

Machine Automation Controller NX1

Powerful functionality in a compact design



Features

- Fast and accurate control by synchronizing all machine devices with the PLC and Motion Engines
- Three built-in industrial Ethernet ports
- OPC UA server functionality 
- Up to 12 axes of control via EtherCAT
- Up to 32 local NX I/O Units
- DC power supply without battery backup
- Fully conforms to IEC 61131-3 standard programming
- PLCopen Function Blocks for Motion Control allow users to create complex programs quickly and easily
- Direct connection to a database, with no special unit, software, or middleware required (NX102-□□20)

CONSULTING DISTRIBUTOR

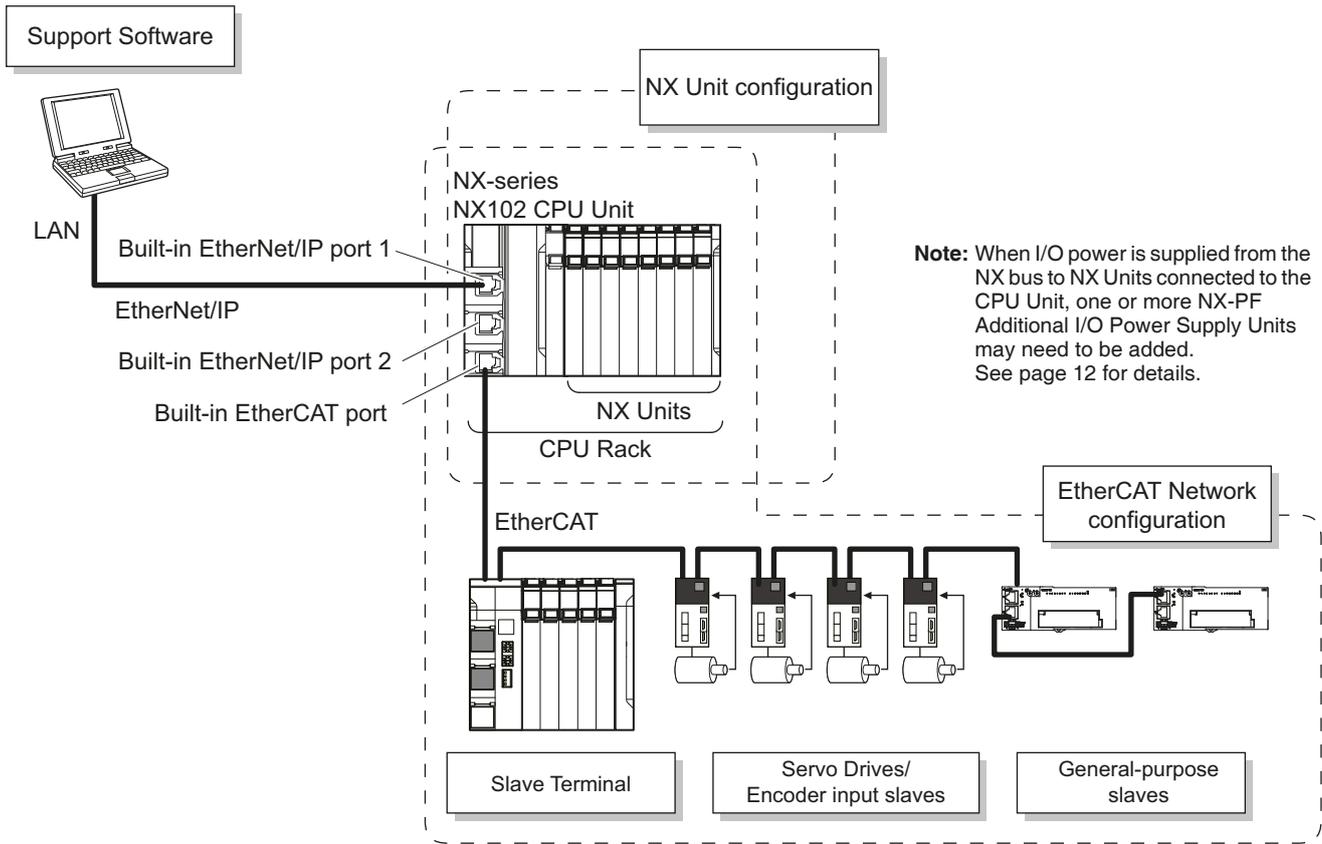


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System Configuration

Basic System Configuration



Ordering Information

Applicable standards

Refer to the OMRON website (www.ia.omron.com) or ask your OMRON representative for the most recent applicable standards for each model.

NX-series NX102 CPU Units

| Product name | Specifications | | | | | Model |
|---|------------------|--|----------------------------------|-----------------------------------|---|---------------|
| | Program capacity | Memory capacity for variables | Maximum number of used real axes | | | |
| | | | Motion control axes | Single-axis position control axes | | |
| NX102 CPU Unit  | 5 MB | 1.5 MB (Retained during power interruption)/32 MB (Not retained during power interruption) | 12 | 8 | 4 | NX102-1200 |
| | | | 8 | 4 | 4 | NX102-1100 |
| | | | 6 | 2 | 4 | NX102-1000 |
| | | | 4 | 0 | 4 | NX102-9000 |
| NX102 Database Connection CPU Unit  | | | 12 | 8 | 4 | NX102-1220 *1 |
| | | | 8 | 4 | 4 | NX102-1120 *1 |
| | | | 6 | 2 | 4 | NX102-1020 *1 |
| | | | 4 | 0 | 4 | NX102-9020 *1 |

*1. NX102-1220-DH, NX102-1120-DH, NX102-1020-DH, NX102-9020-DH are products equipped with time series data collection system. Consult your Omron sales representative for details.

Note: 1. One NX-END02 End Cover is provided with the NX102-□□□□, and the HMC-SD292 Memory Card is provided with the NX102-□□□20.
2. The battery is not mounted when the product is shipped. Refer to the *Battery* for details.

