Sysmac Automation Platform
One Connection, One Software, One Controller

OMRON

# Sysmac:
# Complete Automation Control


SYSMAC
always in control


SYSMAC
always in control

# Over 90 Years of Industry Experience In One Platform

The Sysmac platform has been built with the sole purpose of maximizing automation performance. Combining the strengths of open protocols, Sysmac achieves performance through robust system architectures while gathering more process data. This pursuit for performance creates automation that can be designed, commissioned, and scaled with confidence.

With one software, one controller, and one connection, Sysmac is always in control.

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## Sysmac Family



## Service and Support



SYSMAC
always in control

# Sysmac: A Fully Integrated Platform

### Integration and Functionality

Sysmac is an integrated automation platform dedicated to providing complete control and management of your automation plant. At the core of this platform, the Machine Controller series offers synchronous control of all machine devices and advanced functionality such as motion, robotics and database connectivity. This multidisciplinary concept allows you to simplify solution architecture, reduce programming and optimize productivity.

**One Machine Controller**
Complete integration of motion and logic sequence


FACTORY AUTOMATION

MACHINE CONTROL

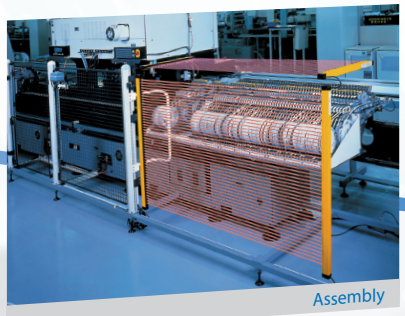
Machine Automation Controller / Industrial PC with Sysmac Machine Control

## Motion

Filling line

- Motion Control is integrated within the IDE, and operating in real-time
- Standard PLCopen Function Blocks plus Omron generated motion FB's
- Direct synchronous control for position, speed and torque

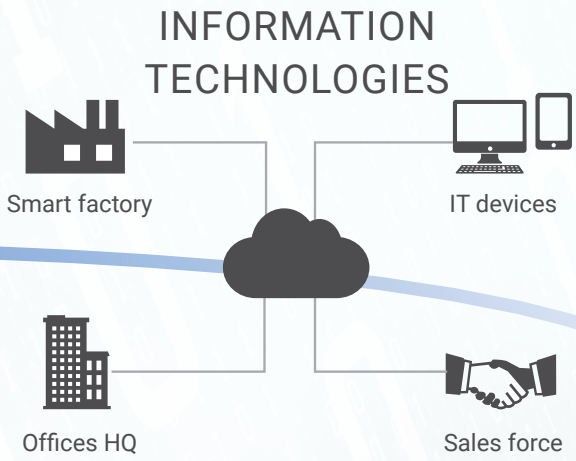
## Safety



Assembly

- All safety related data is synchronized with the whole network
- The PLCopen® FBD simplifies and accelerates the development process through structuring safety circuits and enhancing reuse.

**One Integrated Development Environment Software**
Single software to design, commission, and revision all machine automation.




## Information


Pills blister packing

**One Machine Connection:**

By seamlessly combining the strengths of globally open industrial protocols, Sysmac empowers facilities to use networks as they were designed to achieve more efficient results quicker.

## Vision


Quality inspection

- Higher resolution images available without increasing the vision processing time
- Shape search technology provides more stable and accurate object detection for Pick & Place projects

## Robot

© ETR 300
Pick & Place

- Function Blocks in the Adept Robot Control Library enable robot control from the NJ/NX/NY Controller using Ladder and Structured Text

## Sensing


Presence detection of the rubber seal

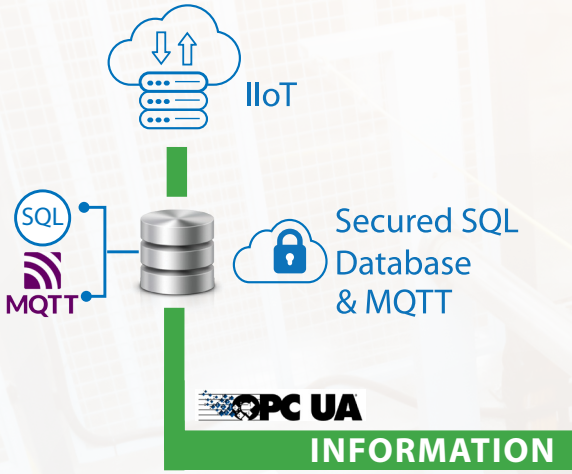
- Full control of the process parameter setting and predictive maintenance functions
- High precision detection and positioning data synchronized on the network

# One Connection

## Sysmac Architecture

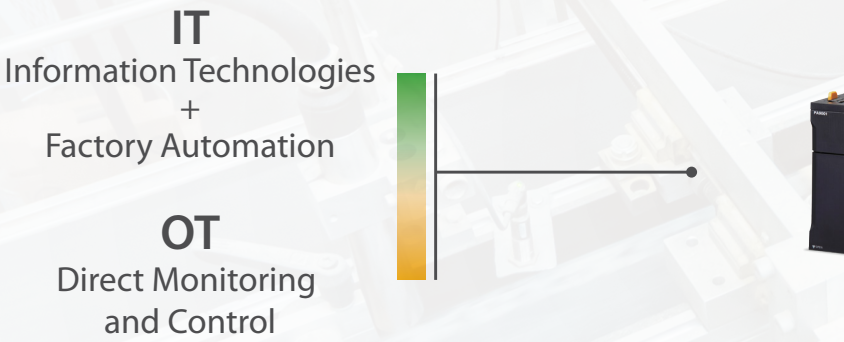
### Efficiency through simplicity. Simplicity is using protocols as they were designed.

