NX1 Machine Automation Controller
Continue to pursue productivity

NX102-1200

OMRON
NX1

RUN
ERROR
BUSY

SD — PWR
BUSY

PORT1 — NET RUN
NET ERR
L/A

PORT2 — NET RUN
NET ERR
L/A

PORT3 — NET RUN
NET ERR
L/A

OPC UA
EtherNet/IP
EtherCAT

PORT1 EtherNet/IP

PORT2 EtherNet/IP

PORT3 EtherCAT

POWER

The solution in your hand

sysmac
always in control

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 safety to provide the same level of quality and meet rising quality and safety standards.

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 isues

Compromise between production efficiency and information utilization/safety measures/quality control

INFORMATION

Production cycle time is increased due to traceability data processing

Full traceability is required to meet high-level quality standards.
As it takes a long time to process all traceability data, the production cycle time increases.

SAFETY

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.

QUALITY

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.
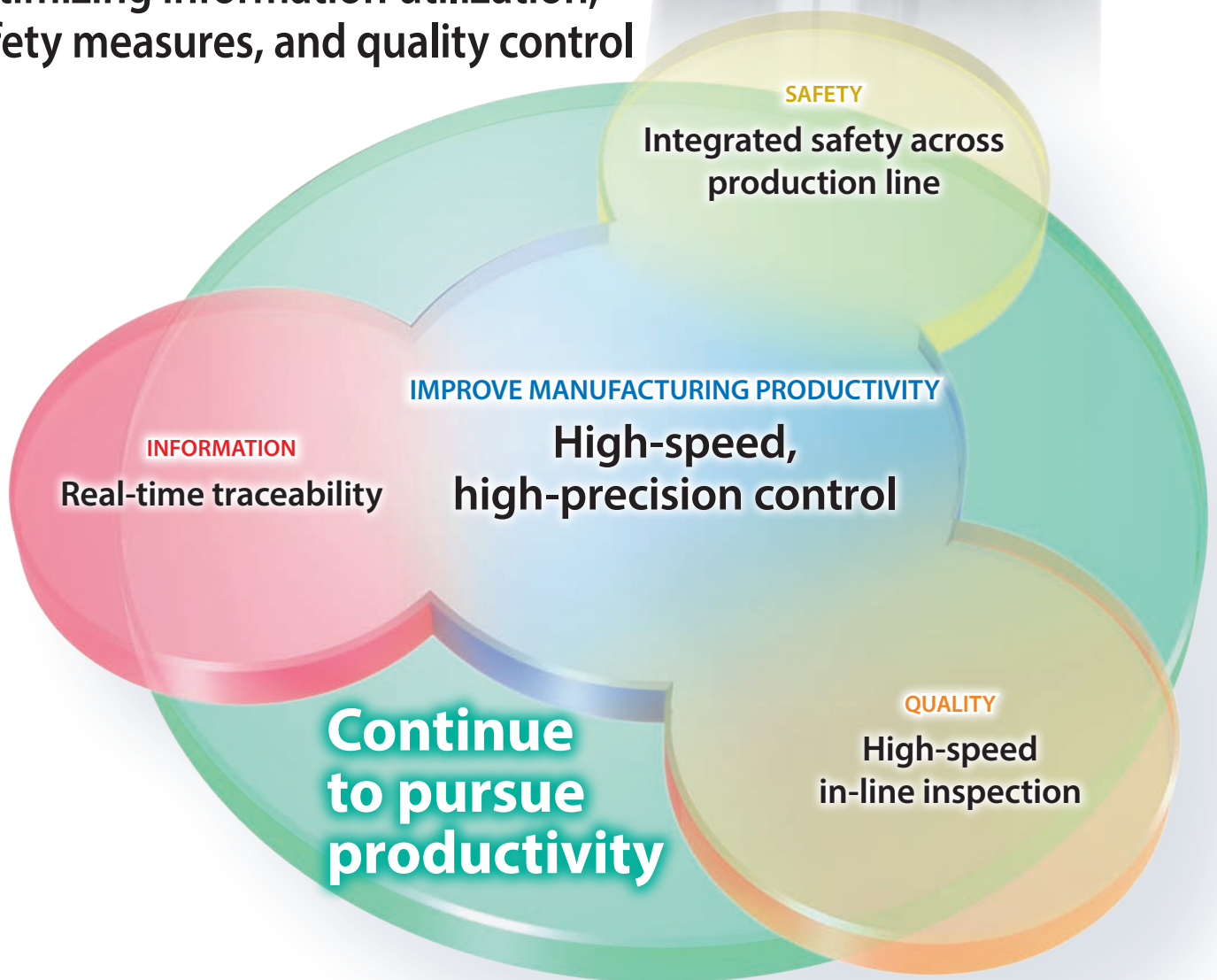
NX1

