

## Safety CPU Unit

# NX-SL5□□□

## Integrate safety into ultra-flexible, ultra-high-speed machine automation and build a distributed safety system

- Automatic generation, from safety programs through to safety functional test reports
- Data logging with fast cycle time to detect causes of downtime and degradation of safety components
- Integrated safety over EtherCAT® for high-speed, high-precision fieldbus communication in a machine
- Integrated safety into EtherNet/IP™ for safety communication between machines
- Easy to set up motion and robots that are the key to quality and productivity enhancement



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

## Features

- Meets EN ISO 13849-1 (PLe/Category 4) and IEC 61508 (SIL3)
  - Safety over EtherCAT (FSoE) allows standard devices and safety devices to be mixed on the same EtherCAT® network
  - CIP Safety™ allows standard devices and safety devices to be mixed on the same EtherNet/IP network
  - Reusable safety program POU's according to IEC 61131-3 make programming more efficient
  - PLCopen® Function Blocks for Safety reduce time and cost to learn safety design
  - Safety I/O wiring diagrams, safety circuit programs, and user-defined Function Blocks can be automatically generated, minimizing safety design errors
  - Simple Automatic Test using Offline Simulation is available. Online Functional Test ensures and maintains safety during machine commissioning and operation
- \* 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 "FailSafe 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.



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## Ordering Information

### Safety CPU Units NX-SL5□□□

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	<b>NX-SL5500</b>
		2032 points	4096 KB	254	Free-Run refreshing	Ver. 1.4	<b>NX-SL5700</b>

### Accessories

There is no accessory.

### 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
<b>Sysmac Studio Standard Edition Ver. 1.□□</b>	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.	--- (Media only)	Sysmac Studio 32-bit edition DVD	<b>SYSMAC-SE200D</b>
	Sysmac Studio runs on the following OS. *2 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)/11(64-bit version) For details, refer to your local OMRON website.	--- (Media only)	Sysmac Studio 64-bit edition DVD	<b>SYSMAC-SE200D-64</b>
	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 (CX-Designer). For details, refer to your local OMRON website.	1 license *3	---	<b>SYSMAC-SE201L</b>
<b>Sysmac Studio Safety Edition *4 Ver. 1.□□</b>	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	---	<b>SYSMAC-FE001L</b>

**Note:** For details of the automation software Sysmac Studio, refer to your local OMRON website.

\*1. The SYSMAC-SE□□□L Sysmac Studio Standard Edition with license(s) provides functions that the SYSMAC-FE001L Safety Edition provides. With the version 1.24 or higher, you can use the setup functions for the Communication Control Unit.

\*2. SYSMAC-SE200D-64 runs on Windows 10 (64-bit edition) or higher.

\*3. Multi licenses are available for the Sysmac Studio (3, 10, 30, or 50 licenses).

\*4. The Safety Edition can be used with a safety control system using the Communication Control Unit or EtherNet/IP Coupler Unit.

## Regulations and Standards

### Safety CPU Units NX-SL5□□□

Certification body	Standards
TÜV Rheinland	<ul style="list-style-type: none"> <li>• EN ISO 13849-1</li> <li>• EN ISO 13849-2</li> <li>• IEC 61508 parts 1-7</li> <li>• IEC/EN 61131-2</li> <li>• IEC 61326-3-1</li> <li>• IEC 61131-6</li> </ul>
UL	<ul style="list-style-type: none"> <li>• NRAG (UL 61010-1 and UL 61010-2-201 and UL 121201)</li> <li>• NRAG7 (CSA C22.2 No. 61010-1 and CSA C22.2 No. 61010-2-201 and CSA C22.2 No. 213)</li> <li>• FSPC (IEC 61508 and ISO 13849)</li> </ul>
Shipbuilding Standards	NK, LK

Using the NX-series Safety CPU Unit allows you to build a safety control system that meets the following standards:

- Requirements for SIL 3 in IEC 61508
- Requirements for PLe and Category 4 in EN ISO 13849-1

The NX-series Safety CPU 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 <sup>2</sup> 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 <sup>2</sup> , 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)	

# Unit Specifications

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		
Hardware switch settings		
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 *2	3.35 W max.	
Current consumption from I/O power supply	No consumption	
Weight	130 g max.	
Installation orientation and restrictions *3	Installation orientation: Upright installation Restriction: 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. The NX102 CPU Unit, NX502 CPU Unit, and NX-CSG Communication Control Unit can be connected.