NX Units

Digital Input Units

| Product Name | Specifications | | | | | Model |
|--|--|---------------------|---------------------|--|--|------------------------|
| | Number of points | Internal I/O common | Rated input voltage | I/O refreshing method | ON/OFF response time | |
| DC Input Unit  (Screwless Clamping Terminal Block, 12 mm Width) | 4 points | NPN | 12 to 24 VDC | Switching Synchronous I/O refreshing and Free-Run refreshing | 20 μs max./400 μs max. | NX-ID3317 |
| | | | 24 VDC | Input refreshing with input changed time only *1 | 100 ns max./100 ns max. | NX-ID3344 |
| | | PNP | 12 to 24 VDC | Switching Synchronous I/O refreshing and Free-Run refreshing | 20 μs max./400 μs max. | NX-ID3417 |
| | | | 24 VDC | Input refreshing with input changed time only *1 | 100 ns max./100 ns max. | NX-ID3444 |
| | 8 points | NPN | 24 VDC | Switching Synchronous I/O refreshing and Free-Run refreshing | 20 μs max./400 μs max. | NX-ID4342 |
| | | | | | | NX-ID4442 |
| | | PNP | | | | NX-ID5342 |
| | | | | | | NX-ID5442 |
| DC Input Unit  (M3 Screw Terminal Block, 30 mm Width) | 16 points | For both NPN/PNP | 24 VDC | Switching Synchronous I/O refreshing and Free-Run refreshing | 20 μs max./400 μs max. | NX-ID5142-1 |
| | DC Input Unit  (MIL Connector, 30 mm Width) | 16 points | For both NPN/PNP | 24 VDC | Switching Synchronous I/O refreshing and Free-Run refreshing | 20 μs max./400 μs max. |
| 32 points | | NX-ID6142-5 | | | | |
| DC Input Unit  (Fujitsu Connector, 30 mm Width) | 32 points | For both NPN/PNP | 24 VDC | Switching Synchronous I/O refreshing and Free-Run refreshing | 20 μs max./400 μs max. | NX-ID6142-6 |

Machine Automation Controller NX1

| Product Name | Specifications | | | | | Model |
|---|------------------|---|---------------------|-----------------------|-----------------------|-----------|
| | Number of points | Internal I/O common | Rated input voltage | I/O refreshing method | ON/OFF response time | |
|  (Screwless Clamping Terminal Block, 12 mm Width) | 4 points | 200 to 240 VAC, 50/60 Hz (170 to 264 VAC, ±3 Hz) | | Free-Run refreshing | 10 ms max./40 ms max. | NX-IA3117 |

*1. To use input refreshing with input changed time, the EtherCAT Coupler Unit with unit version 1.1 or later and the Sysmac Studio version 1.07 or higher are required.

Digital Output Units

| Product Name | Specifications | | | | | | Model |
|--|------------------|---------------------|---------------------------------------|---|---|-----------------------------|-------------|
| | Number of points | Internal I/O common | Maximum value of load current | Rated voltage | I/O refreshing method | ON/OFF response time | |
|  (Screwless Clamping Terminal Block, 12 mm Width) | 2 | NPN | 0.5 A/point, 1 A/Unit | 24 VDC | Output refreshing with specified time stamp only *1 | 300 ns max./ 300 ns max. | NX-OD2154 |
| | | PNP | | | | | NX-OD2258 |
| | 4 | NPN | 0.5 A/point, 2 A/Unit | 12 to 24 VDC | Switching Synchronous I/O refreshing and Free- Run refreshing | 0.1 ms max./ 0.8 ms max. | NX-OD3121 |
| | | | | 24 VDC | | 300 ns max./ 300 ns max. | NX-OD3153 |
| | | PNP | | | | 0.5 ms max./ 1.0 ms max. | NX-OD3256 |
| | | | | 300 ns max./ 300 ns max. | | NX-OD3257 | |
| | 8 | NPN | 0.5 A/point, 4 A/Unit | 12 to 24 VDC | | 0.5 ms max./ 1.0 ms max. | NX-OD3268 |
| | | PNP | | 24 VDC | | 0.1 ms max./ 0.8 ms max. | NX-OD4121 |
| | 16 | NPN | 0.5 A/point, 4 A/Unit | 12 to 24 VDC | | 0.5 ms max./ 1.0 ms max. | NX-OD4256 |
| | | | | 24 VDC | | 0.1 ms max./ 0.8 ms max. | NX-OD5121 |
| | 16 | PNP | 0.5 A/point, 4 A/Unit | 12 to 24 VDC | 0.5 ms max./ 1.0 ms max. | NX-OD5256 | |
| | | | | 24 VDC | | | |
|  (M3 Screw Terminal Block, 30 mm Width) | 16 | NPN | 12 to 24 VDC | Switching Synchronous I/O refreshing and Free- Run refreshing | 0.1 ms max./ 0.8 ms max. | NX-OD5121-1 | |
| | | PNP | 24 VDC | | 0.5 ms max./ 1.0 ms max. | NX-OD5256-1 | |
|  (MIL Connector, 30 mm Width) | 16 | NPN | 12 to 24 VDC | Switching Synchronous I/O refreshing and Free- Run refreshing | 0.1 ms max./ 0.8 ms max. | NX-OD5121-5 | |
| | | PNP | 24 VDC | | 0.5 ms max./ 1.0 ms max. | NX-OD5256-5 | |
| | 32 | NPN | 0.5 A/point, 2 A/ common, 4 A/Unit | | 12 to 24 VDC | 0.1 ms max./ 0.8 ms max. | NX-OD6121-5 |
| | | PNP | | | 24 VDC | 0.5 ms max./ 1.0 ms max. | NX-OD6256-5 |
|  (Fujitsu Connector, 30 mm Width) | 32 | NPN | 0.5 A/point, 2 A/ common, 4 A/Unit | 12 to 24 VDC | Switching Synchronous I/O refreshing and Free- Run refreshing | 0.1 ms max./ 0.8 ms max. | NX-OD6121-6 |

| Product Name | Specifications | | | | | | Model |
|---|------------------|-----------------------|--|---------------------|-----------------------|----------------------|-------|
| | Number of points | Internal I/O common | Maximum value of load current | Rated voltage | I/O refreshing method | ON/OFF response time | |
|  (Screwless Clamping Terminal Block, 12 mm Width/24 mm Width) | 2 | Relay type: N.O. | 250 VAC/2 A (cosφ=1), 250 VAC/2 A (cosφ=0.4), 24 VDC/2 A, 4 A/Unit | Free-Run refreshing | 15 ms max./15 ms max. | NX-OC2633 | |
| | | Relay type: N.O.+N.C. | | | | NX-OC2733 | |
| | 8 | Relay type: N.O. | 250 VAC/2 A (cosφ=1), 250 VAC/2 A (cosφ=0.4), 24 VDC/2 A, 8 A/Unit | Free-Run refreshing | 15 ms max./15 ms max. | NX-OC4633 | |

*1. To use input refreshing with input changed time, the EtherCAT Coupler Unit with unit version 1.1 or later and the Sysmac Studio version 1.07 or higher are required.

