Sysmac Family Brochure

One complete machine automation solution integrates Logic, Motion, Vision, Safety, Robotics, Sensing, and Enterprise. The Sysmac family of products continues to grow, while remaining true to its roots as One Controller, with One Connection, programmed using One Software.

Controller
- NJ3 CPU units for 4 and 8 axes
- NJ5 CPU units for 16, 32 and 64 axes

NJ-Series
- One CPU for Logic, Motion, Vision, Safety, Robot, and Database Connectivity
- Scalable motion control: CPUs for 4, 8, 16, 32 and 64 axes
- One event log for controller, field devices, and network
- Centralized variable database
- EtherCAT and EtherNet/IP ports embedded
- Project encryption to serial number
- Reuse with most CJ-series I/O units

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I/O
- NX I/O
  - Over 70 models of I/O units including position interface, temperature inputs and integrated safety
  - High-speed I/O units synchronized with the EtherCAT cycle
  - NX Bus technology provides deterministic I/O response with nanosecond resolution*
  - Automatic backup/restore of all I/O unit parameters
  - Detachable terminal blocks with screwless cage clamps
  - Slim design: up to 16 I/O points 12 mm wide

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Safety
- NX Safety
- NX Safety Control
  - The safety controller meets Category 4, P.4e according to the ISO 13849-1 and SIL3 according to IEC 61508
  - Safety system allows you freely mix safety controller and safety I/O units with standard NX I/O
  - Up to 8 safety input points per unit
  - Safety Function Blocks conforming to IEC 61508-3 standard programming
  - PLCopen Function Blocks for safety*

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Servo
- G5 servo drive
  - High-response frequency of 2 kHz
  - Built-in safety conforming ISO13849-1
  - Performance Level d
  - High accuracy provided by 20 bit encoder
  - Advanced vibration suppression functions

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* Available soon

*2 Approved soon

SHOP ONLINE at www.airlinehyd.com 800-999-7378
Inverter

**MX2 V1**
- Power range up to 15 kW
- Torque control in open loop
- 200% starting torque
- Dual rated VT 120%/1 min and CT 150%/1 min
- Drive Programming

**RX V1**
- Power range up to 132 kW
- Sensor-less and closed-loop vector control
- High starting torque in open-loop (200% at 0.3 Hz)
- Full torque at 0 Hz in closed-loop
- Dual rated VT 120%/1 min and CT 150%/1 min
- Drive Programming

Vision and sensing

**FQ-M Series and FH Series**
Vision Solutions
- Designed for High Speed Motion Interface
- Fast and powerful Object Recognition
- Network Connectivity allows ease of I/O mapping
- Smart Calibration provides simple coordinate interface
- Vision Sensor provides compact solution
- Vision System includes quad core processing for inspection advantage

**ZW Measurement Sensor**
- Compact and lighter weight fiber displacement sensor
- Stable measurements for any material with same mounting position
- Robust sensor head structure

**N-Smart Sensors**
- **E3NX-FA Fiber Sensors**
  - One amplifier with over 300 compatible fiber head options
- **E3NC-L Compact Laser Sensors**
  - 2 types of heads are available for long distance or small spot detection
- **E3NC-S Ultra-compact CMOS Laser Sensors**
  - Stable detection of glossy and matte-black workpieces with the industry’s smallest sensor head*

*Based on February 2013 OMRON investigation

**CONFIGURATION**
- Security
- Field devices
- Vision
- Motion axis
- Network
- Controller

**PROGRAMMING**
- Ladder
- Structured text
- Function Blocks
- CAM editor
- Safety FBD

**MONITORING**
- Trending, logging & tracing
- 3D Motion simulation

**Sysmac Studio**
- ESI files
- Tag Database
- IEC programming
- PLCopen FB motion and safety
- Event log Database

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**P. 24**
One Controller
Logic, Motion, Vision, and Safety in one

One controller through one connection and one software is how we define the Sysmac automation platform. The NJ Machine Automation Controller (MAC) is a single robust Controller that integrates PLC logic, Motion control, Vision processing, Safety function blocks, Robot kinematics, and Database connectivity. This unique architecture drastically reduces machine tact time, and programming complexity, improving performance and speeding development.

