OMRON

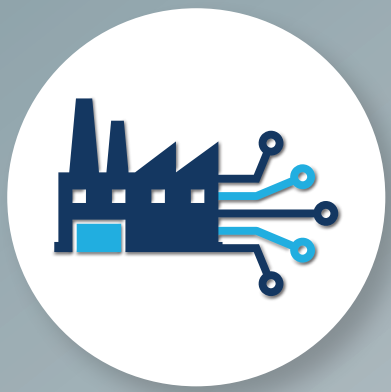
Safety Network Controller

NX Series

Safety over EtherCAT®

SAFETY, TECHNOLOGY & INNOVATION

Quick, easy and flexible integration of production line safety



Scalable from large automotive production lines to small parts production lines

- Flexible safety system for large-scale production
- Interlocking between various machines

Page 4

Quick and easy safety program design

- Reduce time required for design
- Reduce time required for verification

Page 8

Efficient safety management and maintenance

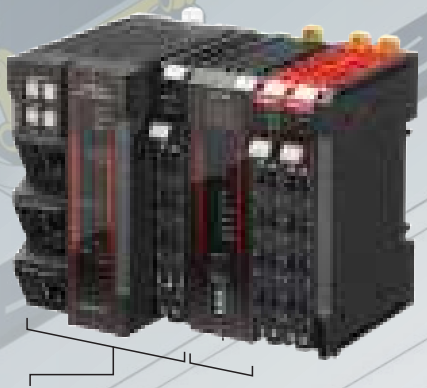
- Minimize system downtime
- Reduce maintenance work

Page 10

Manufacturers require flexible systems for global production and high-mix production.
System designs have become more and more complicated because these flexible systems need safety control according to control programs.
However, it is also required to reduce design and maintenance time to efficiently build various systems.
In order to meet these needs, we offer a new NX Safety Network Controller.

Safety control for large systems

CIP Safety



Communication Control Unit
NX-CSG320 NEW

Safety CPU Unit
NX-SL5500/5700 NEW

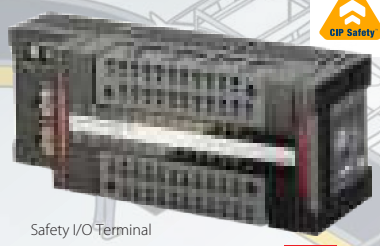
High-speed safety control for mid-size systems

CIP Safety Safety over EtherCAT

Machine Automation Controller
NX-102 NEW

Safety CPU Unit
NX-SL5500/5700 NEW

Safety I/O Terminal
I/O model GI-SMD1624 NEW



Safety I/O Terminal
Input model GI-SID1224 NEW

Automation Software
Sysmac Studio
SYSMAC-SE/FE

EtherNet/IP™ is a widely used and vendor-independent industrial Ethernet network that is managed by ODVA.

CIP Safety

The Common Industrial Protocol (CIP™) is an industry standard open network, enabling seamless communication among CIP networks. CIP Safety™ adds safety functionality to CIP networks.

EtherCAT®

EtherCAT® is an industrial real-time communication network promoted by EtherCAT Technology Group (ETG).

Safety over EtherCAT

Safety over EtherCAT (FSoE) allows a single communication system to be used for both control and safety data.

Flexible safety system for large-scale production

EtherNet/IP for safety across the world

Production systems have to meet worldwide standards because of the globalization of production.
CIP Safety is a protocol for transmitting safety data via EtherNet/IP that is adopted by factory automation and robot manufacturers all over the world. Using CIP Safety, you can build globally standardized networks and simplify the global procurement of production systems.

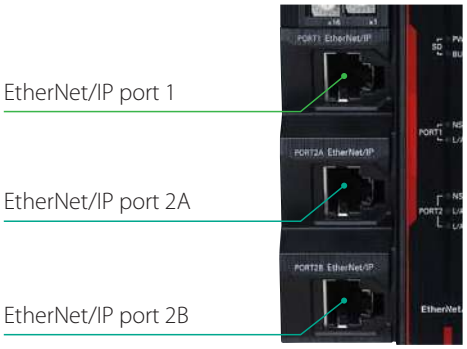
One connection using CIP Safety

Safety systems for industrial robots are becoming increasingly used; networks can be easily built with the NX-CSG Communication Control Unit and NX-SL5 Safety CPU Units which support CIP Safety.

EtherNet/IP brings flexibility

Multiple network ports enable a safety network to be divided into several segments, making it easy to connect many network devices required for a large production line. This allows flexibility to add or remove devices from existing safety systems.

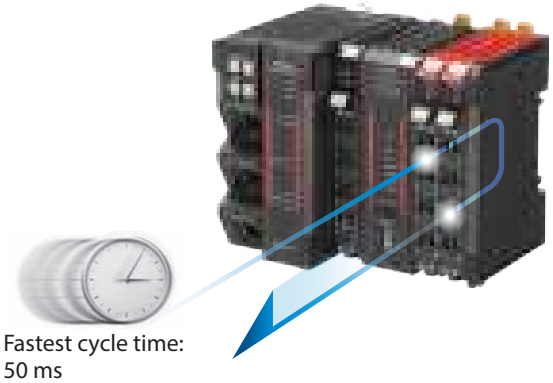
Safety control between lines : Port 1
Robot control within process : Port 2A, 2B



Fast and fixed response cycle facilitates reconfiguration

The NX-CSG320 Communication Control Unit and NX-SL5 Safety CPU Unit provide safety communications via CIP safety and at the same time provides local high-speed safety I/O control. With a local I/O response time as low as every 50 ms, the NX-SL5 Safety CPU Unit can be used for applications where a high level of responsiveness is required.

