OMRON

# 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 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

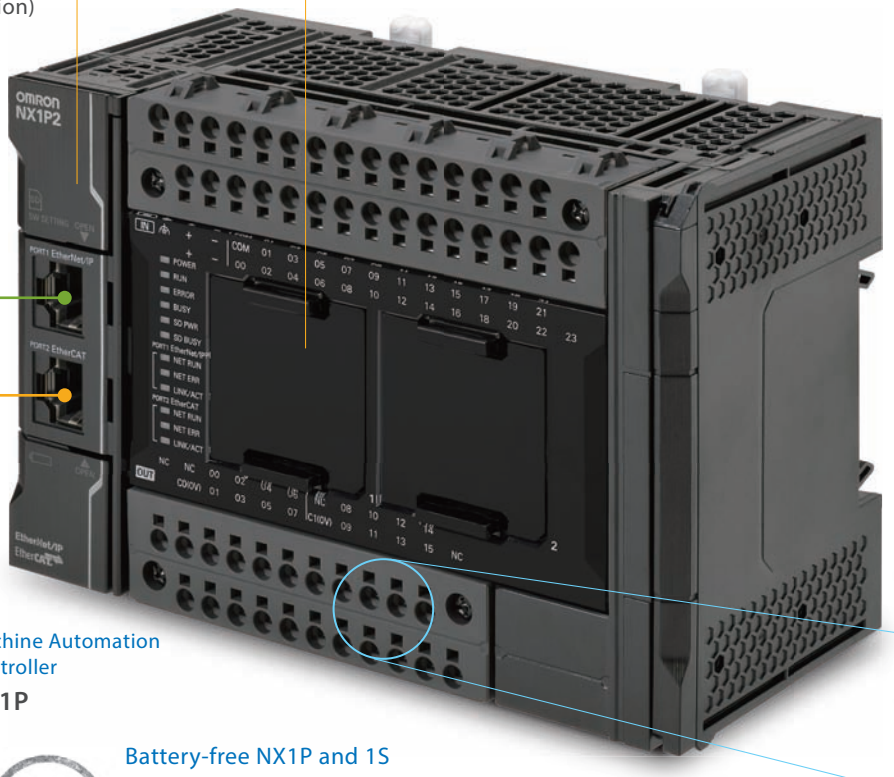
- Back up, restore, and verify data in the controller



### 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




Machine Automation Controller

**NX1P**

## EtherCAT

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

### 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 sensor

**IO-Link**

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.



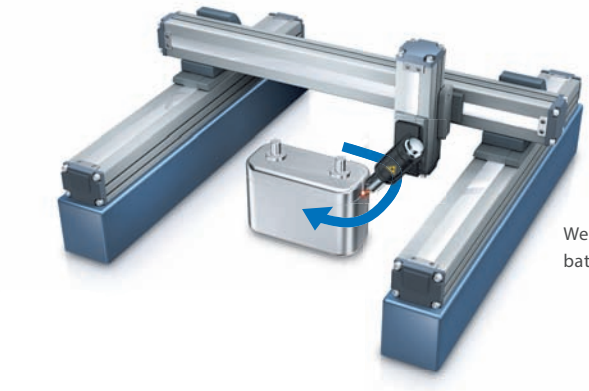
# Advanced motion control

## 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

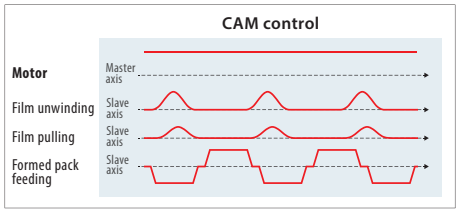
- Linear interpolation and circular interpolation for precise machining and high-speed handling