**Machine control**
- Complete integration of Logic, Motion, Vision and Safety
- Synchronous control of all machine network devices
- Multi-tasking programs
- In-line ST, Structured Text and Ladder mixed in one program
- I/O Capacity: 2,560 local points plus 192 EtherCAT slaves

**System robustness**
- One event log for controller, field devices and networks
- Standard PLC system check: Watch-Dog Timer, memory check, network topology check, etc.

**FailSafe Design**
Avoid equipment damage with managed shutdown and fast boot-up

**Motion control**
- Up to 64 axis control
- Single axis moves and axes interpolation
- 32 axes / 500 µs cycle time
- Electronic gearing and camming synchronization
- On-the-fly electronic CAM changes
- Full control of axes group position, linear and circular interpolation
- Control of up to 8 Delta robots in 2 ms/ 4 Delta robots in 1 ms
- Integrated robotics FB library for Delta-3 control

**Maintenance Friendly**
Connect via USB, Ethernet, or SD card for troubleshooting and project upload/download
Lock-Down Security

Protect intellectual property with serial number specific project encryption

Hardware design
- Architecture based on Intel® Atom™ Processor
- The most compact controller in its class
- Built-in USB port and SD card slot
- Fan-less cooling

Factory & Enterprise Network
- Programming
- Other Machine controllers
- HMI / SCADA
- IT systems
- Standard Protocols and Services: TCP/IP, FTP, NTP, SNMP
- CIP protocol
- DB_Connection FB’s: SQL Client

Machine Network
- Servos
- Inverters
- Robotics
- Vision systems
- Distributed I/O
- Measurement Sensors

Unit type

<table>
<thead>
<tr>
<th>CPU Unit</th>
<th>Unit type</th>
<th>Axes</th>
</tr>
</thead>
<tbody>
<tr>
<td>NJ501</td>
<td>Standard</td>
<td>16, 32, 64</td>
</tr>
<tr>
<td></td>
<td>NJ Robotics</td>
<td></td>
</tr>
<tr>
<td></td>
<td>NJ with SQL Client</td>
<td></td>
</tr>
<tr>
<td>NJ301</td>
<td>Standard</td>
<td>4, 8</td>
</tr>
</tbody>
</table>

- Fully conforms with IEC 61131-3 standards
- PLCopen Function Blocks for Motion Control

Powerful Intel MPU

Optimized for industrial environments and a Realtime Operating System (OS)
One Connection
Ethernet for Enterprise and Machine Networking

Through two built-in Ethernet ports, the Sysmac NJ Machine Automation Controller (MAC) connects to both Enterprise and Machine level devices. With the built-in EtherNet/IP port, access the machine HMI, programming software, other machines, or databases. The EtherCAT machine control real-time network allows real-time control of devices such as I/O, Servos, Inverters, Vision and Smart Sensors.

Built-In EtherNet/IP:
» EtherNet/IP for peer to peer communications
» SQL Client for fast data read and write to SQL servers
» FTP Server for access to SD card on CPU
» TCP/IP and UDP/IP Socket Services
» NTP clock synchronizing
» SNMP Simple Network Management Protocol
**EtherCAT: the optimal machine network**

- Up to 192 slaves
- Fastest in class machine network on the market
- Noise immunity to stringent Omron standards
- Embedded in Omron servo drive, inverter, safety, vision sensor and I/O
- Uses standard STP Ethernet cable with RJ45 connectors

**Integrated Machine Safety**

- FSoE – FailSafe over EtherCAT
- Flexible system configuration with distributed safety I/O
- Single variable database includes Safety I/O
- PLCopen Function Blocks for Safety programming*

*Approved soon

**PROGRAMMING**

**SIMULATION**

**INFORMATION**

- Sysmac Studio
- SQL-Database
EtherCAT
The optimal machine network

EtherCAT is the fastest industrial network for machine automation, connecting to I/O, servos, inverters, vision and smart sensors. It is Ethernet-based, fast, deterministic and highly efficient in terms of data transmission. All EtherCAT slave devices have dual ports, enabling line topology without extra hardware like switches, hubs, or routers.

Key features
- High synchronisation accuracy using a distributed clock mechanism.
- Fastest in class network on the market with 100 μs refresh time and less than 1 μs jitter
- Easy setup with automatic address assignment for nodes
- Standard Ethernet cables and connectors
- FSoE - FailSafe over EtherCAT

EtherCAT is Industrial Ethernet
The EtherCAT Telegram is contained in the Ethernet Data section of the IEEE 802.3 Ethernet frame. The frame travels through the media at 100 Mbps in full duplex mode.