The Next Standard

NX1

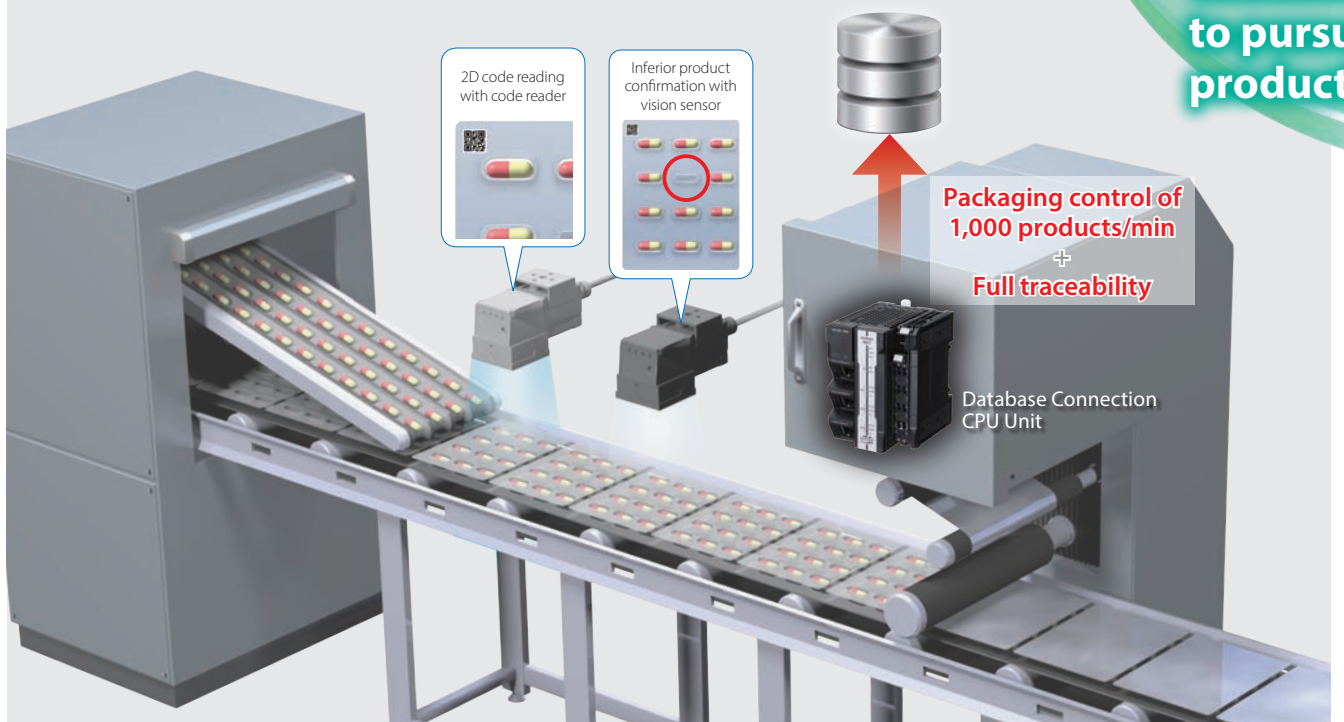## Improves production efficiency while optimizing information utilization, safety measures, and quality control

SAFETY

Integrated safety across production line

IMPROVE MANUFACTURING PRODUCTIVITY

High-speed, high-precision control

INFORMATION

Real-time traceability

QUALITY

High-speed in-line inspection

Continue to pursue productivity

Produce faster without compromising on quality

The NX1 can utilize 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.