## Combinations of CPU Unit, Communications Unit, and Software

The following table shows the NX-series CPU Unit, Communications Units, and Sysmac Studio editions that can be used with the NX-SL5□□□ Safety CPU Unit.

CPU Unit and Communications Unit	NJ/NX Series CPU Unit *1	Communications Unit		
	NX102-□□□□ NX502-□□□□	EtherCAT Coupler Unit NX-ECC20□	EtherNet/IP Coupler Unit NX-EIC202	Communication Control Unit NX-CSG320
Edition of Sysmac Studio *2	Standard Edition	Standard Edition	Standard Edition Sysmac Studio Safety Edition	Standard Edition Sysmac Studio Safety Edition
NX-SL5500	YES	No	No	YES
NX-SL5700	YES	No	No	YES

\*1. The NX-SL5□□□ Safety CPU Unit cannot be connected directly to the NJ/NX1P/NX7 CPU Unit. The NX-CSG320 Communication Control Unit is required to connect a system using these CPU Units.

\*2. Refer to *Version Information* for the possible combinations of the versions of Units and Sysmac Studio.

## Version Information

The following table shows the possible combinations of versions of NX-series Safety Control Units, CPU Units, Communication Control Units, and Sysmac Studio. Available functions that are related to safety control vary depending on the versions of the units and Sysmac Studio. Refer to the *NX-series Safety Control Unit User's Manual* (Cat. No. Z930) and the *NX-series Safety Control Unit/Communication Control Unit User's Manual* (Cat. No. Z395) for details.

NX-SL5□□□ version 1.4 can be connected to the following versions of the CPU Unit or Communication Control Unit:

- NX102 CPU Unit version 1.31 or later and Sysmac Studio version 1.40 or higher
- NX502 CPU Unit version 1.60 or later and Sysmac Studio version 1.54 or higher
- NX-CSG version 1.01 or later and Sysmac Studio version 1.40 or higher

### Combinations of versions

Safety Control Unit model and version		NX bus master: NX102 CPU Unit		NX bus master: NX502 CPU Unit		NX bus master: Communication Control Unit	
Model	Unit Version	NX102-□□□□	Sysmac Studio	NX502-□□□□ *1	Sysmac Studio *2	Communication Control Unit NX-CSG	Sysmac Studio
NX-SL5500	Ver.1.3	Ver.1.31 or later	Ver.1.24 or higher	Ver.1.60 or later	Ver.1.54 or higher	Ver.1.01 or later	Ver.1.24 or higher
	Ver.1.4		Ver.1.40 or higher				
NX-SL5700	Ver.1.2	---	---	---	---	Ver.1.00 only	Ver.1.24 or higher
	Ver.1.3	Ver.1.31 or later	Ver.1.24 or higher	Ver.1.60 or later	Ver.1.54 or higher	Ver.1.01 or later	Ver.1.24 or higher
	Ver.1.4	Ver.1.31 or later	Ver.1.40 or higher	Ver.1.60 or later	Ver.1.54 or higher	Ver.1.01 or later	Ver.1.40 or higher
NX-SIH400	Ver.1.0	Ver.1.30 or later	Ver.1.22 or higher	Ver.1.60 or later	Ver.1.54 or higher	Ver.1.00 or later	Ver.1.24 or higher
	Ver.1.1						Ver.1.24 or higher
NX-SID800	Ver.1.0	Ver.1.30 or later	Ver.1.22 or higher	Ver.1.60 or later	Ver.1.54 or higher	Ver.1.00 or later	Ver.1.24 or higher
NX-SOH200	Ver.1.0	Ver.1.30 or later	Ver.1.22 or higher	Ver.1.60 or later	Ver.1.54 or higher	Ver.1.00 or later	Ver.1.24 or higher
NX-SOD400	Ver.1.0	Ver.1.30 or later	Ver.1.22 or higher	Ver.1.60 or later	Ver.1.54 or higher	Ver.1.00 or later	Ver.1.24 or higher

\*1. To use CIP Safety communications, connect the NX-EIP201 EtherNet/IP Unit to the NX502 CPU Unit or use the NX502-1□00 CPU Unit version 1.64 or later.

