Machine Automation Controller

NX1P

sysmac
always in control

Advanced motion control and networks

EtherNet/IP™

Open industrial Ethernet network

- Interface with HMI
- Peer-to-Peer controller communication
- Interface with Sysmac Studio
- Information network (host application)

MQTT MQTT communication ideal for connecting to IoT systems

NX1P supports MQTT (S) communication using MQTT Communication Library. It can easily connect to the cloud without a gateway PC and securely collect manufacturing site data.

SD memory card

- Back up, restore, and verify data in the controller

Option board

Add serial communications or analog control without increasing the size

- RS-232, RS-422A/485 (Modbus-RTU: 32 nodes max.)
- Analog I/O

EtherCAT®

The fast machine network for a wide range of field and motion devices.

Machine Automation Controller
NX1P

Battery-free NX1P and 1S

The NX1P requires no battery to retain user program, set values, and variables during power interruption in the built-in memory.
The 1S AC Servo System comes with a battery-free absolute encoder.
They reduce machine maintenance.

Advanced motion control increases machine speed and precision

The NX1P provides advanced motion control previously done by a dedicated controller or special unit. Continuous operation by use of electronic cams improves productivity and meets diverse production needs.

1S AC Servo System

Sysmac Library
Simplicity for advanced motion control

for onsite IoT in a Sysmac entry model

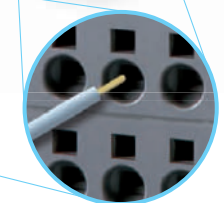Build a cost saving weighing/measurement system by using load cells

The controller makes temperature control easy. Build a temperature control system with heater burnout detection

Load Cell Input Unit
NX-RS

Temperature Input Unit
NX-TS

Heater Burnout Detection Unit
NX-HB

IO-Link Master Unit
NX-ILM400

Value Design for Panel

Time saving wiring by Push-In Plus terminals
Corresponding to our shared **Value Design for Panel** concept for the specifications of products.

Start small-scale onsite IoT with IO-Link

Predictive maintenance minimizes downtime. Omron recommends to start from the point in your machine where failure often occurs.

◈ IO-Link

IO-Link sensor

IO-Link collects information held by sensors and actuators through the IO-Link master and via a fieldbus network into the host controller. It enables communication within the whole system and reduces time required for commissioning and maintenance.

Advanced motion control

The built-in EtherCAT port and advanced motion control make machines faster and more precise

• EtherCAT simplifies the wiring to up to eight servo systems including for single-axis position control.
• Up to four axes of motion control. Electronic cams and interpolation increase machine speed and precision.
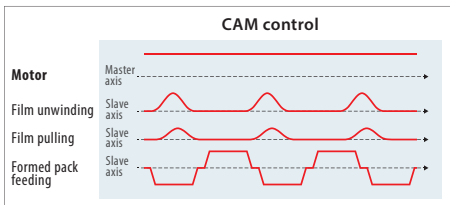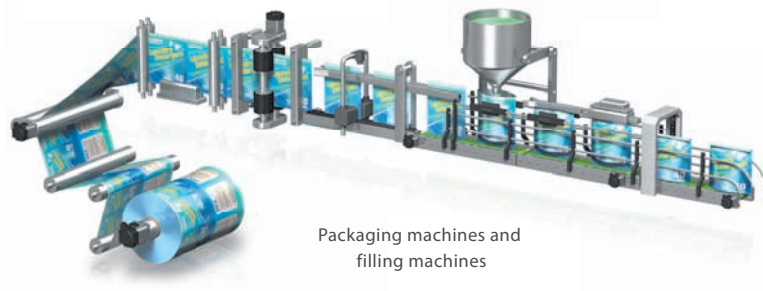
Interpolation

• Linear interpolation and circular interpolation for precise machining and high-speed handling

Welding for secondary batteries and bonding
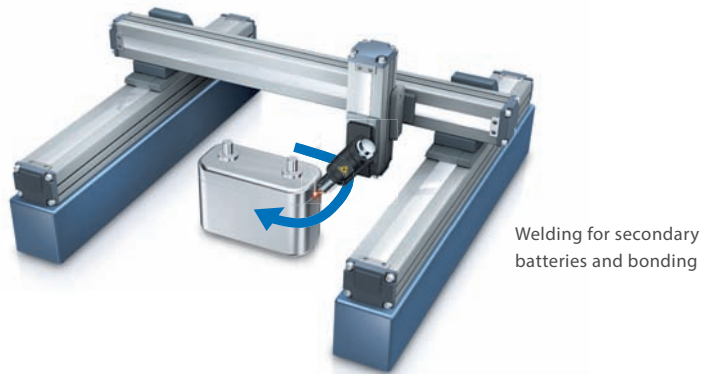
Electronic cam