Single machine controller architecture with one connection and one software is how we define the Sysmac automation platform. The Machine Automation Controller integrates logic, motion, safety, robotics, vision, information, visualization and networking under one software, Sysmac Studio. This one software provides a true Integrated Development Environment (IDE). The machine controller comes standard with built-in EtherCAT™ and EtherNet/IP™. The two networks provide the perfect match between fast real time machine control and factory scale data management in a single unified connection..




### Factory Automation with EtherNet/IP™

- Peer-to-Peer controller communication interface with Sysmac Studio , NA HMI or SCADA software
- Database connection for Microsoft SQL Server, Oracle, IBM DB2, MySQL and Firebird
- One connection includes safety over CIP Safety™




### Direct Monitoring and Control with EtherCAT™

- Fast and precise: Fastest cycle time of 125 µs, synchronization with 1 µs jitter
- Embedded in OMRON servo drives, inverters, I/O, Safety, Vision and Sensing
- One connection includes safety over Fail Safe Over EtherCAT™

Integrated Development Environment

Industrial PC

HMI/SCADA

M2M

Mobile Robot Fleet Manager

EtherNet/IP™

FACTORY AUTOMATION

CIP Safety™

Port 1

Port 2

Mobile & Collaborative Robots

AI on the Edge

Secured Controller

Port 3

MACHINE CONTROL

Safety over EtherCAT®

Machine Safety

Inspection & Traceability

Fixed Robots

# One Software

## Design

### Minimize time to market

#### Collaborate as a team

- Coordinated development in large decentralized teams is possible. Sysmac Studio integrates a unique graphic interface with a GIT version control system. Take full control of your code and variations and take advantage of the most popular version control software (GIT) and its possibilities for team collaboration, not only during the design phase but also the commissioning and operation phases.

#### Backwards Compatible

- 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.

## Commissioning

### Reduce installation costs

#### 3D Simulation

- Import and control CAD data to simulate a machine using standard ladder logic, structured text and function block commands. Sysmac Studio can fully simulate HMI, controller and machine operation in one software.

#### Motion Simulation

- More than 50 PLC open and Proprietary Motion FB's available in controller to develop single, synchronous and coordinated motion applications. Rich graphic cam editor including multiple interpolation methods as standard. Motion Program Simulation does not require any hardware connection.

#### Sysmac Troubleshooter

- Sysmac Studio troubleshooter handles not only Sysmac Controller but complete Sysmac system troubleshooting in a single reporting tool. Commissioning time is dramatically reduced as any Controller, Network, or Slave problem will be detected with all suitable information available for you to control.

## Production

### Boost Productivity

#### Automatic Data Playback

- The Sysmac Automation Playback is the convergence of data, video, program structure, and ladder logic. All playback is time synced and event triggered to allow local and remote team members to quickly and accurately diagnose issues without interrupting production.

#### Ever Ready Security

- Future updates are part of the Sysmac ethos. Automatic software updates continuously improve software security. Combining updates with backwards compatibility firmware allows for quicker deployment of updates.

# One Controller

## Machine Automation Controller

The NX product line completely controls the machine architecture. Performance and quality are never compromised with OMRON controllers. Patented connector security with a range of available processors give OMRON controllers the ability to drive performance into every node in your architecture. By seamlessly combining the strengths of CIP Safety™, EtherCAT® motion, and EtherNET/IP™ connectivity, OMRON's controllers allow facilities to use networks as they were designed to achieve world class efficiency.


NX controllers use the full DIN Rail. The X BUS, on the left side of the central processing unit, uses high speed data transfer to meet both performance requirements and larger data packets of open networks. The X Bus decreases automation cost by allowing a single NX controller to manage network bandwidth through the creation of subnets. Maximizing performance without requiring multiple controllers.

CIP Safety

EtherNet/IP™

Embedded SQL client and embedded OPC UA Server to remove complex middleware and minimize "Man in the Middle" Cyber vulnerablities.


Over 120 local and remote IO for complete customization and expandability.

Up to 1 Gb/s Connection for both safe and non-safe devices to quickly integrate into native architectures.

Up to 32 GB on edge storage and onboard battery to back-up process data

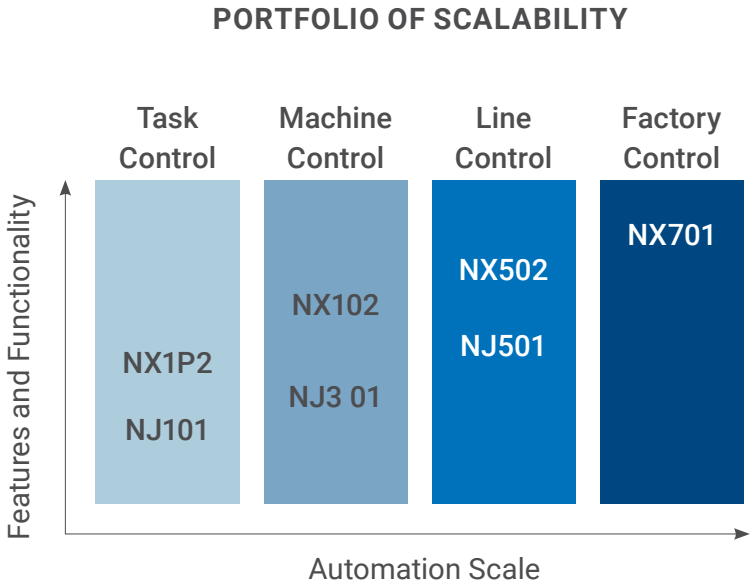
Real time motion control for jitter free precision, reducing scrap.