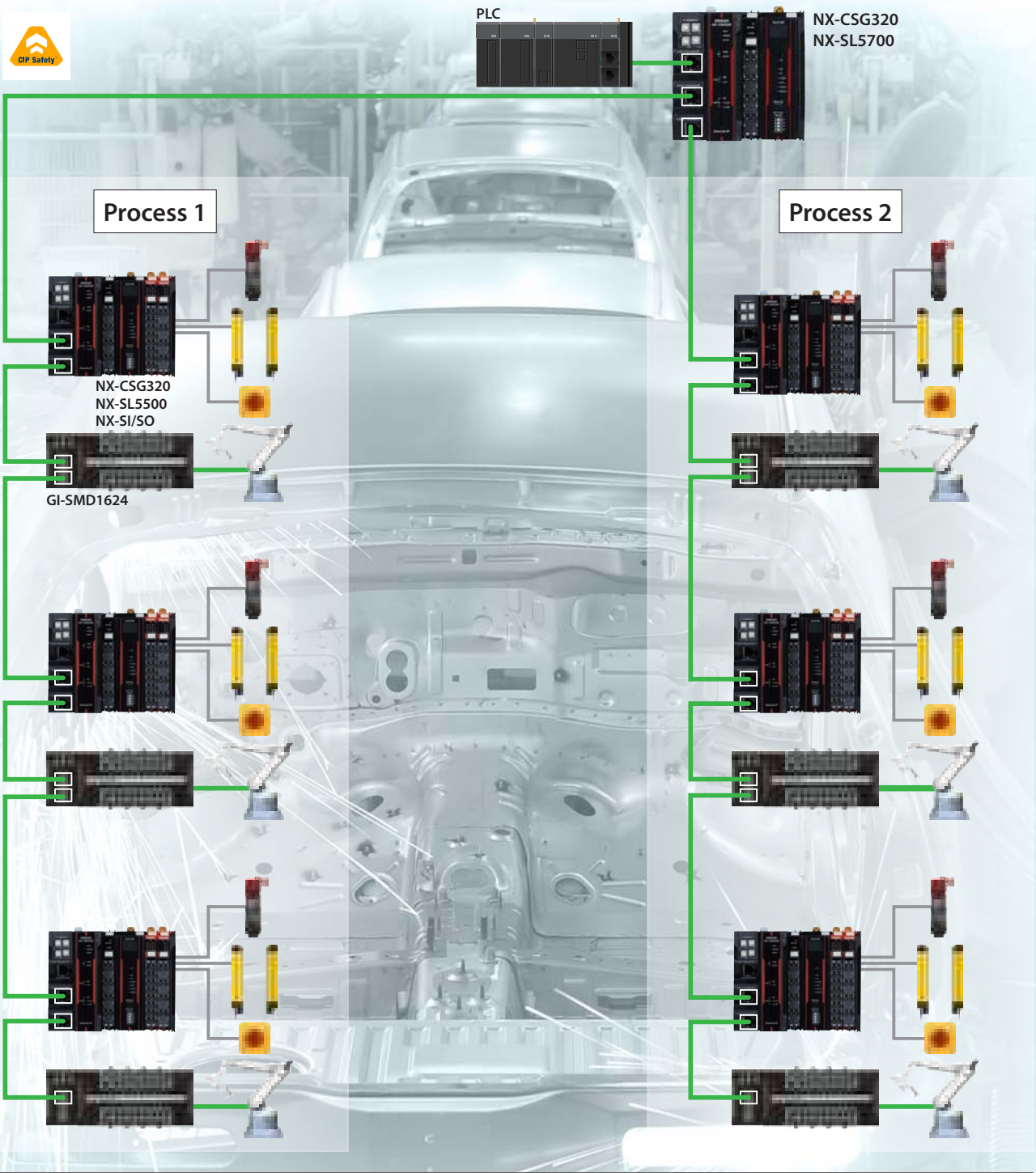
* Calculate the response speed of your system taking the performance of I/O devices into consideration. Refer to the manual for details.



Standardize the safety system network for a large robot system

System configuration

In this example, devices and machines communicate via EtherNet/IP and CIP Safety in this system.
Each process includes robots, safety light curtains, emergency stop switches, and other safety components. The NX-CSG Communication Control Unit and NX-SL5 Safety CPU Unit execute safety control programs in each process. CIP Safety is used for safety interlocking between processes and for building a safety control network across the system.



* Understand the connection specifications of devices which are used in the system before creating a network.

Interlocking between various machines

Simple configuration

CIP Safety allows safety devices and standard devices to be mixed on the same network, providing safety interlock control between machines. CIP Safety robots and remote I/O terminals can be easily connected.

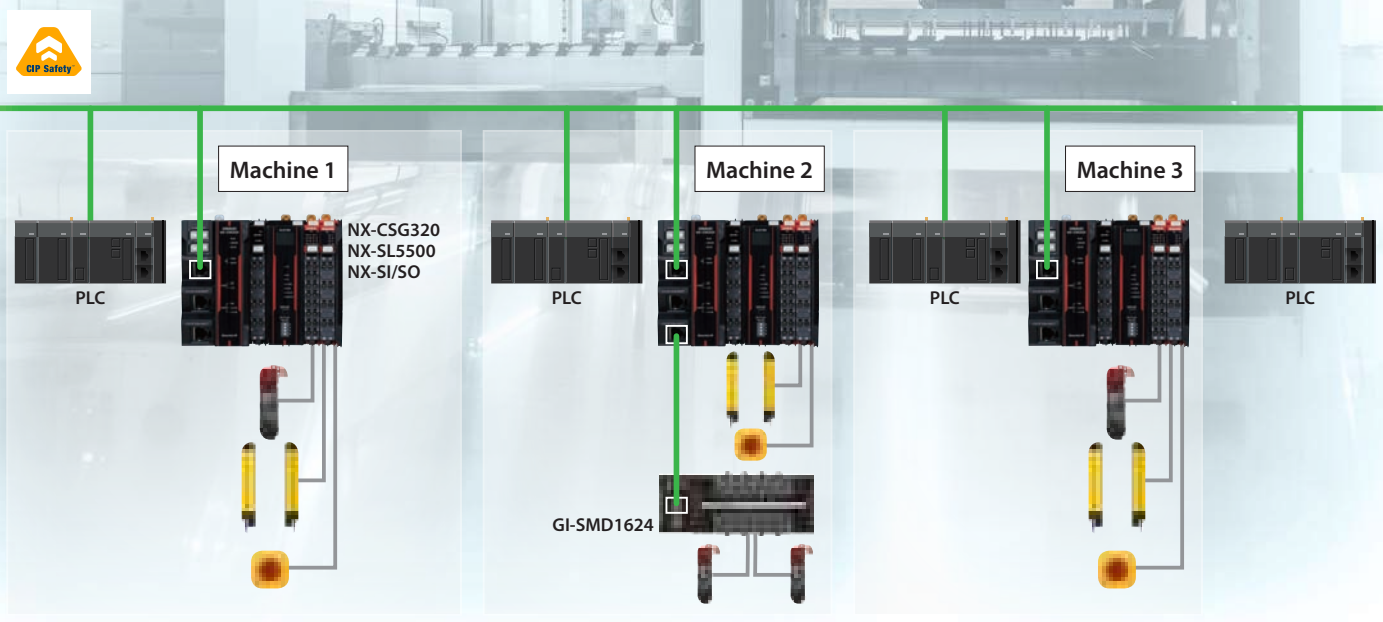
Modular processes bring flexibility to line layouts

The NX-CSG320 Communication Control Unit and NX-SL5 Safety CPU Unit exchange interlock signals with other machines while implementing safety control within the machine. Programs for machine control and safety control can be created for each machine. This modularized design helps standardize design and improve design efficiency.

Modular machines with individual CPU units

System configuration

Machine 1 and 3 are processing machines with the control program and safety control program for each machine. Machine 2 is a material handling machine that transports products processed by Machine 1 and 3 to the next process. The NX-CSG320 Communication Control Unit and NX-SL5 Safety CPU Unit are used for all machines, and CIP Safety is used for safety interlocking between machines.



* Understand the connection specifications of devices which are used in the system before creating a network.

Two different networks in a single system

The NX-SL5 Safety CPU Unit connected with the NX102 Machine Automation Controller enables the use of both EtherCAT + FSoE (Safety over EtherCAT) and EtherNet/IP + CIP Safety at the same time.
In addition to interlock control within a machine via FSoE, safety interlock between machines can be implemented using CIP Safety.