Digital Mixed I/O Units

| Product Name | Specifications | | | | | Model |
|---|---|--|---|--|--|-------------|
| | Number of points | Internal I/O common | Maximum value of load current | I/O refreshing method | ON/OFF response time | |
|  (MIL Connector, 30 mm Width) | Outputs: 16 points Inputs: 16 points | Outputs: NPN Inputs: For both NPN/PNP | Outputs: 12 to 24 VDC Inputs: 24 VDC | Switching Synchronous I/O refreshing and Free-Run refreshing | Outputs: 0.1 ms max./0.8 ms max. Inputs: 20 μs max./400 μs max. | NX-MD6121-5 |
| | | Outputs: PNP Inputs: For both NPN/PNP | Outputs: 24 VDC Inputs: 24 VDC | | Outputs: 0.5 ms max./1.0 ms max. Inputs: 20 μs max./400 μs max. | NX-MD6256-5 |
|  (Fujitsu Connector, 30 mm Width) | Outputs: 16 points Inputs: 16 points | Outputs: NPN Inputs: For both NPN/PNP | Outputs: 12 to 24 VDC Inputs: 24 VDC | Switching Synchronous I/O refreshing and Free-Run refreshing | Outputs: 0.1 ms max./0.8 ms max. Inputs: 20 μs max./400 μs max. | NX-MD6121-6 |

High-speed Analog Input Units

| Product name | Specifications | | | | | | | Model | |
|---|------------------|---|--|--------------------|------------------|-----------------------|---------------------|----------------------------|-----------------------|
| | Number of points | Input range | Resolution | Input method | Conversion time | Trigger input section | | | I/O refreshing method |
| | | | | | | Number of points | Internal I/O common | | |
|  High-speed Analog Input Unit | 4 | -10 to 10 V -5 to 5 V 0 to 10 V 0 to 5 V 1 to 5 V 0 to 20 mA 4 to 20 mA | <ul style="list-style-type: none"> Input range of -10 to 10 V or -5 to 5 V: 1/64,000 (full scale) Other input range: 1/32,000 (full scale) | Differential input | 5 μs per channel | 4 | NPN | Synchronous I/O refreshing | NX-HAD401 |
| | | | | | | | PNP | | NX-HAD402 |

Analog Input Units

| Product Name | Specifications | | | | | | | | | Model |
|--|------------------|-------------|------------|--|--------------------------|---|-----------------|-----------------|--|------------------------|
| | Number of points | Input range | Resolution | Conversion value, decimal number (0 to 100%) | Over all accuracy (25°C) | Input method | Conversion time | Input impedance | I/O refreshing method | |
| Voltage Input Unit  | 2 | -10 to +10V | 1/8000 | -4000 to 4000 | ±0.2% (full scale) | Singleended input Differential Input | 250 μs/point | 1MΩ min. | Free-Run refreshing | NX-AD2603 NX-AD2604 |
| | | | 1/30000 | -15000 to 15000 | ±0.1% (full scale) | Differential Input | 10 μs/point | | Selectable Synchronous I/O refreshing or Free-Run refreshing | NX-AD2608 |
| | 4 | | 1/8000 | -4000 to 4000 | ±0.2% (full scale) | Singleended input Differential Input | 250 μs/point | | Free-Run refreshing | NX-AD3603 NX-AD3604 |
| | | | 1/30000 | -15000 to 15000 | ±0.1% (full scale) | Differential Input | 10 μs/point | | Selectable Synchronous I/O refreshing or Free-Run refreshing | NX-AD3608 |
| | 8 | | 1/8000 | -4000 to 4000 | ±0.2% (full scale) | Singleended input Differential Input | 250 μs/point | | Free-Run refreshing | NX-AD4603 NX-AD4604 |
| | | | 1/30000 | -15000 to 15000 | ±0.1% (full scale) | Differential Input | 10 μs/point | | Selectable Synchronous I/O refreshing or Free-Run refreshing | NX-AD4608 |
| Current Input Unit  | 2 | 4 to 20mA | 1/8000 | 0 to 8000 | ±0.2% (full scale) | Singleended input Differential Input | 250 μs/point | 250Ω | Free-Run refreshing | NX-AD2203 NX-AD2204 |
| | | | 1/30000 | 0 to 30000 | ±0.1% (full scale) | Differential Input | 10 μs/point | | Selectable Synchronous I/O refreshing or Free-Run refreshing | NX-AD2208 |
| | 4 | | 1/8000 | 0 to 8000 | ±0.2% (full scale) | Singleended input Differential Input | 250 μs/point | | Free-Run refreshing | NX-AD3203 NX-AD3204 |
| | | | 1/30000 | 0 to 30000 | ±0.1% (full scale) | Differential Input | 10 μs/point | | Selectable Synchronous I/O refreshing or Free-Run refreshing | NX-AD3208 |
| | 8 | | 1/8000 | 0 to 8000 | ±0.2% (full scale) | Singleended input Differential Input | 250 μs/point | | Free-Run refreshing | NX-AD4203 NX-AD4204 |
| | | | 1/30000 | 0 to 30000 | ±0.1% (full scale) | Differential Input | 10 μs/point | | Selectable Synchronous I/O refreshing or Free-Run refreshing | NX-AD4208 |