# Sysmac Family

## Controllers

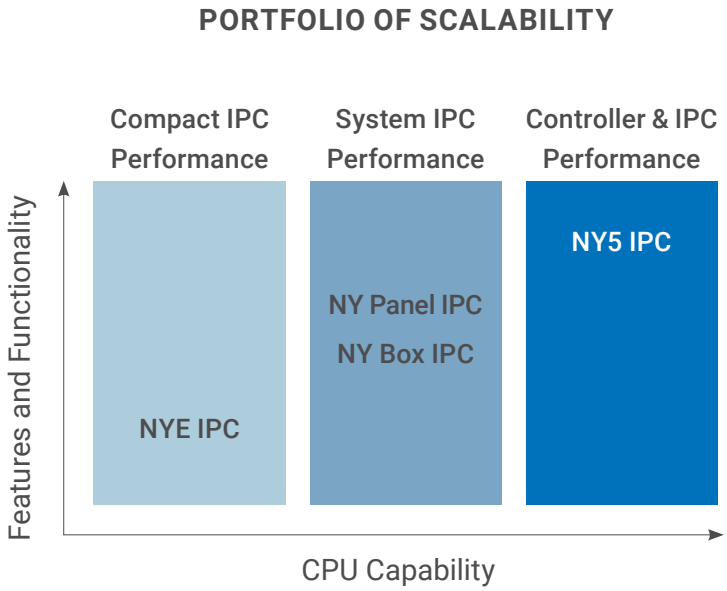
Jump into task control with the NX1P or machine control with the NX102 then scale with the NX502 for line control or NX701 for factory control.

Each Sysmac controller family shares compatible IO and all controllers use the same integrated development environment, Sysmac Studio, with backwards compatibility as standard. Simplifying automation scaling.




## Industrial PCs

OMRON NY Series Industrial PCs are designed with the Sysmac principals of creating the highest degree of machine performance while empowering users through data. Visualization of data is the key to utilizing operations technology data to implement change and achieve next level process efficiency.



# Lineup

| Series | NX Series | | | | NJ Series | | | |
|---|---|---|---|---|---|---|---|---|
| Model | NX1P2-□□□□ | NX102-□□□□ | NX502-□□□□ | NX701-□□□□ | NJ101-□□□□ | NJ101-□□20 | NJ301-□□□□ | NJ501-□□□□ |
| Feature | Task level control with built-in IO | Complete machine control in a single unit. | Line Scale Automation Control | Factory scale motion control. | For simple machines | | For small-scale control with up to 8 axes | For large-scale control with up to 64 axes |
| Appearance |  |  |  |  |  | |  |  |
| Instruction execution times (LD instruction) | 3.3 ns | 3.3 ns | 0.53ns | 0.37 ns | 3.0 ns | | 1.6 ns | 1.1 ns |
| Program capacity | 1.5 MB | 5 MB | 80 MB | 80 MB | 3 MB | | 5 MB | 20 MB |
| Variables capacity (No retain attribute) | 2 MB | 32 MB | 256 MB | 256 MB | 2 MB | | 2 MB | 4 MB |
| I/O capacity | 40 points | – | – | – | 2,560 points | | 2,560 points | 2,560 points |
| Number of EtherCAT slaves | 16 | 64 | 256 | 512 | 64 | | 192 | 192 |
| Number of motion axes | 0, 2, 4 | 0, 2, 4, 8 | 16, 32, 64, 128, 256 | 128, 256 | 0, 2 | | 4, 8 | 16, 32, 64 |
| Functions | – | Database connection (NX102-□□20) | Database Connection for all Units | Database connection (NX701-1□20) | – | Database connection | – | – |

| Windows OS | | | Windows OS with RTOS Machine Control |
|---|---|---|---|
| NYE Compact IPC | NYB Box IPC | NYP Panel IPC | NY5 Box IPC |
|  |  |  |  |
| **Available in 12” and 15”** | Powered by 11th Generation CPU | Available in 12”, 15” and 18” | Supports EtherCAT as standard |
| **NYE with FH+V7 Software** | Die cast aluminum casing | Powered by 11th Generation CPU | Die cast aluminum casing |
| **NYE with Soft NA Software** | Supports 2.5 Gbps Ethernet as standard | Supports 2.5 Gbps Ethernet as standard | Supports 2.5 Gbps Ethernet as standard |
| **NYE with WeblinkPC/ Autovision Software** | Zero fan design available | Zero fan design available | No heat pipes |

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**Select Your OMRON IPC**

For detailed specifications, please visit automation.omron.com

# Sysmac Family

## Software

### SYSMAC-SE2□□□

### Sysmac Studio Automation Software

#### One software for programming, configuration, simulation and monitoring

- One software for motion, logic sequence, safety, vision and visualization
- Fully compliant with open standard IEC 61131-3
- Supports Ladder, Structured Text, and Function Block programming with a rich instruction set
- Advanced security function with 32 digit security password

