NX1 Machine Automation Controller
Continue to pursue productivity

The solution in your hand
Secure data transfer | Machine control | Safety integration | Traceability | Quality inspection
Improve productivity, improve your business

The manufacturing industry is under pressure to keep boosting productivity without compromising on quality. Global production and flexible production are required to satisfy diverse consumer needs. In addition, manufacturers need to control quality and enhance safety to meet advanced regulatory requirements. In order to fulfill these requirements, it is crucial to utilize information, take safety measures, control quality, and at the same time improve production efficiency.

Common issues

Customers compromise between production efficiency and information utilization/safety measures/quality control

- **Production cycle time is increased due to data traceability requirements**
  Full traceability is required to meet high-level quality standards.

- **Safety measures make setup and troubleshooting difficult**
  Separate safety control for machines and lines and separate controllers for machine control and safety are required. Line and machine design is time-consuming, and safety measures have to be redesigned when the layout is changed.

- **Production lead time is increased due to additional inspections and tight quality control**
  Adding inspections to maintain quality increases production lead time. When special machines with built-in PC that collect and process data at high speeds are used for inspections, maintenance becomes difficult. Instead, acceptance sampling is conducted offline.
NX1

The next standard

Improves production efficiency while optimizing information utilization, safety measures, and quality control.
Produce faster without compromising on quality

The NX1 can securely transfer information, take safety measures, and control quality while at the same time improving production efficiency through high-speed, high-precision control. This contributes to continuous improvement in productivity.

Real-time traceability

The NX1 provides high-speed control while utilizing information. For example, the NX1 used for a packaging machine with the capability of handling 1,000 products per minute can collect all traceability data in synchronization with the production cycle while performing motion control.
Integrated safety across production line

The NX1 is the first in the world* to integrate two different open networks: EtherNet/IP™ for scalable safety control in production lines and EtherCAT® for fast, reliable, redundant safety control in machines. Furthermore, it integrates safety control into machine control in lines that require fast cycle times. This integration allows you to standardize machines and build flexible lines.

* Based on Omron investigation in March 2018.

High-speed in-line inspection

Although special inspection machines with built-in PC are widely used for high-speed inspections, they require special maintenance skills. Therefore, acceptance sampling is often carried out offline to prevent line stoppages. The NX1 can be used in conjunction with the High-speed Analog Input Unit to collect measurement data within a fixed cycle time of 5 μs. This standard controller eliminates the need for special machines with PC and can be maintained by on-site engineers. In-line inspections of all products can also be conducted easily.
Seamless integration: production line & IT systems

The NX1 Controller integrates inputs, logic, outputs, safety, and robotics, offering a wide variety of applications that leverage information to boost productivity and measures for quality and safety.

Secure direct connection to database

Networks

MotorNet/IP
EtherCAT
IO-Link

High-speed, high-precision control: Synchronized within same cycle

The NX1 provides synchronized control of the NX bus connected I/O and motion control network within same system cycle time and jitter below 1 µs. This enables real-time data collection and analysis as well as high-speed, high-precision control.
### Application | NX1 functionality + product
---|---
All traceability data storage | NX1 Database Connection CPU Unit Code reader RFID
Direct connection of machine to MES/SCADA | NX1 OPC UA server (standard functionality)
Data utilization to prevent manipulation | HF Vision System
Linkage between image and data | FH Vision System

### Application | NX1 + product
---|---
Predictive maintenance | NX-ILM400 IO-Link Master Unit IO-Link sensor
Automatically optimized temperature control | NX-TC@@@ Temperature Control Unit E5@D Digital Temperature Controller
Position and load control for servo press | 1S Servo System
Weighing control | NX-RS@@@ Load Cell Input Unit
Tracer control | ZW-7000/3000 Confocal Fiber Displacement Sensor
Rotator inspection | NX-HAD@@@ High-speed Analog Input Unit
Welding quality inspection | FH Vision System
Appearance inspection | FH Vision System
High-speed safety control in machine | NX-LS@00 Safety CPU Unit
Safety control in line | F3SG-R Safety Light Curtain
Intrusion detection |
NX1 brings advanced control in miniaturized size

