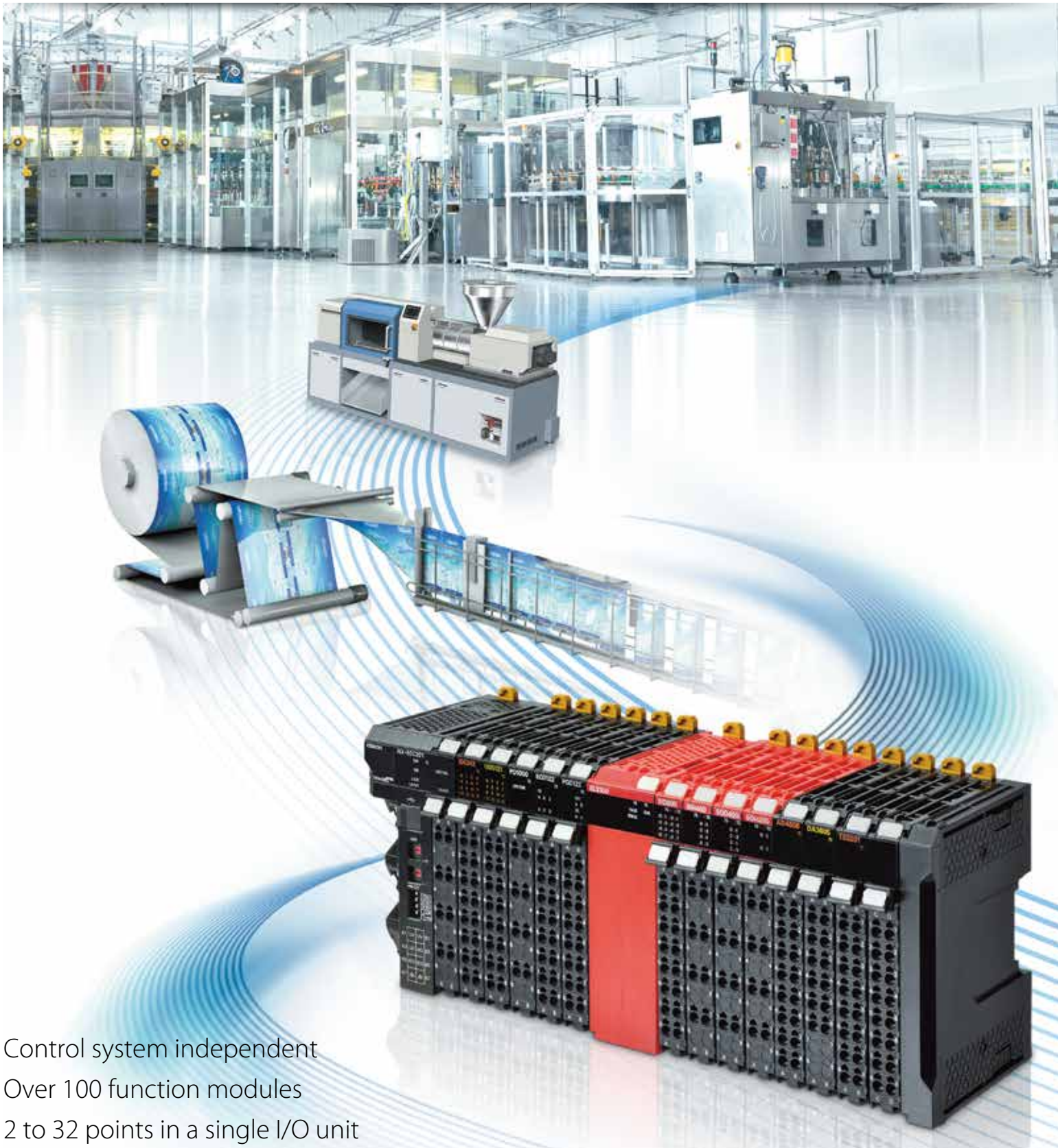
OMRON

NX-series I/O System

Universal I/O for EtherCAT and Ethernet/IP Systems



Control system independent

Over 100 function modules

2 to 32 points in a single I/O unit

OMRON

Create, Save Space, Add Functionality

The I/O system that maximizes system design options

Application example

Value Design for Panel

Corresponding to our shared **Value Design for Panel** concept for the specifications of products