Analog Output Units

| Product Name | Specifications | | | | | | | Model |
|---|------------------|-------------|------------|--|--------------------------|-----------------|--|-----------|
| | Number of points | Input range | Resolution | Output setting value, decimal number (0 to 100%) | Over all accuracy (25°C) | Conversion time | I/O refreshing method | |
| Voltage Output Unit  | 2 points | -10 to +10V | 1/8000 | -4000 to 4000 | ±0.3% (full scale) | 250 μs/point | Free-Run refreshing | NX-DA2603 |
| | | | 1/30000 | -15000 to 15000 | ±0.1% (full scale) | 10 μs/point | Selectable Synchronous I/O refreshing or Free-Run refreshing | NX-DA2605 |
| | 4 points | | 1/8000 | -4000 to 4000 | ±0.3% (full scale) | 250 μs/point | Free-Run refreshing | NX-DA3603 |
| | | | 1/30000 | -15000 to 15000 | ±0.1% (full scale) | 10 μs/point | Selectable Synchronous I/O refreshing or Free-Run refreshing | NX-DA3605 |
| Current Output Unit  | 2 points | 4 to 20mA | 1/8000 | 0 to 8000 | ±0.3% (full scale) | 250 μs/point | Free-Run refreshing | NX-DA2203 |
| | | | 1/30000 | 0 to 30000 | ±0.1% (full scale) | 10 μs/point | Selectable Synchronous I/O refreshing or Free-Run refreshing | NX-DA2205 |
| | 4 points | | 1/8000 | 0 to 8000 | ±0.3% (full scale) | 250 μs/point | Free-Run refreshing | NX-DA3203 |
| | | | 1/30000 | 0 to 30000 | ±0.1% (full scale) | 10 μs/point | Selectable Synchronous I/O refreshing or Free-Run refreshing | NX-DA3205 |

Temperature Control Units

| Product name | Specifications | | | | | | | | Model |
|---|--------------------|--|----------------------------------|-------------------------|---------------------------|-------------------------|-----------------|-----------------------|-----------|
| | Number of channels | Input type | Output | Number of output points | Number of CT input points | Control type | Conversion time | I/O refreshing method | |
| Temperature Control Unit 2-channel Type  | 2 | Universal input (thermocouple, resistance thermometer) | Voltage output (for driving SSR) | 2 | 2 | Standard control | 50 ms | Free-Run refreshing | NX-TC2405 |
| | | | | | None | Standard control | | | NX-TC2406 |
| | | | Voltage output (for driving SSR) | 4 | None | Heating/cooling control | | | NX-TC2407 |
| | | | Linear current output | 2 | None | Standard control | | | NX-TC2408 |
| Temperature Control Unit 4-channel Type  | 4 | | Voltage output (for driving SSR) | 4 | 4 | Standard control | | | NX-TC3405 |
| | | | | | None | Standard control | | | NX-TC3406 |
| | | | Voltage output (for driving SSR) | 8 | None | Heating/cooling control | | | NX-TC3407 |
| | | | Linear current output | 4 | None | Standard control | | | NX-TC3408 |

Temperature Input Units

| Product Name | Specifications | | | | | | | Model |
|---|------------------|--|-------------------|--|-----------------|-----------------------|----------------|-----------|
| | Number of points | Input type | Resolution (25°C) | Over all accuracy (25°C) | Conversion time | I/O refreshing method | Terminals | |
| Thermocouple Input type  | 2 | Thermocouple | 0.1°C max. *1 | For details, refer to your local OMRON website | 250 ms/Unit | Free-Run refreshing | 16 Terminals | NX-TS2101 |
| | 4 | | | | | | 16 Terminals×2 | NX-TS3101 |
| | 2 | | 0.01°C max. | | 10 ms/Unit | | 16 Terminals | NX-TS2102 |
| | 4 | | | | | | 16 Terminals×2 | NX-TS3102 |
| | 2 | | 0.001°C max. | | 60 ms/Unit | | 16 Terminals | NX-TS2104 |
| | 4 | | | | | | 16 Terminals×2 | NX-TS3104 |
| Resistance Thermometer Input type  | 2 | Resistance Thermometer (Pt100/Pt1000, three-wire) *2 | 0.1°C max. | | 250 ms/Unit | | 16 Terminals | NX-TS2201 |
| | 4 | | | | | | 16 Terminals×2 | NX-TS3201 |
| | 2 | | 0.01°C max. | | 10 ms/Unit | | 16 Terminals | NX-TS2202 |
| | 4 | | | | | | 16 Terminals×2 | NX-TS3202 |
| | 2 | | 0.001°C max. | | 60 ms/Unit | | 16 Terminals | NX-TS2204 |
| | 4 | | | | | | 16 Terminals×2 | NX-TS3204 |

*1. The resolution is 0.2°C max. when the input type is R, S, or W.

*2. The NX-TS2202 and NX-TS3202 only support Pt100 three-wire sensor.

Heater Burnout Detection Units

| Product Name | Specifications | | | | | | | Model |
|---|------------------|------------------------|------------------------|---------------------|-------------------------|---------------|-----------------------|-----------|
| | CT input section | | Control output section | | | | I/O refreshing method | |
| | Number of inputs | Maximum heater current | Number of outputs | Internal I/O common | Maximum load current | Rated voltage | | |
| Heater Burnout Detection Unit  | 4 | 50 AAC | 4 | NPN | 0.1 A/point, 0.4 A/Unit | 12 to 24 VDC | Free-Run refreshing | NX-HB3101 |
| | | | | PNP | | 24 VDC | | NX-HB3201 |

Load Cell Input Unit

| Product Name | Specifications | | | | | Model |
|---|------------------|------------------|---|------------------------------|------------------|------------------|
| | Number of points | Conversion cycle | I/O refreshing method *1 | Load cell excitation voltage | Input range | |
| Load Cell Input Unit  | 1 | 125 μs | <ul style="list-style-type: none"> Free-Run refreshing Synchronous I/O refreshing Task period prioritized refreshing | 5 VDC ± 10% | -5.0 to 5.0 mV/V | NX-RS1201 |

*1. Refer to the *NX-series Load Cell Input Unit User's Manual (W565)* for detailed information on I/O refresh cycle.