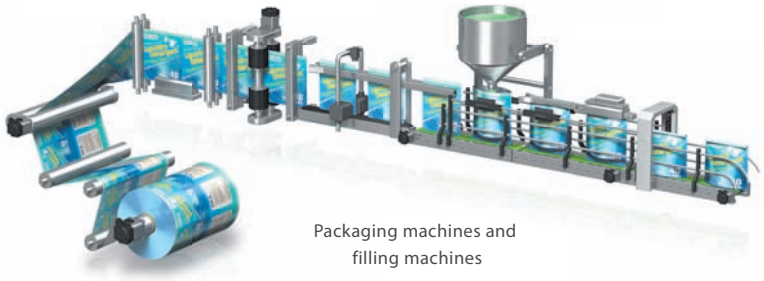


Welding for secondary batteries and bonding

### 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



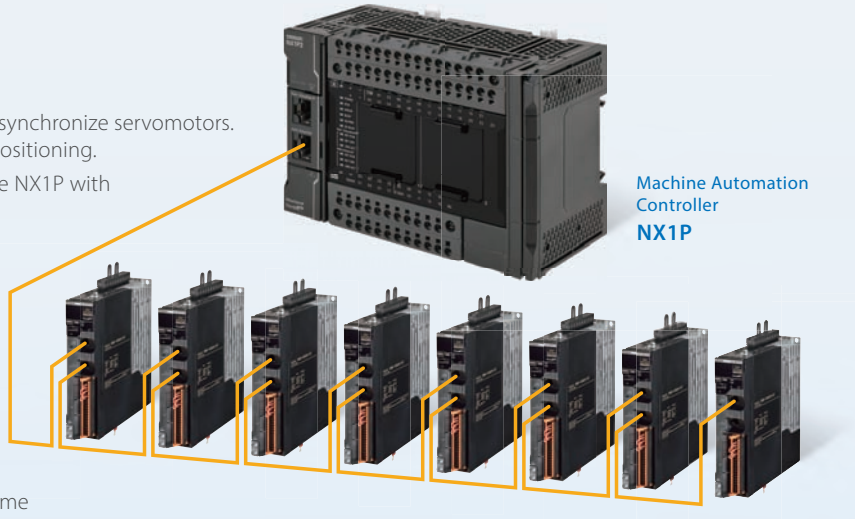



Packaging machines and filling machines

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**

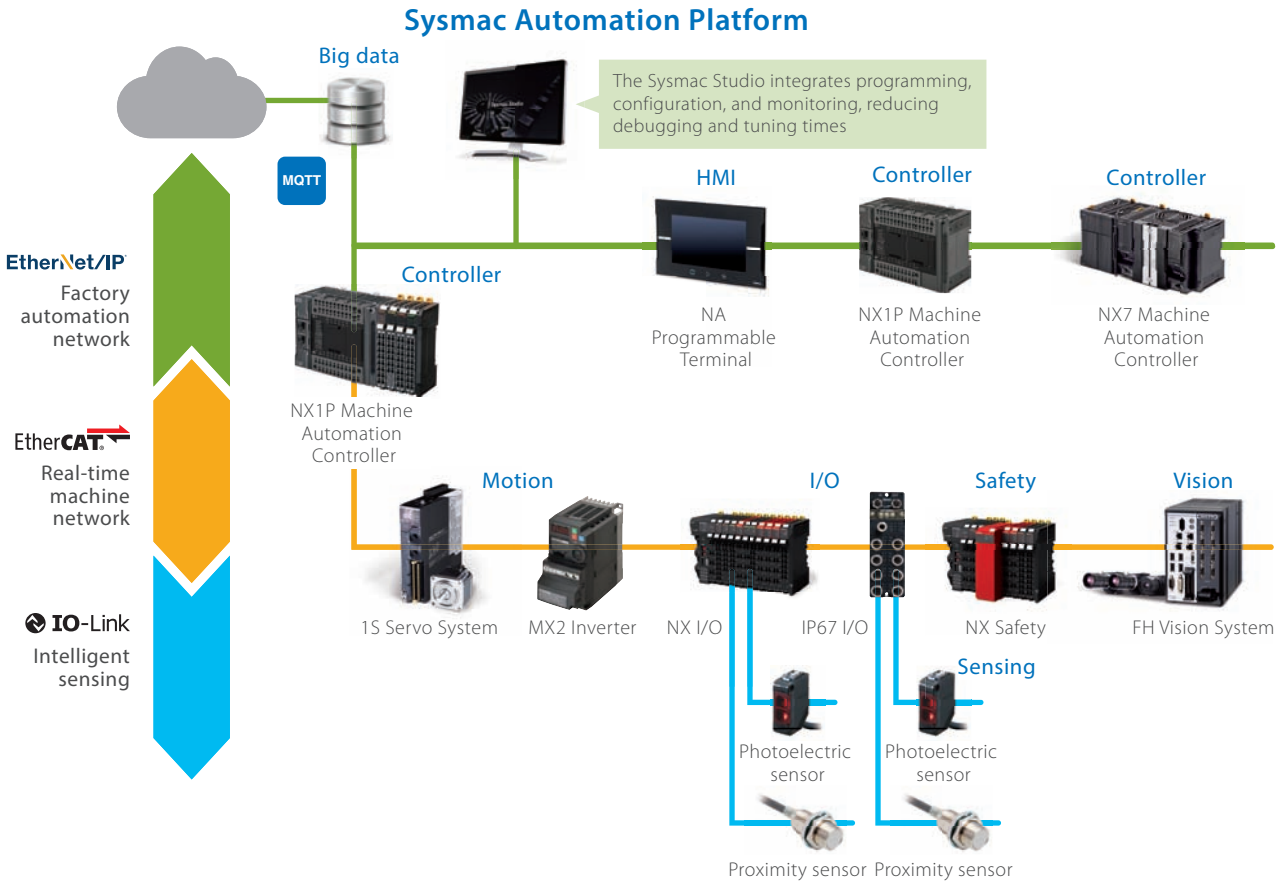
**1S AC Servo System**

- 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

# Networks for onsite IoT

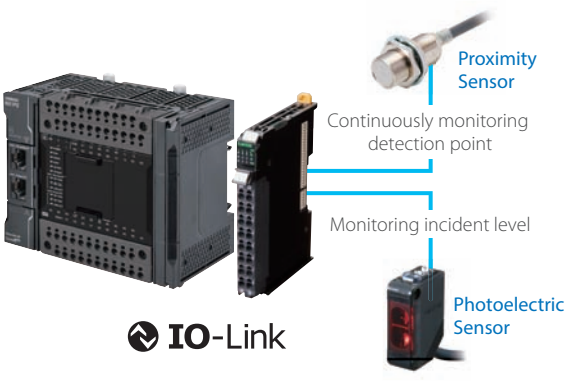
## IO-Link brings IoT to the sensor level

- 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.




## Predictive maintenance using IO-Link

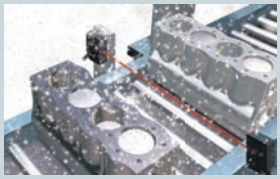
You can start predictive maintenance with visualization of the status of a small-sized machine.
IO-Link functionality can be added to existing machines.






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)**

**24-point type**
130(W)×100(H)×71(D)

**40-point type**
154(W)×100(H)×71(D)

**Option Boards**



Serial Communications
**NX1W-CIF01/ CIF11/CIF12**



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




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

