

## Safety Control Unit

# NX-SL3/SL5/SI/SO

**The simplest way to integrate safety into ultra-flexible, ultra-high-speed machine automation -**

**Bring safety to your production site**

- 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 to EtherNet/IP™ for safety communication between machines
- Integrated safety over EtherCAT® for high-speed, high-precision fieldbus communication in a machine
- 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/Safety Category 4) and IEC 61508 (SIL3)
- CIP Safety™ allows standard devices and safety devices to be mixed on the same EtherNet/IP™ network
- Safety over EtherCAT (FSoE) allows standard devices and safety devices to be mixed on the same EtherCAT® 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

### EtherNet/IP™

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



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.

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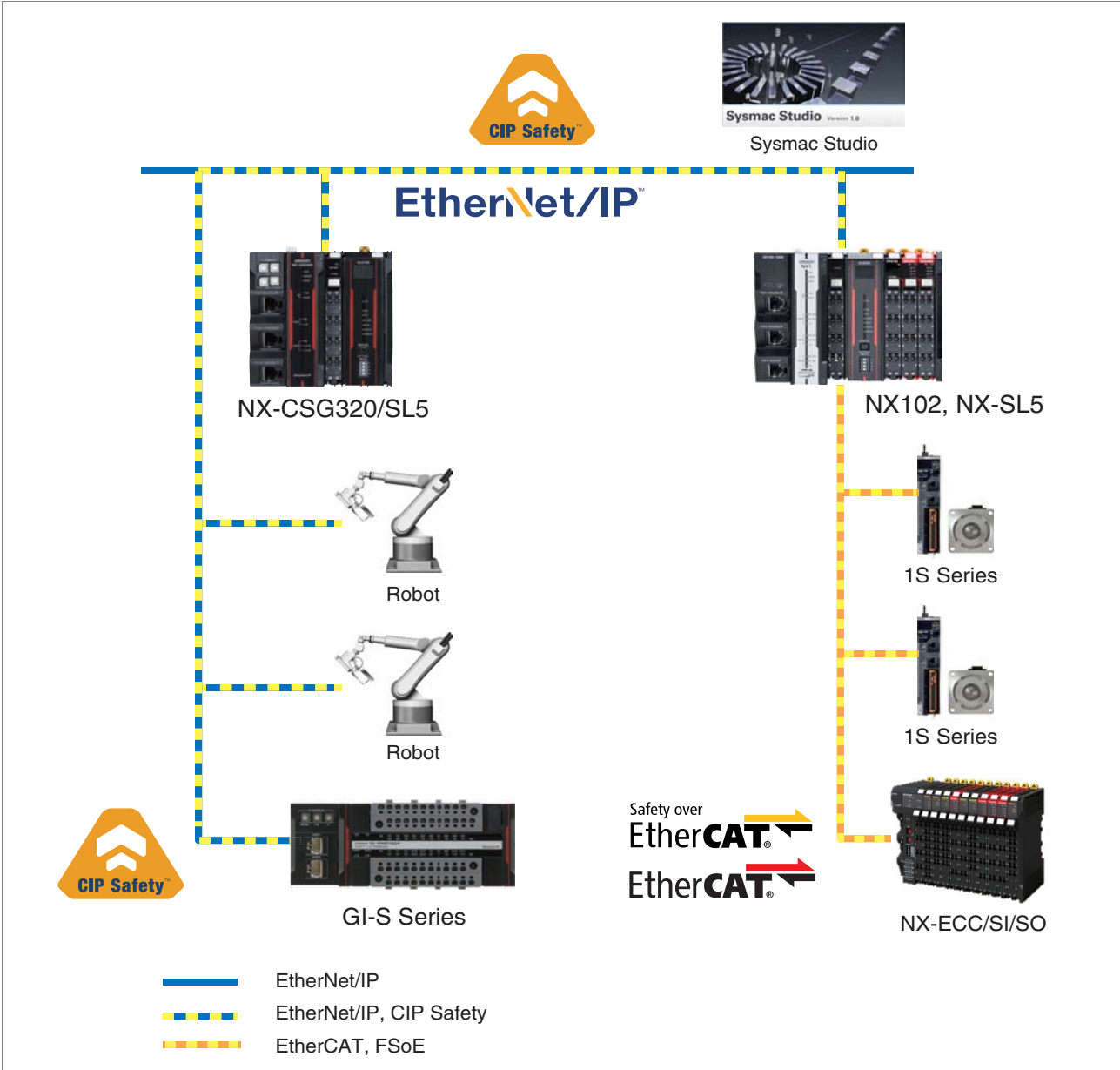
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# NX-SL3/SL5/SI/SO





## System configuration

|                                   |  |   |   |
|-----------------------------------|--|---|---|
| Machine controller                | NX102  |   | NJ1/3/5 series, NX1P, NX7   |
| Safety CPU unit                   | NX-SL5500<br>NX-SL5700   | NX-SL3300<br>NX-SL3500                  |   |
| System overview                   | Integrated safety of internal high-speed high-precision fieldbus and industrial Ethernet between instruments is realized   |   | Enables both high-speed high-precision control and safety control |
| Standard network                  | EtherNet/IP, EtherCAT  |   |   |
| Safety network                    | FSoE, CIP Safety   |   | FSoE(Safety over EtherCAT)  |
| Number of safety I/O connections  | NX-SL5500: Max. 128<br>NX-SL5700: Max. 254   |   | NX-SL3300: Max. 32<br>NX-SL3500: Max. 128                         |
| Safety motion                     | Connectable with 1S series   |   |   |
| Safety communication with robots  | Connectable  |   | Not connectable   |
| Safety data logging without tools | Supported  |   | Not supported   |
| Common safety functions           | <ul style="list-style-type: none"> <li>Automatic generation of safety I/O wiring diagram</li> <li>Automatic generation of safety circuit program</li> <li>Automatic generation of user definition function block</li> <li>Offline simulation function and quick automatic test</li> <li>Online safety function test</li> </ul> |   |   |
| System configuration              | System configuration diagram A (page 2)  | System configuration diagram B (page 3) | System configuration diagram C (page 3)                           |

System configuration A (NX102+SL5)

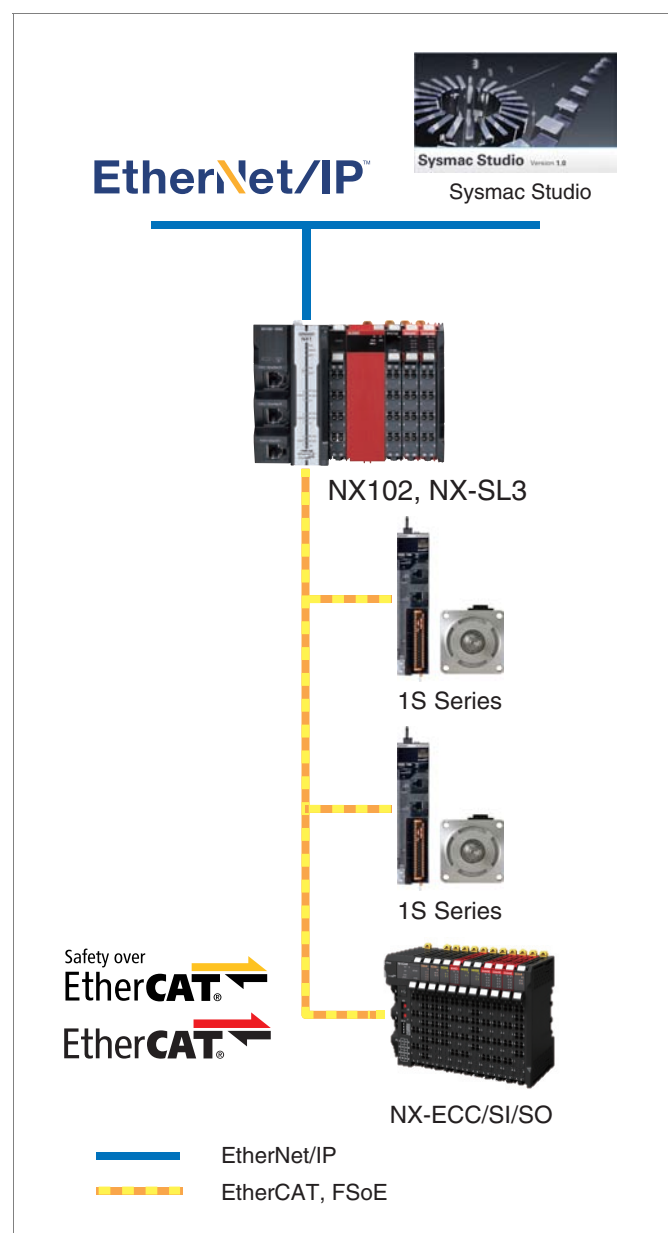


# List of global standards

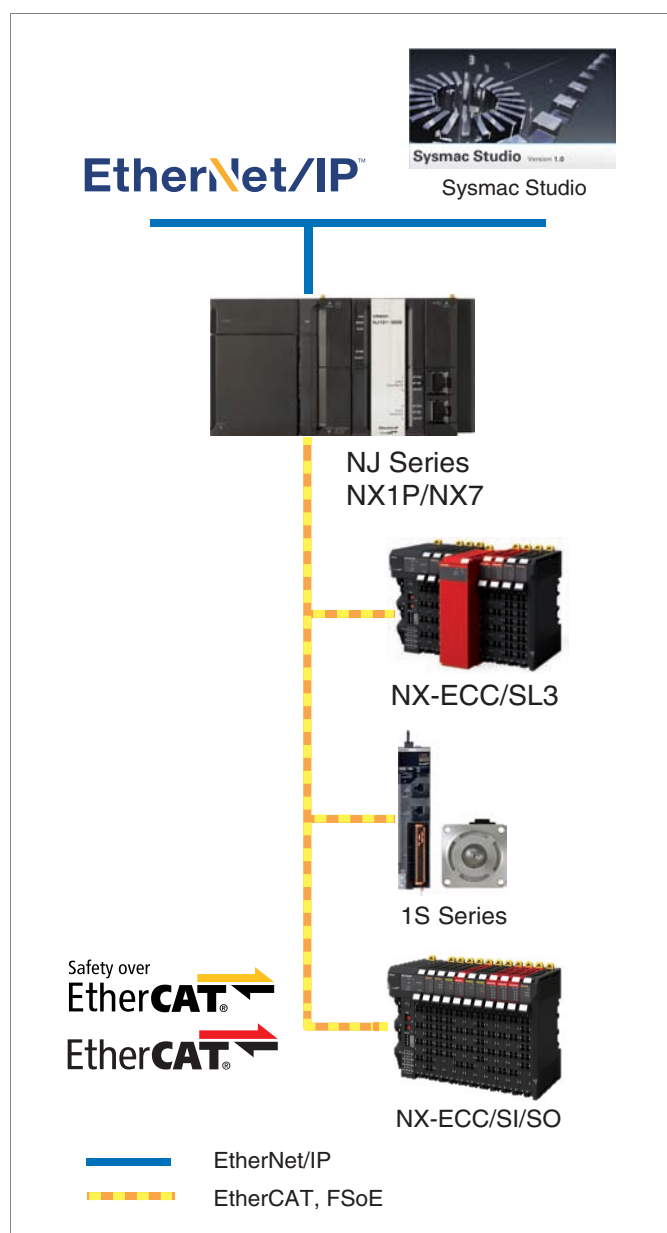
|                                |   |  |
|--------------------------------|---|--|
| Safety certification standards |   | <ul style="list-style-type: none"> <li>• EN ISO 13849-1</li> <li>• EN ISO 13849-2</li> <li>• IEC 61508 parts 1-7</li> <li>• IEC/EN 62061</li> <li>• IEC 61131-6 *</li> </ul> |
| Network standards              | EtherCAT, FSoE<br> Safety over  | IEC 617842-2-CPF12   |
|                                | EtherNet/IP, CIP-Safety<br>     | IEC 617842-2-CPF2  |
| Programming languages          |   | IEC 61131-3  |

\* IEC 61131-6 is acquired by NX-SL5500/5700 only.