IoT

IO-Link makes communication down to the sensor level visible

Applicable units:
NX-ECC203
NX-ILM400

Weighing

High-accuracy weighing using load cells

Applicable units:
NX-RS1201

Servo press

High-speed, high-precision press fit using load cells

Applicable units:
NX-RS1201
NX-SIH200
NX-SOD400

Safety control

Simplify safety control systems

Applicable units:
NX-SL3300
NX-SIH400
NX-SOH200

Temperature control

Simplify temperature control systems using temperature sensors

Applicable units:
NX-TS3101
NX-HB3101
NX-TC3405

Motion

Simplify position control systems using pulse-train input type motors

Applicable units:
NX-ECS212
NX-PG0342-5

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

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 Units

- 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
- Controls up to 128 safety I/O units

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) point per channels
- Conversion time of 50 ms
- Voltage output (for driving SSR) or Linear current output
- 1 CT input points per

Position interface

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

End cover

OMRON

Simplicity for advanced control

A fully integrated platform

The NX I/O is used to integrate sequence, motion, analog, vision, and safety control, previously done by PLC and dedicated controllers, and visualization of previously invisible sensor data within the Sysmac automation platform.

Sequence control

Multi-tasking and fully compliant with IEC 61131-3 standard programming and PLCopen® Function Blocks.

PLCopen® CONFORMITY LEVEL No. 0043 ST 05.06.2015 Datatypes supported: 17 of 26

Motion control

PLCopen® Function Blocks for the motion control library are available to implement advanced motion control.

PLCopen® motion control

Analog control

The Sysmac Library* and instructions make temperature, weighing, and load control easier.

Weighing Control Library
Servo Press Library

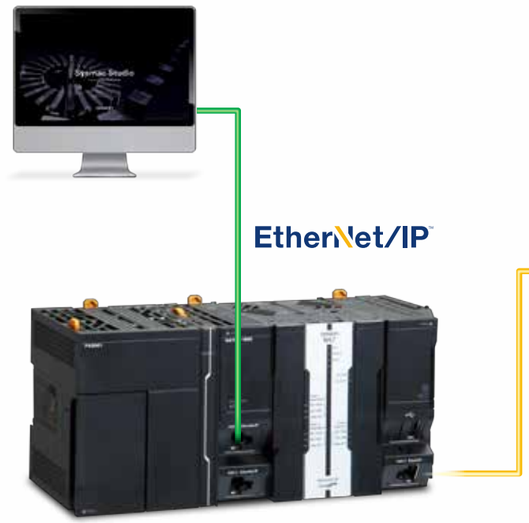
Sysmac Library

* The Sysmac Library is a collection of software functional components that can be used in programs for the NJ/NX/NY Controllers. Sample programs and HMI templates are also available. Download from Omron website and install to use in the Automation Software Sysmac Studio. http://www.ia.omron.com/sysmac_library/

Safety control

Conforms with PLCopen® Function Blocks for Safety.