• Electronic cam enables continuous and high-speed machine operation
• Electronic cam makes it possible to easily change operation timing via a program through computerized cam operation to meet diverse production needs, which is difficult with mechanical cam

CAM control

Motor	Master axis	
Film unwinding	Slave axis	
Film pulling	Slave axis	
Formed pack feeding	Slave axis	

Packaging machines and filling machines

EtherCAT®

Data transmission delay is compensated to synchronize servomotors. Synchronized axes provide high-precision positioning.

• EtherCAT enables one cable to connect the NX1P with servo drives, reducing wiring work.

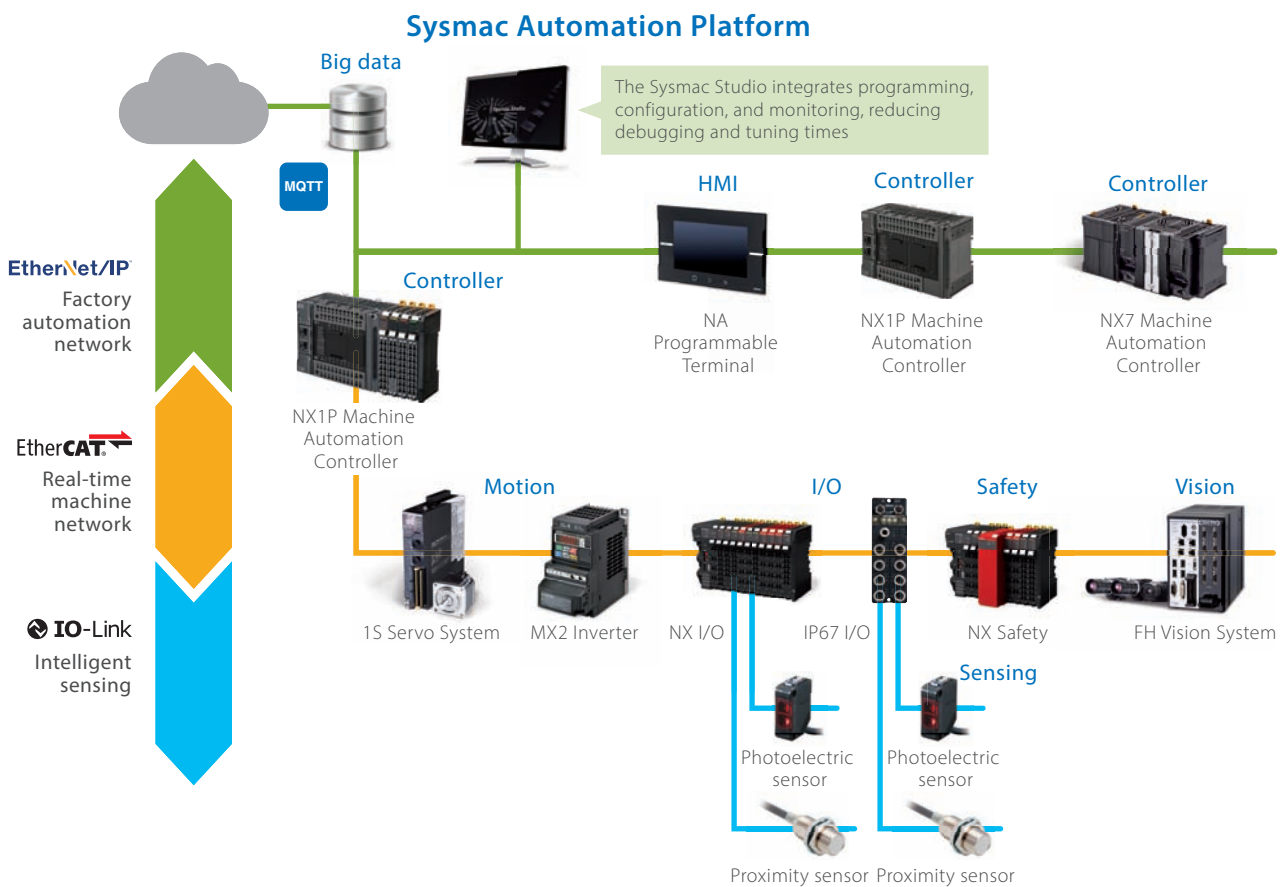Machine Automation Controller
NX1P

1S AC Servo System

• No battery, no maintenance. No need for homing sequence improving machine uptime
• 23 bit high resolution encoder as standard
• Improved loop control for low overshoot and quick settling time
• Safety function: STO