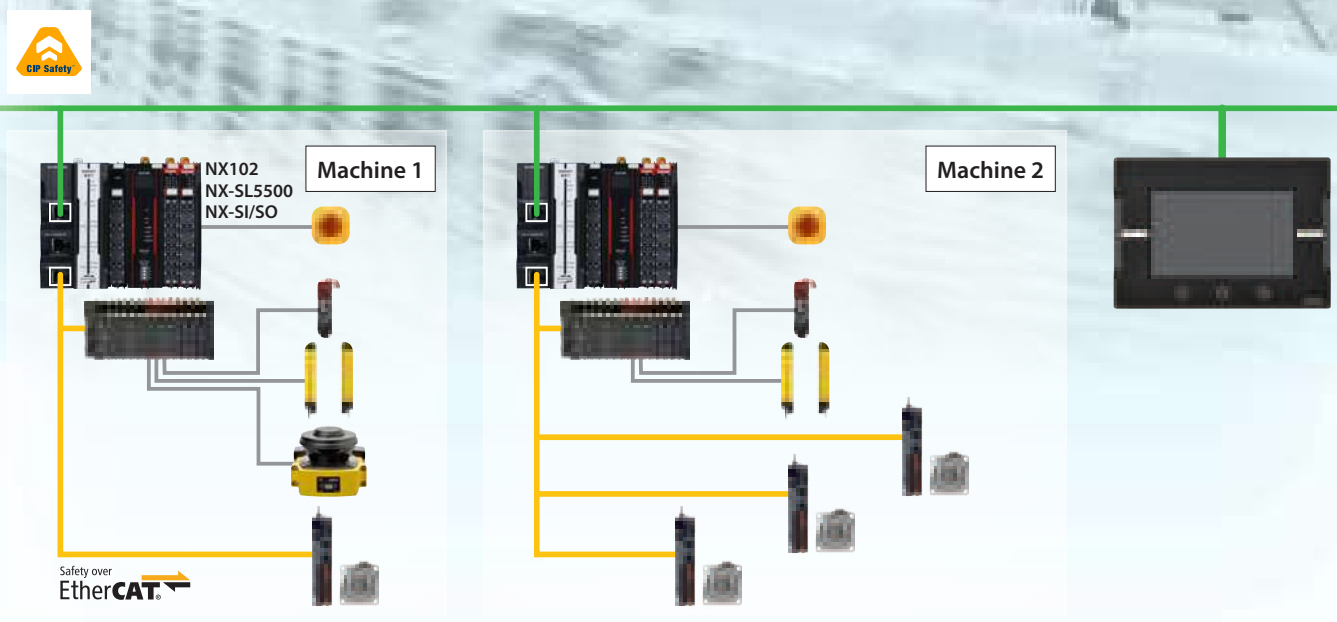
Integrated safety into high-speed machine control

The NX-SL5 Safety CPU Unit combination with the NX102 Machine Automation Controller , provides both safety control and machine control with fast cycle times.
By mounting the NX-SL Safety CPU Unit and safety I/O units to the NX102 and by connecting the servo drives via FSoE on EtherCAT, you can configure a simple motion and safety control system using high-speed networks.

Line safety control and fast machine control at the same time

System configuration

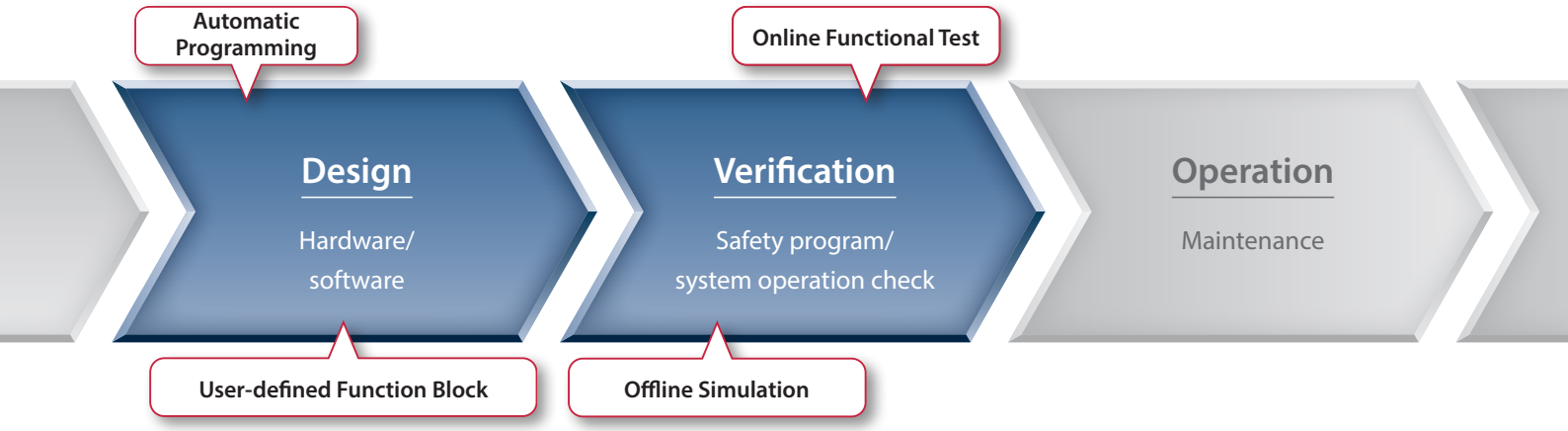
The NX102 Machine Automation Controller and NX-SL5 Safety CPU Unit are used in Machine 1 and 2 to build a system with safety network and real-time control capabilities using EtherCAT. The machine status is reported to the host system and displayed on the HMI connected on the same network.



* Understand the connection specifications of devices which are used in the system before creating a network.

Improve design productivity

The Automation Software Sysmac Studio provides various functionalities to reduce time required for production system design and safety program verification.



Design Reduce time required for production system design

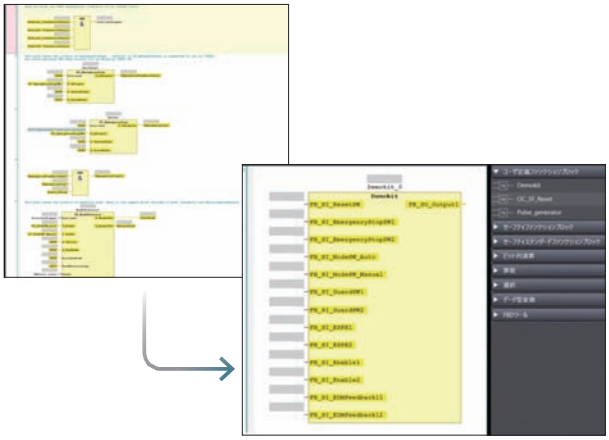
Automatic Programming

Create a truth table using input, output, and stop conditions of safety devices to automatically create a safety program for a simple machine.

* Programs created by Automatic Programming will not guarantee functional safety. Refer to the User's Manual (Cat. No. Z395) for details.

User-defined Function Block (FB)

Programs can be easily converted into a user-defined function block (FB); help files can be attached to describe input and output conditions as well as the functionality of the program within the function block (FB). Different security levels can be set to protect the function block from viewing and unauthorized modifications.



* User-defined FBs can be used as modular software components according to the hardware configuration. They help standardize programs and maintain the consistency of design quality.

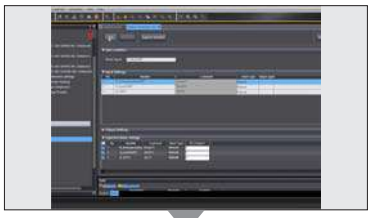
Verification Implement safety management without experts and global standardization

Offline Simulation

Programs can be simulated on your PC, Sysmac Studio allows verification of programs without connecting hardware.

Online Functional Test

Online Functional Test enables operation of safety functions to be checked when the NX-SL5 Safety CPU Unit is online with Sysmac Studio. The test results can be output as a report along with the safety signature; the safety signature is displayed on the seven-segment display of the NX-SL5 Safety CPU Unit, and can easily checked if the configuration matches the report after the program has been validated.