FailSafe over EtherCAT (FSoE)
Seamless integration of the safety into machine automation. The FSoE frame is included in the EtherCAT process data. This system provides a flexible solution with distributed safety I/O.
“On-the-fly” data exchange
The slave devices extract and/or insert data on the fly. This method assures the highest possible throughput.

Simple cabling: 100Base-TX
EtherCAT uses standard 100BASE-TX Ethernet communication very efficiently, over standard shielded Ethernet cables and connectors. No need for network switches. No need for network switches in line topology.

Distributed clocks
The EtherCAT node slave measures the time difference between incoming and returning frame - timestamp. With these timestamps the master can determine the propagation delay offset to the individual slave accurately. This mechanism ensures accurate synchronisation between devices with less than 1 μs jitter.

Flexible topology
With two EtherCAT ports on all devices, no additional switches are required to create a linear network. EtherCAT junction slaves can be used to build tree and star topologies, which provides section segregation isolation.
One Software
Sysmac Studio for machine creators

The Sysmac Studio software suite programs and configures all Sysmac related hardware, including the NJ Machine Automation Controller (MAC), G5 Servos, MX2 and RX Inverters, FQ-M Vision, NX I/O, NX Safety Controller, N-Smart sensors, and NS HMI. The Sysmac Studio Integrated Development Environment (IDE) provides a single interface for configuration, programming, simulation, and commissioning, all with a common variable database. This environment allows machine creators direct access to all elements of their system, eliminating all traditional data synchronization bottlenecks between control disciplines during development. This IDE also boasts unique features such as built-in 3D Simulation and Vision Sensor setup options, critical in cutting programming and debug time.

**SQL server configuration**
Simple setup and testing of log on to Microsoft and Oracle SQL servers.

**Design and operability**
Unified design environment is provided for programming, configuration and monitoring. It also offers intuitive navigation between control modes.

**Configuration and monitoring for servo system**
Parameter setting, monitoring and data trace for servo drive and inverter.

**Motion control**
The graphical CAM editor allows quick implementation of complex motion profiles. CAM tables can be modified on the fly. A PLCopen Function Blocks for the Motion Control library are available to implement general purpose motion control.

**Simulation**
Motion trajectories in 3D can be pre-tested with advanced simulation of sequence and motion control. Simulation of single Function Blocks, POU’s (Program Organization Unit) or the entire program can be performed. In addition all standard features such as Break & Step are available.

**Synchronized data tracing**
Easy system tuning thanks to integrated and synchronised data tracing of motion commands, position and speed feedback and I/O status and values.
Integrated safety programming
The Function Block Diagram editor includes 79 safety FB/FUN. Conforms to IEC 61131-3 standard programming and PLCopen Function Blocks for Safety*.

Programming
Multi-tasking and fully compliant to IEC 61131-3 standard. The program editor includes smart support functions such as syntax error check and distinct color segregation of variables and symbols. ST instructions can be directly written in Ladder programs thanks to in-line ST function.
NX I/O
Speed and accuracy for machine performance

Based on an internal high-speed bus running in synchronization with the EtherCAT network, the NX I/O can be controlled with microsecond accuracy and with nanosecond resolution. The I/O range consists of over 70 models including position interface, temperature inputs and integrated safety.

• Deterministic I/O response with nanosecond resolution
• Digital I/O: high-speed and time-stamp models
• Analog I/O: high performance models offer 10 $\mu$s conversion time per channel and 1:30000 resolution
• Detachable terminal block with screwless cage clamps
• On/Offline configuration, simulation, and unified troubleshooting in the Sysmac Studio software

NX I/O Features

EtherCAT connectivity
• Distributed clock to ensure I/O response with less than 1 $\mu$s jitter
• FailSafe over EtherCAT (FSoE)

EtherCAT coupler
• Up to 1024 byte input / 1024 byte output
• Automatic backup/restore of all I/O unit parameters

• 4, 8 or 16 points
• Standard, high-speed and Time-Stamp models

• High signal density; up to 16 I/O points in 12 mm width
NX Bus

The new NX Bus is synchronized with the EtherCAT network, allowing for fast and accurate machine control. This is accomplished due to:
• EtherCAT distributed clock
• High-speed I/O synchronization
• I/O with Time-Stamp function* (accuracy < 1 µs)