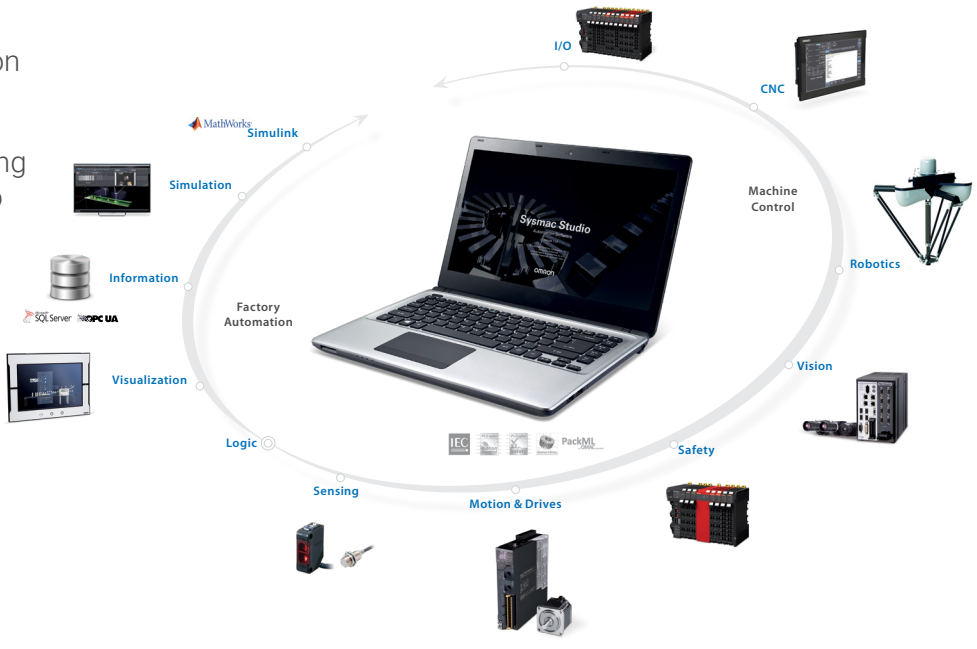

### SYSMAC-XR□□□

### Sysmac Library

Sysmac Library

#### For Design, Commissioning, and Production

- Advanced control such as vibration
- suppression and temperature control
- High-precision control of packaging
- machines and actuators for servo presses
- Productivity improvement by monitoring device operations and restoring parameters
- Reduction in programming time



# Lineup

## Sysmac Studio Standard Edition

Compatible with all Sysmac Devices

| Part Number | # of Users | License Delivery Method |
|---|---|---|
| SYSMAC-SE201L | 1 | Electronic |
| SYSMAC-SE203L | 3 | Electronic |
| SYSMAC-SE210L | 10 | Electronic |
| SYSMAC-SE230L | 30 | Electronic |
| SYSMAC-SE250L | 50 | Electronic |
| SYSMAC-SE2XXL | Site | Electronic |

## Sysmac Studio Basic Edition

Control of Standard Edition with Online License Management

| Part Number | # of Users | License Delivery Method |
|---|---|---|
| SYSMAC-BA201L | 1 | Electronic |

## Sysmac Studio Advanced Edition

Control of Basic Edition with Addition of 3D Simulation and Online License Management

| Part Number | # of Users | License Delivery Method |
|---|---|---|
| SYSMAC-AD201L | 1 | Electronic |

## Sysmac Studio Lite Edition

Compatible with all Sysmac Devices except NJ3, NJ5, NX7

### Full Capability of Sysmac Studio Limited to NX1, NJ1 controllers.

| Part Number | # of Users | License Delivery Method |
|---|---|---|
| SYSMAC-LE201L | 1 | Electronic |
| SYSMAC-LE203L | 3 | Electronic |
| SYSMAC-LE210L | 10 | Electronic |

### License required to upgrade from Lite to Standard

| Part Number | # of Users | License Delivery Method |
|---|---|---|
| SYSMAC-LU501L | 1 | Electronic |
| SYSMAC-LU503L | 3 | Electronic |
| SYSMAC-LU510L | 10 | Electronic |

### Included with Install for Standard, Basic, and Advanced Editions:

- Sysmac Studio
- CX-Integrator
- CX-Designer
- CX-Protocol
- Network Configurator
- CX-ConfiguratorFDT
- Adept Robot IP Address Setting Tool
- CX-Server
- Communications Middleware

### Expanded capabilities:

Access to Sysmac Studio License Manager, allowing users to recover licenses in the event of lost license key.

### Included with Install for Lite Edition:

- Sysmac Studio
- CX-Integrator
- CX-Designer
- CX-Protocol
- Network Configurator
- CX-ConfiguratorFDT
- Adept Robot IP Address Setting Tool
- CX-Server

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**Select Your Sysmac Studio License**

For detailed specifications, please visit automation.omron.com

# Sysmac Family

## HMI

### NA

### Advanced Programmable Terminals and HMIs

#### Enable faster and more efficient control with clear process visualization.

The NA family of HMI terminals makes it fast and intuitive to implement dynamic and highly custom operator interfaces that provides the factory floor process information in real time. Boosting productivity through clear communication.

- NA HMI's use a single connection to visualize complete machine performance.
- NA HMI's are designed and can be completely stimulated within the integrated development environment Sysmac Studio. Maximizing operator and engineering collaboration.
- Easy to read interfaces with sizes up to 15.4 inches with over 16 million display colors on 24 bit color.


**IAG – Intelligent Application Gadgets**

The graphics collection accelerates the development process. You can make your own collections and share them between projects.

# Lineup

| Series | NA Series | | | |
|---|---|---|---|---|
| Feature | More than 16 million color (24 bit full color) and wide screen for all models | | | |
| Appearance |  |  |  |  |
| Display device | TFT LCD | | | |
| Screen size | 15.4-inch widescreen | 12.1-inch widescreen | 9.0-inch widescreen | 7.0-inch widescreen |
| Number of dots (horizontal × vertical) | WXGA 1,280×800 dots | | WVGA 800×480 dots | |
| Colors | 16,770,000 colors (24 bit full colors) | | | |
| Built-in ports | 2 Ethernet ports, 2 USB host ports, 1 USB slave port | | | |
| Allowable power supply voltage range | 19.2 to 28.8 VDC | | | |
| Degree of protection | Front-panel controls: IP65 oil-proof type | | | |
| Memory card | SD/SDHC memory card | | | |
| Flame colors | Black, silver | | | |

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**View the OMRON HMI Portfolio**

For detailed specifications, please visit automation.omron.com

# Sysmac Family

## Motion

### R88M-1□/R88D-1SN□-ECT

### 1S AC Servo System

Improved machine design. Increased machine productivity.

#### Optimized installation and commissioning tasks

- Reduce cabinet size with compact servo drive with same height throughout the whole power range
- Fast and secure screw-less push-in in control I/O connector and brake interlock connector

#### 23 bit high resolution encoder

- No battery, no maintenance and compact size

#### Multi-axis setup and tuning

- Configure and monitor multiple axes in one view
- Easy & fast parameter transfer among axes in the machine (up to 256 axes)
- Comprehensive gain tuning

#### Safety control via EtherCAT

- EN ISO 13849-1(Cat.3 PLd)
- EN61508(SIL2), EN62061(SIL2)
- EN61800-5-2(STO)

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### R88M-1A/R88D-1SAN-ECT

### 1SA Safety Servo System

Safer environment and higher productivity.