Position Interface: Incremental Encoder Input Units

| Product Name | Specifications | | | | | Model |
|---|--------------------|-----------------|----------------------------|--|------------------------------|------------------|
| | Number of channels | External inputs | Maximum response frequency | I/O refreshing method | Number of I/O entry mappings | |
| Incremental Encoder Input Unit  | 1 (NPN) | 3 (NPN) | 500 kHz | Free-Run refreshing, Synchronous I/O refreshing | 1/1 | NX-EC0112 |
| | 1 (PNP) | 3 (PNP) | | | | NX-EC0122 |
| | 1 | 3 (NPN) | 4 MHz | | | NX-EC0132 |
| | | 3 (PNP) | | | | NX-EC0142 |
| | 2 (NPN) | None | 500 kHz | | 2/2 | NX-EC0212 |
| | 2 (PNP) | | | | | NX-EC0222 |

Position Interface: SSI Input Units

| Product Name | Specifications | | | | | Model |
|---|--------------------|-----------------------|---------------------|----------------------|---|------------------|
| | Number of channels | Input/Output form | Maximum data length | Encoder power supply | Type of external connections | |
| SSI Input Unit  | 1 | EIA standard RS-422-A | 32 bits | 24 VDC, 0.3 A/CH | Screwless push-in terminal block (12 terminals) | NX-ECS112 |
| | 2 | EIA standard RS-422-A | 32 bits | 24 VDC, 0.3 A/CH | Screwless push-in terminal block (12 terminals) | NX-ECS212 |

Position Interface: Pulse Output Units

| Product Name | Specifications | | | | | | | Model |
|---|-----------------------|-------------------|--------------------|----------------------------|---|------------------------------|--------------------------|-------------|
| | Number of channels *1 | External inputs | External outputs | Maximum pulse output speed | I/O refreshing method | Number of I/O entry mappings | Control output interface | |
|  | 1 (NPN) | 2 (NPN) | 1 (NPN) | 500 kpps | Synchronous I/O refreshing, Task period prioritized refreshing *2 | 1/1 | Open collector output | NX-PG0112 |
| | 1 (PNP) | 2 (PNP) | 1 (PNP) | | | | | NX-PG0122 |
| | 2 | 5 inputs/CH (NPN) | 3 outputs/CH (NPN) | 4 Mpps | | 2/2 | Line driver output | NX-PG0232-5 |
| | | 5 inputs/CH (PNP) | 3 outputs/CH (PNP) | | | | | NX-PG0242-5 |
| | 4 | 5 inputs/CH (NPN) | 3 outputs/CH (NPN) | | | 4/4 | | NX-PG0332-5 |
| | | 5 inputs/CH (PNP) | 3 outputs/CH (PNP) | | | | | |

*1. This is the number of pulse output channels.

*2. Unit version 1.2 or later and an NX-ECC203 EtherCAT Coupler Unit are required.

Communications Interface Units

| Product Name | Serial interface | External connection terminal | Number of serial ports | Communications protocol | Model |
|---|------------------|-----------------------------------|------------------------|---|-----------|
|  | RS-232C | Screwless Clamping Terminal Block | 1 port | <ul style="list-style-type: none"> • No-protocol • Signal lines | NX-CIF101 |
| | RS-422A/485 | | | | NX-CIF105 |
| | RS-232C | D-Sub connector | 2 ports | | NX-CIF210 |

RFID Units

| Product name | Amplifier/Antenna | No. of unit numbers used | Model |
|---|-------------------|--------------------------|-----------|
|  | V680 series | 1 | NX-V680C1 |
|  | | 2 | NX-V680C2 |

IO-Link Master Unit

| Product Name | Specifications | | | Model |
|---|-------------------------|-----------------------|-----------------------------------|-----------|
| | Number of IO-Link ports | I/O refreshing method | I/O connection terminals | |
|  | 4 | Free-Run refreshing | Screwless clamping terminal block | NX-ILM400 |

Machine Automation Controller NX1

System Units

| Product Name | Specifications | Model |
|--|---|------------------|
| Additional NX Unit Power Supply Unit  | Power supply voltage: 24 VDC (20.4 to 28.8 VDC) NX Bus power supply capacity: 10 W max. | NX-PD1000 |
| Additional I/O Power Supply Unit  | Power supply voltage: 5 to 24 VDC (4.5 to 28.8 VDC) I/O power feed maximum current: 4 A | NX-PF0630 |
| | Power supply voltage: 5 to 24 VDC (4.5 to 28.8 VDC) I/O power feed maximum current: 10 A | NX-PF0730 |
| I/O Power Supply Connection Unit  | Number of I/O power terminals: IOG: 16 terminals Current capacity of I/O power terminal: 4 A/terminal max. | NX-PC0010 |
| | Number of I/O power terminals: IOV: 16 terminals Current capacity of I/O power terminal: 4 A/terminal max. | NX-PC0020 |
| | Number of I/O power terminals: IOV: 8 terminals, IOG: 8 terminals Current capacity of I/O power terminal: 4 A/terminal max | NX-PC0030 |
| Shield Connection Unit  | Number of shield terminals: 14 terminals (The lower two terminals are functional ground terminals.) | NX-TBX01 |

EtherCAT Coupler Units

You can use the NX Units via the EtherCAT Coupler Unit that is connected to the built-in EtherCAT port on the CPU Unit.

| Product Name | Communications cycle in DC Mode | Current consumption | Maximum I/O power supply current | Model |
|--|---------------------------------|---------------------|----------------------------------|------------------|
| EtherCAT Coupler Unit *1  | 250 to 4000 μ s *2 | 1.45 W max. | 4 A | NX-ECC201 |
| | 250 to 4000 μ s *2 | | 10 A | NX-ECC202 |
| | 125 to 10000 μ s *2 | 1.25 W max. | | NX-ECC203 |

*1. One End Cover NX-END01 is provided with the EtherCAT Coupler Unit.

*2. This depends on the specifications of the EtherCAT master. For example, the values are as follows when the EtherCAT Coupler Unit is connected to the built-in EtherCAT port on an NJ5-series CPU Unit: 500 μ s, 1,000 μ s, 2,000 μ s, and 4,000 μ s. Refer to the *NJ/NX-series CPU Unit Built-in EtherCAT Port User' Manual* (Cat. No. W505) for the specifications of the built-in EtherCAT ports on NJ/NX-series CPU Units. This also depends on the unit configuration.