PLCopen® safety



EtherNet/IP

EtherCAT

Feature of Sysmac

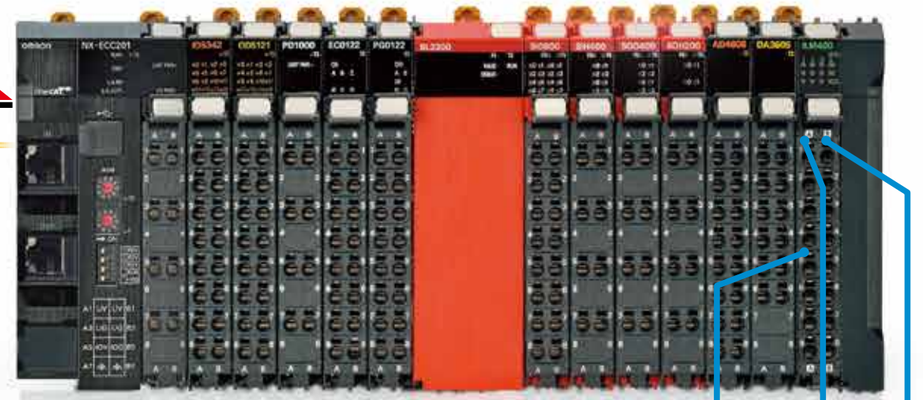
One Control through
One Software and
One Network
simplifies control system configuration

Interfaces for sequence, motion, safety, and analog control and communications required for machines

Visualized sensor data

IO-Link makes communication down to the sensor level visible

IO-Link master



Connecting directly to most sensors, actuators, and safety components

IO-Link

Note: Functionality provided by the EtherCAT coupler unit

Synchronized control for high-speed performance

Production data collection synchronized at high speed

Based on an internal high-speed bus running in synchronization with the EtherCAT network and CPU cycle, the NX I/O can be controlled and used for position, analog, and digital data collection with microsecond accuracy and with nanosecond resolution.

Feature

High-speed I/O units accurately synchronized with the CPU cycle*1

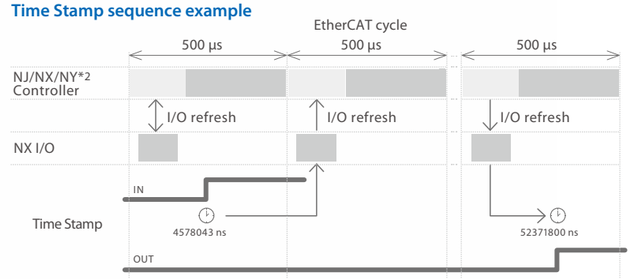
- Digital I/O: High-speed and time-stamp models (NsynX)
- Analog I/O: 10 µs conversion time per channel and 1:30000 resolution
- Load cell inputs: 125 µs conversion time per channel and 24-bit resolution

*1.Fastest cycle time: NX7=125 µs, NJ5=500 µs

NsynX technology

- The NsynX technology is provided by the internal high-speed bus synchronized with the EtherCAT network. This technology is designed for machine control and includes:
- I/O units with distributed clock
- High-speed I/O units synchronized with the EtherCAT cycle
- I/O units with Time-Stamp function

Time Stamp sequence example



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

*2. Industrial PC Platform NY-series IPC Machine Controller only.

Distributed clock

The EtherCAT node slave measures the time difference between incoming and returning frame - Time-Stamp function. With this Time-Stamp function the master can determine the propagation delay offset to the individual slave accurately. This mechanism ensures accurate synchronization between devices with less than 1 µs jitter.

Synchronous production data collection

Data can be collected from the load cell (load data) and servo system (position and torque data) in synchronization with the CPU cycle.

Note: Functionality provided by the EtherCAT coupler unit

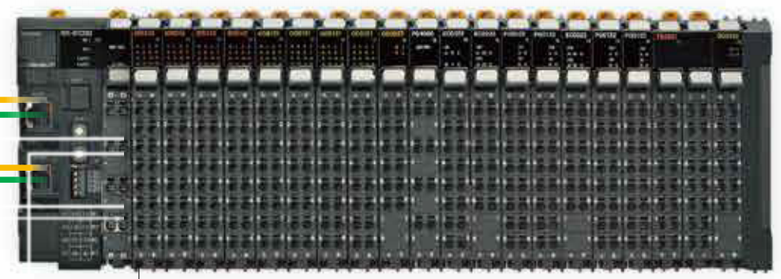
OMRON

The I/O System of Choice for EtherCAT and Ethernet/IP Networks

NX I/O is the premier I/O system for Omron's NX and NJ series of Machine Automation Controllers
NX I/O network interfaces are designed to the industry standards for EtherCAT and Ethernet/IP. This ensures the quality of interface to other control systems that use EtherCAT and Ethernet/IP.