Analog I/O
• +/-10V voltage and 4-20 mA current signals
• 2, 4 or 8 channels per input unit
• 2 or 4 channels per output unit
• Standard and high-performance models

Position Interface
• Encoder input units for connection of external axes to the Sysmac system
• Incremental and absolute encoder support
• Positioning control unit with pulse train output

End Cover
• Included with coupler

Time-Stamp* Sequence Example

<table>
<thead>
<tr>
<th>EtherCAT cycle</th>
<th>500 µs</th>
<th>500 µs</th>
</tr>
</thead>
<tbody>
<tr>
<td>NJ Controller</td>
<td>I/O PROGRAM</td>
<td>I/O PROGRAM</td>
</tr>
<tr>
<td>NX I/O</td>
<td>I/O Refresh</td>
<td>I/O Refresh</td>
</tr>
<tr>
<td>Time Stamp</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Accurate control of input events and perfect control of output with nanosecond resolution

Analog I/O
• 2 or 4 or 8 channels per unit
• Free allocation of the Safety I/O units on the internal high speed bus.

Thermocouple or RTD inputs, 2 or 4 per unit

Detachable terminal block with screwless cage clamps allows for easy pre-wiring, testing and system maintenance

* Except for NX Safety Controller and Safety I/O
*2 Available soon
NX Safety Control
Integrated safety into machine automation

The Sysmac Automation platform integrates a safety solution within our one connection and one software concept. One connection is realized through the use of FailSafe over EtherCAT-FSoE- protocol. The one software is the Sysmac Studio true Integrated Development Environment (IDE) for configuration, programming and maintenance. The NX safety system consists of safety controller and safety I/O units. Both the safety controller and safety I/O can be freely distributed in an I/O rack throughout the network, mixing them in any combination with standard NX I/O.

NX Safety controller
• The safety controller variables are part of the NJ controller project
• Flexibility and reusability of the programming code

ISO 13849-1, PLe
IEC 61508, SIL3

NX Safety features
• The safety controller meets PLe according to the ISO 13849-1 and SIL3 according to IEC 61508
• Flexible system architecture lets you freely mix safety controller and safety I/O units with standard NX I/O
• Integration in One software, Sysmac Studio
• Certified programs can be reused, which reduces the amount of verification work

EtherCAT telegram

Note: Scheduled to be certificated soon.
- Integrated Development Environment in Sysmac Studio provides one common software for hardware configuration, programming and maintenance of the Sysmac platform
- 79 safety FB/FUN conforming to IEC 61131-3 standard programming
- PLCopen Function Blocks for safety
- Up to 8 safety input points per unit
- Flexible connectivity to a wide selection of safety devices
- I/O data monitoring in the NJ controller project

FailSafe over EtherCAT frame

NJ Controller

Sysmac Studio

*Approved soon
G5 Servo System
At the heart of every great machine

Great machines are born from a perfect match between control and mechanics. G5 gives you that extra edge to build more accurate, faster, smaller and safer machines.

EtherCAT connectivity
- Compliant with CoE-CIA402 Drive profile
- Cyclic Synchronous Position, Velocity and Torque modes
- Embedded Gear Ratio, Homing and Profile Position modes
- Distributed clock to ensure high precision synchronisation (< 1 us)

Safety conformance
- PL-d according ISO13849-1
- STO: IEC61800-5-2
- SIL2 according to EN61508

G5 servo system features
- Compact size servo drives with EtherCAT connectivity built-in
- High-response frequency of 2 kHz
- Load vibration suppression and dual feedback control
- Embedded Safety conforming ISO13849-1 Performance Level d
- Advanced tuning algorithms (Anti-vibration function, torque feedforward, disturbance observer)
- Wide range of servo motors
- Voltage 120, 230 and 460 VAC
- Power from 50 W to 15 KW
Improved rotary motors

- Low cogging torque servo motors
- High accuracy provided by 20 bit encoder
- IP67 for all motors and connectors
- Large range of motors from 0.16 Nm up to 96 Nm nominal torque (224 Nm peak)
MX2 V1 and RX V1 Inverter
Fast response inverter for Machine Control

Thanks to its advanced design and algorithms, the MX2 inverter provides smooth control down to near zero speed, plus precise operation for cyclic operations and torque control capability in open loop. The RX series combines high performance, application functionality and customization to match the precise requirements. Both, the MX2 and RX inverter series are fully integrated within the Omron Sysmac Studio software.