#### Safety functionality

- Safety-over-EtherCAT (FsoE)
- Safety functions according to SIL3/PLe
- Safety functions: STO, SS1, SS2, SOS, SLS, SLP, SDI, SBC

#### 20 bit high resolution encoder

- No battery, no maintenance and compact size

#### Optimized installation and commissioning tasks

- Fast and secure screw-less push-in in control I/O connector and brake interlock connector
- Power, encoder and brake in one cable

# Lineup

| Series | 1S Series | | | 1SA Series | |
|---|---|---|---|---|---|
| Model | R88M-1□/R88D-1SN□-ECT | | | R88M-1A□/R88D-1SAN□-ECT | |
| Appearance |  | | |  | |
| Type | Built-in EtherCAT Communications with STO | | | Built-in EtherCAT Communications and Safe Motion | |
| 100 VAC Applicable motor capacity/ force | 50 W to 400 W | | | N/A | |
| 200 VAC Applicable motor capacity/ force | 50 W to 15 kW | | | 200 W to 3 kW | |
| 400 VAC Applicable motor capacity/ force | 600 W to 15 kW | | | 400 W to 3 kW | |
| Applicable servomotor | 1S Servomotor | | | 1SA Rotary Servomotor | |
| Control mode | Position, speed and torque control | | | Position, speed and torque control | |
| Safety approvals | · ISO 13849-1 (PL-e/PL-d)<br>· EN61508 (SIL3/SIL2)<br>· EN62061 (SIL3/SIL2)<br>· IEC 61800-5-2 (STO) | | | · EN ISO 13849-1 PLe/Cat.3<br>· EN 61508 SIL3<br>· EN 62061 SIL CL3<br>· EN 61800-5-2 SIL3 (STO/SS1/SS2/SOS/ SLS/SLP/SDI/SBC) | |
| Appearance |  |  |  |  |  |
| Rated rotation speed | 3,000 r/min | 2,000 r/min | 1,500 r/min | 3,000 r/min | 1,500 r/min |
| Momentary maximum rotation speed | 5,000 to 6,000 r/min | 3,000 r/min | 2,000 to 3,000 r/min | 5,000 to 6,000 r/min | 3,000 r/min |
| Rated torque | 0.318 to 9.55 N·m | 4.77 to 14.3 N·m | 25.5 to 95.5 N-M | 0.637 to 9.55 N·m | 9.55 to 19.1 N·m |
| Capacity | 50 W to 3 kW | 400 W to 3 kW | 4 to 15 kW | 200 W to 3 kW | 1.5 kW to 3 kW |
| Applicable servo drive | 1S Servo Drive | | | 1SA Servo Drive | |
| Encoder resolution | 23-bit absolute | 23-bit absolute | 23-bit absolute | 20-bit absolute | 20-bit absolute |
| Protective structure | IP67 | | | | |

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**View the OMRON Servo Portfolio**

For detailed specifications, please visit automation.omron.com

# Sysmac Family

## I/O

## NX Series
# Modular I/O

### Speed and accuracy for machine performance

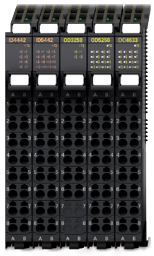
The NX Modular IO range offers over 120 I/O unique part numbers. Allowing machine design maximum flexibility and modularity. Its ultra-fast internal bus system is synchronized with the distributed clock of the EtherCAT™ network. The resulting system-wide deterministic I/O operation allows machine builders to improve machine production rates and output quality. The NX Modular IO range creates a robust IO foundation for any automation including position, control, temperature, and integrated safety

**Communications coupler**
- EtherCAT®
- EtherNet/IP™

**IO-Link master**
- Up to 4 IO-Link devices with one master

**Serial communications**
- RS-232C or RS-422A/485 interface

**RFID**
- Direct connection to V680 RFID System



**Digital I/O**
- 4, 8, 16, or 32 channels per input unit
- 2, 4, 8, 16, or 32 channels per output unit (8 channels per relay output unit)
- 16 channels per mixed I/O unit
- Standard, high-speed, and time-stamp models
- Units with Push-In Plus/MIL/ Fujitsu/M3 Screw connector

**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
- Single-ended input and differential input models

**High-speed analog input**
- 4 channels per input unit
- Differential input
- Sampling as fast as every 5 µs

**Load cell inputs**
- One load cell with one unit
- Fastest conversion cycle of 125 µs

**Safety I/O**
- 4 or 8 safety input points per unit
- 2 or 4 safety output points per unit
- Free allocation of the safety I/O units on the internal high speed bus

**Safety CPU**
- EN ISO13849-1 (PLe/Safety Category 4), IEC 61508 (SIL3) certified

**Temperature inputs**
- Thermocouple or RTD inputs, 2 or 4 per unit
- Conversion time of 10 ms, 60 ms or 250 ms

**Heater burnout detection**
- 4 CT sensor inputs and 4 trigger outputs to drive SSRs

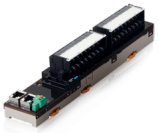
**Temperature control**
- 2 or 4 multi-input (thermocouple and resistance thermometer) channels per unit
- Conversion time of 50 ms
- Voltage output (for driving SSR) or linear current output
- 1 CT input per channel