INFORMATION

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2D code reading with code reader

Inferior product confirmation with vision sensor

Packaging control of 1,000 products/min
+
Full traceability

Database Connection CPU Unit

Integrated safety across production line

CIP Safety

EtherNet/IP

Safety control between machines
+
High-speed synchronous safety control

Safety over **EtherCAT**

NX-SL5☐00 Safety CPU Unit

Safety over **EtherCAT**

Safety over **EtherCAT**

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 and 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.

SAFETY

IMPROVE MANUFACTURING PRODUCTIVITY

QUALITY

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.

High-speed in-line inspection of all products with standard inspection machine
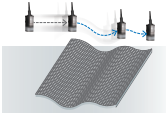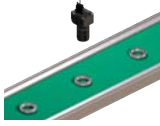
NX-HAD☐☐☐ High-speed Analog Input Unit

Seamless Integration: Production Line & IT sys

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.

Information

Secure direct connection to database

HMI

SCADA/MES/ERP

Database

• Microsoft SQL server
• Oracle Database
• IBM DB2   • MySQL
• PostgreSQL • Firebird

Networks

OPC UA

EtherNet/IP

EtherCAT

IO-Link

NX102-1200

OMRON NX1

SL5700

HAD401

Production Line

Safety

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

Vision

Motion

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.

tems

Information Utilization Application

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	
Linkage between image and data	FH Vision System
Data collection by utilizing the cloud	NX1 MQTT Communication MQTT Communications Library

Production Efficiency Improvement Application

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-7000/5000 Confocal Fiber Displacement Sensor

Sensing

Quality Control Application

Application	NX1 + product
Rotator inspection	**NX-HAD□□□** High-speed Analog Input Unit
Welding quality inspection	
Appearance inspection	FH Vision System

Safety Measures Application

Application	NX1 + product
High-speed safety control in machine	**NX-SL5□00** Safety CPU Unit
Safety control in line	
Intrusion detection	F3SG-R Safety Light Curtain

NX1 brings advanced control in miniaturized

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.

Actual size

Information

Two built-in ports
OPC UA functionality
Modbus/TCP, FINS
Enhanced security

EtherNet/IP
OPC UA

Production Line

Motion control of 4/6/8/12 axes*
Up to 64 slaves

EtherCAT

Embedded Power Supply

DC power supply without
battery backup

NX bus

Up to 32 local NX I/O units

NX bus connection

* Including single axis position control axes

size

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-□□00)

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.

Non-redundant system

Safety over
EtherCAT.

Disconnection

The entire line stops, reducing uptime

Redundant system

Safety over
EtherCAT.

Disconnection

Redundancy avoids line stops for recovery
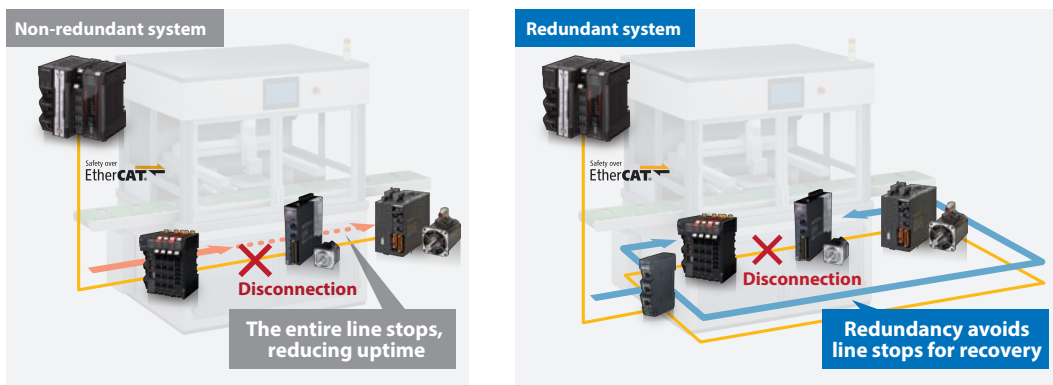
Multicore microprocessor for control and data handling