Feature

Wide choice: More than 100 types of I/O unit, from 2 to 32 points in one unit



Types of NX I/O Units

- Digital Input/Output Units
- Analog Input/Output Units
- Temperature Input Units
- Encoder/Positioning Units
- System Units
- Serial communication Units

Quick connections

- Detachable screwless terminal block for easy commissioning and maintenance
- Push-In Plus connections speed up installation
- MIL/Fujitsu connectors for high-density I/O

Safety integrated

The NX Safety CPU Unit and Safety I/O Units can be mixed with standard I/O units to create a complete modular safety control system

EtherCAT

NJ/NX/NY Series or EtherCAT master from other vendors

EtherNet/IP

NX/NJ Series or PLC from other vendors

EtherCAT

EtherCAT specification is governed by the EtherCAT Technology Group (ETG). EtherCAT is suitable for motion control and other applications that require high speed and high precision because of no need of handshaking and high bandwidth utilization.

EtherNet/IP

EtherNet/IP specification is governed by the Open DeviceNet Vendors Association (ODVA). Based on standardized Ethernet protocols (TCP/IP, UDP/IP), EtherNet/IP devices can be mixed with standard Ethernet devices.

Note: 1. Communications coupler units vary depending on the connected network.
2. Connectable units vary depending on the communications coupler unit.
3. The number of connectable nodes varies depending on the master.

Downsize machines and control panels

Reduce wiring time and save space

Push-In Plus connections reduce the work and time required for wiring. Modular design saves space. Also designed for installation in any orientation, the NX I/O can be freely allocated in machines.

Up to 63 units per communication coupler

Feature

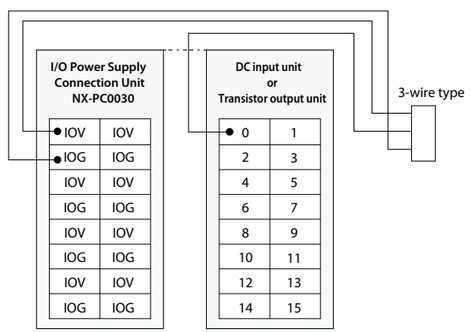
Compact design: Up to 16 digital signals in 12 mm width

Value Design for Panel

Corresponding to our shared **Value Design for Panel** concept for the specifications of products

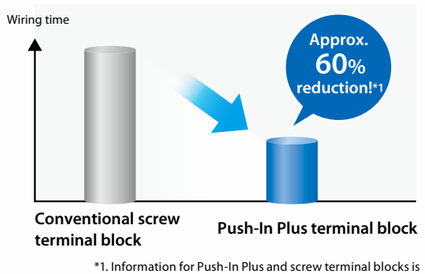
Save space in control panels

V and G terminals are provided for each input signal (NX-PC0030). No relay terminal block is required, which saves space in control panels.

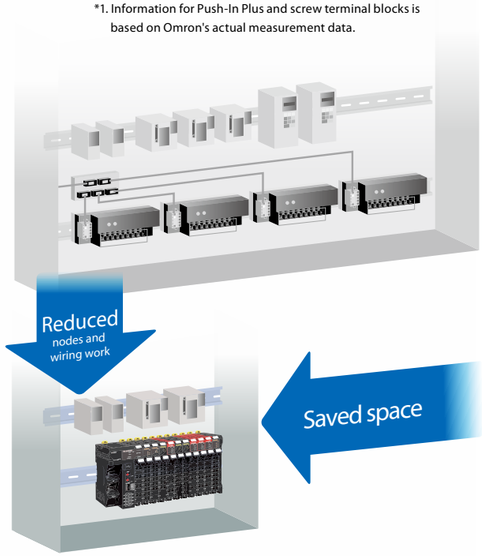


Greatly reduce wiring work with Push-In Plus terminal blocks

Push-In Plus terminal blocks make wiring work easy - just insert wires.