**Position interface**
- Incremental and absolute encoder support
- Pulse output unit (line driver output model)

# Lineup

| Series | NX Series |
|---|---|
| Features | · Over 100 models including digital I/O, analog I/O, position interface, temperature inputs, temperature control, RFID, safety CPU, and safety I/O<br>· NsynX technology provides I/O response with less than 1 µs jitter<br>· Screwless terminal block, connector, and M3 screw types<br>· Up to 32 channels per digital input unit or output unit |
| Appearance |  |
| Type | Modular I/O |
| Communications interface | EtherCAT |
| Number of connectable units | · 63 units max.<br>· Input: 1,024 bytes max., output: 1,024 bytes max. |
| Unit types | Communications coupler, IO-Link master, serial communication, RFID, digital I/O, analog I/O, high-speed analog input, load cell input, safety I/O, safety CPU, temperature input, heater burnout detection, temperature control, position interface |
| Mounting | DIN track |

* See page 27 for more information on safety I/O.

| Series | NXR Series |
|---|---|
| Features | · IP67 Ingress Protection Rating for Longevity<br>· M12 Connector for Quick Connection<br>· Pre-Programmed Port Setting for Fast Set-up |
| Appearance |   |
| Type | Block |
| Communications interface | EtherNet/IP and EtherCAT™ with IO Link |
| Number of connectable units | 8 configurable ports: IO-Link, 2 inputs, 2 outputs, or 1 input and 1 output |
| I/O types | Digital I/O |

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**View the OMRON local NX IO Portfolio**

# Sysmac Family

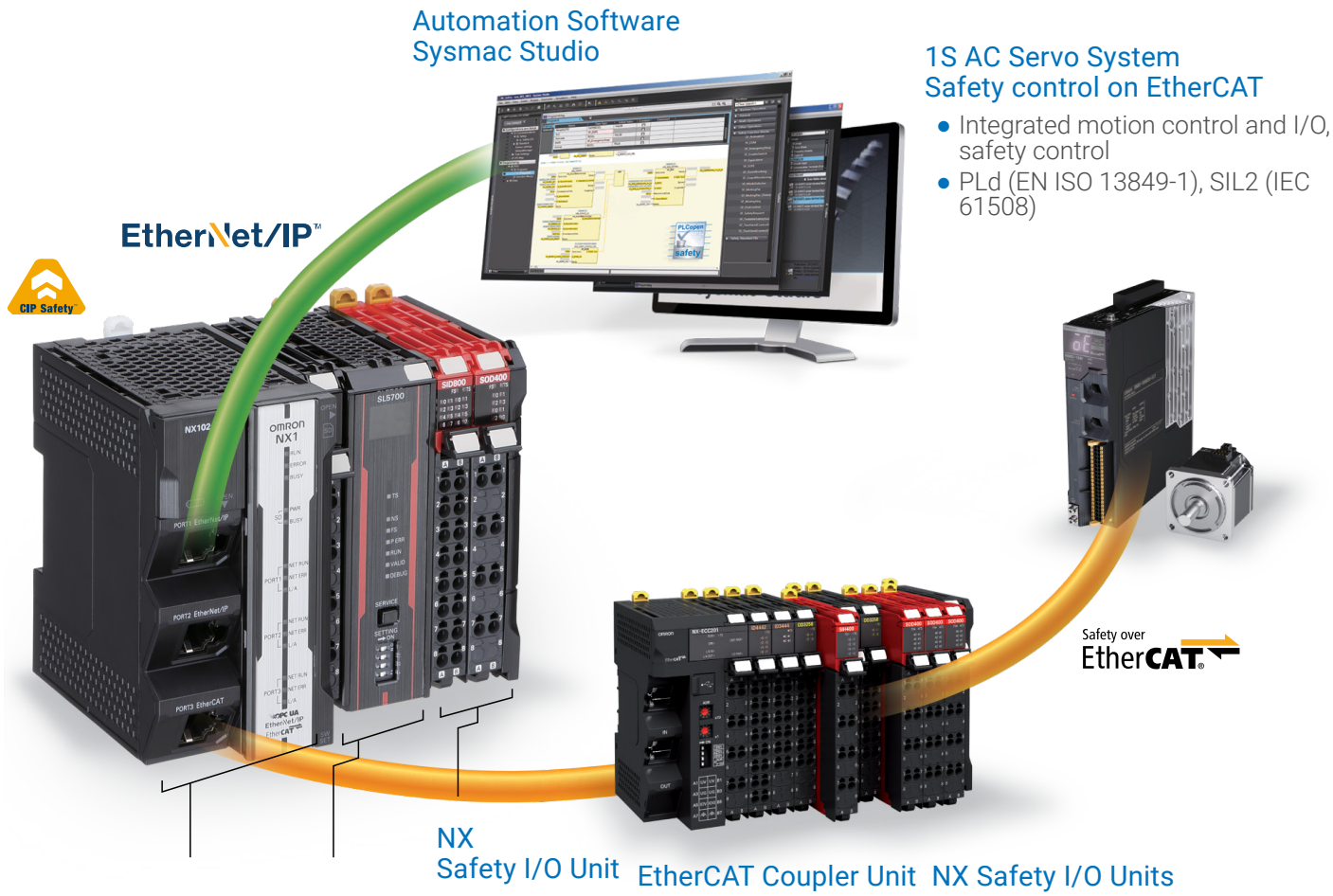
## Safety

### NX-SL/SI/SO

### NX Safety Controller

#### Integrated safety into machine automation

- The safety controller meets PLe according to the ISO 13849-1 and SIL3 according to IEC 61508
- Flexible system 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