Three industrial Ethernet ports and a power supply are housed in a compact design with a width of 66 mm. The NX1 provides key functionality to integrate control and information for advanced manufacturing applications. The new controller contributes to the pursuit of productivity improvements.
High-speed, high-precision control

Synchronized control of I/O and motion within 1 ms cycle time
Jitter : 1 μs
Memory capacity for variables : 33.5 MB*1

Redundancy to minimize downtime (NX102-□□□□0)

Even if a part of the EtherCAT network is disconnected, Cable Redundancy provides continuous connectivity. This function allows you to fix disconnection without stopping the machines and production line where one controller provides both machine control and safety control.

Multicore microprocessor for control and data handling

The multicore microprocessor enables information utilization including communications and traceability without compromising control performance.

Secure host connection

OPC UA is an IEC communication protocol which is listed as a recommendation for Industrie 4.0 and PackML. The NX1 comes equipped with an OPC UA server interface and provides a secure connection to IT systems such as MES and ERP.

Enhanced Ethernet functionality

Connectivity to existing devices (e.g., Modbus/TCP*2, FINS communications, and connection to other vendor PLC*3) and EtherNet/IP™ performance (increased to 12,000 pps*4) are improved. Packet Filter enhances security, and visualization of EtherCAT™ slave errors makes troubleshooting easier.

*1. The total number of bytes of retained and non-retained variables.
*2. Clients instructions are supported.
*3. SLMP commands are included in the Sysmac Library.
*4. The total pps of two ports.
One software for easy integration & simulation

Sysmac Studio – Integrated Development Environment integrates programming, configuration, information, and safety. The project version control system in the Sysmac Studio Team Development Option ensures smooth development across the team. The Sysmac Studio includes Function Blocks for motion control and database connection, and collections of software functional components Sysmac Libraries can be downloaded from our website. These allow you to minimize time to build systems that boost productivity.
## NX-Series NX102 CPU Units

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Program capacity</th>
<th>Memory capacity for variables</th>
<th>Specifications</th>
<th>Model</th>
<th>Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>NX102 CPU Unit</td>
<td></td>
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<td>Maximum number of used real axes</td>
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<td></td>
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<td>Motion control axes</td>
<td>Single-axis position control axes</td>
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<td></td>
<td></td>
<td>12</td>
<td>8</td>
<td>4</td>
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<td></td>
<td></td>
<td>6</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>NX102 Database Connection CPU Unit</td>
<td></td>
<td></td>
<td>4</td>
<td>0</td>
<td>4</td>
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<td>6</td>
<td>2</td>
<td>4</td>
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</table>

### Automation Software Sysmac Studio

Please purchase a DVD and required number of licenses the first time you purchase the Sysmac Studio. DVDs and licenses are available individually. Each model of licenses does not include any DVD.

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Specifications</th>
<th>Number of licenses</th>
<th>Media</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sysmac Studio Standard Edition</td>
<td>The Sysmac Studio is the software that provides an integrated environment</td>
<td>1 license*1</td>
<td>DVD</td>
<td>SYMAC-SE200D</td>
</tr>
<tr>
<td>Ver.1.0</td>
<td>for setting, programming, debugging and maintenance of machine automation</td>
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<tr>
<td></td>
<td>controllers including the NJ/NX-series CPU Units, NY-series Industrial PC,</td>
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<tr>
<td></td>
<td>EtherCAT Slave, and the HMI. Sysmac Studio runs on the following OS.</td>
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<tr>
<td></td>
<td>Windows 7 (32-bit/64-bit version)/</td>
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<td>Windows 8 (32-bit/64-bit version)/</td>
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<td>Windows 8.1 (32-bit/64-bit version)/</td>
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<td></td>
<td>Windows 10 (32-bit/64-bit version)</td>
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<td></td>
<td>The Sysmac Studio Standard Edition DVD includes Support Software to set up</td>
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<tr>
<td></td>
<td>EtherNet/IP Units, DeviceNet slaves, Serial Communications Units, and</td>
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<tr>
<td></td>
<td>Support Software for creating screens on HMIs (CXDesigner). For details,</td>
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<tr>
<td></td>
<td>refer to your local OMRON website.</td>
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</tbody>
</table>

*1 Multi licenses are available for the Sysmac Studio (3, 10, 30, or 50 licensed).