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.

CERTIFIED FOR COMPLIANCE
OPC FOUNDATION

The NX1 provides a easily and secure connection to the cloud by using MQTT Communications Library.

MQTT

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 to get things done...

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 com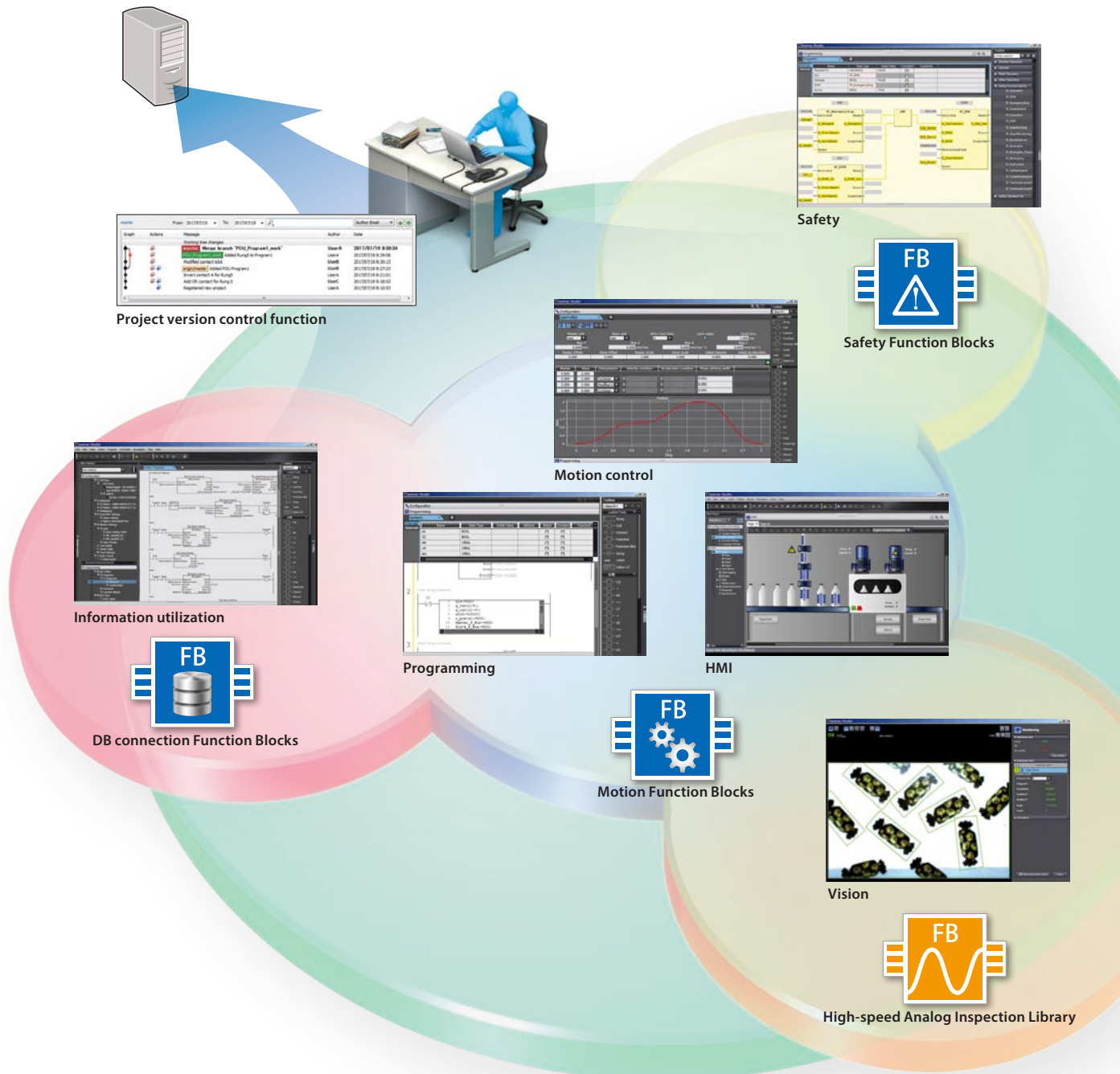ponents Sysmac Libraries can be downloaded from our website. These allow you to minimize time to build systems that boost productivity.