1S AC Servo System
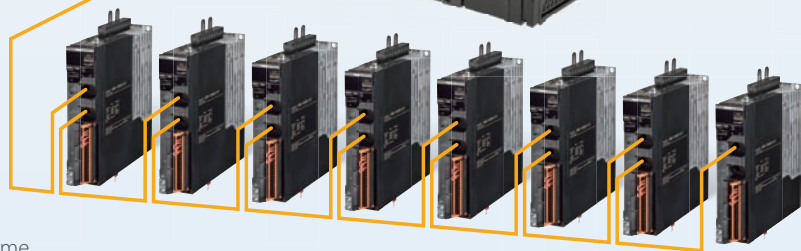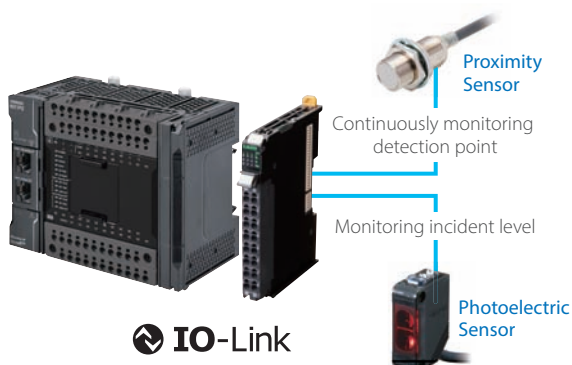
Networks for onsite IoT

IO-Link brings IoT to the sensor level

- EtherCAT connects I/O devices, motion devices, safety controllers, and vision systems with a single cable. You can check machine information by monitoring the status of the connected components.
- EtherNet/IP enables communications with a host PC and data links between NJ/NX Controllers and CJ PLCs.
- The NX1P can easily connect to the cloud using the MQTT Communication Library, and data on the manufacturing site can be collected securely.

Sysmac Automation Platform

Big data

The Sysmac Studio integrates programming, configuration, and monitoring, reducing debugging and tuning times

MQTT

EtherNet/IP
Factory automation network

EtherCAT
Real-time machine network

IO-Link
Intelligent sensing

Controller

HMI

Controller

Controller

NX1P Machine Automation Controller

NA Programmable Terminal

NX1P Machine Automation Controller

NX7 Machine Automation Controller

Motion

I/O

Safety

Vision

1S Servo System

MX2 Inverter

NX I/O

IP67 I/O

NX Safety

FH Vision System

Sensing

Photoelectric sensor

Photoelectric sensor

Proximity sensor   Proximity sensor

Predictive maintenance using IO-Link

You can start predictive maintenance with visualization of the status of a small-sized machine.
IO-Link functionality can be added to existing machines.

Proximity Sensor

Continuously monitoring detection point

Monitoring incident level

Photoelectric Sensor

IO-Link

Wear and vibration of mechanical parts may cause problems

Monitoring excessive remoteness or proximity using the IO-Link proximity sensor greatly reduces the occurrence of sudden defects

The incident level drops due to dirt

Monitoring the incident level using the IO-Link photoelectric sensor prevents false detection

Product line up

Machine Automation Controller NX-series

NX1P2 CPU Units

24-point type 40-point type

EtherNet/IP
EtherCAT

Dimensions (Unit: mm)	**Option Boards**
24-point type 130(W)×100(H)×71(D)	Serial Communications **NX1W-CIF01/ CIF11/CIF12**
40-point type 154(W)×100(H)×71(D)	Analog I/O **NX1W-ADB21/ DAB21V/MAB221**

NX Series   Up to eight NX Units can be connected to an NX1P2 CPU Unit.

IO-Link

| Digital I/O Units **NX-ID/IA/ OD/OC/MD** | Analog I/O Units **NX-AD/DA** | Temperature Input/ Heater Burnout Detection Units **NX-TS/HB** | Load Cell Input Unit **NX-RS** | Position Interface Units **NX-EC0/ ECS/PG0** | Communications Interface Unit **NX-CIF** | IO-Link Master Unit **NX-ILM400** | System Units **NX-PD/PF/ PC/TBX** |

NX-series I/O system
Cat. No. R183

Automation Software Sysmac Studio

SYSMAC-SE2□□□

Significantly reduced startup time (Ver. 1.17 or higher)

The Sysmac Studio is the software that provides an integrated environment for setting, programming, debugging and maintenance of machine automation controllers including the NJ/NX CPU Units, EtherCAT Slave, and the HMI.