## System configuration B (NX102+SL3)



## System configuration C (NJ+SL3)





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



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- \* 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.

## Features

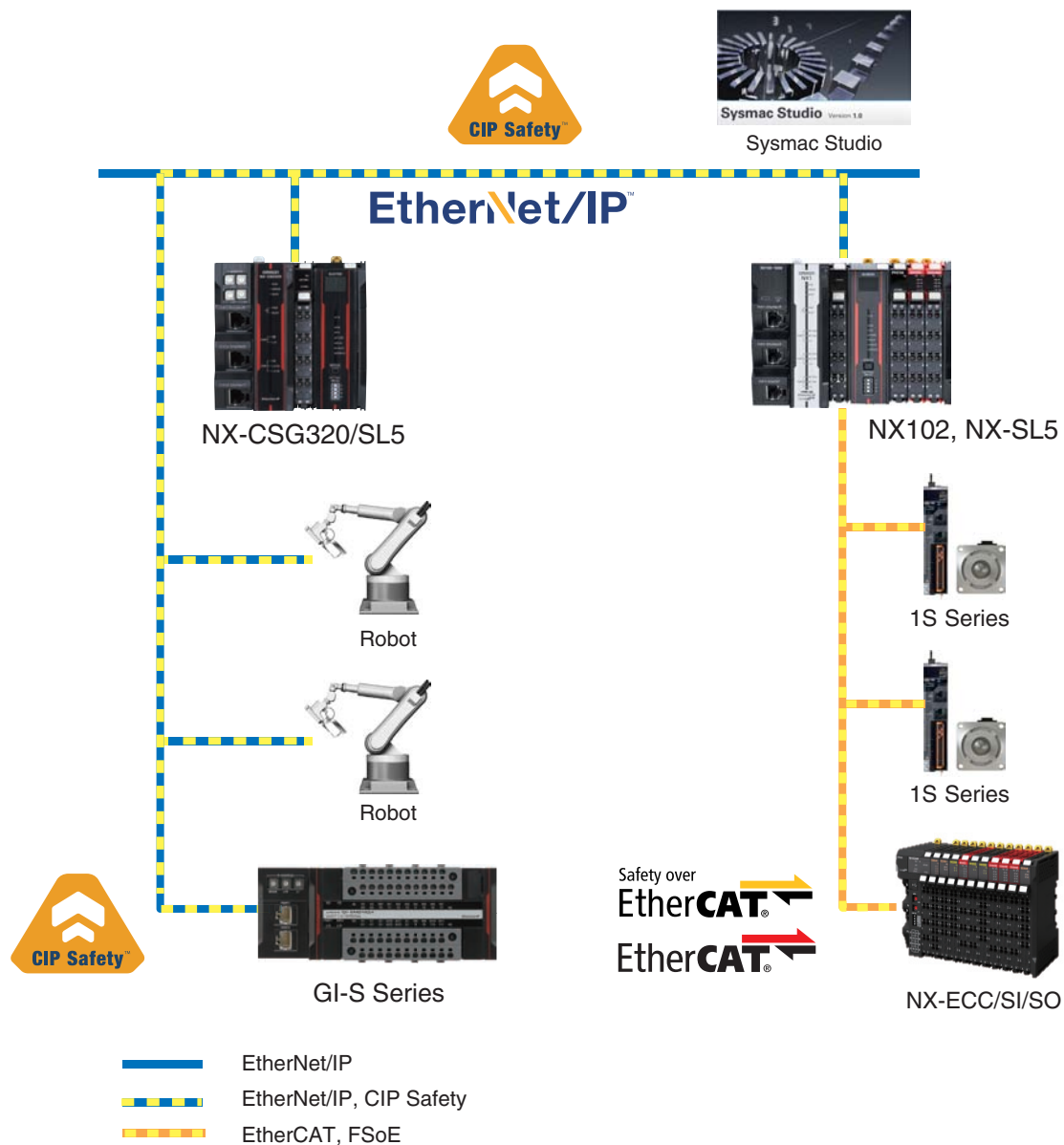
- Meets EN ISO 13849-1 (PLe/Safety Category 4) and IEC 61508 (SIL3)
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## System configuration



## Ordering Information

### Safety CPU Units NX-SL5500/5700

| 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.      | ---<br>(Media only) | Sysmac Studio 32-bit edition DVD | <b>SYSMAC-SE200D</b>    |
|   | Sysmac Studio runs on the following OS.<br>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) *1<br>For details, refer to your local OMRON website.  | ---<br>(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).<br>For details, refer to your local OMRON website. | 1 license *2        | ---                              | <b>SYSMAC-SE201L</b>    |

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

\*1. SYSMAC-SE200D-64 runs on Windows 10 (64-bit edition).

\*2. Multi licenses are available for the Sysmac Studio (3, 10, 30, or 50 licenses).

## Regulations and Standards

### NX-series Safety Control Units NX-SL5/SI/SO

| Certification body     | NX-SL5500/SL5700   | NX-SI/SO   |
|------------------------|--|--|
| TÜV Rheinland *1       | <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 62061</li> <li>• IEC/EN 61131-2</li> <li>• IEC 61326-3-1</li> </ul> |  |
|                        | • IEC 61131-6 *2   | ---  |
| 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. 213)</li> </ul>                                  | <ul style="list-style-type: none"> <li>• NRAG (UL 508 and ANSI/ISA 12.12.01)</li> <li>• NRAG7 (CSA C22.2 No. 142 and CSA C22.2 No. 213)</li> </ul> |
|                        | • FSPC (IEC 61508 and ISO 13849) *2  | ---  |
| Shipbuilding Standards | NK, LK   |  |

\*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 PL e (Performance Level e) and for safety category 4 in EN ISO13849-1

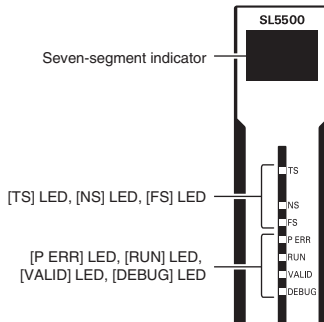
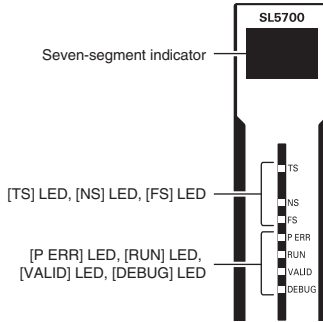
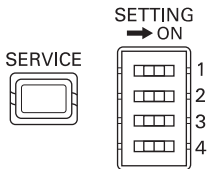
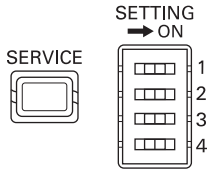
## General Specifications

| 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.<br>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.<br>5 to 8.4 Hz with 3.5-mm amplitude<br>8.4 to 150 Hz, acceleration of 9.8 m/s <sup>2</sup><br>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.<br>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)  |

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



## 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<br>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. Only NX102 CPU Units and Communication Control Units can be connected. NX1P2 CPU Units or Communications Coupler Units cannot be connected.

## Function Specifications

Refer to your local OMRON website for function specifications of the Safety Control Unit.

## Version Information

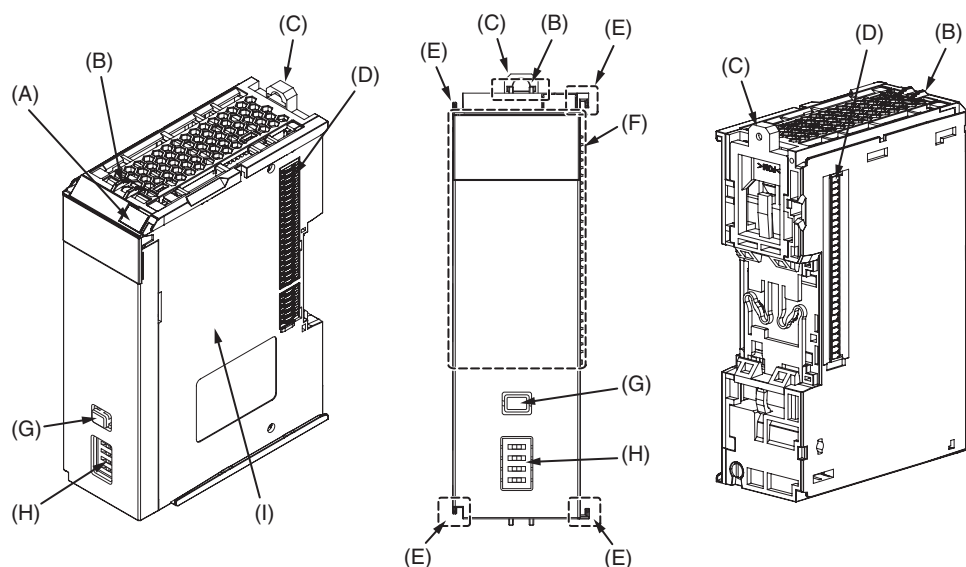
### Relationship between the Unit Versions of Safety Control Units and Sysmac Studio Versions

This section describes the combinations that can be used of the unit versions of the Safety Control Unit and NX102 CPU unit, and the version of the Sysmac Studio.