[Preparation]
Start the Sysmac Studio and go online with the NX-SL5. Register the safety devices to test and set the expected values of each signal.

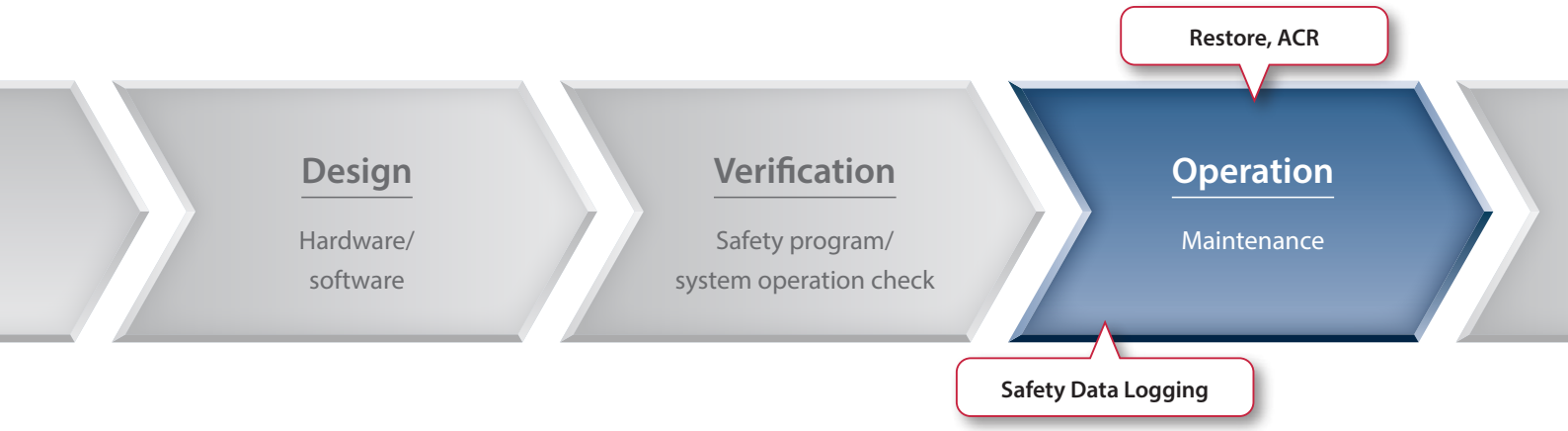
[Testing]
Operate safety devices by following the instructions on the screen. Check if each device operates correctly and input the check results.

[Tests completed]
The test results are listed after all tests have been completed. The list can be output as a CSV file.

[Printing test results]
The test details, results, and executed date and time can be output as a PDF file. The names of the tester and approver can be added. The safety signature code, which identifies the validated program, is included at the bottom right of the report.

Maintenance without PC

No PC is required for maintenance, which reduces production system maintenance work and minimizes system downtime.



Operation Minimize system downtime

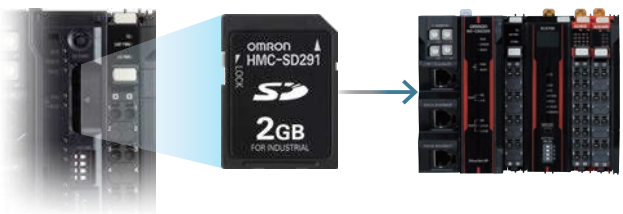
Safety Data Logging

An SD memory card containing logging settings is used for Safety Data Logging.
When start trigger conditions are met, the specified device variables and exposed variables can be logged in a chronological order and output to the SD memory card. This function helps to quickly identify the cause of a sudden stoppage of the system and determine preventive measures.

Operation Reduce maintenance work

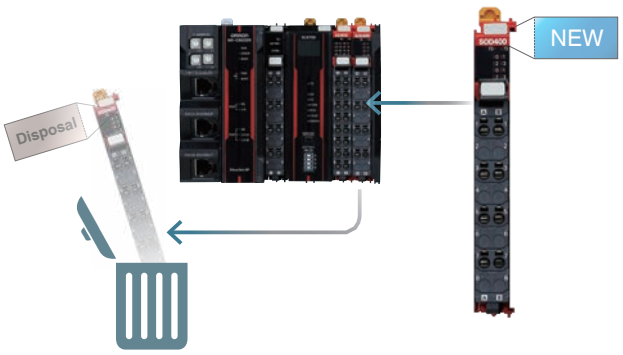
Safety Unit Restore

Programs and settings can be stored on an SD memory card inserted into the communication control unit. When the safety CPU unit is replaced, the stored programs and settings can be easily copied to a new unit using the SD memory card.



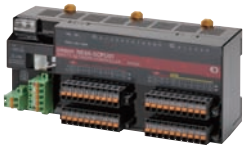
ACR (Automatic Configuration Restart)

When replacing a safety I/O unit, just remove the old unit and mount a new one. The setting data is automatically downloaded. When replacing a safety I/O terminal, remove the memory cassette from the old terminal and install it into the new terminal to inherit the settings. No software is required. (See page 34)



Existing products

Choose a safety controller to suit your application.

Product name	Features	Catalog
NX Safety Controller **Safety Control Unit** **NX-SL3/SI/SO** 	**Integration of safety into machine automation enables simple, flexible system configuration** ●Fully integrate safety and standard control in one network by connecting with an NX EtherCAT Coupler Unit ●Safety CPU unit: Up to 128 safety I/O units ●Safety input unit: 8 or 4 safety input points per unit 4-channel units can be directly connected with Omron non-contact switches and single-beam sensors ●Safety output unit: 2 or 4 safety output points per unit Output breaking current of 2.0 A (2-channel units) ●PLCopen® Function Blocks for Safety ●Standard IEC 61131-3 programming	 (Cat. No.) F100  (Cat. No.) F101
Safety Network Controller **NE1A-SCPU Series** 	**Acts as a DeviceNet Safety master and slave and hosts the safety application program** ●NE1A-SCPU01-V1 with built-in 16 safety inputs and 8 safety outputs ●NE1A-SCPU02 with built-in 40 safety inputs and 8 safety outputs ●Simplifies safety systems. With safety network master capabilities, up to 32 safety nodes ●Safety system can be monitored by standard controller via DeviceNet	 Refer to your local OMRON website
Safety Network Controller **NE1A-SCPU0□-EIP** 	**Acts as a DeviceNet Safety master and slave and monitors safety system via EtherNet/IP** ●Connect with Omron PLC via EtherNet/IP for easy maintenance ●Simplifies safety systems. With safety network master capabilities, up to 32 safety nodes ●No external devices required for connecting to EtherNet/IP	 Refer to your local OMRON website
Safety Network Controller **NE0A-SCPU01** 	**As a standalone controller as well as a DeviceNet Safety slave** ●TÜV-certified templates for safety applications with up to 12 inputs ●Reusable user-defined safety circuit templates for easy standardization ●NE0A operating status can be monitored by standard DeviceNet master	 Refer to your local OMRON website
Safety Controller **G9SP Series** 	**Standalone safety controller** ●Easy programming for complex safety control ●Unique programming software (G9SP Configurator) to support easy design and verification	 (Cat. No.) F090