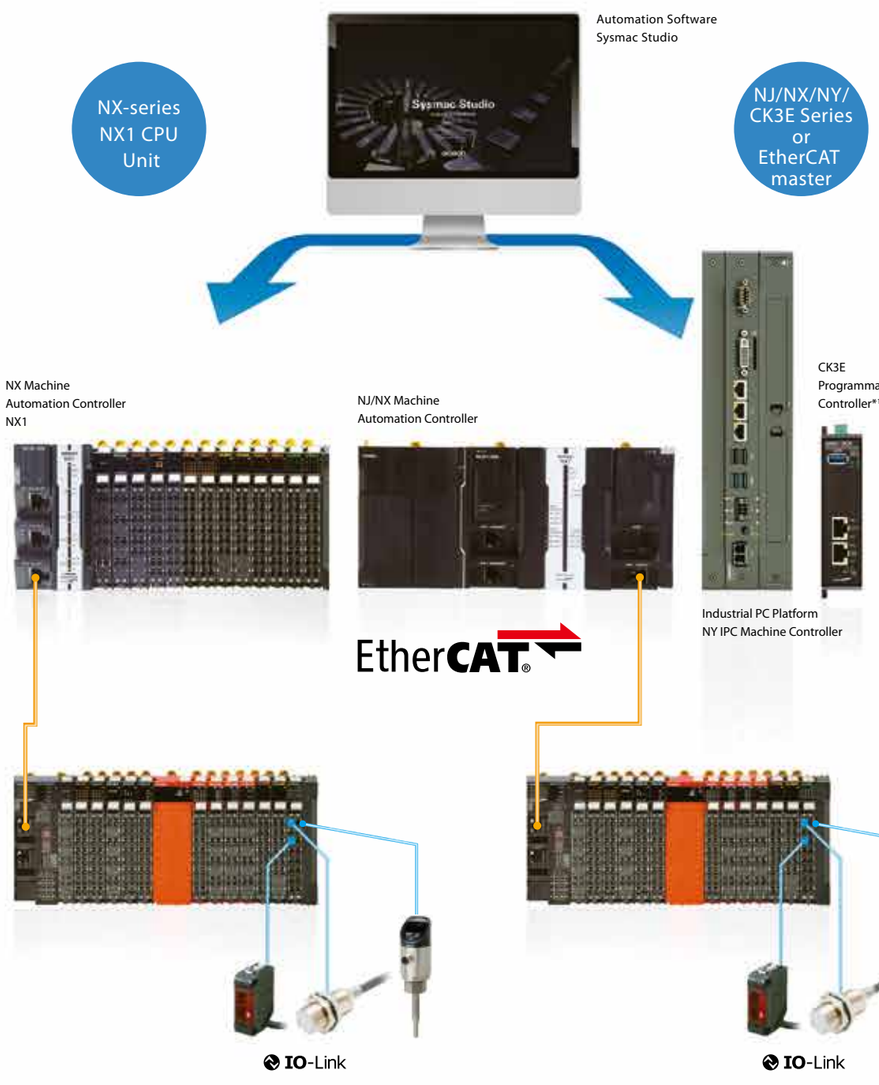
*1. Information for Push-In Plus and screw terminal blocks is based on Omron's actual measurement data.



Take NX I/O Everywhere

One I/O system for various controllers

While different machines may require different levels of controller performance, the NX I/O is the only remote I/O system you will need. This will unify wiring and installation techniques, and simplify spare parts stock.

