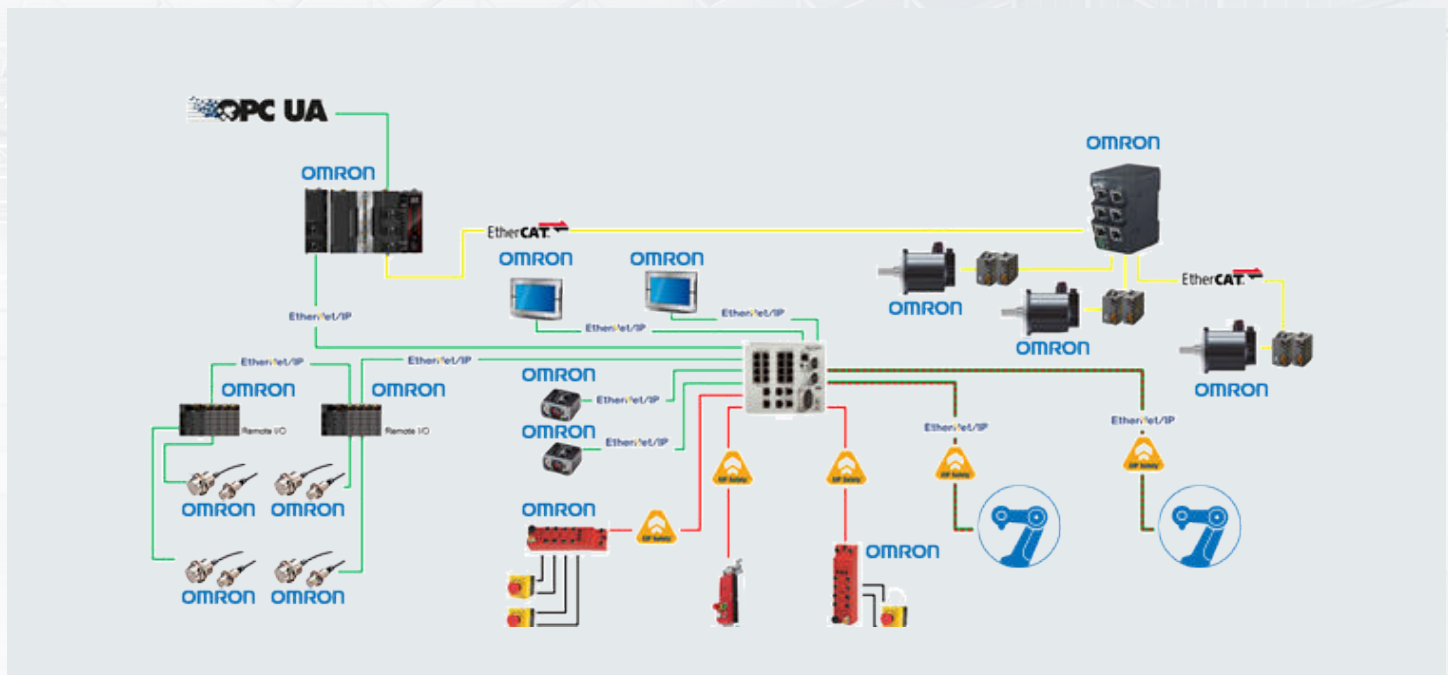
By incorporating these products into a solution, OMRON effectively tackles the most common market problems for motion control and machine safety, providing comprehensive and efficient answers to the manufacturing industry's challenges.



# Key Areas OMRON Addresses our Customers Greatest Challenges

## Diagram for OMRON Motion Control and Machine Safety Products Showing How They Operate as a Complete Solution

Let's take a look at typical Motion Control and Machine Safety diagram to understand how the products work together as a complete system.