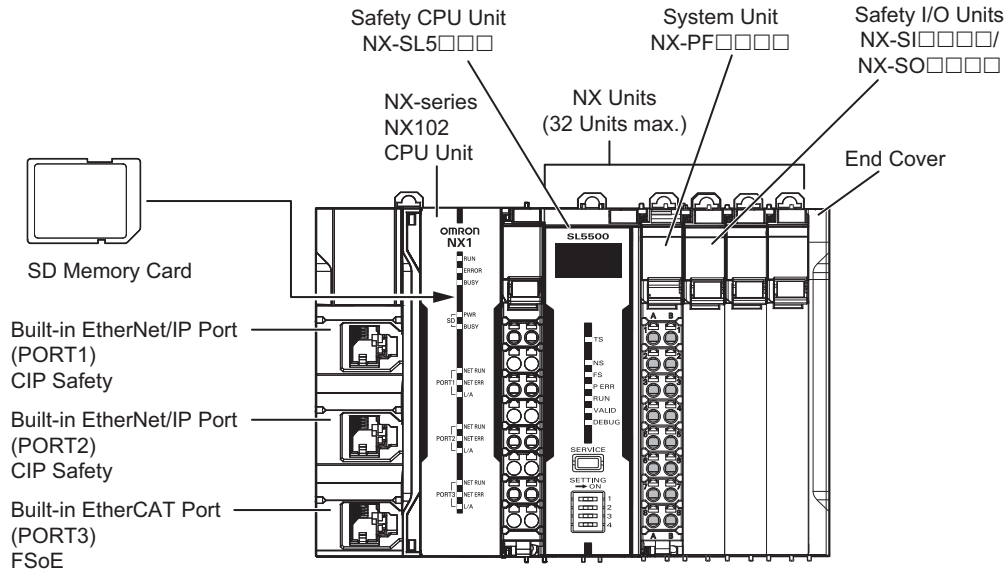
\*2. Use the Sysmac Studio version 1.56 or higher for CIP Safety communications via the built-in EtherNet/IP port on the NX502-1□00 version 1.64 or later.

# NX-SL5□□□□

## NX Unit Configuration

### CPU Rack (Using NX102 CPU Unit)

The CPU Rack consists of an NX-series NX102 CPU Unit, NX Units, and an End Cover.  
Up to 32 NX Units can be connected.



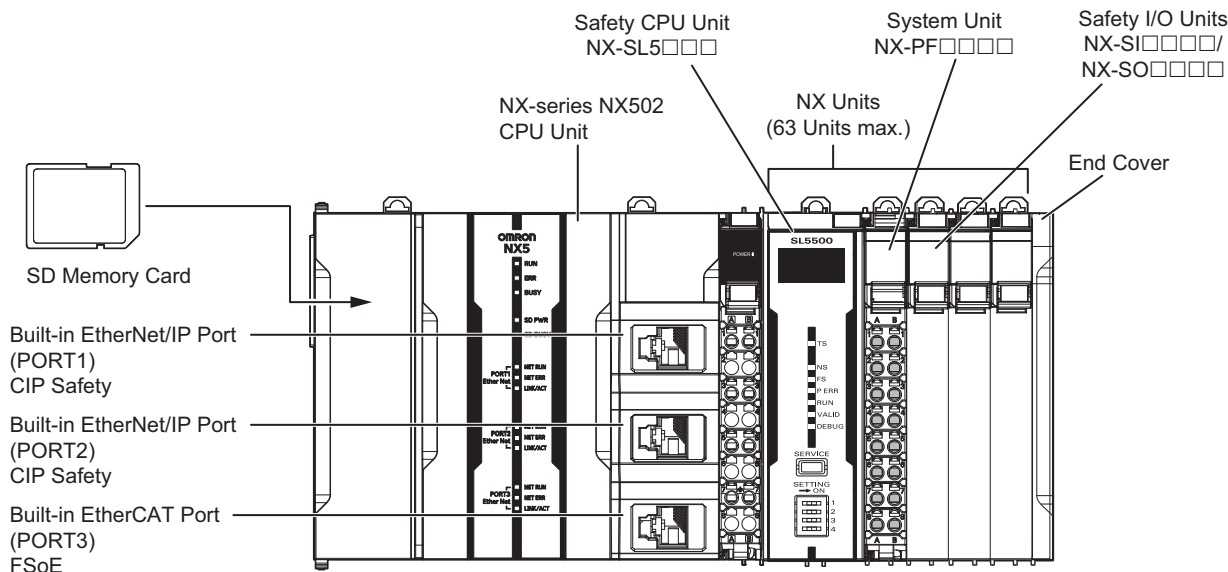
Up to 32 Units can be mounted to each CPU Rack.