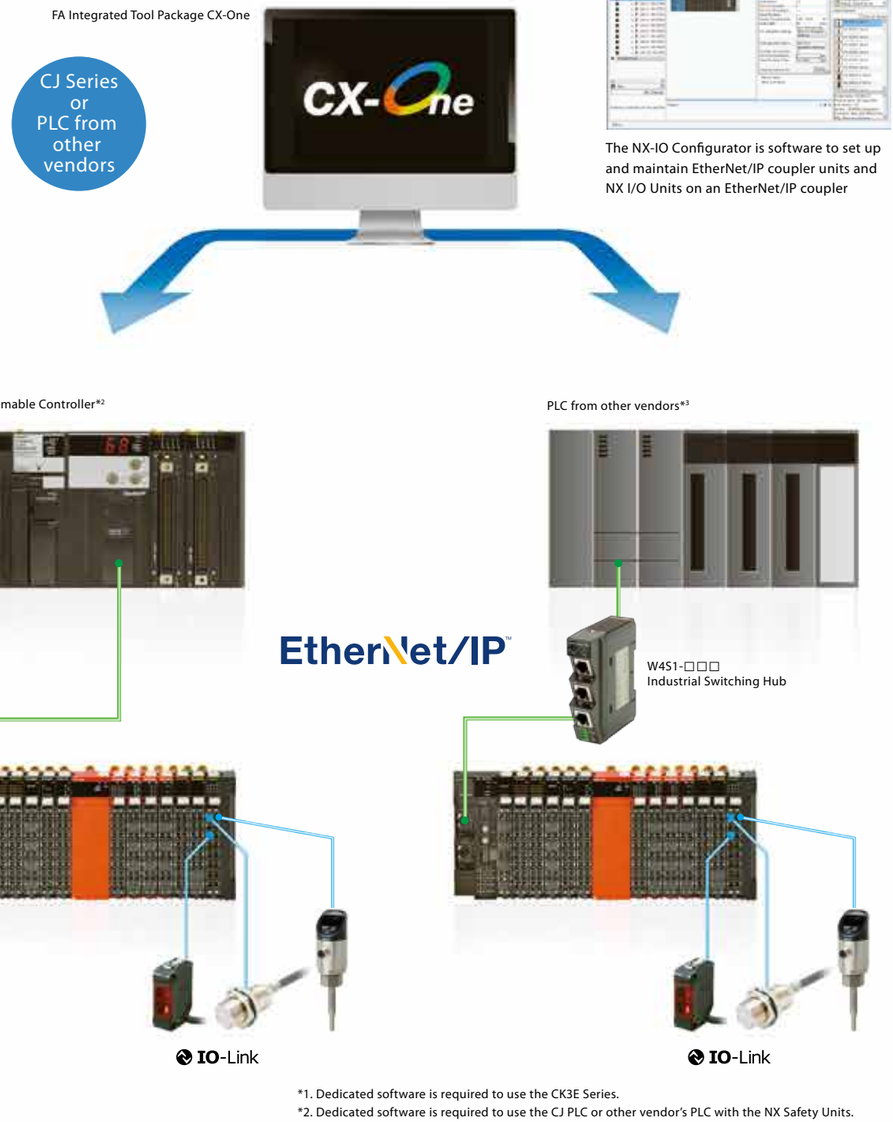


Features

- Multivendor compatibility
  The NX I/O can be connected with PLC from other vendors as well as Omron PLC
- Start a small-scale IO-Link
  IO-Link and other unique I/O systems can be easily integrated into existing machine configurations

Easy configuration with NX-IO Configurator

The NX-IO Configurator is software to set up and maintain EtherNet/IP coupler units and NX I/O Units on an EtherNet/IP coupler



*1. Dedicated software is required to use the CK3E Series.
*2. Dedicated software is required to use the CJ PLC or other vendor's PLC with the NX Safety Units.
*3. Connect the NX I/O system to a PLC from another vendor via a switching hub and set up with the CX-One.