Safety CPU Units

| Appearance | Specifications | | | | | Model |
|---|-------------------------------------|------------------|----------------------------------|-----------------------|-------------------|------------------|
| | Maximum number of safety I/O points | Program capacity | Number of safety I/O connections | I/O refreshing method | Unit version | |
|  | 1,024 | 2,048 KB | 128 | Free-Run refreshing | Ver. 1.3 or later | NX-SL5500 |
| | 2,032 | 4,096 KB | 254 | | | NX-SL5700 |
|  | 256 | 512 KB | 32 | Free-Run refreshing | Ver. 1.0 or later | NX-SL3300 |
| | 1,024 | 2,048 KB | 128 | | | NX-SL3500 |

Safety Input Units

| Appearance | Specifications | | | | | | | | 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 | Unit version | |
|  | 4 points | 2 points | Sinking inputs (PNP) | 24 VDC | Can be connected. | 1 | Free-Run refreshing | Ver.1.1 | NX-SIH400 |
|  | 8 points | 2 points | Sinking inputs (PNP) | 24 VDC | Cannot be connected. | 1 | Free-Run refreshing | Ver.1.0 | NX-SID800 |

Safety Output Units

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

Unit Power Supply System

Add one or more NX-PF Additional I/O Power Supply Units when I/O power is supplied from the NX bus to NX Units connected to the CPU Unit. Check the table below.

| NX Units | Model | NX-PF Additional I/O Power Supply Unit required |
|-------------------------------|-------------|---|
| Digital Input Units | NX-ID3317 | Yes |
| | NX-ID3343 | Yes |
| | NX-ID3344 | Yes |
| | NX-ID3417 | Yes |
| | NX-ID3443 | Yes |
| | NX-ID3444 | Yes |
| | NX-ID4342 | Yes |
| | NX-ID4442 | Yes |
| | NX-ID5342 | Yes |
| | NX-ID5442 | Yes |
| | NX-ID5142-1 | No |
| | NX-ID5142-5 | No |
| | NX-ID6142-5 | No |
| | NX-ID6142-6 | No |
| | NX-IA3117 | No |
| Digital output Units | NX-OD2154 | Yes |
| | NX-OD2258 | Yes |
| | NX-OD3121 | Yes |
| | NX-OD3153 | Yes |
| | NX-OD3256 | Yes |
| | NX-OD3257 | Yes |
| | NX-OD3268 | No |
| | NX-OD4121 | Yes |
| | NX-OD4256 | Yes |
| | NX-OD5121 | Yes |
| | NX-OD5256 | Yes |
| | NX-OD5121-1 | No |
| | NX-OD5256-1 | No |
| | NX-OD5121-5 | No |
| | NX-OD5256-5 | No |
| | NX-OD6121-5 | No |
| | NX-OD6256-5 | No |
| | NX-OD6121-6 | No |
| | NX-OC2633 | No |
| | NX-OC2733 | No |
| NX-OC4633 | No | |
| Digital Mixed I/O Units | NX-MD6121-5 | No |
| | NX-MD6256-5 | No |
| | NX-MD6121-6 | No |
| High-speed Analog Input Units | NX-HAD401 | Yes |
| | NX-HAD402 | Yes |
| Analog Input Units | NX-AD2603 | Yes |
| | NX-AD2604 | No |
| | NX-AD2608 | No |
| | NX-AD3603 | Yes |
| | NX-AD3604 | No |
| | NX-AD3608 | No |
| | NX-AD4603 | Yes |
| | NX-AD4604 | No |
| | NX-AD4608 | No |
| | NX-AD2203 | Yes |
| | NX-AD2204 | No |
| | NX-AD2208 | No |
| | NX-AD3203 | Yes |
| | NX-AD3204 | No |
| | NX-AD3208 | No |
| | NX-AD4203 | Yes |
| | NX-AD4204 | No |
| | NX-AD4208 | No |

| NX Units | Model | NX-PF Additional I/O Power Supply Unit required |
|---|-------------|---|
| Analog Output Units | NX-DA2603 | Yes |
| | NX-DA2605 | Yes |
| | NX-DA3603 | Yes |
| | NX-DA3605 | Yes |
| | NX-DA2203 | Yes |
| | NX-DA2205 | Yes |
| | NX-DA3203 | Yes |
| | NX-DA3205 | Yes |
| Temperature Control Units | NX-TC2405 | Yes |
| | NX-TC2406 | Yes |
| | NX-TC2407 | Yes |
| | NX-TC2408 | Yes |
| | NX-TC3405 | Yes |
| | NX-TC3406 | Yes |
| | NX-TC3407 | Yes |
| | NX-TC3408 | Yes |
| Temperature Input Units | NX-TS2101 | No |
| | NX-TS3101 | No |
| | NX-TS2102 | No |
| | NX-TS3102 | No |
| | NX-TS2104 | No |
| | NX-TS3104 | No |
| | NX-TS2201 | No |
| | NX-TS3201 | No |
| Heater Burnout Detection Units | NX-TS2202 | No |
| | NX-TS3202 | No |
| | NX-TS2204 | No |
| | NX-TS3204 | No |
| Load Cell Input Unit | NX-HB3101 | Yes |
| | NX-HB3201 | Yes |
| Position interface: Incremental Encoder Input Units | NX-RS1201 | No |
| | NX-EC0112 | Yes |
| | NX-EC0122 | Yes |
| | NX-EC0132 | Yes |
| | NX-EC0142 | Yes |
| | NX-EC0212 | Yes |
| Position interface: SSI Input Units | NX-EC0222 | Yes |
| | NX-ECS112 | Yes |
| Position interface: Pulse Output Units | NX-ECS212 | Yes |
| | NX-PG0112 | Yes |
| | NX-PG0122 | Yes |
| | NX-PG0232-5 | No |
| | NX-PG0242-5 | No |
| Communications Interface Units | NX-PG0332-5 | No |
| | NX-PG0342-5 | No |
| | NX-CIF101 | No |
| RFID Units | NX-CIF105 | No |
| | NX-CIF210 | No |
| IO-Link Master Unit | NX-V680C1 | Yes |
| | NX-V680C2 | Yes |
| Safety Input Units | NX-ILM400 | Yes |
| | NX-SIH400 | Yes |
| Safety Output Units | NX-SID800 | Yes |
| | NX-SOH200 | Yes |
| | NX-SOD400 | Yes |

Note: Refer to the *NX-series NX102 CPU Unit Hardware User's Manual* (Cat. No. W593) for the NX Unit power supply system.