For restrictions of the NX unit, refer to *NX-series NX102 CPU Unit Hardware User's Manual* (Cat. No. W593).

Series	Configuration	Remarks
NX-series	NX-series NX102 CPU Unit	One required for every CPU Rack. Up to 32 Units can be mounted to each CPU Rack. For restrictions of the NX unit, refer to <i>NX-series NX102 CPU Unit Hardware User's Manual</i> (W593).
	End Cover	Must be connected to the right end of the CPU Rack. One End Cover is provided with the CPU Unit.
	Safety Control Units	This is a programmable safety controller which supports IEC 61131-3 and PLCopen® TC5 Safety. This unit consists of safety CPU unit and safety I/O unit.
	Safety CPU Unit NX-SL5□□□□	This Unit has safety control functions. It operates as an NX Unit. It also operates as an FSoE master. It operates as a CIP-Safety-on-EtherNet/IP device.
	Safety I/O Units	These Units have safety input functions or safety output functions. They operate as NX Units. These Units operate as FSoE slaves.
	Safety Input Unit	These Units have safety input functions.
	Safety Output Unit	These Units have safety output functions.
	System Unit	When the I/O power supply for the NX Unit connected to the CPU Unit is supplied through the NX bus, the IO power supply unit (NX-PF) must be used as well.
	Other NX units	For the latest lineup of NX units, refer to our catalog and our website, or inquire of our local representative.
NJ/NX-series	SD Memory Card	Install as required.

## CPU Rack (Using NX502 CPU Unit)

The CPU Rack consists of an NX-series NX502 CPU Unit, NX Units, and an End Cover.  
Up to 63 NX Units can be connected.