**Torque control in open loop**
- Ideal for low to medium torque applications

**Quick response to load fluctuation**
- Stable control without decreasing machine speed improves quality and productivity

### MX2 V1 features
- Power range up to 15 kW
- Torque control in open loop, ideal for low to medium torque applications
- 200% starting torque near stand-still operation (0.5 Hz)
- Double rating VT 120%/1 min and CT 150%/1 min
- IM and PM motor control
- Indexer functionality
- Drive Programming
- 24 VDC backup supply for control board and communications
- Built-in application functionality (i.e. Brake control)
- PID for process control
Motor efficiency control
• Double rating VT 120%/1 min and CT 150%/1 min
• Energy saving function

RX V1 features
• Power range up to 132 kW
• Sensor-less and closed-loop vector control
• High starting torque in open-loop (200% at 0.3 Hz)
• Full torque at 0 Hz in closed-loop
• Dual rated VT 120%/1 min and CT 150%/1 min
• Indexer functionality
• Drive Programming
• Built-in application functionality (i.e. ELS - Electronic Line Shaft)

200% starting torque
• Near stand-still operation
• High starting torque in open loop
• Control of fast cyclic loads

(EXample of Speed vs. Torque Characteristics: RX series V1 type)
The FQ-M series is a vision sensor designed specifically for pick and place applications. It comes with EtherCAT embedded and can be configured and monitored from Sysmac Studio software. The FQ-M series is compact, fast and includes an incremental encoder input for easy tracking and calibration.

**Connectivity**
- EtherCAT port for object tracking
- Ethernet port for advanced configuration and monitoring
- Encoder input for accurate “on the fly tracking” and easy calibration
- Automatic strobe timing control

**Performance**
- Up to 5000 pieces per minute with 360 degree rotation
- Stable and robust detection under changeable environmental conditions

**FQ-M features**
- Made specifically for tracking applications
- Designed to work within Sysmac integrated automation with embedded EtherCAT and integrated software tool
- Smart camera with EtherCAT: camera, image processing and connectivity in one
- Vision sensor with encoder input for tracing function
- Calibration function of the complete system
- Can inspect a wide range of objects
- Sysmac Studio software for vision system operation and setting
Encoder input for tracking and calibration

» The assisted calibration procedure simplifies the overall system set-up.

» Objects that overlap within more than one field of view are segregated and its data is ignored.

First shot: The position and orientation data of pieces 1, 2 and 3 are sent to the controller.

Second shot: Only the position and orientation data of piece 4 are sent to the controller.

Design
- Camera and image processing in one
- Standard C-mount lenses; choose the field of view and focus distance you need
- Variety of industrial connector types (angled, straight) for correct mounting

One Software
- Fully integrated within Sysmac Studio
- Intuitive and icon driven set-up and configuration
- Trending and logging function
FH Vision System
Machine vision tailored for pick & place

The FH Vision System is optimized to detect the position and orientation of any object at high speed and with high accuracy. This provides a new generation of image processing technologies within an intuitive user interface optimized for positioning applications. The built-in EtherCAT communications enable reliable and easy networking with motion control, increasing the overall machine performance.

Stable measurements under changing conditions
• Differences of the work piece
• Dust and dirt
• Changing ambient environment

Alignment and quality inspection in one system
• Inspection of scratches and defects
• Detection of dirty or overlapping objects
• Edge and corner breakage inspection
• Automatic calibration for robots, XY, and UVW stages

Shape based object positioning:
• Separation of attached objects
• Detection of partially hidden objects
• Compensation for rounded or broken edges

Features
• Easy and guided setup using the Application Wizard
• Simple auto-calibration with the picker
• High-speed cameras and positioning algorithm
• Simultaneous quality inspection
• EtherCAT connectivity built in
• NPN / PNP output in one controller
ZW Measurement Sensor
Ultra-compact, Lightweight sensor measures any material

The ZW confocal fiber displacement sensor delivers stable, non-contact in-line measurements of height, thickness and other dimensions. It solves the problems of traditional laser triangulation sensors: deviation between different material with inclination tolerance. The compact sensing head has no electronic parts to eliminate problems of installation space and mutual interference, electrical/magnetic noise, temperature rise and mechanical positioning. The EtherCAT interfaces integrates height and position coordinates for profile mapping.