Above: Motion Control & Safety Solution Architecture Map

### The Strength of OMRON's Motion Control and Machine Safety: Integrated Development Environment

- One software package for the entire solution
- IEC611-31 compliance and third-party compatibility further accelerates program time while allowing minimum impact to existing automation infrastructure
- Sysmac Studio function blocks can be locked and customized to decrease risk of stolen intellectual property and easy version control
- No matter the version of Sysmac Studio, the software is compatible with all firmware versions of products in the OMRON portfolio. Extending product life in the field
- Sysmac Studio Motion Simulation
- Motor Sizing Software Sysmac Studio 3D Simulation



# Key Areas OMRON Addresses our Customers Greatest Challenges

## OMRON Motion Control and Machine Safety Product Overview

### Controllers

NX Series



OMRON's machine automation controllers provide robust safety, precise motion, and transparent control. The NX102 and NX502 controllers, centered in the Sysmac architecture, offer unified factory automation. The NX102 is an industry-proven machine controller and the NX502 enables scaling from machine to line control. Compatible with over 120 NX I/O units, both can be paired with OMRON Safety CPUs for reliable safety. Both support OPC UA® and SQL for secure database connectivity, and both offer repeatable EtherCAT® motion axis control. Regardless of the application scale, Sysmac users are always in control.

### Servo

1SA safety rated servo



OMRON's 1SA servos address the need for improved productivity and safety in manufacturing industries. With advanced processors and communication technology, integrated safety automation has evolved to enhance quality and performance. While productivity has improved, production line suspensions for emergency stops and maintenance remain necessary for operator safety. OMRON achieves industry-leading motion and safety control, enabling manufacturers to balance productivity and safety effectively.

### Safety Controller

NXSL5



The NXSL5 is a versatile safety controller with EtherCat and EtherNet/IP capabilities, simplifying machine safety. It reduces programming, verification, and troubleshooting time with automatic programming, simple testing, and data logging. Supporting flexible manufacturing and scalable safety solutions, it enables simultaneous CIP Safety over Ethernet/IP and FSoE. The NX-SL5 provides an interactive environment accessible without advanced training, with safety signature check and function verification reports for compliant, functional systems.

# Key Areas OMRON Addresses our Customers Greatest Challenges

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## OMRON Motion Control and Machine Safety Product Overview

### Safety Input Devices

F3SG-SR Light Curtains



The F3SG-SR light curtain series simplifies installation, maintenance, and troubleshooting, reducing downtime and costs. It offers quick alignment with 3-color Area Beam Indicators, eliminates dead zones when cascading, and enables fast programming with the Intelligent Tap. Providing critical preventive maintenance data via I/O Link or Bluetooth, it offers immediate status updates through 3-color Area Beam Indicators to prevent stoppages. With advanced muting and blanking functionality and protection ratings from IP67G to IP69K, it suits safety applications while cutting costs.

### Safety Input Devices

OS32C Laser Scanner



The OS32C safety laser scanner safeguards large and irregular areas with a configurable 4-meter safety range and 15-meter warning zone. It offers up to 70 different safety zone sets, a pollution tolerance mode, and distance measurement capabilities up to 50 meters. Consuming just 5 watts of power, it is ideal for advanced mobile robot (AMR) navigation. This Type 3 Safety Laser Scanner complies with IEC61496-1/-3, features clear status indication, and prevents unauthorized position changes with a reference boundary function.

### Safety Input Devices

D41 Safety door interlocks



The D41 series safety door interlocks are tamper-proof switches that enhance worker safety with high-coded RFID technology, ideal for hazardous applications. Easy to install and troubleshoot, they feature 3-color LEDs and automatic pairing, minimizing labor hours for commissioning and maintenance. Tailored models accommodate various applications, including space constraints, harsh wash-down or hygienic requirements, and ergonomic emergency exit actuators. Up to 31 switches can be connected in series, saving space while maintaining the highest safety level.