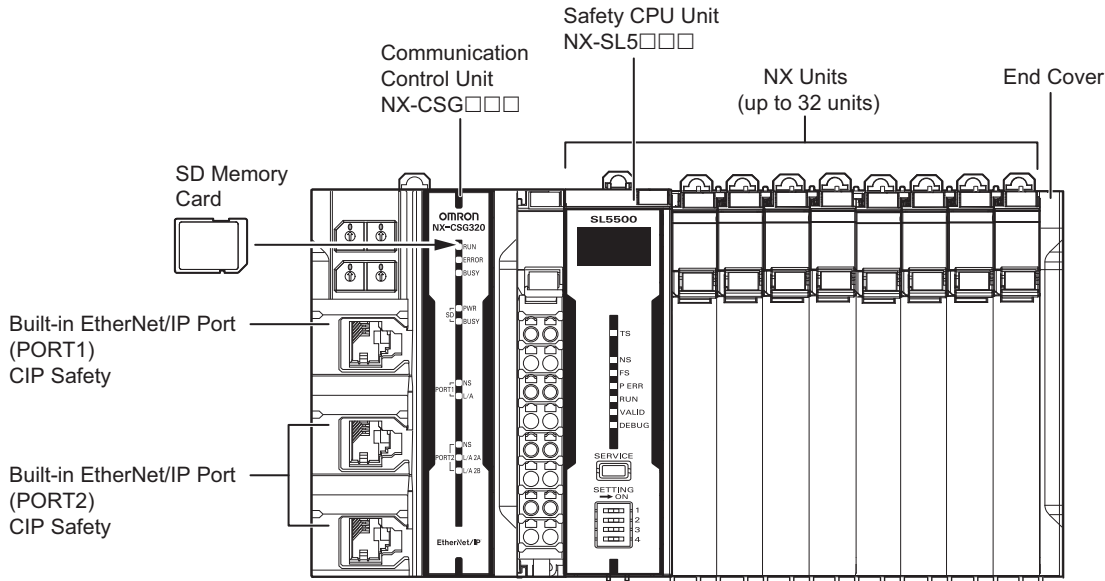


For restrictions of the NX unit, refer to *NX-series NX502 CPU Unit Hardware User's Manual* (Cat. No. W629).

Series	Configuration	Remarks
NX-series	NX-series NX502 CPU Unit	One required for every CPU Rack. Up to 63 Units can be mounted to each CPU Rack. For restrictions of the NX unit, refer to <i>NX-series NX502 CPU Unit Hardware User's Manual</i> (W629).
	End Cover	Must be connected to the right end of the CPU Rack. One End Cover is provided with the CPU Unit.
	Safety Control Units	This is a programmable safety controller which supports IEC 61131-3 and PLCopen® TC5 Safety. This unit consists of safety CPU unit and safety I/O unit.
	Safety CPU Unit NX-SL5□□□	This Unit has safety control functions. It operates as an NX Unit. It also operates as an FSoE master. It operates as a CIP-Safety-on-EtherNet/IP device.
	Safety I/O Units	These Units have safety input functions or safety output functions. They operate as NX Units. These Units operate as FSoE slaves.
	Safety Input Unit	These Units have safety input functions.
	Safety Output Unit	These Units have safety output functions.
	System Unit	When the I/O power supply for the NX Unit connected to the CPU Unit is supplied through the NX bus, the IO power supply unit (NX-PF) must be used as well.
	Other NX units	For the latest lineup of NX units, refer to our catalog and our website, or inquire of our local representative.
NJ/NX-series	SD Memory Card	Install as required.

### CPU Rack (Using NX-CSG Communication Control Unit)

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.



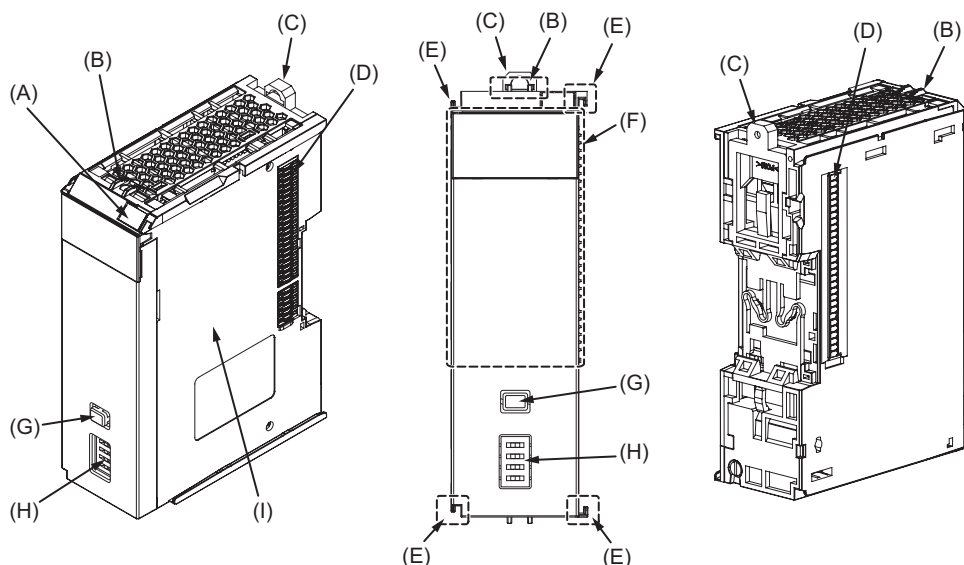
Refer to the *NX-series Safety Control Unit/Communication Control Unit User's Manual* (Cat. No. Z395) for details on the configuration of the system using the Communication Control Unit.