Related product

Product name	Features	Catalog
Machine Automation Controller **NX1** 	NX102 CPU Unit **NX102-□□□□** **Brings advanced control in miniaturized size**	 (Cat. No.) P129  (Cat. No.) P130

NX-series Communication Control Unit/Safety Control Units

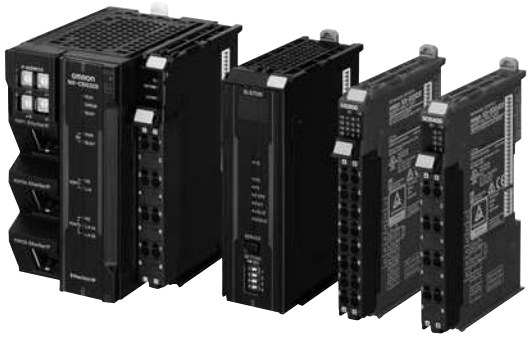
NX-CSG/SL5/SI/SO

Quick, easy, and flexible to integrate safety into production lines

- Two built-in CIP Safety on EtherNet/IP ports
- Up to 254 connections (NX-SL5700)
- Up to 32 NX Units per Communication Control Unit
- Innovative automation software
  - Automatic Programming
  - Safety Data Logging
  - Online Functional Test
- Meets EN ISO 13849-1 (PLe/Safety Category 4) and IEC 61508 (SIL3)

✻ The Common Industrial Protocol (CIP™) is an industry standard open network, enabling seamless communication among CIP networks. CIP Safety™ adds safety functionality to CIP networks.

✻ Safety over EtherCAT (FSoE): The open protocol Safety over EtherCAT (abbreviated with FSoE "Safety over EtherCAT") defines a safety related communication layer for EtherCAT. Safety over EtherCAT meets the requirements of IEC 61508 SIL 3 and enables the transfer of safe and standard information on the same communication system without limitations with regard to transfer speed and cycle time.



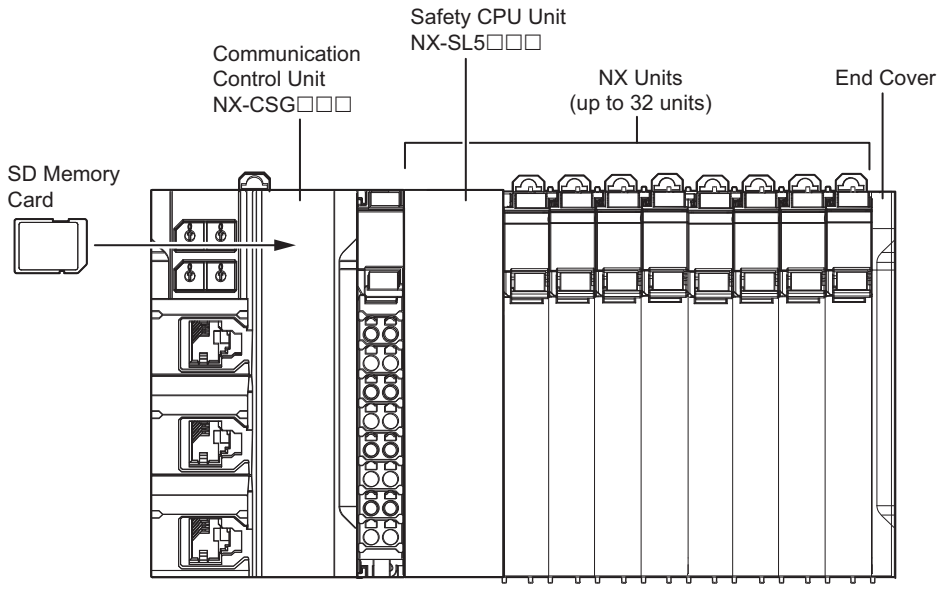
For the most recent information on models that have been certified for safety standards, refer to your OMRON website.

Features

- CIP Safety on EtherNet/IP Is Supported
- Feature EtherNet/IP Communications Port
- The Standard Unit of NX-series Available
- Excellent Connectability with OMRON Safety I/O Devices
- Support for the IEC 61131-3 Programming Environment
  - Program Languages Based on the IEC 61131-3 International Standard
  - Programming with Variables
- Complete Advanced Validation
  - Checking Safety Programs and Safety Parameters
  - Debugging

CPU Rack Configuration

The following shows the CPU Rack Configuration, where NX Units are mounted to a CPU Rack. The CPU Rack is configured with a Communication Control Unit, a Safety CPU Unit, Safety I/O Units, other NX Units, and an End Cover mounted to it.
The number of NX Unit connections is up to 32 units.



Configuration		Remarks
Communication Control Unit NX-CSG□□□		One required for every CPU Rack.
End Cover		Must be connected to the right side of the CPU Rack. One end cover is provided with the Communication Control Unit as a standard accessory.
NX Unit	Safety CPU Unit NX-SL5□□□	Up to 32 units can be mounted onto the CPU Rack. One Safety CPU Unit is required for each CPU Rack. Refer to *NX-series Safety Control Unit/Communication Control Unit User's Manual* (Cat. No. Z395) for the NX Units that you can connect.
	Safety Input Unit	
	Safety Output Unit	
	Other NX Units	
SD Memory Card		Install as required.

Ordering Information

NX-series Communication Control Unit

Unit type	Appearance	Supported communications protocol	Number of communications connectors	Network variables	Unit version	Model
Communication Control Unit		EtherNet/IP ✻1	3	2 ✻2	Ver. 1.01	**NX-CSG320**

Note: One NX-END02 End Cover is provided with the NX-CSG320 Communication Control Unit.
✻1. Routing of the CIP Safety protocol is supported.
✻2. PORT1 is an independent port. PORT2A and PORT2B are the ports with a built-in Ethernet switch.

NX-series Safety Control Units

Safety CPU Units

Unit type	Appearance	Specifications				Unit version	Model
		Maximum number of safety I/O points	Program capacity	Number of safety I/O connections	I/O refreshing method		
Safety CPU Unit (NX-SL5□□□)		1024 points	2048 KB	128	Free-Run refreshing	Ver. 1.4	**NX-SL5500**
		2032 points	4096 KB	254	Free-Run refreshing	Ver. 1.4	**NX-SL5700**

Note: Refer to your local OMRON website for details of the NX-SL3□□□ Safety CPU Unit.

Safety Input Units

Unit type	Appearance	Specifications							Unit version	Model
		Number of safety input points	Number of test output points	Internal I/O common	Rated input voltage	OMRON special safety input devices	Number of safety slave connections	I/O refreshing method		
Safety Input Units		4 points	2 points	Sinking inputs (PNP)	24 VDC	Cannot be connected. ✻	1	Free-Run refreshing	Ver. 1.1	**NX-SIH400**
		8 points	2 points	Sinking inputs (PNP)	24 VDC	Cannot be connected.	1	Free-Run refreshing	Ver. 1.0	**NX-SID800**

✻ The following OMRON special safety input devices can be connected directly without a special controller.
For detail of connectable OMRON special safety input devices, refer to *NX-series User's Manual Safety Control Unit/Communication Control Unit* (Cat. No. Z395).

Type	Model and corresponding PL and safety category
OMRON Single-beam Safety Sensors	E3ZS
OMRON Non-contact Door Switches	D40Z D40A
OMRON Safety Mats	UM, UMA ✻
OMRON Safety Edges	SGE (4-wire connection)

✻ The UM Series was discontinued at the end of June 2019.