Function Library Speeds Development Time

The Sysmac Library is a collection of software functional components that can be used in programs for the NJ/NX Machine Automation Controllers or Industrial PC Platform NY IPC Machine Controllers.
Packed with Omron's rich technical know-how on control programs, the Sysmac Library makes advanced control easy.

Easy-to-obtain Library

The Sysmac Library is freely available to download from Omron website.
These software components specially designed for the NJ/NX/NY Controller can be used in your programs without the need for additional work.

Download from

http://www.ia.omron.com/product/tool/sysmac-library/

Note: Ask your Omron representative to obtain Libraries that are not provided on the above website.

Application example (1) Load cells

Press fit using servo press

Improve both speed and quality of the press-fit process

Load data is collected in synchronization with the CPU cycle for high-speed measurement, high-speed servo press control, and precision improvement.

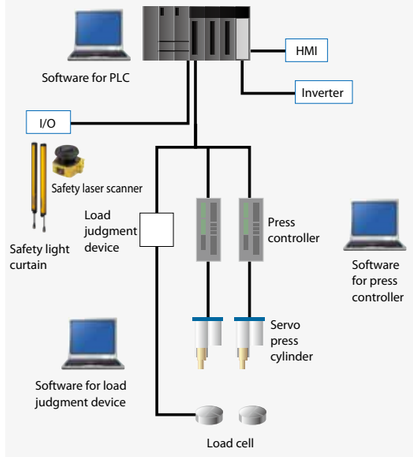
Previous issues

- Wait time must be considered to operate the dedicated press controller together with the main PLC.
- Load, position, and torque data collected at the same time cannot be checked from the host device.

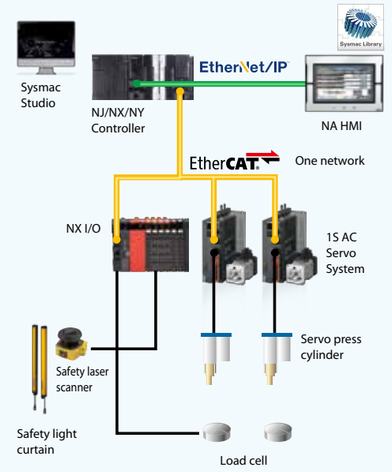
Solution using Sysmac

- One CPU system capable of switching between position, velocity, and torque control without stopping
- Fastest control cycle of 125 µs and servo press function using software for required control
- High-speed measurement and control by collecting load data synchronized with servo data (position and torque data).

FROM Conventional system (Ex. multi-axis)



TO NJ/NX/NY Controller + NX I/O + 1S Servo integrate control elements



Application example (2) Temperature control

Packaging machines and molding machines
(Temperature/motion/weighing)

Reduce material and design costs to implement temperature control

TCO can be reduced by eliminating the need for the dedicated temperature controller and reducing inventory control work and communications programming work.

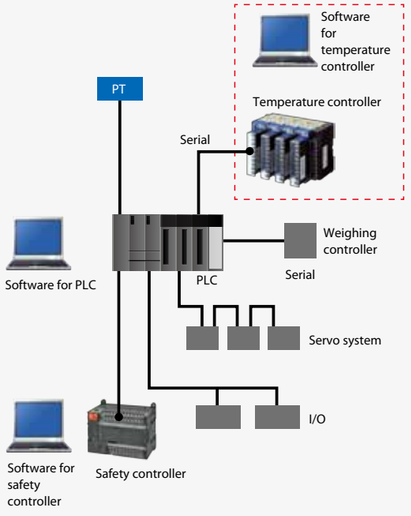
Previous issues

- Communications networks are selected for each device, and dedicated software for each component is used.
- Ladder program and memory configuration for communications are required.