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 | Specification | Number of licenses | Media | Model |
|---|---|--------------------|----------------------------|-------------------------|
| Sysmac Studio Standard Edition Ver.1.□□ | 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. Sysmac Studio runs on the following OS. Windows 7 (32-bit/64-bit version)/ Windows 8 (32-bit/64-bit version)/ Windows 8.1 (32-bit/64-bit version)/ Windows 10 (32-bit/64-bit version) *1 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 (CXDesigner). For details, refer to your local OMRON website. | --- | Sysmac Studio (32-bit) DVD | SYSMAC-SE200D |
| | | --- | Sysmac Studio (64-bit) DVD | SYSMAC-SE200D-64 |
| | | 1 license *2 | --- | SYSMAC-SE201L |

*1. Model "SYSMAC-SE200D-64" runs on Windows 10 (64 bit).

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

Collection of software functional components Sysmac Library

Please download the Sysmac Library from the following URL and add it to the Sysmac Studio.

http://www.ia.omron.com/sysmac_library/

Typical Models

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

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

Recommended EtherCAT and EtherNet/IP Communications Cables

Use Straight STP (shielded twisted-pair) cable of category 5 or higher with double shielding (braiding and aluminum foil tape) for EtherCAT. For EtherNet/IP, required specification for the communications cables varies depending on the baud rate.

For 100BASE-TX/10BASE-T, use an STP (shielded twisted-pair) cable of Ethernet category 5 or higher.

In the table, materials indicated available for EtherNet/IP 100BASE-TX are available for both of 100BASE-TX and 10BASE-T.

Cables with Connectors (For EtherCAT only)

| Item | Appearance | Recommended manufacturer | Cable length (m) | Model |
|---|---|--------------------------|------------------|----------------------|
| Cable with Connectors on Both Ends (RJ45/RJ45) Standard RJ45 plugs *1 Wire gauge and number of pairs: AWG26, 4-pair cable Cable sheath material: LSZH *2 Cable color: Yellow *3 |  | OMRON | 0.3 | XS6W-6LSZH8SS30CM-Y |
| | | | 0.5 | XS6W-6LSZH8SS50CM-Y |
| | | | 1 | XS6W-6LSZH8SS100CM-Y |
| | | | 2 | XS6W-6LSZH8SS200CM-Y |
| | | | 3 | XS6W-6LSZH8SS300CM-Y |
| | | | 5 | XS6W-6LSZH8SS500CM-Y |
| Cable with Connectors on Both Ends (RJ45/RJ45) Rugged RJ45 plugs *1 Wire gauge and number of pairs: AWG22, 2-pair cable Cable color: Light blue |  | OMRON | 0.3 | XS5W-T421-AMD-K |
| | | | 0.5 | XS5W-T421-BMD-K |
| | | | 1 | XS5W-T421-CMD-K |
| | | | 2 | XS5W-T421-DMD-K |
| | | | 5 | XS5W-T421-GMD-K |
| | | | 10 | XS5W-T421-JMD-K |
| Cable with Connectors on Both Ends (M12 Straight/M12 Straight) Shield strengthening connector cable *4 M12/Smartclick connectors Wire gauge and number of pairs: AWG22, 2-pair cable Cable color: Black |  | OMRON | 0.5 | XS5W-T421-BM2-SS |
| | | | 1 | XS5W-T421-CM2-SS |
| | | | 2 | XS5W-T421-DM2-SS |
| | | | 3 | XS5W-T421-EM2-SS |
| | | | 5 | XS5W-T421-GM2-SS |
| | | | 10 | XS5W-T421-JM2-SS |
| Cable with Connectors on Both Ends (M12 Straight/RJ45) Shield strengthening connector cable *4 M12/Smartclick connector and rugged RJ45 plug Wire gauge and number of pairs: AWG22, 2-pair cable Cable color: Black |  | OMRON | 0.5 | XS5W-T421-BMC-SS |
| | | | 1 | XS5W-T421-CMC-SS |
| | | | 2 | XS5W-T421-DMC-SS |
| | | | 3 | XS5W-T421-EMC-SS |
| | | | 5 | XS5W-T421-GMC-SS |
| | | | 10 | XS5W-T421-JMC-SS |

*1. Cables with standard RJ45 plugs are available in the following lengths: 0.2 m, 0.3 m, 0.5 m, 1 m, 1.5 m, 2 m, 3 m, 5 m, 7.5 m, 10 m, 15 m, 20 m. Cables with rugged RJ45 plugs are available in the following lengths: 0.3 m, 0.5 m, 1 m, 2 m, 3 m, 5 m, 10 m, 15 m. For details, refer to the *Industrial Ethernet Connectors Catalog* (Cat. No. G019).

*2. The lineup features Low Smoke Zero Halogen cables for in-cabinet use and PUR cables for out-of-cabinet use. Although the LSZH cable is single shielded, its communications and noise characteristics meet the standards.

*3. Cables colors are available in yellow, green, and blue.

*4. For details, contact your OMRON representative.

Cables / Connectors (For EtherCAT or EtherNet/IP (100BASE-TX))**Wire Gauge and Number of Pairs: AWG24, 4-pair Cable**

| Item | Appearance | Recommended manufacturer | Model |
|-----------------|------------|--------------------------|-----------------------------------|
| Cables | --- | Hitachi Metals, Ltd. | NETSTAR-C5E SAB 0.5 × 4P CP *1 |
| | --- | Kuramo Electric Co. | KETH-SB *1 |
| RJ45 Connectors | --- | Panduit Corporation | MPS588-C *1 |

*1. We recommend you to use above cable and connector together.

Wire Gauge and Number of Pairs: AWG22, 2-pair Cable

| Item | Appearance | Recommended manufacturer | Model |
|-------------------------|---|--------------------------|-----------------|
| Cables | --- | Kuramo Electric Co. | KETH-PSB-OMR *1 |
| | --- | JMACS Japan Co., Ltd. | PNET/B *1 |
| RJ45 Assembly Connector |  | OMRON | XS6G-T421-1 *1 |

*1. We recommend you to use the above Cable and OMRON's RJ45 Assembly Connector together.

Note: Connect both ends of cable shielded wires to the connector hoods.