- Ultra-compact sensing head: 24x24mm weighs only 105g
- High flexibility fiber optic cable from sensor to controller - up to 32m
- Mount sensing head one time - no need to re-tune for changing materials
- Separate amplifier provides white LED light source, spectroscope and processor to convert reflected color light to distance
- Stable measurements for any material - glass, stainless steel, mirror, white ceramic and PCB substrates

An LED is used in place of a laser for the light source to eliminate the need for safety measures.

No electronic parts in the sensor head.

Electric circuits and the light source are contained in the Controller.
N-Smart Sensors
Customized Sensor Arrays on EtherCAT

The Sysmac family includes Omron’s advanced N-Smart sensor solution. The N-Smart sensors are building blocks to a fully customizable Fiber and Laser sensor array that fits any application and communicates seamlessly to your machine controller over EtherCAT. The N-Smart solution is simple and dependable, ideal for high-speed workpieces and high-precision position feedback control. Onsite maintenance is improved with clearly readable high-contrast displays on each sensor. Setup without software using built-in push buttons.

Features

- Ultra-easy Advanced Smart Tuning with the push of a button
- More dependable detection of high-speed targets
- Predictive Maintenance to reduce downtime
- Highly visible white LED display, an industry first
- E3NX-FA has 1.5x the sensing distance of conventional amplifiers

Inter-Unit Network

1. The DS-Bus is an OMRON Inter-Unit network communications protocol that connects the E3NW-ECT Sensor Communications Unit and E3NW-DS Distributed Sensor Units.
2. Each E3NW Node supports a maximum of 30 total sensors, including DS-Bus sensors.
Optimum Settings Achieved Even in Super-high-speed Mode

More Dependable Detection of High-speed Workpieces

The N-Smart solution enables super high-speed 30µs response time. This allows for more stable detection of faster workpieces than with conventional models.\(^1\,\text{2}\)

* Increased dynamic range for improved detection stability

- Excessive Incident Level
  - Incident light reduced.
  - Saturation Distance: 1.2 mm
  - For E32-T11R Fiber Unit

- Insufficient Incident Level
  - Incident light increased.

\(^1\) Model with 1 output: 30 µs, model with 2 outputs: 32 µs.
\(^2\) E3X-HD.
Our wide network of machine automation specialists will help you select the right automation architecture and products to meet your requirements.

As your project matures, make use of our Automation Centers to test and catch-up with technology trends in motion, robotics, networking, safety, quality control, etc. Make use of our Tsunagi (connectivity) laboratory to interface, test and validate your complete system with our new machine network (EtherCAT) and factory network (EtherNet/IP).

We will assign a dedicated application engineer to assist with initial programming and proof testing of the critical aspects of your automation system. Our application engineers have in-depth expertise in and knowledge of networks, PLCs, motion, safety and HMIs when applied to machine automation.
As your development begins, our Customer Service support ensures accurate ordering and delivery coordination, offering you peace of mind.

Our worldwide service and support network makes the export of your product simple. All our products are global products, meeting global standards – CE, cULus, NK, LR. We will support you on-site with your customer anywhere in the world.

Our support extends to a comprehensive set of post-sale support services, including:
- Commissioning/Startup
- Field maintenance & troubleshooting
- Telephone technical support - Free
- Warranty repair
- Replacement parts
- Training
- Product operation/automation optimization

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Automation Control Systems
• Machine Automation Controllers (MAC) • Programmable Controllers (PLC)
• Operator interfaces (HMI) • Distributed I/O • Software

Drives & Motion Controls
• Servo & AC Drives • Motion Controllers & Encoders

Temperature & Process Controllers
• Single and Multi-loop Controllers

Sensors & Vision
• Proximity Sensors • Photoelectric Sensors • Fiber-Optic Sensors
• Amplified Photoimicrosensors • Measurement Sensors
• Ultrasonic Sensors • Vision Sensors • RFID/Code Readers

Industrial Components
• Relays • Pushbuttons & Indicators • Limit and Basic Switches • Timers
• Counters • Metering Devices • Power Supplies

Safety
• Laser Scanners • Safety Mats • Edges and Bumpers
• Programmable Safety Controllers • Light Curtains • Safety Relays
• Safety Interlock Switches