Note: For Sysmac Studio Team Development Option, refer to your local OMRON website.

### Collection of software functional components Sysmac Library

Please download the Sysmac Library from the following URL and add it to the Sysmac Studio.
http://www.ia.omron.com/sysmac_library/

<table>
<thead>
<tr>
<th>Product name</th>
<th>Specifications</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLMP Communications Library</td>
<td>The SLMP Communications Library is used to control communications with</td>
<td>SYMAC-XR017</td>
</tr>
<tr>
<td></td>
<td>Mitsubishi sequencers using the SLMP communications protocol.</td>
<td></td>
</tr>
<tr>
<td>High-Speed Analog Inspection Library</td>
<td>The High-speed Analog Inspection Library records analog input values acquired</td>
<td>SYMAC-XR016</td>
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<tr>
<td></td>
<td>by the High-speed Analog Input Units in time.</td>
<td></td>
</tr>
</tbody>
</table>

### High-speed Analog Input Unit

<table>
<thead>
<tr>
<th>Product name</th>
<th>Specifications</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>High-speed Analog Input Unit</td>
<td>Number of points: 4 points, Input range: -10 to +10 V, 1 to 5 V, 0 to 10 V, 0 to 5 V, Conversion time: 5 μs/4 Ch</td>
<td>NX-HAD401</td>
</tr>
<tr>
<td></td>
<td>Trigger input section: 4 points, Internal I/O common: NPN</td>
<td>PNP</td>
</tr>
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<td></td>
<td>Model: Free-Run refreshing</td>
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</tbody>
</table>

### Safety CPU Unit

<table>
<thead>
<tr>
<th>Product name</th>
<th>Specifications</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety CPU Unit</td>
<td>Maximum number of safety I/O points: 1024 points, 2048 kB, 128</td>
<td>NX-SL500</td>
</tr>
<tr>
<td></td>
<td>Number of safety master connections: 2032 points, 4096 kB, 254</td>
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<td></td>
<td>I/O refreshing method: Free-Run refreshing</td>
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<tr>
<td></td>
<td>Model: Free-Run refreshing</td>
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</tbody>
</table>
Authorized Distributor:

- Controllers & I/O
  - Machine Automation Controllers (MAC)
  - Motion Controllers
  - Programmable Logic Controllers (PLC)
  - Temperature Controllers
  - Remote I/O

- Robotics
  - Industrial Robots
  - Mobile Robots

- Operator Interfaces
  - Human Machine Interface (HMI)

- Motion & Drives
  - Machine Automation Controllers (MAC)
  - Motion Controllers
  - Servo Systems
  - Frequency Inverters

- Vision, Measurement & Identification
  - Vision Sensors & Systems
  - Measurement Sensors
  - Auto Identification Systems

- Sensing
  - Photoelectric Sensors
  - Fiber-Optic Sensors
  - Proximity Sensors
  - Rotary Encoders
  - Ultrasonic Sensors

- Safety
  - Safety Light Curtains
  - Safety Laser Scanners
  - Programmable Safety Systems
  - Safety Mats and Edges
  - Safety Door Switches
  - Emergency Stop Devices
  - Safety Switches & Operator Controls
  - Safety Monitoring/Force-guided Relays

- Control Components
  - Power Supplies
  - Timers
  - Counters
  - Programmable Relays
  - Digital Panel Meters
  - Monitoring Products

- Switches & Relays
  - Limit Switches
  - Pushbutton Switches
  - Electromechanical Relays
  - Solid State Relays

- Software
  - Programming & Configuration
  - Runtime

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Note: Specifications are subject to change. © 2018 Omron. All Rights Reserved. Printed in U.S.A.