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# 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.<br>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.<br>Connection type: Screwless clamping terminal block (5 terminals) | | NX1W-CIF11 | |
| | One RS-422A/485 port (isolated). Transmission distance: 500 m.<br>Connection type: Screwless clamping terminal block (5 terminals) | | NX1W-CIF12 | |
| Analog Input Option Board  | Analog input: 2<br>Voltage input: 0 to 10 V (Resolution: 1/4,000). Current input: 0 to 20 mA (1/2,000)<br>Connection type: Screwless clamping terminal block (5 terminals) | | NX1W-ADB21 | |
| Analog Output Option Board  | Analog output: 2<br>Voltage output: 0 to 10 V (Resolution: 1/4,000)<br>Connection type: Screwless clamping terminal block (3 terminals) | | NX1W-DAB21V | |
| Analog I/O Option Board  | Analog input: 2/Analog output: 2<br>Voltage input: 0 to 10 V (Resolution: 1/4,000). Current input: 0 to 20 mA (1/2,000)<br>Voltage output: 0 to 10 V (Resolution: 1/4,000)<br>Screwless clamping terminal block (8 terminals) | | NX1W-MAB221 | |

## Automation Software Sysmac Studio

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-series CPU Units, NY-series Industrial PC, EtherCAT Slave, and the HMI.

For details, refer to your local OMRON website and *Sysmac Studio Catalog* (Cat. No. P138).

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