Safety Output Units

Unit type	Appearance	Specifications						Unit version	Model
		Number of safety output points	Internal I/O common	Maximum load current	Rated voltage	Number of safety slave connections	I/O refreshing method		
Safety Output Units		2 points	Sourcing outputs (PNP)	2.0 A/point, 4.0 A/Unit at 40°C, and 2.5 A/Unit at 55°C The maximum load current depends on the installation orientation and ambient temperature.	24 VDC	1	Free-Run refreshing	Ver. 1.0	**NX-SOH200**
		4 points	Sourcing outputs (PNP)	0.5 A/point and 2.0 A/Unit	24 VDC	1	Free-Run refreshing	Ver. 1.0	**NX-SOD400**

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	Specifications	Number of licenses	Media	Model
Sysmac Studio Safety Edition ✻1 Ver. 1.□□	Sysmac Studio Safety Edition is a license including necessary setting functions for the safety control system. ✻This product is a license only. You need the Sysmac Studio Standard Edition DVD media to install it.	1 license	---	**SYSMAC-FE001L**
Sysmac Studio Standard Edition ✻2 Ver. 1.□□	Sysmac Studio runs on the following OS. Windows 7(32-bit/64-bit version)/8(32-bit/64-bit version)/8.1(32-bit/64-bit version)/10(32-bit/64-bit version) **✻3**	--- (Media only)	Sysmac Studio (32bit) DVD	**SYSMAC-SE200D**
		--- (Media only)	Sysmac Studio (64bit) DVD	**SYSMAC-SE200D-64**

Note: For details of the Automation Software Sysmac Studio, refer to your local OMRON website.
✻1. The Safety Edition can be used with the Communication Control Unit and EtherNet/IP Coupler Unit.
✻2. The Sysmac Studio Standard Edition License (SYSMAC-SE2□□L) includes functions that the Safety Edition (SYSMAC-FE001L) provides. The Communication Control Unit can be used with the Sysmac Studio version 1.24 or higher.
✻3. Model "SYSMAC-SE200D-64" runs on Windows 10 (64bit).

Optional Products

Product name	Specification	Model
Memory Card	SD memory card, 2 GB	**HMC-SD291**
	SD memory card, 4 GB	**HMC-SD491**

Product Name	Specification	Model
Unit/Terminal Block Coding Pins	For 10 Units (Terminal Block: 30 pins, Unit: 30 pins)	**NX-AUX02**

Product name	Specification				Model
	No. of terminals	Terminal number indications	Ground terminal mark	Terminal current capacity	
Terminal Block	8	A/B	Provided	10 A	**NX-TBC082**
	8	A/B	None	10 A	**NX-TBA082**
	16	A/B	None	10 A	**NX-TBA162**

Accessories

Communication Control Unit Accessories

End Cover (NX-END02): 1

One End Cover is provided with the Communication Control Unit.

Specifications

Regulations and Standards

NX-series Safety Control Units

Safety CPU Units NX-SL5500/SL5700

Certification body	Standards
TÜV Rheinland ∗1	• EN ISO 13849-1 • EN ISO 13849-2 • IEC 61508 parts 1-7 • IEC/EN 62061 • IEC/EN 61131-2 • IEC 61326-3-1 • IEC 61131-6 ∗2
UL	• NRAG (UL 61010-1, UL 61010-2-201 and UL 121201) • NRAG7 (CSA C22.2 No. 61010-1, CSA C22.2 No. 61010-2-201 and CSA C22.2 No. 213) • FSPC (IEC 61508 and ISO 13849) ∗2

Safety Input/Output Units NX-SI/SO

Certification body	Standards
TÜV Rheinland ∗1	• EN ISO 13849-1 • EN ISO 13849-2 • IEC 61508 parts 1-7 • IEC/EN 62061 • IEC/EN 61131-2 • IEC 61326-3-1
UL	• NRAG (UL 508 and ANSI/ISA 12.12.01) • NRAG7 (CSA C22.2 No. 142 and CSA C22.2 No. 213)

∗1. The FSoE protocol was certified for applications in which OMRON FSoE devices are connected to each other.
For compatibility with FSoE devices other than OMRON FSoE devices, the customer must validate FSoE communications.
∗2. Only NX-SL5500/5700 have obtained IEC 61131-6 and FSPC certifications.

The NX-series Safety Control Units allow you to build a safety control system that meets the following standards.
- Requirements for SIL 3 (Safety Integrity Level 3) in IEC 61508, IEC/EN 62061, (Functional Safety of Electrical/Electronic/Programmable Electronic Safety-related Systems)
- Requirements for PLe (Performance Level e) and for safety category 4 in EN ISO13849-1

NX-series Communication Control Unit NX-CSG320

Certification body	Standards
UL	• NRAG (UL 61010-1, UL 61010-2-201 and UL 121201) • NRAG7 (CSA C22.2 No. 61010-1, CSA C22.2 No. 61010-2-201 and CSA C22.2 No.213)

NX-series Communication Control Unit NX-CSG320 and Safety Control Units NX-SL/SI/SO

Certification body	Standards
Shipbuilding Standards	NK, LK

The NX-series Communication Control Units and the NX-series Safety Control Units are also registered for RCM, EAC, and KC compliance.

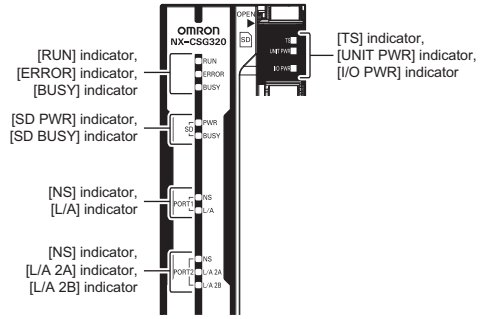
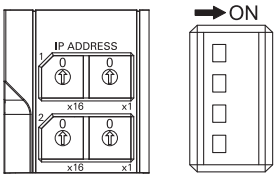
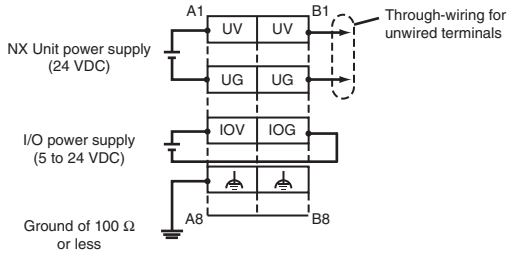
General Specifications

Item		Specification
Enclosure		Mounted in a panel (open)
Grounding method		Ground to 100 Ω or less
Operating environment	Ambient operating temperature	0 to 55°C
	Ambient operating humidity	10% to 95% (with no condensation or icing)
	Atmosphere	Must be free from corrosive gases.
	Ambient storage temperature	–25 to 70°C (with no condensation or icing)
	Altitude	2,000 m max.
	Pollution degree	2 or less
	Noise immunity	Conforms to IEC 61131-2. 2 kV on power supply line
	Insulation class	Class III (SELV)
	Overvoltage category	II
	EMC immunity level	Zone B
	Vibration resistance	Conforms to IEC 60068-2-6. 5 to 8.4 Hz with 3.5-mm amplitude 8.4 to 150 Hz, acceleration of 9.8 m/s^2 100 minutes each in X, Y, and Z directions (10 sweeps of 10 min each = 100 min total)
	Shock resistance	Conforms to IEC 60068-2-27. 147 m/s^2, 3 times each in X, Y, and Z directions
	Insulation resistance ∗	20 MΩ between isolated circuits (at 100 VDC)
	Dielectric strength ∗	510 VAC for 1 min between isolated circuits, leakage current: 5 mA max.
Installation method		DIN Track (IEC 60715 TH35-7.5/TH35-15)

∗ The specification is for the Communication Control Unit, Safety Input Unit, and Safety Output Unit, not for the Safety CPU Unit.