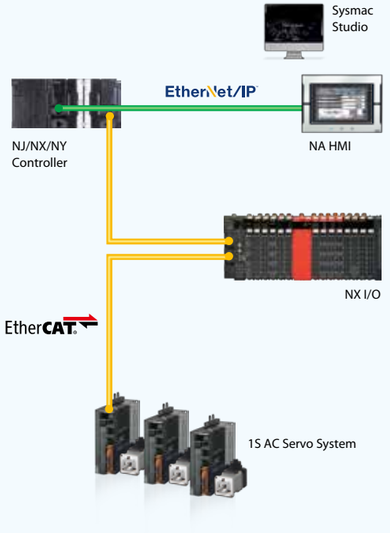
Solution using Sysmac

- Dedicated controllers, dedicated software, separate networks, and separate programs are no longer required

FROM Conventional system



TO NJ/NX/NY Controller + NX I/O + 1S Servo integrate control elements (temperature/motion/weighing/safety control)



Application example (3) Photoelectric sensors and proximity sensors

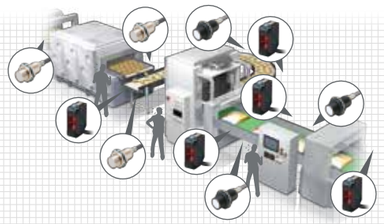
Improving system commissioning and changeover efficiency

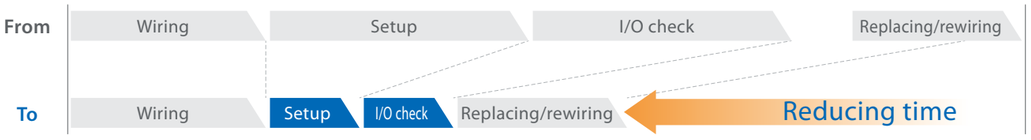
Reduce work by individual identification

IO-Link sensors allow you to check individual sensor identifications in batches without going to the site, which results in a significant reduction of commissioning time.

Previous issues

- During system commissioning or changeover, operators have to perform the I/O check for each of the thousands of sensors installed on the line, and it took an enormous amount of time.
- Incorrect sensor installation creates unnecessary extra work.



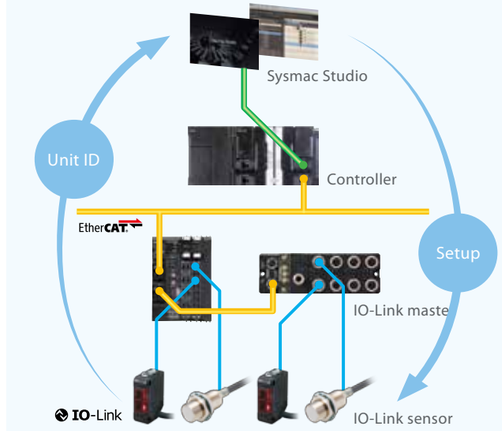


* The graph above is a conceptual illustration.

Setup

Setting all sensors from a host device at the same time

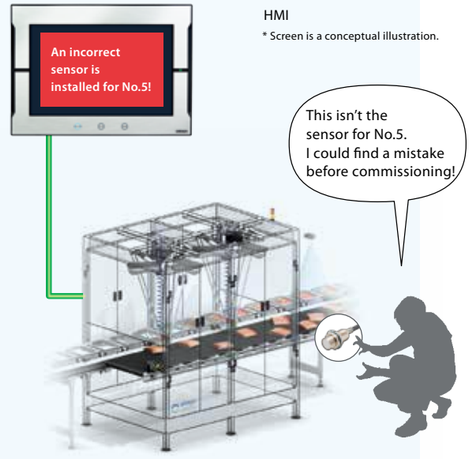
Reduce setting time and inconsistent settings



I/O chec

Identification checks with HMI

Check sensor installation before commissioning to prevent installation mistakes



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