# Lineup

## Safety Controller

| Product name | Safety CPU Unit | |
|---|---|---|
| Model | NX-SL5500/5700 | NX-SL3300/3500 |
| Features | · Two different networks, Safety over EtherCAT (FSoE) and EtherNet/IP (CIP Safety), in a single system<br>· Line safety control and fast machine control at the same time<br>· Sysmac Studio version 1.24 or higher for hardware configuration and programming<br>· Flexible Safety system building<br>· Optimal I/O building | · Integrated safety into machine automation through the use of Safety over EtherCAT -FSoE- protocol. Freely mixing with standard NX I/O<br>· Sysmac Studio version 1.07 or higher for hardware configuration and programming<br>· Flexible Safety system building<br>· Optimal I/O building |
| Appearance |  |  |
| Network | Safety over EtherCAT (FSoE), EtherNet/IP (CIP Safety) | Safety over EtherCAT (FSoE) |
| Applicable standards | EN ISO 13849-1 (PLe/Safety Category 4), IEC 61508(SIL3), IEC/EN 62061(SIL CL3), IEC/EN 61131-2 , IEC 6132-3-1, IEC 61131-6 | EN ISO 13849-1 (PLe/Safety Category 4), IEC 61508 (SIL3), EN 62061 (SIL CL3), IEC/EN 61131-2, IEC 6132-3-1 |
| Programming | · IEC 61131-3 standard<br>· PLCopen Function Blocks for Safety | |
| Program capacity | 2048 KB, 4096 KB | 512 KB, 2048 KB |
| Safety I/O connection | 128/254 | 32/128 |
| Maximum number of safety I/O points | 1024, 2032 | 256, 1024 |
| Units that can connect | NX102 CPU Unit, Communication Control Unit | NX102 CPU Unit, EtherCAT Coupler Unit, EtherNet/IP Coupler Unit |

| Product name | Safety Input Unit | Safety Output Unit |
|---|---|---|
| Model | NX-SIH400/SID800 | NX-SOH200/SOD400 |
| Appearance |  |  |
| Applicable standards | EN ISO 13849-1 (PLe/Safety Category 4), IEC 61508(SIL3), IEC/EN 62061(SIL CL3), IEC/EN 61131-2, IEC 6132-3-1 | |
| Number of safety input/output points | 4, 8 | 2, 4 |

# Sysmac Family

## Vision

## FH
## Vision System

### Flexible solution for machine vision

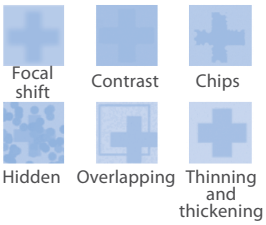
The FH Vision System is optimized to detect the position and orientation of any object at high speed and with high accuracy. The built-in EtherCAT communications enable reliable and easy networking with motion control, increasing the overall machine performance. A flexible machine vision tailored for quality inspection.

### Wide camera range

- Up to 20.4 M pixel
- High speed CMOS camera
- Use different fields of vision and at any angle

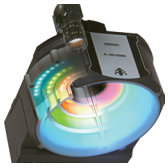
### Advanced shape search technology

- Differences of the work piece
- Dust and dirt conditions
- Detection of overlapping objects
- Changing ambient environment



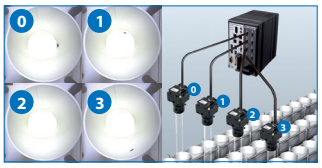

### Unique light

- The MDMC light flexibly changes illumination colors and angles according to items to measure.



### Multiple inspection

- Powerful 4-core i7 parallel processor
- Up to 8 camera by one controller




## FQ-M
## Vision Sensor

### Designed for object tracking

The FQ-M Series is a vision sensor designed specifically for pick and place applications. Up to 5,000 pieces per minute with 360 degree rotation can be detected. The FQ-M series include an incremental encoder input for easy tracking and calibration.


### Compact design

Camera and image processing in one

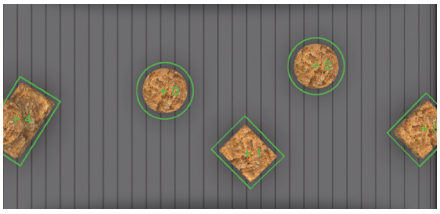
Standard C-mount lenses; choose the field of view and focus distance you need

- Flexible cables
- Vision sensor with encoder
- input for tracking function

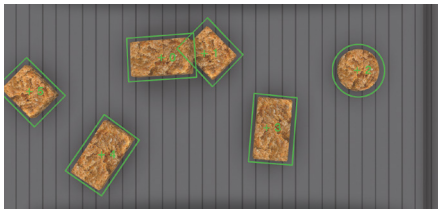
EtherCAT

### Advanced shape search technology

Varying material ie. shiny



Overlapping products



Product detection:
10 pcs with rotation < 200 ms

# Lineup

| Product name | | Smart Camera | Vision System |
|---|---|---|---|
| Series | | FQ-M Series | FH Series |
| Appearance | |  |  |
| Hardware features | | · Camera and image processing in one<br>· Easy to installation | Flexible configuration of cameras and controller to suit your applications |
| Software feature | | Communication wizard for easy setting | Flexible setting with flowchart |
| Processing items | | Processing items for Pick & Place applications | Processing items covering general applications |
| Processing resolution | 0.4 Mpix | 752 (H)×480 (V) | 720 (H)×540 (V) |
| | 5 Mpix | — | 2448 (H)×2048 (V) |
| | 20.4 Mpix | — | 5544 (H)×3692 (V) |
| Communications interfaces | | EtherCAT, Ethernet, Parallel I/O, encoder input | |

# Sysmac Family

## Sensing

## ZW-8000/7000

## Confocal Fiber Displacement Sensor

### Measure anything from anywhere for the most reliable in-line measurements.

The ZW-8000 Series provides high-precision in-line measurements of rattling, inclined, shiny, thin or minute parts. The ZW-7000 Series provides ultra-high-speed, stable measurements of diffuse reflective objects during movement.These sensors help increase quality inspection accuracy and to reduce inspection time.


### Reliable measurements for any material and surface types

The white light confocal design principals allow a continuous measurement of object in any mixed conditions including mirror, coarse, transparent, curved, or narrow areas without stopping the sensor head.