• Fully compliant with open standard IEC 61131-3 and Japanese standard JIS B3503
• Supports Ladder, Structured Text and Function Block programming with a rich instruction set
• CAM editor for easy programming of complex motion profiles
• One simulation tool for sequence and motion in a 3D environment
• Advanced security function with 32 digit security password

Ordering Information

International Standards

- The standards are abbreviated as follows: UC1: cULus (Class I Division 2 Products for Hazardous Locations), L: Lloyd, CE: EU Directives, RCM: Regulatory Compliance Mark, and KC: KC Registration.
- Contact your OMRON representative for further details and applicable conditions for these standards.

NX1P2 CPU Units

Product name	Program capacity	Memory capacity for variables	Maximum number of used real axes			Total number of built-in I/O points			Model	Standards
			Used motion control servo axes	Used single-axis position control servo axes		Number of input points	Number of output points			
40-point type	1.5MB	32 KB (Retained during power interruptions) or 2 MB (Not retained during power interruptions)	8 axes	4 axes	4 axes	40 points	24 points	16 points, NPN transistor	NX1P2-1140DT	UC1, L, CE, RCM, KC
								16 points, PNP transistor *	NX1P2-1140DT1	
			6 axes	2 axes	4 axes			16 points, NPN transistor	NX1P2-1040DT	
								16 points, PNP transistor *	NX1P2-1040DT1	
24-point type			4 axes	0 axes	4 axes	24 points	14 points	10 points, NPN transistor	NX1P2-9024DT	
								10 points, PNP transistor *	NX1P2-9024DT1	

Note. One NX-END02 End Cover is provided with the NX1P2 CPU Unit.
* With the load short-circuit protection.

Option Boards (For CPU Units)

Product name		Specification	Supported protocol	Model	Standards
Serial Communications Option Board		One RS-232C port. Transmission distance: 15 m. Connection type: Screwless clamping terminal block (9 terminals).	Host link, Modbus-RTU master, and no-protocol	NX1W-CIF01	UC1, L, CE, RCM, KC
Serial Communications Option Board		One RS-422A/485 port. Transmission distance: 50 m. Connection type: Screwless clamping terminal block (5 terminals)		NX1W-CIF11	
		One RS-422A/485 port (isolated). Transmission distance: 500 m. Connection type: Screwless clamping terminal block (5 terminals)		NX1W-CIF12	
Analog Input Option Board		Analog input: 2 Voltage input: 0 to 10 V (Resolution: 1/4,000). Current input: 0 to 20 mA (1/2,000) Connection type: Screwless clamping terminal block (5 terminals)		NX1W-ADB21	
Analog Output Option Board		Analog output: 2 Voltage output: 0 to 10 V (Resolution: 1/4,000) Connection type: Screwless clamping terminal block (3 terminals)		NX1W-DAB21V	
Analog I/O Option Board		Analog input: 2/Analog output: 2 Voltage input: 0 to 10 V (Resolution: 1/4,000). Current input: 0 to 20 mA (1/2,000) Voltage output: 0 to 10 V (Resolution: 1/4,000) Screwless clamping terminal block (8 terminals)		NX1W-MAB221	

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.

Product name	Specification	Number of licenses	Media	Model
Sysmac Studio Standard Edition Ver.1.□□	Sysmac Studio runs on the following OS. Windows 7 (32-bit/64-bit version)/Windows 8 (32-bit/64-bit version)/ Windows 8.1 (32-bit/64-bit version)/Windows 10 (32-bit/64-bit version) *1 The Sysmac Studio Standard Edition DVD includes Support Software to set up EtherNet/IP Units, DeviceNet slaves, Serial Communications Units, and Support Software for creating screens on HMIs (CXDesigner). Refer to your OMRON website for details.	— (Media only)	Sysmac Studio (32-bit) DVD	SYSMAC-SE200D
		— (Media only)	Sysmac Studio (64-bit) DVD	SYSMAC-SE200D-64
		1 license *2	—	SYSMAC-SE201L

*1. Model "SYSMAC-SE200D-64" runs on Windows 10 (64 bit).
*2. Multi licenses are available for the Sysmac Studio (3, 10, 30, or 50 licenses).

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