#### When connected with CPU rack

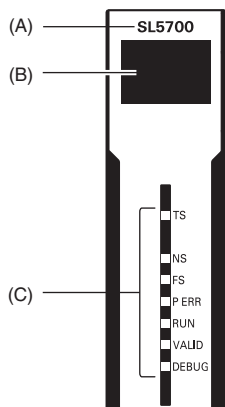
| Safety Control Unit model and version |              | NX bus master: CPU Unit |                   |
|---------------------------------------|--------------|-------------------------|-------------------|
| Model                                 | Unit version | NX102 CPU unit          | Sysmac Studio     |
| NX-SL5500                             | Ver.1.3      | Ver.1.31 or later       | Ver.1.24 or later |
|                                       | Ver.1.4      |                         | Ver.1.40 or later |
| NX-SL5700                             | Ver.1.2      | ---                     | ---               |
|                                       | Ver.1.3      | Ver.1.31 or later       | Ver.1.24 or later |
|                                       | Ver.1.4      |                         | Ver.1.40 or later |
| NX-SIH400                             | Ver.1.0      | Ver.1.30 or later       | Ver.1.22 or later |
|                                       | Ver.1.1      |                         |                   |
| NX-SID800                             | Ver.1.0      |                         |                   |
| NX-SOH200                             |              |                         |                   |
| NX-SOD400                             |              |                         |                   |

## Part Names and Functions



| 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

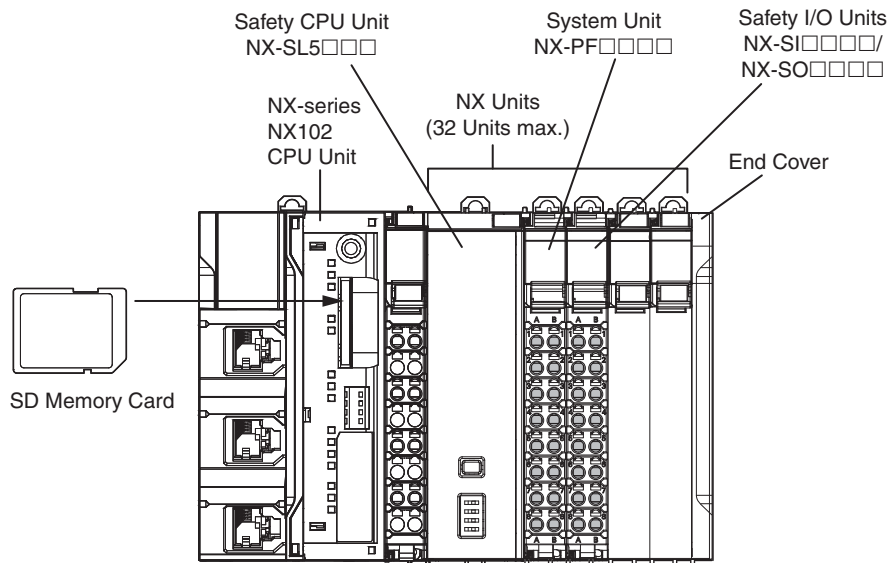
The two-digit seven-segment indicator shows the detailed information on the Safety CPU Unit.

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

## NX Unit Configuration

### CPU Rack

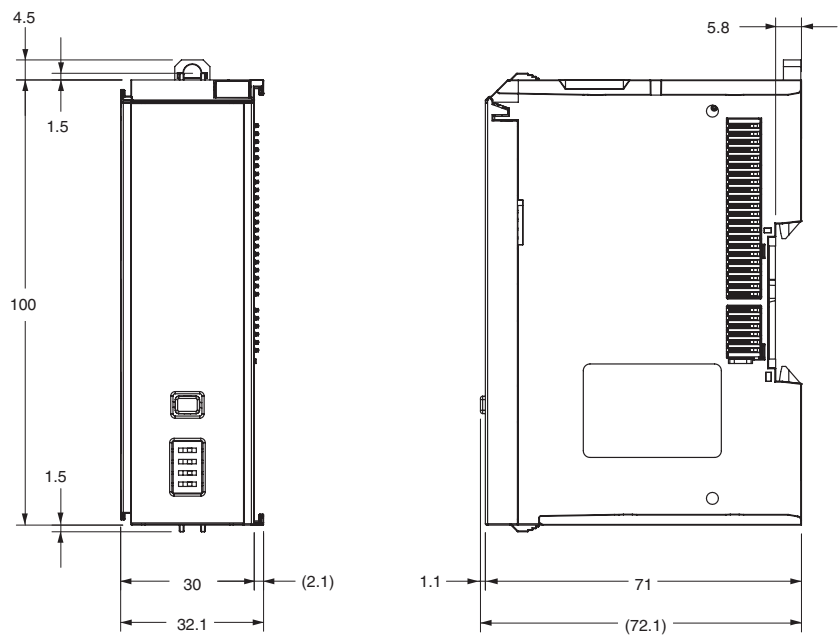
The CPU Rack consists of an NX-series NX102 CPU Unit, NX Units, and an End Cover.  
Up to 32 NX Units can be connected.



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* (W593).

| Series       | Configuration                | Remarks   |
|--------------|------------------------------|---|
| NX-series    | NX-series NX102 CPU Unit     | One required for every CPU Rack.<br>Up to 32 Units can be mounted to each CPU Rack.<br>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.<br>This unit consists of safety CPU unit and safety I/O unit.                                      |
|              | Safety CPU Unit<br>NX-SL5□□□ | This Unit has safety control functions.<br>It operates as an NX Unit. It also operates as an FSoE master.<br>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.   |
| NX-series    | 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.  |

Safety CPU Units NX-SL5500/SL5700



Related Manuals

| Related Manuals   | Cat. No. | Model numbers  | Application  | Description  |
|---|----------|--|--|--|
| NX-series Safety Control Unit User's Manual                 | Z930     | NX-SL□□□□<br>NX-SI□□□□□<br>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 NX102 CPU Unit Hardware User's Manual             | W593     | NX102-□□□□□  | Learning the basic specifications of the NX102 CPU Units, including introductory information, designing, installation, and maintenance. Mainly hardware information is provided. | An introduction to the entire NX102 system is provided along with the following information on the CPU Unit. <ul style="list-style-type: none"><li>• Features and system configuration</li><li>• Introduction</li><li>• Part names and functions</li><li>• General specifications</li><li>• Installation and wiring</li><li>• Maintenance and Inspection</li></ul> |
| NX-series Data Reference Manual                             | W525     | NX-□□□□□   | Referencing lists of the data that is required to configure systems with NX-series Units.  | Lists of the power consumptions, weights, and other NX Unit data that is required to configure systems with NX-series Units are provided.  |
| 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.   |
| NX-series System Units User's Manual                        | W523     | NX-PD1□□□□<br>NX-PF0□□□□<br>NX-PC0□□□□<br>NX-TB□□□□X | Learning how to use NX-series System Units.  | The hardware and functions of the NX-series System Units are described.  |

## The simplest way to integrate safety into ultra-high-speed machine automation - Bring safety to your production site



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- Integrated safety over EtherCAT® for high-speed, high-precision fieldbus communication in a machine
- Easy to set up motion that is the key to quality and productivity enhancement

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## Features

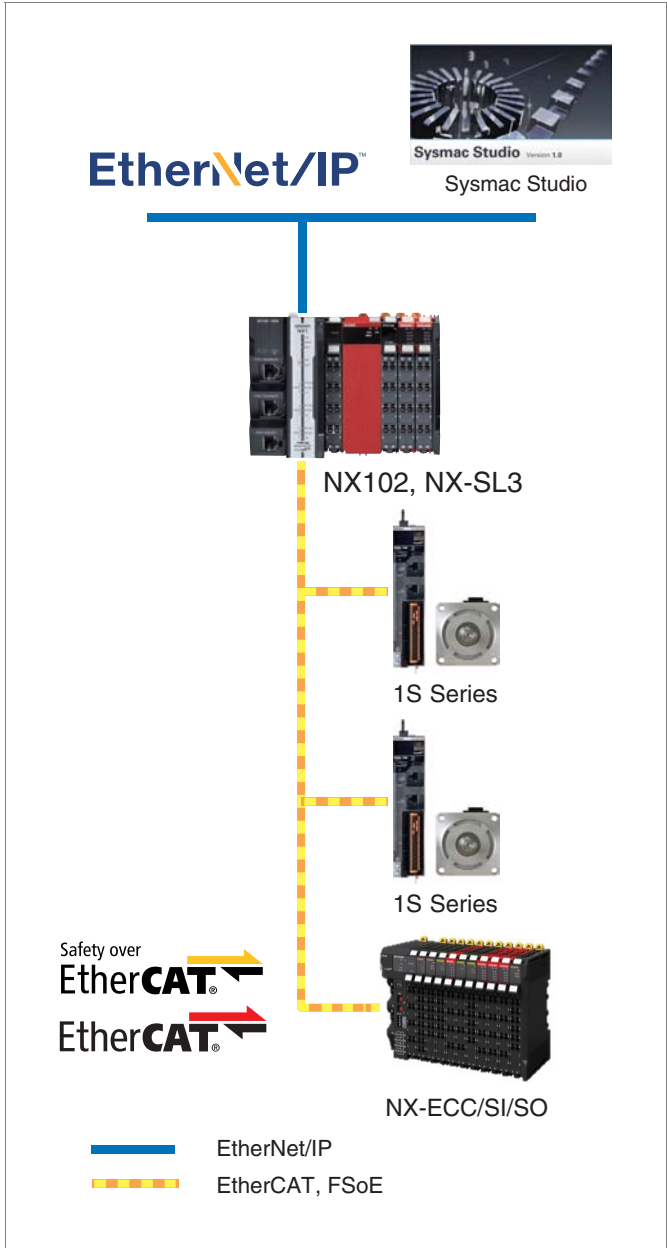
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- ODVA, CIP™, CompoNet™, DeviceNet™, EtherNet/IP™, and CIP Safety™ are trademarks of ODVA.
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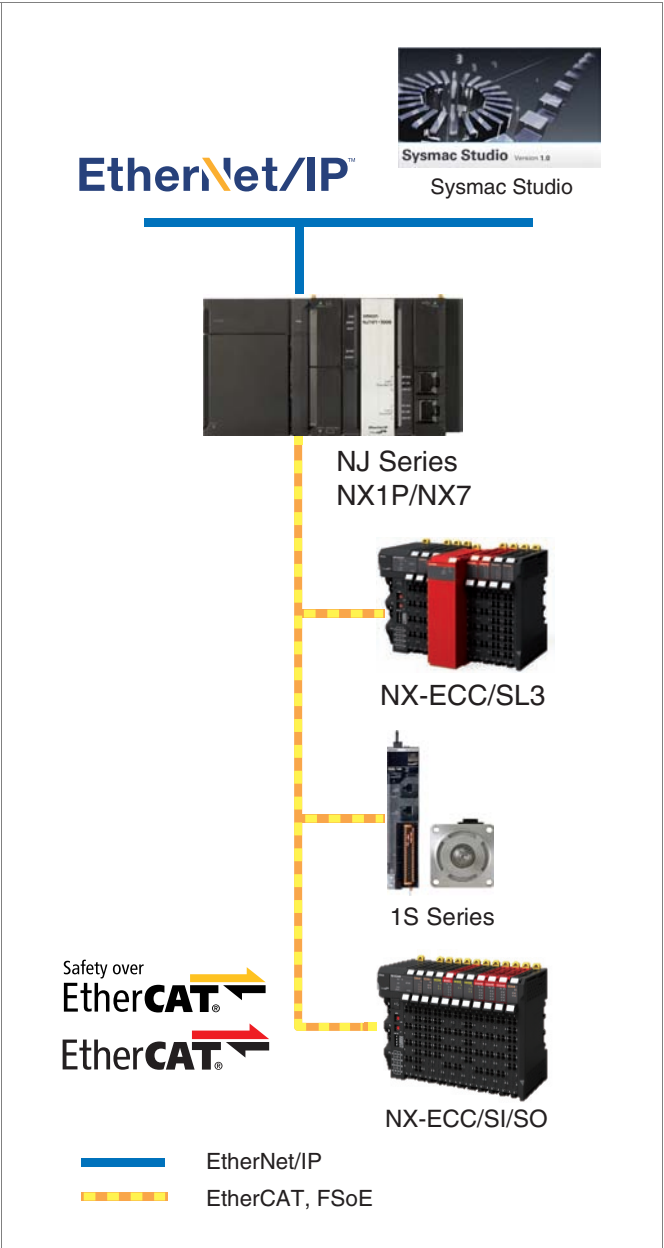
Other company names and product names in this document are the trademarks or registered trademarks of their respective companies.