Specifications of Individual Units

Communication Control Unit

Unit name		Communication Control Unit
Model		NX-CSG320
Indicators		[RUN] indicator, [ERROR] indicator, [BUSY] indicator, [SD PWR] indicator, [SD BUSY] indicator, [NS] indicator × 2, [L/A] indicator, [L/A 2A] indicator, [L/A 2B] indicator, [TS] indicator, [UNIT PWR] indicator, [I/O PWR] indicator 
Hardware switch settings		[IP ADDRESS 1] Switch (x16, x1), [IP ADDRESS 2] Switch (x16, x1), DIP Switch  ✻ Factory default • IP ADDRESS1: 192.168.1.1 [IP ADDRESS 1] Switch = “00” • IP ADDRESS2: 192.168.250.1 [IP ADDRESS 2] Switch = “00”
Dimensions ✻1		72 × 100 × 90 mm (W × H × D)
Weight ✻2		390 g
Number of NX Units that you can connect		32 units or less
Number of communications that can be set between NX Units		254 ports max. ✻3
Unit power supply	**Power supply voltage**	24 VDC (20.4 to 28.8 VDC)
	Unit power consumption ✻4	5.95 W
	Inrush current ✻5	For cold start at room temperature: 10 A max./0.1 ms max. and 2.5 A max./150 ms max.
	Current capacity of power supply terminal ✻6	4 A
	Isolation method	No isolation: Between the Unit power supply terminal and internal circuit
Power supply to the NX Unit power supply	**NX Unit power supply capacity**	10 W max.
	NX Unit power supply efficiency	80%
	Isolation method	No isolation: Between the Unit power supply terminal and NX Unit power supply
I/O power supply to NX Units	**Power supply voltage**	5 to 24 VDC (4.5 to 28.8 VDC)
	Maximum I/O power supply current	4 A
Current consumption from I/O power supply		10 mA max. (24 VDC)
External connection terminals		Screwless clamping terminal block (8 terminals)
Terminal connection diagram		UV/UG: Unit power supply terminals IOV/IOG: I/O power supply terminals 
Accessories		End cover (NX-END02): 1 pc.
Installation orientation and restrictions		Only upright installation orientation

✻1. Includes the End Cover, and does not include projecting parts.
✻2. Includes the End Cover. The weight of the End Cover is 82 g.
✻3. Includes the SD Memory Card. The NX Unit power consumption to NX Units is not included.
✻4. This is the inrush current value when the power supply turns ON after it has been OFF.
The inrush current may vary depending on the operating condition and other conditions. Therefore, select fuses, breakers, and external power supply devices that have enough margin in characteristic and capacity, considering the condition under which the devices are used.
Especially when you turn the power ON/OFF through a switch inserted to the external DC power supply, cycling power ON-OFF-ON within one second will cause the inrush current of approx. 30 A/0.3 mA to occur since the inrush current limiter circuit fails to limit the current.
✻5. The amount of current that can be passed constantly through the terminal. Do no exceed this current value when you use a through-wiring for the Unit power supply.
✻6. The actual configurable number can be calculated as follows: 254 - <Number of CIP Safety connections configured> - <Number of FSoE connections configured>

Built-in EtherNet/IP Port Specifications

The following table shows the specifications of the built-in EtherNet/IP port of the Communication Control Unit.

Item		Specification
		NX-CSG-□□□
Communications protocol		TCP/IP or UDP/IP
Supported services		Sysmac Studio connection, tag data links, CIP message communications, FTP server, automatic clock adjustment (NTP client), SNMP (agent), DNS (client), BOOTP (client), TCP/UDP message service
Number of logical ports		2 (With IP routing function)
Physical layer		100Base-TX or 10Base-T (100Base-TX is recommended.) ✻1
Transmission specifications	Media access method	CSMA/CD
	Modulation	Baseband
	Transmission paths	Star form
	Baud rate	100 Mbps (100BASE-TX)
	Transmission media	Shielded twisted-pair (STP) cable, Category 5, 5e or higher
	Transmission distance	100 m max. (distance between hub and node)
	Number of cascade connections	The built-in switching ports support up to 50 nodes. There is no limitation when an external Ethernet switch is used.
CIP Safety routing	Maximum number of routable CIP Safety connections	254 total For multi-cast connections, 128 total
	Maximum routable Safety data length per connection	32 bytes
CIP service: Tag data links (cyclic communications)	Number of connections	32/Logical ports (total of 64 with two logical ports)
	Packet interval (refresh cycle)	1 to 10,000 ms in 1-ms increments
		Packet intervals can be set independently for each connection. (Data is refreshed over the network at preset intervals and does not depend on the number of nodes.)
	Allowed communications bandwidth per Unit	12,000 pps ✻2
		Note: The heartbeat and CIP Safety routing are included.
	Number of registrable tags	1024/Logical ports (total of 2048 with two logical ports)
	Tag types	Network variables
	Number of tags per connection (=1 tag set)	32 (31 tags if Controller status is included in the tag set.)
	Maximum link data size per node	46,208 bytes/Logical ports 92,416 bytes total
	Maximum data size per connection	1,444 bytes ✻3
	Number of registrable tag sets	Data concurrency is maintained within each connection.
		32 per port (1 connection = 1 tag set) (total of 40 with two logical ports) ✻4
	Maximum size of 1 tag set	1,444 bytes (Two bytes are used if Controller status is included in the tag set.)
	Multi-cast packet filter ✻5	Supported.
CIP message service: Explicit messages ✻6	Class 3 (number of connections)	Connections: 16/Logical ports (total of 32 with two logical ports) (server only)
	UCMM (unconnected)	Maximum number of clients that can communicate at one time: 16 per port (total of 32 with two logical ports) Maximum number of servers that can communicate at one time: 16 per port (total of 32 with two logical ports)
TCP/UDP message service	Maximum number of clients that can communicate at one time	16 per port (total of 32 with two logical ports)
	Maximum message size	Request: 492 bytes Response: 496 bytes
SNMP	Agent	SNMPv1, SNMPv2c
	MIB	MIB-II
EtherNet/IP conformance test		Conforms to CT14
Ethernet interface		10BASE-T or 100BASE-TX Auto negotiation or fixed settings

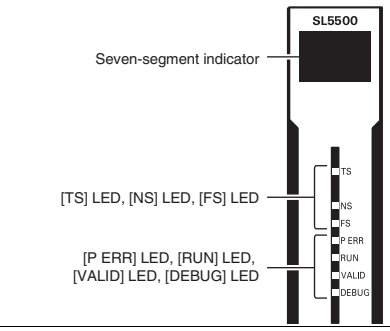
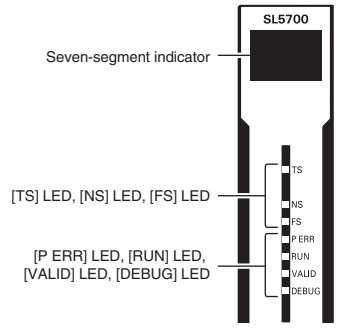
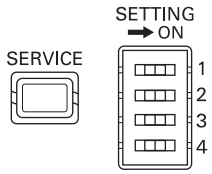
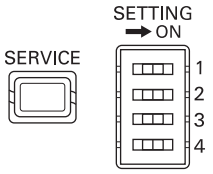
✻1. If tag data links are being used, use 100Base-TX.
✻2. Here, pps means “packets per second” and indicates the number of packets that can be processed in one second.
✻3. To use a data size of 505 bytes or higher, the system must support a large forward open (an optional CIP specification). The CS, CJ, NJ, and NX-series Units support a large forward open, but before connecting to nodes of other companies, confirm that those devices also support it.
✻4. If more than 40 tag sets are registered in total, the *Tag Data Link, Too Many Tag Sets Registered (840E0000 hex)* event will occur.
✻5. Because the built-in EtherNet/IP port is equipped with an IGMP client (version 2), unnecessary multicast packets can be filtered out by an Ethernet switch that supports IGMP Snooping.