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 <i>NX-series Safety Control Unit/Communication Control Unit User's Manual</i> (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.



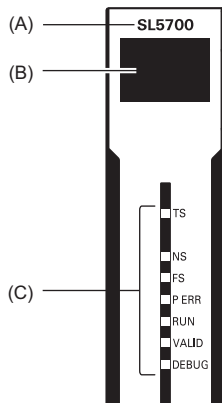
## Part Names and Functions

### Safety CPU Units NX-SL5500/SL5700



Letter	Name	Specification
(A)	Marker attachment locations	The locations where markers are attached. The markers made by OMRON are installed for the factory setting. Commercially available markers can also be installed.
(B)	Protrusions for removing the Unit	The protrusions to hold when removing the Unit.
(C)	DIN Track mounting hook	This hook is used to mount the NX Unit to a DIN Track.
(D)	NX bus connector	This is the NX-series bus connector.
(E)	Unit hookup guides	These guides are used to connect two Units.
(F)	Indicators	The indicators show the current operating status and power supply status of the Safety CPU Unit.
(G)	Service switch	This switch is used for the start trigger of various functions.
(H)	DIP switch	This switch is used for the Safety Unit Restore and the safety data logging function.
(I)	Unit specifications	The specifications of the Safety CPU Unit are given.

**Indicators**



Letter	Name	Function
(A)	Model number display	Displays part of the model number of the Safety CPU Unit.
(B)	Seven-segment Indicator	Displays detailed information on the Safety CPU Unit.
(C)	Indicators	Show the current operating status and communications status of the Safety CPU Unit.

**Indicator specifications**

[TS] LED	The TS indicator shows the current status of the Safety CPU Unit and the communications status with the NX Bus Master.
[NS] LED	The NS indicator shows the CIP Safety communications status of the Safety CPU Unit.
[FS] LED	The FS indicator shows the FSoE communications status of the Safety CPU Unit.
[RUN] LED	The RUN indicator shows the execution status of the safety programs.
[DEBUG] LED	The DEBUG indicator shows the status whether the debug function can be executed on Safety CPU Unit.
[VALID] LED	The VALID indicator shows whether safety validation has been performed on the safety application data in the Safety CPU Unit.

**Seven-segment indicator**

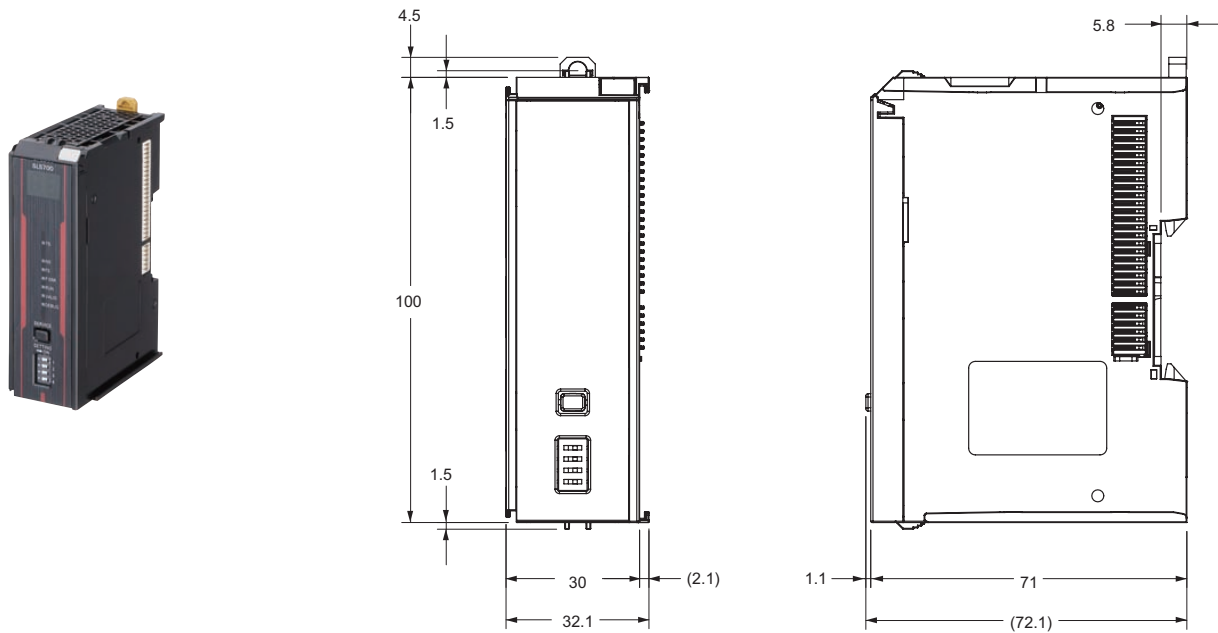
The two-digit seven-segment indicator shows the detailed information on the Safety CPU Unit in the following cases:

At normal operation, when an error occurs, when a signature code is checked, when the Safety Unit Restore is executed, When the Safety Data Logging is executed

# Dimensions

(Unit: mm)

## Safety CPU Units NX-SL5500/SL5700



## Related Manuals

Manual name	Cat. No.	Model numbers	Application	Description
NX-series Safety Control Unit User's Manual	Z930	NX-SL□□□□ NX-SI□□□□□□ NX-SO□□□□□□	Learning how to use the NX-series Safety Control Units.	Describes the hardware, setup methods, and functions of the NX-series Safety Control Units.
NX-series Safety Control Unit Instructions Reference Manual	Z931	NX-SL□□□□□□	Learning about the specifications of instructions for the Safety CPU Unit.	Describes the instructions for the Safety CPU Unit.
NX-series Safety Control Unit / Communication Control Unit User's Manual	Z395	NX-SL5□□□□□ NX-SI□□□□□□ NX-SO□□□□□□ NX-CSG□□□□□□	Learning how to use the NX-series Safety Control Units and Communication Control Units.	Describes the hardware, setup methods, and functions of the NX-series Safety Control Units and Communication Control Units.
Sysmac Studio Version 1 Operation Manual	W504	SYSMAC-SE2□□□□	Learning about the operating procedures and functions of the Sysmac Studio.	Describes the operating procedures of the Sysmac Studio.

## Safety Precautions

Be sure to read the *Common Precautions for Safety Warning* at the following URL: <http://www.ia.omron.com/>.  
Be sure to read the following user's manual for other details required for correct use of the Safety CPU Unit.

# Terms and Conditions Agreement

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Information presented by Omron Companies has been checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical or proofreading errors or omissions.

# OMRON's Products Support IoT for Control Panels and Production Lines



NX-series Safety Controller  
CIP Safety System  
Brochure

Cat. No. F104



Safety I/O Unit  
NX-SI/SO Datasheet

Cat. No. F123



Communication  
Control Unit  
NX-CSG Datasheet

Cat. No. F125



Safety I/O Terminal  
GI-S Series Datasheet

Cat. No. F126



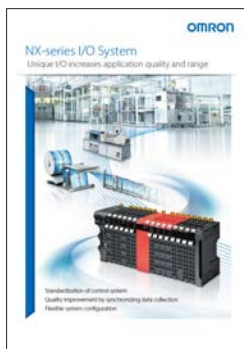
NX1 Machine Automation  
Controller Brochure

Cat. No. P129



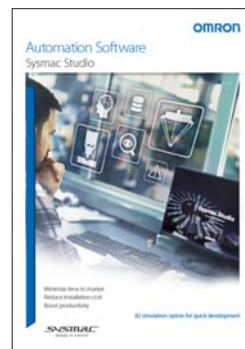
Machine Automation  
Controller  
NX1 Datasheet

Cat. No. P130



NX-series  
I/O System Brochure

Cat. No. R183



Automation Software  
Sysmac Studio Brochure

Cat. No. P138



Automation Software  
Sysmac Studio Ver.1.00  
Datasheet

**Note: Do not use this document to operate the Unit.**

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