System configuration

System configuration (NX102+SL3)





System configuration (NJ+SL3)





## Ordering Information

### Safety CPU Unit NX-SL3300/3500

| 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<br>(NX-SL3□00) |  | 256 points                          | 512KB            | 32                               | Free-Run refreshing   | Ver. 1.1     | <b>NX-SL3300</b> |
|                                |  | 1024 points                         | 2048KB           | 128                              | Free-Run refreshing   | Ver. 1.1     | <b>NX-SL3500</b> |

### Accessories

Not included.

### 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.□□ *3</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.  | ---<br>(Media only) | Sysmac Studio 32-bit edition DVD | <b>SYSMAC-SE200D</b>    |
|   | Sysmac Studio runs on the following OS.<br>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) *4   | ---<br>(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).<br><br>* Refer to your OMRON website for details such as supported models and functions. | 1 license           | ---                              | <b>SYSMAC-SE201L</b>    |

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

\*1 Only EtherNet/IP coupler can be used for NX-I/O edition.

\*2 Safety Edition can be used with Communication Control Unit and EtherNet/IP Coupler Unit.

\*3 The Sysmac Studio Standard Edition with license(s) (SYSMAC-SE□□□L) provides functions of the NX-I/O Edition (SYSMAC-NE001L).

With the Sysmac Studio Standard Edition with license(s) (SYSMAC-SE□□□L) version 1.10 or higher, you can use the setup functions for the EtherNet/IP Coupler.

\*4 SYSMAC-SE200D-64 runs on Windows 10 (64-bit edition).

## Regulations and Standards

### NX-series Safety Control Units NX-SL3/SI/SO

| 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 62061</li> <li>• IEC/EN 61131-2</li> <li>• IEC 61326-3-1</li> </ul> |
| UL                     | <ul style="list-style-type: none"> <li>• NRAG (UL 508 and ANSI/ISA 12.12.01)</li> <li>• NRAG7 (CSA C22.2 No. 142 and CSA C22.2 No. 213)</li> </ul>   |
| Shipbuilding Standards | NK, LK   |

\* The FSoE was certified for applications in which OMRON FSoE devices are connected to each other.

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, EN 62061, (Functional Safety of Electrical/Electronic/Programmable Electronic Safety-related Systems)
- Requirements for PL<sub>e</sub> (Performance Level e) and for safety category 4 in EN ISO13849-1



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 (The upper limit of the ambient operating temperature is restricted by the installation orientation.)  |
|                       | 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.<br>2 kV on power supply line (Conforms to IEC 61000-4-4.)   |
|                       | Insulation class              | Class III (SELV)   |
|                       | Overvoltage category          | II   |
|                       | EMC immunity level            | Zone B   |
|                       | Vibration resistance          | Conforms to IEC 60068-2-6.<br>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.<br>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)   |

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

## Unit Specifications

| Unit name                                      |  | Safety CPU Unit  |   |
|--|--|--|---|
| Model  |  | NX-SL3300  | NX-SL3500   |
| Maximum number of safety I/O points            |  | 256 points   | 1024 points   |
| Program capacity                               |  | 512 KB   | 2048 KB   |
| Number of safety I/O connections               |  | 32   | 128   |
| Number of FSoE master connections              |  | 32   | 128   |
| I/O refreshing method                          |  | Free-Run refreshing  |   |
| External connection terminals                  |  | None   |   |
| Indicators                                     |  |   |  |
| 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 *1                   |  | <ul style="list-style-type: none"> <li>Connected to a CPU Unit<br/>1.25 W max.</li> <li>Connected to a Communications Coupler Unit<br/>0.90 W max.</li> </ul>  |   |
| Current consumption from I/O power supply      |  | No consumption   |   |
| Weight   |  | 75 g max.  |   |
| Installation orientation and restrictions *2   |  | Installation orientation: <ul style="list-style-type: none"> <li>Connected to a CPU Unit<br/>Possible in the upright installation orientation.</li> <li>Connected to a Communications Coupler Unit<br/>Six possible orientations.</li> </ul> Restriction: None |   |

\*1 The cable length for the Units that supply power to the corresponding Unit must be up to 20 m.

\*2 Only NX102 CPU Units can be connected. NX1P2 CPU Units cannot be connected.

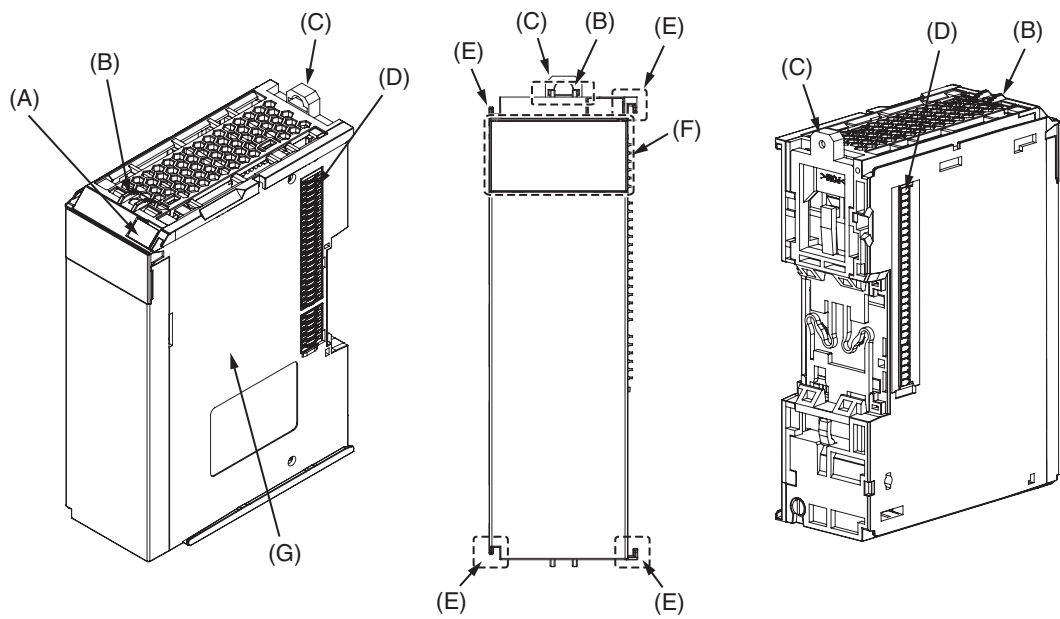
## Version Information

This section describes the possible combinations of versions of Safety Control Units, NJ/NX-series CPU Units, and Communications Coupler Units.

| Safety Control Unit model and version |              | NX bus master:<br>NX102 CPU Unit | NX bus master:<br>EtherCAT Coupler Unit |                      | Sysmac Studio     |
|---------------------------------------|--------------|----------------------------------|---|----------------------|-------------------|
| Model                                 | Unit version | NX102 CPU unit                   | Communications Coupler Unit             | NJ/NX1P/NX7 CPU Unit |                   |
| NX-SL3300                             | Ver.1.0      | Ver.1.30 or later                | Ver.1.1 or later                        | Ver.1.06 or later    | Ver.1.22 or later |
|                                       | Ver.1.1      |                                  |   |                      |                   |
| NX-SL3500                             | Ver.1.0      | Ver.1.30 or later                | Ver.1.2 or later                        | Ver.1.07 or later    | Ver.1.22 or later |
|                                       | Ver.1.1      |                                  |   |                      |                   |
| NX-SIH400                             | Ver.1.0      | Ver.1.30 or later                | Ver.1.2 or later                        | Ver.1.06 or later    | Ver.1.22 or later |
|                                       | Ver.1.1      |                                  |   |                      |                   |
| NX-SID800                             | Ver.1.0      | Ver.1.30 or later                | Ver.1.1 or later                        | Ver.1.06 or later    | Ver.1.22 or later |
| NX-SOD400                             | Ver.1.0      | Ver.1.30 or later                | Ver.1.1 or later                        | Ver.1.06 or later    | Ver.1.22 or later |
| NX-SOD200                             | Ver.1.0      | Ver.1.30 or later                | Ver.1.1 or later                        | Ver.1.06 or later    | Ver.1.22 or later |

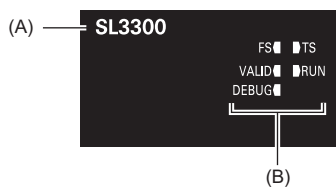
Part Names and Functions

Safety CPU Unit NX-SL3300/SL3500



| Letter | Item                              | 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 hooks          | These hooks are used to mount the NX Unit to a DIN Track.  |
| (D)    | NX bus connector                  | This is the NX-series bus connector. It is used to connect an NX-series Safety I/O Unit or other NX Unit.  |
| (E)    | Unit hookup guides                | These guides are used to connect two Units.  |
| (F)    | Indicators                        | The indicators show the current operating status of the NX Unit or signal I/O status.  |
| (G)    | Unit specifications               | The specifications of the NX Unit are given here.  |

Indicators



| Letter | Name                 | Function   |
|--------|----------------------|--|
| (A)    | Model number display | Displays part of the model number of the Safety CPU Unit.  |
| (B)    | Indicators           | The indicators show the current operating status and communications status of the Safety CPU Unit. |