Sysmac Studio

- Fully conforms with IEC 61131-3 standards
- PLCopen Function Blocks for Motion Control

Project version control function

Information utilization

DB connection Function Blocks

Programming

Motion control

Motion Function Blocks

HMI

Safety

Safety Function Blocks

Vision

High-speed Analog Inspection Library

Ordering Information

International Standards

The standards are abbreviated as follows: U: UL, U1: UL(Class I Division 2 Products for Hazardous Locations), C: CSA, UC: cULus, UC1: cULus(Class I Division 2 Products for Hazardous Locations), CU: cUL, N: NK, 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.

NX-Series NX102 CPU Units

Product Name	Specifications					Model	Standards
	Program capacity	Memory capacity for variables	Maximum number of used real axes				
				Motion control axes	Single-axis position control axes		
NX102 CPU Unit	5 MB	1.5 MB (Retained during power interruption)/ 32 MB (Not retained during power interruption)	12	8	4	NX102-1200	UC1, N,L CE, RCM, KC
			8	4	4	NX102-1100	
			6	2	4	NX102-1000	
			4	0	4	NX102-9000	
NX102 Database Connection CPU Unit			12	8	4	NX102-1220	
			8	4	4	NX102-1120	
			6	2	4	NX102-1020	
			4	0	4	NX102-9020	

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).

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/

Product name	Specifications	Model
MQTT Communications Library [1]	The MQTT communication library is a collection of software functional objects for exchanging Pub / Sub type messages through the MQTT server (MQTT broker).	SYSMAC-XR020
High-Speed Analog Inspection Library	The High-speed Analog Inspection Library records analog input values acquired by the High-speed Analog Input Units in time.	SYSMAC-XR016

*1. This Library is not available for NX102-□□20-DH (products equipped with time series data collection system).

High-speed Analog Input Unit

Product name	Specifications					Model
	Number of points	Input range		Conversion time	Trigger input section	
					Number of points	Internal I/O common	
High-speed Analog Input Unit	4 points	-10 to +10 V -5 to +5 V 0 to 10 V 0 to 5 V	1 to 5 V 0 to 20 mA 4 to 20 mA	5 µs/4 Ch	4 points	NPN	NX-HAD401
						PNP	NX-HAD402

Safety CPU Unit

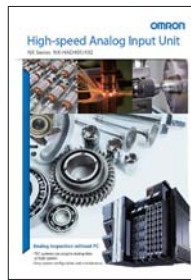| Product name	Specifications				Model
	Maximum number of safety I/O points	Program capacity	Number of safety I/O connections	I/O refreshing method	
Safety CPU Unit	1024 points	2048 KB	128	Free-Run refreshing	NX-SL5500
	2032 points	4096 KB	254		NX-SL5700

Related catalogs

Machine Automation Controller
NX1 Datasheet

Cat. No. P130

High-speed Analog Input Unit
NX-HAD401/402 Catalog

Cat. No. P128

Safety Network Controller
NX-series Catalog

Cat. No. F104

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