# SUMMARY

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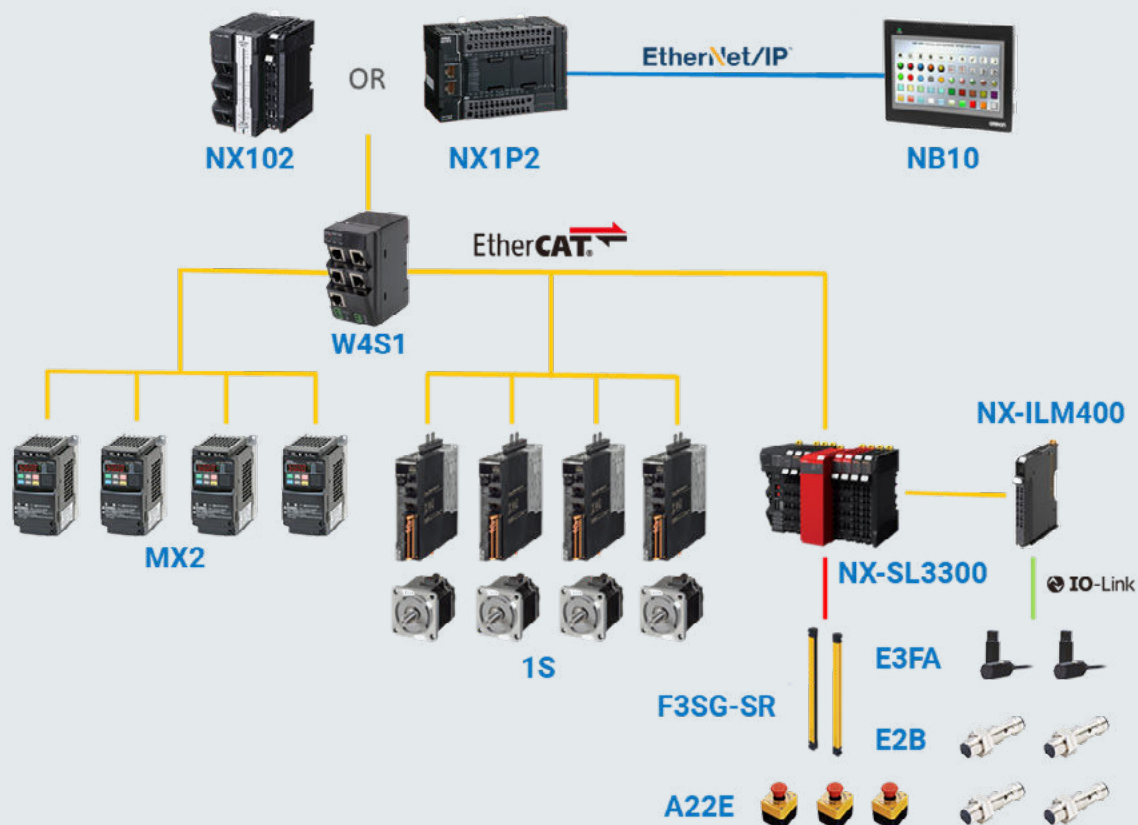
## A Brief Summary of the OMRON Motion Control and Machine Safety Solution

# A Brief Summary of the OMRON Motion Control and Machine Safety Solution

## Optimizing Manufacturing Efficiency and Safety with OMRON's Integrated Solutions

OMRON's motion control and safety solutions offer a comprehensive and integrated approach to address the challenges faced by the manufacturing industry. By providing solutions for system integration, overall equipment efficiency, machine maintenance and troubleshooting, and machine safety, OMRON enables manufacturers to optimize their processes, improve productivity, and ensure worker safety. The integrated machine control systems, safety-rated servos, and comprehensive software packages streamline operations, reduce downtime, and enhance overall efficiency.

With OMRON as a trusted partner, manufacturers can achieve seamless integration, maximize equipment effectiveness, and maintain a safe working environment. By embracing OMRON's motion control and safety solutions, manufacturers can stay competitive in the ever-evolving manufacturing landscape.





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