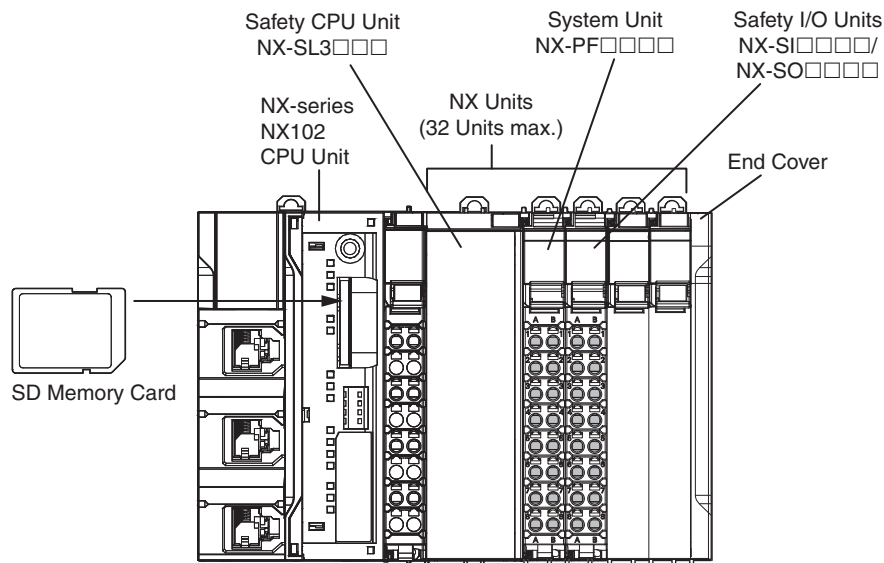
Indicator specifications

|             |  |
|-------------|--|
| [TS] LED    | The TS indicator shows the current operating status and communications status of the Safety CPU Unit.      |
| [FS] LED    | The FS indicator shows the safety communications status and safety function 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 is executable on Safety CPU Unit.          |
| [VALID] LED | The VALID indicator shows whether safety validation has been performed.                                    |

## NX Unit Configuration

### CPU Rack

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.

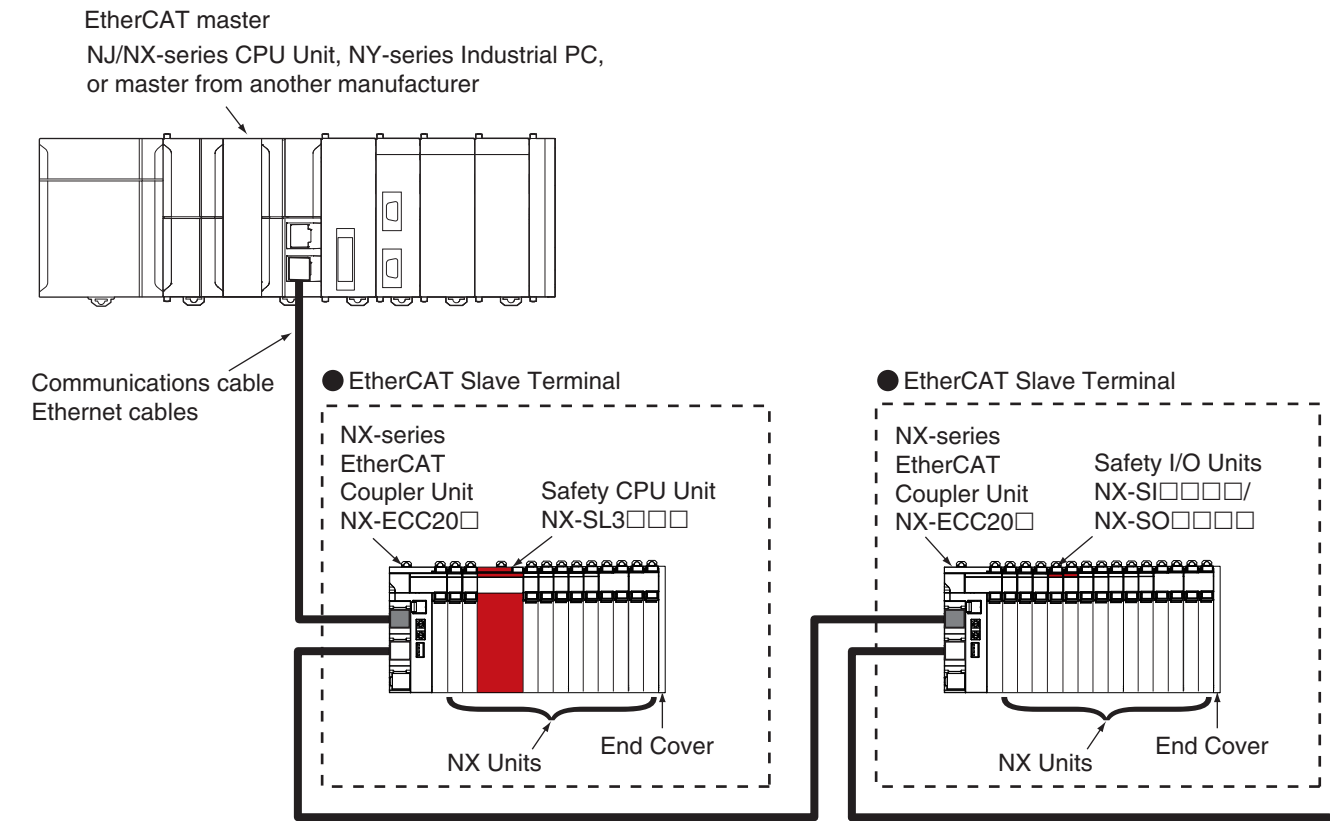


Up to 32 Units can be mounted to each CPU Rack.  
For restrictions of the NX unit, refer to *NX-series NX102 CPU Unit Hardware User's Manual* (W593).

| Series       | Configuration                | Remarks   |
|--------------|------------------------------|---|
| NX-series    | NX-series NX102 CPU Unit     | One required for every CPU Rack.<br>Up to 32 Units can be mounted to each CPU Rack.<br>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.<br>This unit consists of safety CPU unit and safety I/O unit.                                      |
|              | Safety CPU Unit<br>NX-SL3□□□ | This Unit has safety control functions.<br>It operates as an NX Unit. It also operates as an FSoE master.<br>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.   |
| NX-series    | 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.  |

EtherCAT slave terminal

The EtherCAT slave terminal consists of NX-ECC EtherCAT coupler unit, component units of the NX unit, and end cover. Up to 63 NX Units can be connected.

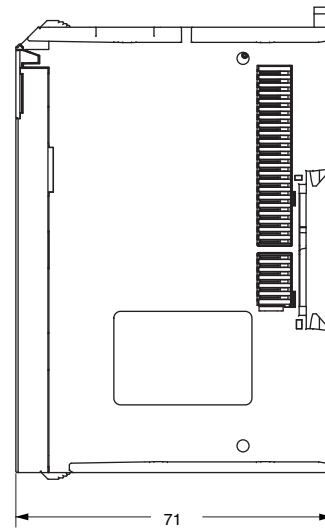
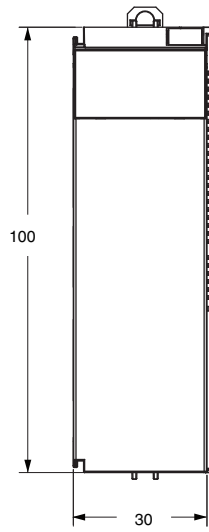


For restrictions of the NX unit, refer to *NX-series EtherCAT® Coupler Unit User's Manual* (W519).

| Series       | Configuration                                   | Remarks  |
|--------------|---|--|
| NJ/NX-series | EtherCAT master                                 | The EtherCAT master manages the EtherCAT network, monitors the status of the slaves, and exchanges I/O data with the slaves.   |
| NX-series    | NX-series<br>EtherCAT Coupler Unit<br>NX-ECC□□□ | The EtherCAT Coupler Unit is an interface that performs process data communications between a group of NX Units and the EtherCAT master over an EtherCAT network. The I/O data for the NX Units is first accumulated in the EtherCAT Coupler Unit and then all of the data is exchanged with the EtherCAT master at the same time. The EtherCAT Coupler Unit can also perform message communications (SDO communications) with the EtherCAT master. You can connect up to 63 NX Units. |
|              | End Cover                                       | This is required on the right end of the EtherCAT slave terminal. One cover comes with each coupler unit by default.   |
|              | NX Units  | The NX Units perform I/O processing with connected external devices. The NX Units perform process data communications with the EtherCAT master through the EtherCAT Coupler Unit.  |
|              | System Unit                                     | System Units are used as required to build a Slave Terminal.   |
|              | Safety Control Units                            | The Safety Control Units constitute a programmable safety controller that complies with IEC 61131-3 and PLCopen® TC5 Safety. They include Safety CPU Units and Safety I/O Units.   |
|              | Safety CPU Unit<br>NX-SL3□□□                    | This Unit controls the Safety I/O Units through the NX bus and EtherCAT.   |
|              | Safety I/O Units                                | Safety CPU unit control this units through the NX bus and EtherCAT.  |
|              | Other NX units                                  | For types of NX units, refer to <i>NX-series EtherCAT® Coupler Unit User's Manual</i> (W519). For details of units, refer to the User's Manual of each unit. For the latest lineup of NX units, refer to our catalog and our website, or inquire of our local representative.  |

# Dimensions

Safety CPU Unit NX-SL3300/SL3500



## Related Manuals

| Cat. No. | Model number                        | Manual name  | Application  | Description   |
|----------|-------------------------------------|--|--|---|
| Z930     | NX-SL□□□□<br>NX-SI□□□□<br>NX-SO□□□□ | NX-series<br>Safety Control Unit<br>User's Manual                    | Learning how to use NX-series Safety Control Units.  | Describes the hardware, setup methods, and functions of the NX-series Safety Control Units.   |
| Z931     | NX-SL□□□□                           | NX-series<br>Safety Control Unit<br>Instructions<br>Reference Manual | Learning about the specifications of instructions for the Safety CPU Unit.   | Describes the instructions for the Safety CPU Unit. When programming, use this manual together with the <i>NX-series Safety Control Units User's Manual</i> (Cat. No. Z930).  |
| W504     | SYSMAC-SE2□□□                       | Sysmac Studio Version 1<br>Operation Manual                          | Learning about the operating procedures and functions of the Sysmac Studio.  | Describes the operating procedures of the Sysmac Studio.  |
| W593     | NX102-□□□□                          | NX-series<br>NX102 CPU Unit<br>Hardware<br>User's Manual             | Learning the basic specifications of the NX102 CPU Units, including introductory information, designing, installation, and maintenance. Mainly hardware information is provided. | An introduction to the entire NX102 system is provided along with the following information on the CPU Unit. <ul style="list-style-type: none"> <li>• Features and system configuration</li> <li>• Introduction</li> <li>• Part names and functions</li> <li>• General specifications</li> <li>• Installation and wiring</li> <li>• Maintenance and Inspection</li> </ul> |
| W519     | NX-ECC□□□                           | NX-series<br>EtherCAT®<br>Coupler Unit<br>User's Manual              | Learning how to use the NX-series EtherCAT Coupler Unit and EtherCAT Slave Terminals.  | The following items are described: the overall system and configuration methods of an EtherCAT Slave Terminal (which consists of an NX-series EtherCAT Coupler Unit and NX Units), and information on hardware, setup, and functions to set up, control, and monitor NX Units through EtherCAT.   |



# Safety I/O Unit

# NX-SI/SO

## Build a simple and flexible safety system

- Free combination of four types of safety input and output units
- Flexible panel design with a width of 12 mm per unit
- Quick wiring with detachable screwless clamping terminal block
- Direct connection to dedicated safety input components



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

\* 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.