### ZW-8000/700 Resolution

- Angle characteristic: ±25° for shiny surfaces
- Linearity for different materials: ±0.3 µm
- Minimum sampling period: 20 µs
- Minimum spot diameter: 4 µm

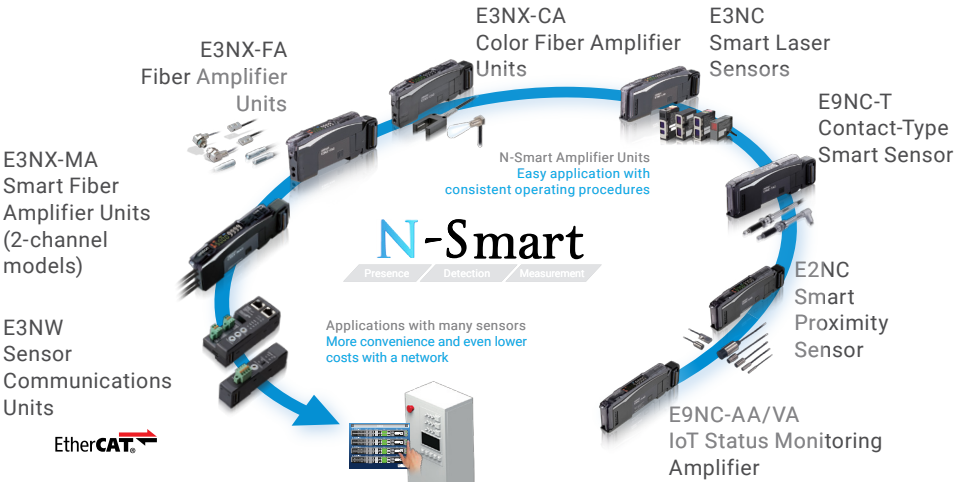
Note: Specifications differ among models. Please ask OMRON sales representative for details.

## E3NX/E3NC/E9NC/E2NC Series

## N-Smart Series

### Various sensors connected over EtherCAT™

The N-Smart lineup of next-generation fiber sensors, laser sensors, contact sensors, and proximity sensors are designed to solve common industry problems maximizing uptime to achieve optimum cost performance.




### N-Smart Series Problem Solving Features

- Ultra-easy Advanced Smart Tuning with the push of a button
- Stable detection of high-speed workpieces
- Predictive maintenance to reduce downtime
- Highly visible white LED display
- E3NX-FA has 1.5x the sensing distance of conventional amplifiers[1]

1. Compared with E3X-ZV/MZV

# Lineup

| Product name | Confocal Fiber Displacement Sensor | | |
|---|---|---|---|
| Series | ZW-8000 Series | ZW-7000 Series | ZW-5000 Series |
| **Feature** | For measurements of rattling or inclined “transparent objects or mirror surfaces” such as thin film sheets or glass | For accurate shape measurements of “coarse surfaces” while the sensor head is moving | Bring the benefits of the white light confocal principle to production lines |
| **Appearance** |  | | |
| **Measurement method** | White light confocal principle | | |
| **Measuring range** | Min : 7±0.3 mm,<br>Max : 30±2 mm | | |
| **Static resolution** | 0.002 to 0.016 µm | | |
| **Linearity** | ±0.3 to ±3.0 µm | | |
| **Spot diameter** | 4 to 11 µm | 50 to 190 µm | 9 to 20 µm |
| **Measurement cycle** | 60 to 7500 µs | 20 to 400 µs | 80 to 1600 µs |

| Product name | Detection Sensors | |
|---|---|---|
| Series | N-Smart Series | |
| Feature | Connect fiber, laser and contact sensors to EtherCAT™ | |
| Appearance |  | |
| Network specification | EtherCAT™ communication unit | |
| Sensor Communications Units | E3NW-ECT/DS | |
| Connectable sensor amplifier units | Fiber Sensor<br>E3NX-FA0<br>E3NX-CA0<br>E3NX-MA0<br>Laser Sensor<br>E3NC-LA0<br>E3NC-SA0 | Contact Sensor<br>E9NC-TA0<br>E9NC-AA0/VA0<br>Proximity Sensor<br>E2NC-EA0 |
| **Maximum number of connectable sensors** | 30 | |

| Product name | Detection Sensors | |
|---|---|---|
| Series | IO Link Compatable | |
| Feature | Utilize IO-link at the basic sensor level to start predict machine maintenance programs, reconfigure replacement sensors and quickly troubleshoot sensor failures to minimize downtime. | |
| Appearance |  | |
| Network specification | IO Link on NXR Series Remote IO | |
| Connectable sensor | Photoelectric Sensor<br>E3Z-IL<br>E3AS-HL<br>E3AS-F<br>E3AS-L<br>Color Sensor<br>E3S-DC-IL | Proximity Sensor<br>E2E NEXT<br>E2EQ NEXT<br>E2EW |

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**View the OMRON Sensor Portfolio**

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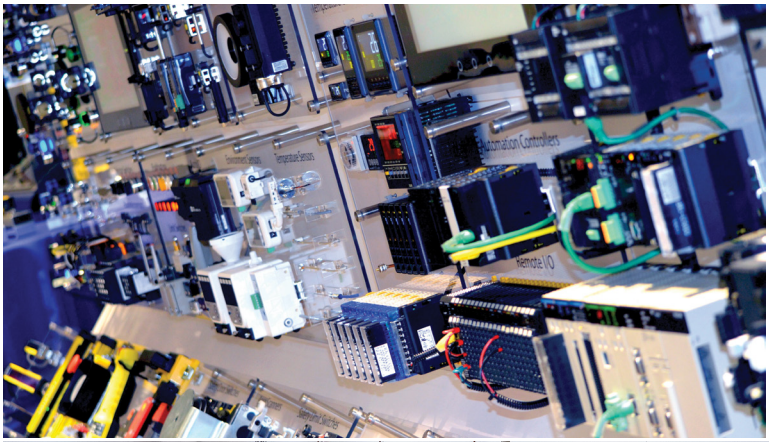
- Technical training



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Note: Specifications are subject to change.



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