✻6. The built-in EtherNet/IP port uses the TCP/UDP port numbers shown in the following table.
Do not set the same port number for more than one TCP/UDP service.

Service	Type	Port number	Remarks
Tag data links	UDP	2222	Fixed values
Used by system	UDP	2223, 2224	
	TCP	9610	
CIP messages	TCP	44818	
FTP client (Data transfer port)	TCP	20	
DNS client	TCP/UDP	53	
BOOTP client	UDP	68	
HTTP server	TCP	80	
Used by system, other	TCP/UDP	9600	You can change the port number in the Unit Settings on the Sysmac Studio.
FTP client (Control port)	TCP	21	
TCP/UDP message service	TCP/UDP	64000	
NTP client	UDP	123	
SNMP agent	UDP	161	
SNMP trap	UDP	162	

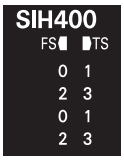
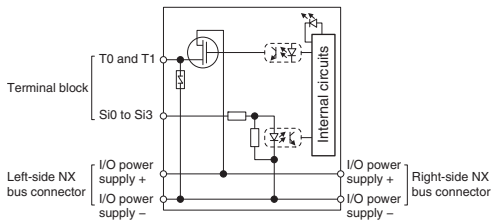
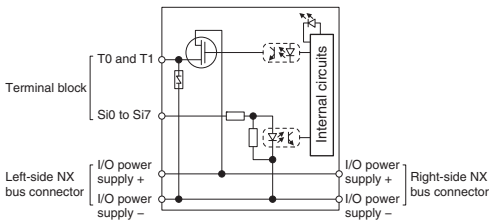
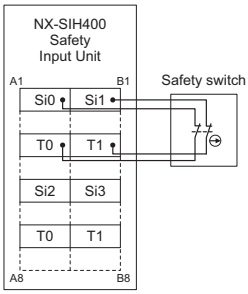
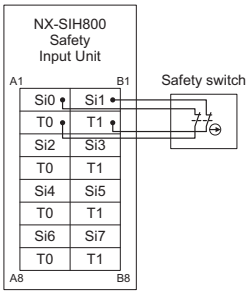
Safety Control Units

Safety CPU Units NX-SL5500/SL5700

Unit name	Safety CPU Unit	
Model	NX-SL5500	NX-SL5700
Maximum number of safety I/O points	1024 points	2032 points
Program capacity	2048 KB	4096 KB
Number of safety master connections ✻1	128	254
Number of CIP Safety originator connections	128	254
Number of CIP Safety target connections	4	4
Number of originators that can be connected with a multi-cast connection	8	8
Number of FSoE master connections	128	254
I/O refreshing method	Free-Run refreshing	
External connection terminals	None	
Indicators	[TS] indicator, [NS] indicator, [FS] indicator, [P ERR] indicator, [RUN] indicator, [VALID] indicator, [DEBUG] indicator, seven-segment indicator 	[TS] indicator, [NS] indicator, [FS] indicator, [P ERR] indicator, [RUN] indicator, [VALID] indicator, [DEBUG] indicator, seven-segment indicator 
Hardware switch settings	[SERVICE] switch, [SETTING] switch 	[SERVICE] switch, [SETTING] switch 
Dimensions	30 × 100 × 71 mm (W × H × D)	
I/O power supply method	Not supplied.	
Current capacity of I/O power supply terminals	No I/O power supply terminals	
NX Unit power consumption	3.35 W max. **✻2**	
Current consumption from I/O power supply	No consumption	
Weight	130 g max.	
Installation orientation and restrictions	Installation orientation: Upright installation Restriction **✻3**: None.	

✻1. This is the maximum number of Safety I/O connections that can be set to this Unit. The value is the total number of CIP Safety originator connections, CIP Safety target connections, and FSoE master connections.
✻2. The cable length for the Units (Communication Control Unit and Power Supply Unit for NX Units) that supply power to the corresponding Unit must be up to 20 m.
✻3. Only NX102 CPU Units and Communication Control Units can be connected. NX1P2 CPU Units or Communications Coupler Units cannot be connected.

Safety Input Units NX-SIH400/SID800

Unit name	Safety Input Unit	
Model	NX-SIH400	NX-SID800
Number of safety input points	4 points	8 points
Number of test output points	2 points	2 points
Internal I/O common	PNP (sinking inputs)	
Rated input voltage	24 VDC (20.4 to 28.8 VDC)	
OMRON special safety input devices	Can be connected.	Cannot be connected.
Number of safety slave connections	1	
I/O refreshing method	Free-Run refreshing	
External connection terminals	Screwless clamping terminal block (8 terminals)	Screwless clamping terminal block (16 terminals)
Indicators	[TS] indicator, [FS] indicator, [IN] indicator, [IN ERR] indicator 	[TS] indicator, [FS] indicator, [IN] indicator, [IN ERR] indicator 
Safety input current	4.5 mA TYP.	3.0 mA TYP.
Safety input ON voltage	11 VDC min.	15 VDC min.
Safety input OFF voltage/OFF current	5 VDC max., 1 mA max.	
Test output type	Sourcing outputs (PNP)	
Test output load current	25 mA max.	50 mA max.
Test output residual voltage	1.2 V max. (Between IOV and all output terminals)	
Test output leakage current	0.1 mA max.	
Dimensions	12 × 100 × 71 mm (W × H × D)	
Isolation method	Photocoupler isolation	
Insulation resistance	20 MΩ min. between isolated circuits (at 100 VDC)	
Dielectric strength	510 VAC for 1 min between isolated circuits, leakage current: 5 mA max.	
I/O power supply method	Power supplied from the NX bus	
Current capacity of I/O power supply terminals	No applicable terminals.	
NX Unit power consumption	• Connected to a CPU Unit or a Communication Control Unit 1.10 W max. • Connected to a Communications Coupler Unit 0.70 W max.	• Connected to a CPU Unit or a Communication Control Unit 1.10 W max. • Connected to a Communications Coupler Unit 0.75 W max.
Current consumption from I/O power supply	20 mA max.	
Weight	70 g max.	
Circuit layout		
Terminal connection diagram	Si0 to Si3: Safety input terminals T0 and T1: Test output terminals  Refer to User's manual (Cat. No. Z395) for details.	Si0 to Si7: Safety input terminals T0 and T1: Test output terminals  Refer to User's manual (Cat. No. Z395) for details.