## Features



- Meets EN ISO 13849-1 (PL<sub>e</sub>/Safety 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
- Omron's safety input components that require dedicated controllers can be connected directly

• Sysmac is a trademark or registered trademark of OMRON Corporation in Japan and other countries for OMRON factory automation products.  
• EtherCAT® is registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.  
• Safety over EtherCAT® is registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.  
• ODVA, CIP™, CompoNet™, DeviceNet™, EtherNet/IP™, and CIP Safety™ are trademarks of ODVA.  
Other company names and product names in this document are the trademarks or registered trademarks of their respective companies.

## Ordering Information

### Safety I/O 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              | Can be connected.<br>*             | 1                                  | Free-Run refreshing   | Ver. 1.1     | <b>NX-SIH400</b> |
|                    |  | 8 points                      | 2 points                     | Sinking inputs (PNP) | 24 VDC              | Cannot be connected.               | 1                                  | Free-Run refreshing   | Ver. 1.0     | <b>NX-SID800</b> |

\* 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 Safety Control Units User's Manual (Cat.No.Z930).

| Type                             | Model and corresponding PL and safety category |
|----------------------------------|--|
| OMRON Single-beam Safety Sensors | E3ZS, E3FS *                                   |
| OMRON Non-contact Door Switches  | D40Z<br>D40A                                   |
| OMRON Safety Mats                | UM *, UMA                                      |
| OMRON Safety Edges               | SGE (4-wire connection)                        |

\* E3FS series is no longer available for order after August 2016.

E3FS series is no longer available for order after 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,<br>and 2.5 A/Unit at 55°C<br>The maximum load current depends on the installation orientation and ambient temperature. | 24 VDC        | 1                                  | Free-Run refreshing   | Ver. 1.0     | <b>NX-SOH200</b> |
|                     |  | 4 points                       | Sourcing outputs (PNP) | 0.5 A/point and 2.0 A/Unit  | 24 VDC        | 1                                  | Free-Run refreshing   | Ver. 1.0     | <b>NX-SOD400</b> |

#### Option

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

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

#### Accessories

Not included.

## Regulations and Standards

### NX-series Safety I/O Units NX-SI/SO

| 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 62061</li> <li>• IEC/EN 61131-2</li> <li>• IEC 61326-3-1</li> </ul> |
| UL                     | <ul style="list-style-type: none"> <li>• NRAG (UL 508 and ANSI/ISA 12.12.01)</li> <li>• NRAG7 (CSA C22.2 No. 142 and CSA C22.2 No. 213)</li> </ul>   |
| Shipbuilding Standards | NK, LK   |

\* The FSoE was certified for applications in which OMRON FSoE devices are connected to each other.

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, EN 62061, (Functional Safety of Electrical/Electronic/Programmable Electronic Safety-related Systems)
- Requirements for PL<sub>e</sub> (Performance Level *e*) and for safety category 4 in EN ISO13849-1

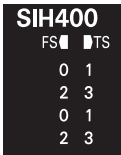

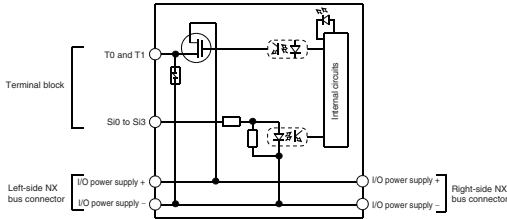
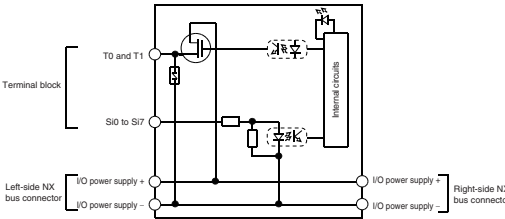
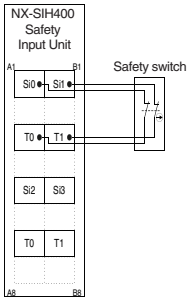
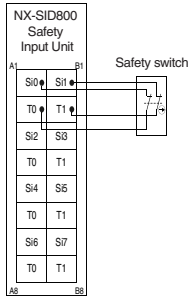
The NX-series Safety Control Units are also registered for RCM, EAC, and KC compliance.

## 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 (The upper limit of the ambient operating temperature is restricted by the installation orientation.)  |
|                       | 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.<br>2 kV on power supply line (Conforms to IEC 61000-4-4.)   |
|                       | Insulation class              | Class III (SELV)   |
|                       | Overvoltage category          | II   |
|                       | EMC immunity level            | Zone B   |
|                       | Vibration resistance          | Conforms to IEC 60068-2-6.<br>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.<br>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


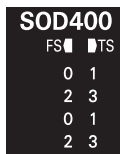
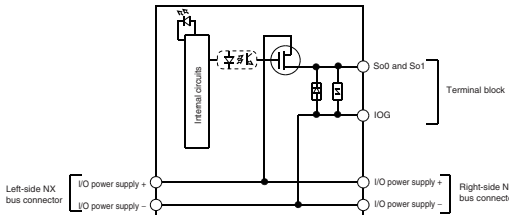
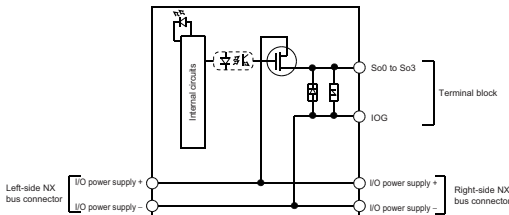
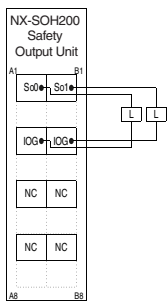
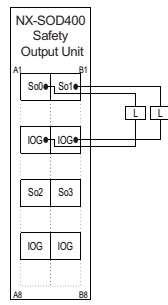
## Safety Input Units NX-SIH400/SID800

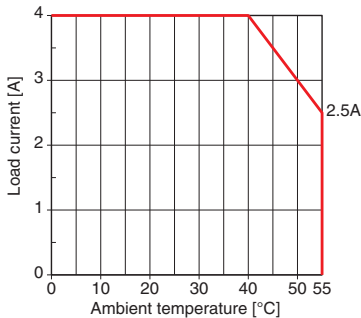
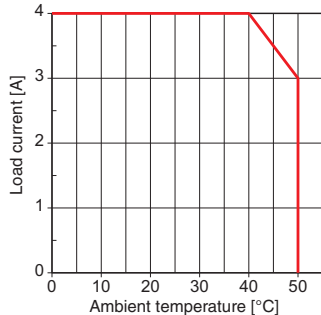
| Unit name                                      | Safety Input Unit   |  |
|--|---|--|
| Model  | NX-SIH400   | NX-SID800  |
| Number of safety input points                  | 4 points  | 8 points   |
| Number of test output points                   | 2 points  | 2 points   |
| Internal I/O common                            | 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                                     |    |    |
| Safety input current                           | 4.5 mA typical  | 3.0 mA typical   |
| 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                      | <ul style="list-style-type: none"> <li>Connected to a CPU Unit or a Communication Control Unit 1.10 W max.</li> <li>Connected to a Communications Coupler Unit 0.70 W max.</li> </ul>                                       | <ul style="list-style-type: none"> <li>Connected to a CPU Unit or a Communication Control Unit 1.10 W max.</li> <li>Connected to a Communications Coupler Unit 0.75 W max.</li> </ul>  |
| Current consumption from I/O power supply      | 20 mA max.  |  |
| Weight   | 70 g max.   |  |
| Circuit layout                                 |    |    |
| Terminal connection diagram                    | <p>Si0 to Si3: Safety input terminals<br/>T0 and T1: Test output terminals</p>  <p>Refer to User's manual (Cat.No.Z930) for details.</p> | <p>Si0 to Si7: Safety input terminals<br/>T0 and T1: Test output terminals</p>  <p>Refer to User's manual (Cat.No.Z930) for details.</p> |

| Unit name                                 | Safety Input Unit   |
|---|---|
| Installation orientation and restrictions | Installation orientation: <ul style="list-style-type: none"><li>• Connected to a CPU Unit or a Communication Control Unit *</li><li>• Possible in the upright installation orientation.</li><li>• Connected to a Communications Coupler Unit</li></ul> 6 possible orientations.<br>Restrictions: Maximum ambient temperature is 50°C for any orientation other than upright installation. |
| Protective functions                      | Overvoltage protection circuit and short detection (test outputs)   |

\* It can be connected to the NX102 CPU unit or communication control unit. It cannot be connected to the NX1P2 CPU unit.

## Safety Output Units NX-SOH200/SOD400

| Unit name                                      | Safety Output Unit   |  |
|--|--|--|
| Model  | NX- SOH200   | NX-SOD400  |
| Number of safety output points                 | 2 points   | 4 points   |
| Internal I/O common                            | PNP (sourcing outputs)   |  |
| Maximum load current                           | 2.0 A/point<br>4.0 A/Unit at 40°C<br>2.5 A/Unit at 55°C<br>The maximum load current depends on the installation orientation and ambient temperature  | 0.5 A/point and 2.0 A/Unit   |
| Rated voltage                                  | 24 VDC (20.4 to 28.8 VDC)  |  |
| Number of safety slave connections             | 1  |  |
| I/O refreshing method                          | Free-Run refreshing  |  |
| External connection terminals                  | Screwless clamping terminal block (8 terminals)  |  |
| Indicators                                     |   |    |
| Safety output ON residual voltage              | 1.2 V max. (Between IOV and all output terminals)  |  |
| Safety output OFF residual voltage             | 2 V max. (Between IOG and all output terminals)  |  |
| Safety 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 | IOG: 2 A max./terminal   | IOG (A3 and B3): 2 A max./terminal<br>IOG (A7 and B7): 0.5 A max./terminal   |
| NX Unit power consumption                      | <ul style="list-style-type: none"> <li>Connected to a CPU Unit or a Communication Control Unit 1.05 W max.</li> <li>Connected to a Communications Coupler Unit 0.70 W max.</li> </ul>                                  | <ul style="list-style-type: none"> <li>Connected to a CPU Unit or a Communication Control Unit 1.10 W max.</li> <li>Connected to a Communications Coupler Unit 0.75 W max.</li> </ul>                                  |
| Current consumption from I/O power supply      | 40 mA max.   | 60 mA max.   |
| Weight   | 65 g max.  |  |
| Circuit layout                                 |   |    |
| Terminal connection diagram                    | <p>So0 and So1: Safety output terminals<br/>IOG: I/O power supply 0 V</p>  <p>Refer to User's manual (Cat.No.Z930) for details.</p> | <p>So0 to So3: Safety output terminals<br/>IOG: I/O power supply 0 V</p>  <p>Refer to User's manual (Cat.No.Z930) for details.</p> |

| Unit name                                 | Safety Output Unit   |  |
|---|--|--|
| Model                                     | NX- SOH200   | NX-SOD400  |
| Installation orientation and restrictions | <p>Installation orientation:</p> <ul style="list-style-type: none"> <li>Connected to a CPU Unit or a Communication Control Unit *</li> <li>Possible in the upright installation orientation.</li> <li>Connected to a Communications Coupler Unit</li> </ul> <p>6 possible orientations</p> <p>Restrictions: For upright installation, the ambient temperature is restricted as shown below depending on the total Unit load current.</p>  <p>For all installation orientations other than upright installation, the ambient temperature is restricted as shown below according to the total Unit load current.</p>  | <p>Installation orientation:</p> <ul style="list-style-type: none"> <li>Connected to a CPU Unit or a Communication Control Unit *</li> <li>Possible in the upright installation orientation.</li> <li>Connected to a Communications Coupler Unit</li> </ul> <p>6 possible orientations</p> <p>Restrictions: None</p> |
|   | <p><b>Protective functions</b> Overvoltage protection circuit and short detection</p>  |  |

\* It can be connected to the NX102 CPU unit or communication control unit. It cannot be connected to the NX1P2 CPU unit.

## Function Specifications

Refer to the *SYSMAC-SE* Datasheet ([www.ia.omron.com/](http://www.ia.omron.com/)) for function specifications of the Safety Control Unit.

## Version Information

This section describes the possible combinations of versions of Safety I/O Units, NJ/NX-series CPU Units, and Communications Coupler Units.

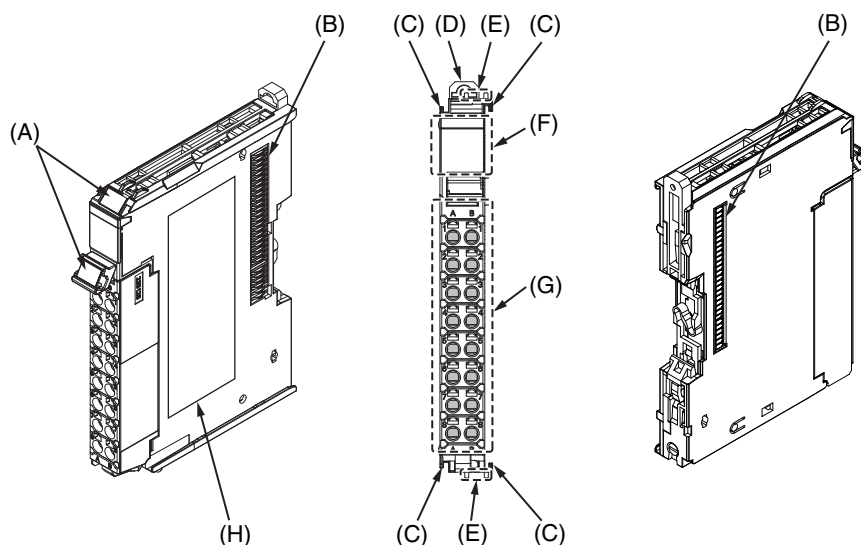
| Safety Control Unit<br>model and version |              | NX bus master:<br>NX102 CPU Unit | NX bus master:<br>EtherCAT Coupler Unit |                         | Sysmac Studio      |
|--|--------------|----------------------------------|---|-------------------------|--------------------|
| Model                                    | Unit version | NX102 CPU unit                   | Communications<br>Coupler Unit          | NJ/NX1P/NX7<br>CPU Unit |                    |
| NX-SIH400                                | Ver.1.0      | Ver.1.30 or later                | Ver.1.2 or later                        | Ver.1.06 or later       | Ver.1.22 or higher |
|  | Ver.1.1      |                                  |   |                         |                    |
| NX-SID800                                | Ver.1.0      | Ver.1.30 or later                | Ver.1.1 or later                        | Ver.1.06 or later       | Ver.1.22 or higher |
| NX-SOD400                                | Ver.1.0      | Ver.1.30 or later                | Ver.1.1 or later                        | Ver.1.06 or later       | Ver.1.22 or higher |
| NX-SOD200                                | Ver.1.0      | Ver.1.30 or later                | Ver.1.1 or later                        | Ver.1.06 or later       | Ver.1.22 or higher |



## Part Names and Functions

Safety Input Unit NX-SIH400/SID800

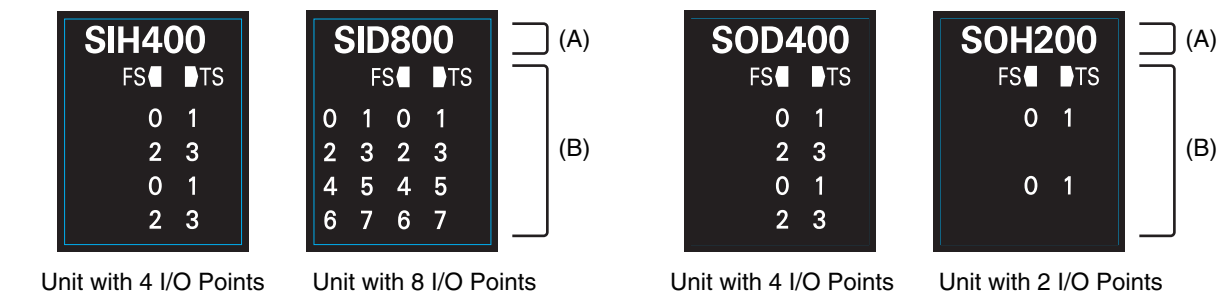
Safety Output Unit NX-SOH200/SOD400



| Letter | Item                              | 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)    | NX bus connector                  | This is the NX-series bus connector. Connect this connector to another Unit, such as the NX-series Safety CPU Unit or a Safety I/O Unit.                         |
| (C)    | Unit hookup guides                | These guides are used to connect two Units.  |
| (D)    | DIN Track mounting hooks          | These hooks are used to mount the NX Unit to a DIN Track.  |
| (E)    | Protrusions for removing the Unit | The protrusions to hold when removing the Unit.  |
| (F)    | Indicators                        | The indicators show the current operating status of the NX Unit or signal I/O status.  |
| (G)    | Terminal block                    | The terminal block is used to connect to external devices. It connects the safety outputs. The number of terminals depends on the NX Unit.                       |
| (H)    | Unit specifications               | The specifications of the NX Unit are given here.  |

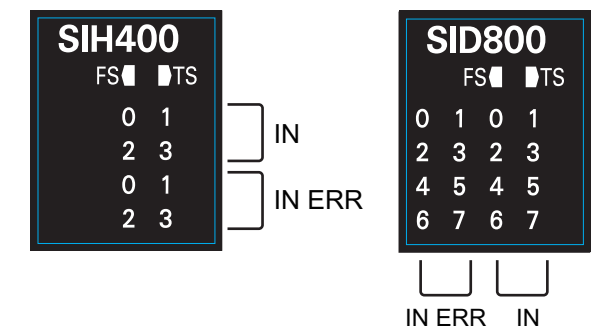
Indicators

The indicator pattern depends on the number of input points, as shown below.



| Letter | Name                 | Function  |
|--------|----------------------|---|
| (A)    | Model number display | Displays part of the model number of the Safety I/O Units.<br>The model number indication is red on all Safety Control Units. |
| (B)    | Indicators           | Show the current operating status and communications status of the Safety I/O Units.  |

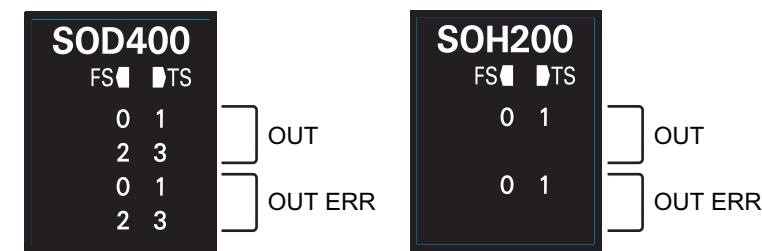
NX-SIH400/SID800



Indicator specifications

|              |  |
|--------------|--|
| [TS] LED     | The TS indicator shows the current status of the Safety Input Unit and its communications status with the NX Bus Master. |
| [FS] LED     | The FS indicator shows the FSoE communications status and safety function status of the Safety Input Unit.               |
| [IN] LED     | The IN indicator shows the signal input status of the safety input terminal.   |
| [IN ERR] LED | The IN ERR indicator shows the error status of the safety input terminal.  |

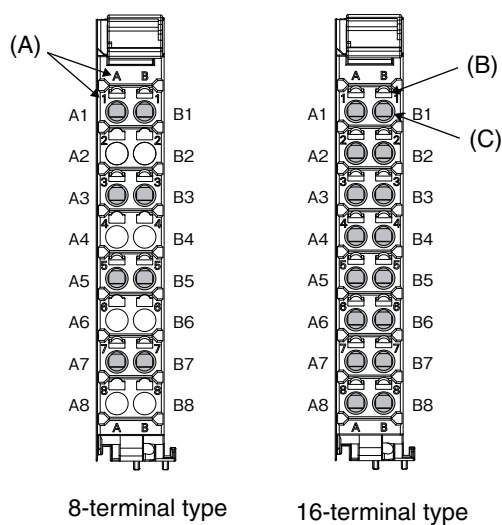
NX-SOD400/SOH200



Indicator specifications

|               |   |
|---------------|---|
| [TS] LED      | The TS indicator shows the current status of the Safety Output Unit and its communications status with the NX Bus Master. |
| [FS] LED      | The FS indicator shows the FSoE communications status and safety function status of the Safety Output Unit.               |
| [OUT] LED     | The OUT indicator shows the signal input status of the safety output terminal.  |
| [OUT ERR] LED | The OUT ERR indicator shows the error status of the safety output terminals.  |

## Terminal Blocks



| Letter | Item                        | Specification   |
|--------|-----------------------------|---|
| (A)    | Terminal number indications | The terminal numbers are given by column letters A and B, and row numbers 1 to 8. The combination of the column and row gives the terminal numbers from A1 to A8 and B1 to B8. The terminal number indicators are the same regardless of the number of terminals on the terminal block, as shown above. |
| (B)    | Release holes               | Insert a flat-blade screwdriver into these holes to connect and remove the wires.   |
| (C)    | Terminal holes              | The wires are inserted into these holes.  |

## Applicable Terminal Blocks for Each Unit Model

| Unit model number | Terminal Blocks |                  |                             |                      |                           |
|-------------------|-----------------|------------------|-----------------------------|----------------------|---------------------------|
|                   | Model           | No. of terminals | Terminal number indications | Ground terminal mark | Terminal current capacity |
| NX-SIH400         | NX-TBA082       | 8                | A/B                         | None                 | 10A                       |
| NX-SID800         | NX-TBA162       | 16               | A/B                         | None                 | 10A                       |
| NX-SOH200         | NX-TBA082       | 8                | A/B                         | None                 | 10A                       |
| NX-SOD400         | NX-TBA082       | 8                | A/B                         | None                 | 10A                       |

## Applicable Wires

### Using Ferrules

If you use ferrules, attach the twisted wires to them.

Observe the application instructions for your ferrules for the wire stripping length when attaching ferrules.

Always use plated one-pin ferrules. Do not use unplated ferrules or two-pin ferrules.

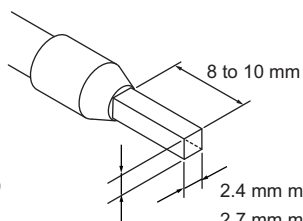
The applicable ferrules, wires, and crimping tool are given in the following table.

| Terminal types                        | Manufacturer    | Ferrule model number | Applicable wire (mm <sup>2</sup> (AWG)) | Crimping tool  |
|---------------------------------------|-----------------|----------------------|---|--|
| Terminals other than ground terminals | Phoenix Contact | AI0,34-8             | 0.34 (#22)                              | Phoenix Contact (The figure in parentheses is the applicable wire size.)<br>CRIMPFOX 6 (0.25 to 6 mm <sup>2</sup> , AWG24 to 10) |
|                                       |                 | AI0,5-8              | 0.5 (#20)                               |  |
|                                       |                 | AI0,5-10             |   |  |
|                                       |                 | AI0,75-8             | 0.75 (#18)                              |  |
|                                       |                 | AI0,75-10            |   |  |
|                                       |                 | AI1,0-8              | 1.0 (#18)                               |  |
|                                       |                 | AI1,0-10             |   |  |
|                                       |                 | AI1,5-8              | 1.5 (#16)                               |  |
| Ground terminals                      | Phoenix Contact | AI1,5-10             |   |  |
|                                       |                 | AI2,5-10             | 2.0 *                                   |  |
| Terminals other than ground terminals | Weidmuller      | H0.14/12             | 0.14 (#26)                              | Weidmuller (The figure in parentheses is the applicable wire size.)<br>PZ6 Roto (0.14 to 6 mm <sup>2</sup> , AWG 26 to 10)       |
|                                       |                 | H0.25/12             | 0.25 (#24)                              |  |
|                                       |                 | H0.34/12             | 0.34 (#22)                              |  |
|                                       |                 | H0.5/14              | 0.5 (#20)                               |  |
|                                       |                 | H0.5/16              |   |  |
|                                       |                 | H0.75/14             | 0.75 (#18)                              |  |
|                                       |                 | H0.75/16             |   |  |
|                                       |                 | H1.0/14              | 1.0 (#18)                               |  |
|                                       |                 | H1.0/16              |   |  |
|                                       |                 | H1.5/14              | 1.5 (#16)                               |  |
| Ground terminals                      | Weidmuller      | H1.5/16              |   |  |
|                                       |                 |                      |   |  |

\* Some AWG 14 wires exceed 2.0 mm<sup>2</sup> and cannot be used in the screwless clamping terminal block.

When you use any ferrules other than those in the above table, crimp them to the twisted wires so that the following processed dimensions are achieved.

Finished Dimensions of Ferrules



1.6 mm max. (except ground terminals)

2.0 mm max. (ground terminals)

2.4 mm max. (except ground terminals)

2.7 mm max. (ground terminals)

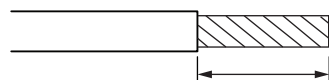
### Using Twisted Wires/Solid Wires

If you use the twisted wires or the solid wires, use the following table to determine the correct wire specifications.

| Terminals                                |                                     | Wire type     |                 |                 |                 | Wire size                                  | Conductor length<br>(stripping length) |
|--|-------------------------------------|---------------|-----------------|-----------------|-----------------|--|--|
|  |                                     | Twisted wires |                 | Solid wire      |                 |  |  |
| Classification                           | Current capacity                    | Plated        | Unplated        | Plated          | Unplated        |  |  |
| All terminals except<br>ground terminals | 2 A max.                            | Possible      | Possible        | Possible        | Possible        | 0.08 to 1.5 mm <sup>2</sup><br>AWG28 to 16 | 8 to 10 mm                             |
|  | Greater than<br>2 A and 4 A or less |               | Not<br>Possible | Possible *1     | Not<br>Possible |  |  |
|  | Greater than<br>4 A                 | Possible *1   |                 | Not<br>Possible |                 |  |  |
| Ground terminals                         | ---                                 | Possible      | Possible        | Possible *2     | Possible *2     | 2.0 mm <sup>2</sup>                        | 9 to 10 mm                             |

\*1 Secure wires to the screwless clamping terminal block. Refer to the *Securing Wires* in the USER'S MANUAL for how to secure wires.

\*2 With the NX-TB□□□1 Terminal Block, use twisted wires to connect the ground terminal. Do not use a solid wire.



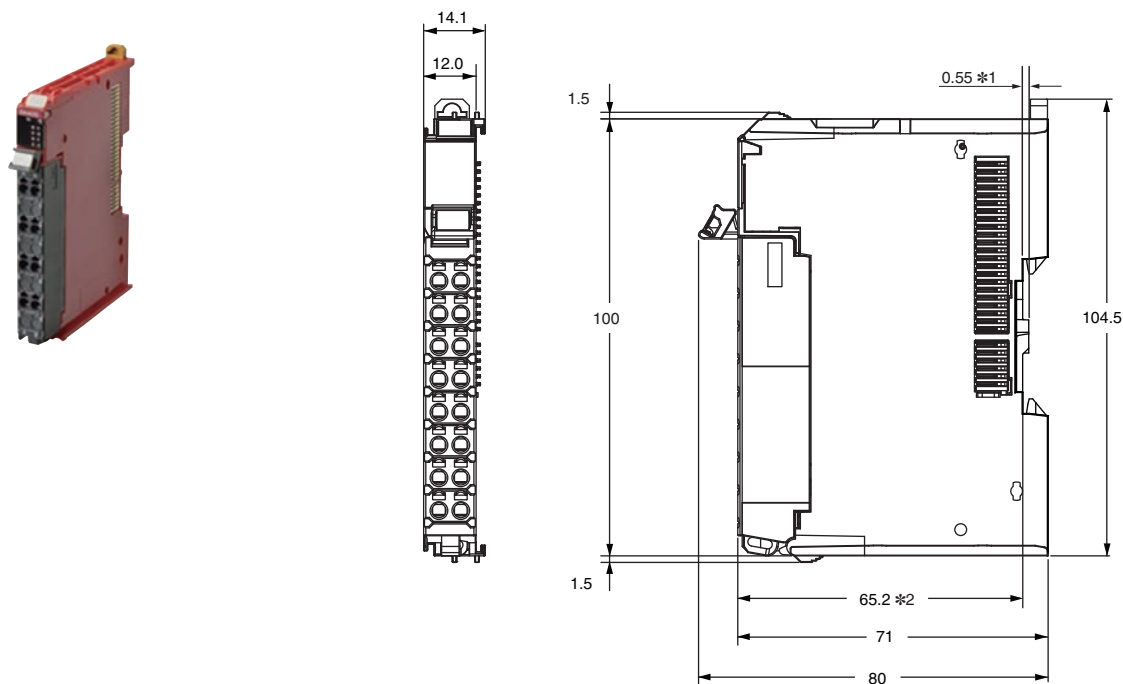
Conductor length (stripping length)

<Additional Information> If more than 2 A will flow on the wires, use plated wires or use ferrules.

## Dimensions

Safety Input Units NX-SIH400/SID800

Safety Output Units NX-SOH200/SOD400



\*1 The dimension is 1.35 mm for Units with lot numbers through December 2014.

\*2 The dimension from the attachment surface of the DIN Track to the front surface of the Safety I/O Unit.

## Related Manuals

| Cat. No. | Model number                        | Manual name  | Application  | Description   |
|----------|-------------------------------------|--|--|---|
| Z930     | NX-SL□□□□<br>NX-SI□□□□<br>NX-SO□□□□ | NX-series<br>Safety Control Unit<br>User's Manual                    | Learning how to use NX-series Safety Control Units.  | Describes the hardware, setup methods, and functions of the NX-series Safety Control Units.   |
| Z931     | NX-SL□□□□                           | NX-series<br>Safety Control Unit<br>Instructions<br>Reference Manual | Learning about the specifications of instructions for the Safety CPU Unit.   | Describes the instructions for the Safety CPU Unit. When programming, use this manual together with the <i>NX-series Safety Control Units User's Manual</i> (Cat. No. Z930).  |
| W504     | SYSMAC-SE2□□□                       | Sysmac Studio Version 1<br>Operation Manual                          | Learning about the operating procedures and functions of the Sysmac Studio.  | Describes the operating procedures of the Sysmac Studio.  |
| W593     | NX102-□□□□                          | NX-series<br>NX102 CPU Unit<br>Hardware<br>User's Manual             | Learning the basic specifications of the NX102 CPU Units, including introductory information, designing, installation, and maintenance. Mainly hardware information is provided. | An introduction to the entire NX102 system is provided along with the following information on the CPU Unit. <ul style="list-style-type: none"> <li>• Features and system configuration</li> <li>• Introduction</li> <li>• Part names and functions</li> <li>• General specifications</li> <li>• Installation and wiring</li> <li>• Maintenance and Inspection</li> </ul> |
| W519     | NX-ECC□□□□                          | NX-series<br>EtherCAT®<br>Coupler Unit<br>User's Manual              | Learning how to use the NX-series EtherCAT Coupler Unit and EtherCAT Slave Terminals.  | The following items are described: the overall system and configuration methods of an EtherCAT Slave Terminal (which consists of an NX-series EtherCAT Coupler Unit and NX Units), and information on hardware, setup, and functions to set up, control, and monitor NX Units through EtherCAT.   |

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Omron Companies shall not be responsible for conformity with any standards, codes or regulations which apply to the combination of the Product in the Buyer's application or use of the Product. At Buyer's request, Omron will provide applicable third party certification documents identifying ratings and limitations of use which apply to the Product. This information by itself is not sufficient for a complete determination of the suitability of the Product in combination with the end product, machine, system, or other application or use. Buyer shall be solely responsible for determining appropriateness of the particular Product with respect to Buyer's application, product or system. Buyer shall take application responsibility in all cases.

NEVER USE THE PRODUCT FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY OR IN LARGE QUANTITIES WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCT(S) IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

## **Programmable Products.**

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## **Performance Data.**

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## **Change in Specifications.**

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