Optional Products/Maintenance Products/DIN Track Accessories

| Product Name | Specification | Model |
|---------------------------------|---|--------------|
| Memory Cards | SD memory card, 2 GB Memory Card is provided with the NX102-□□20. (HMC-SD292) | HMC-SD291 |
| | SDHC memory card, 4 GB | HMC-SD492 |
| | SDHC memory card, 16 GB | HMC-SD1A1 *1 |
| Battery | Refer to the <i>Battery</i> page for details. | CJ1W-BAT01 |
| End Cover | Must be connected to the right end of the CPU Rack. One End Cover is provided with the CPU Unit | NX-END02 |
| DIN Tracks | Length: 0.5 m, Height: 7.3 mm | PFP-50N |
| | Length: 1 m, Height: 7.3 mm | PFP-100N |
| End Plate | There are 2 stoppers provided with CPU Units and I/O Interface Units as standard accessories to secure the Units on the DIN Track. | PFP-M |
| Unit/Terminal Block Coding Pins | For 10 Units (Terminal Block: 30 pins, Unit: 30 pins) | NX-AUX02 |
| DIN Track Insulation Spacers | A Spacer to insulate the control panel from the DIN Track. To insulate the EtherCAT Slave Terminal from the control panel, use DIN Track Insulation Spacers. | NX-AUX01 |

*1. 16 GB memory card can be used for a CPU Unit with unit version 1.32 or later.

Electrical and Mechanical Specifications

| Item | | Specification |
|---|---|---|
| Model | | NX102-□□□□ |
| Enclosure | | Mounted in a panel |
| Dimensions (mm) *1 | | 72 × 100 × 90 mm (W×H×D) |
| Weight *2 | | 390 g max. |
| Unit power supply | Power supply voltage | 24 VDC (20.4 to 28.8 VDC) |
| | Unit power consumption *3 | 5.80 W max. |
| | Inrush current *4 | For cold start at room temperature: 10 A max./0.1 ms max. and 2.5 A max./150 ms max. |
| | Current capacity of power supply terminal *5 | 4 A max. |
| | Isolation method | No isolation: between the Unit power supply terminal and internal circuit |
| Power supply to the NX Unit power supply | NX Unit power supply capacity | 10 W max. |
| | NX Unit power supply efficiency | 80% |
| | Isolation method | No isolation: between the Unit power supply terminal and NX Unit power supply |
| I/O Power Supply to NX Units | | Not provided *6 |
| External connection terminal | Communication connector | RJ45 for EtherNet/IP Communications × 2 RJ45 for EtherCAT Communications × 1 |
| | Screwless clamping terminal block | For Unit power supply input and grounding (Removable) |
| | Output terminal (service supply) | Not provided |
| | RUN output terminal | Not provided |
| | NX bus connector | 32 NX Units can be connected |

*1. Includes the End Cover, and does not include projecting parts.

*2. Includes the End Cover. The weight of the End Cover is 82 g.

*3. Includes an SD Memory Card. The NX Unit power consumption to NX Units is not included.

*4. The inrush current that occurs when the supplied power is changed to ON from a continuous OFF state.

The inrush current may vary depending on the operating condition and other conditions. Therefore, select fuses, breakers, and external power supply devices that have enough margin in characteristic and capacity, considering the condition under which the devices are used.

In particular, in case when you insert a switch to turn ON/OFF the DC power supplied from an external power supply, if the duration of an ON-OFF-ON cycle is one second or less, the inrush control circuit may not function, which cause an inrush current of approximately 30 A/0.3 ms.

*5. The amount of current that can be passed constantly through the terminal. Do not exceed this current value when you use a through-wiring for the Unit power supply.

*6. When the type of the I/O power supply to NX Units you use is the supply from NX bus, an Additional I/O Power Supply Unit is required. Refer to *NX-series NX102 CPU Unit Hardware User's Manual (W593)* for details.

General Specifications

| Item | | Specification |
|--------------------------------|--------------------------------------|---|
| Enclosure | | Mounted in a panel |
| Grounding method | | Ground to less than 100 Ω. |
| Operating environment | Ambient operating temperature | 0 to 55°C |
| | Ambient operating humidity | 10% to 95% (with no condensation) |
| | Atmosphere | Must be free from corrosive gases. |
| | Ambient storage temperature | -25 to 70°C (excluding battery) |
| | Altitude | 2,000 m max. |
| | Pollution degree | 2 or less: Meets IEC 61010-2-201. |
| | Noise immunity | 2 kV on power supply line (Conforms to IEC 61000-4-4.) |
| | Overvoltage category | Category II: Meets IEC 61010-2-201. |
| | EMC immunity level | Zone B |
| | Vibration resistance | Conforms to IEC 60068-2-6. 5 to 8.4 Hz with 3.5-mm amplitude, 8.4 to 150 Hz, acceleration of 9.8 m/s ² 100 min each in X, Y, and Z directions (10 sweeps of 10 min each = 100 min total) |
| Battery | Life | 5 years (Power ON time rate 0% (power OFF)) |
| | Model | CJ1W-BAT01 (sold separately) |
| Applicable standards *1 | EU Directives | EN 61131-2 |
| | cULus | Listed UL 61010-2-201 and ANSI/ISA 12.12.01 |
| | Shipbuilding Standards | NK, LR |
| | Other than the above. | RCM, KC, and EAC |

*1. Refer to the OMRON website (<http://www.ia.omron.com/>) or consult your OMRON representative for the most recent applicable standards for each model.

Performance Specifications

| Item | | | NX102- | | | | |
|-----------------------------------|---|---|--|---------------|--------|--------|--|
| | | | 12□□ | 11□□ | 10□□ | 90□□ | |
| Processing time | Instruction execution times | LD instruction | 3.3 ns | | | | |
| | | Math instructions (for long real data) | 70 ns or more | | | | |
| Programming | Program capacity *1 | Size | 5 MB | | | | |
| | | Quantity | Number of POU definitions | 3,000 | | | |
| | | | Number of POU instances | 9,000 | | | |
| | Memory capacity for variables *2 | Retain attribute | Size | 1.5 MB | | | |
| | | | Number of variables | 10,000 | | | |
| | | No Retain attribute | Size | 32 MB | | | |
| | | | Number of variables | 90,000 | | | |
| | Data types | Number of data types | 1,000 | | | | |
| | Memory for CJ-series Units (Can be specified with AT specifications for variables.) | CIO Area | 0 to 6,144 words (CIO 0 to CIO 6,143) *3 | | | | |
| | | Work Area | 0 to 512 words (W0 to W511) *3 | | | | |
| | | Holding Area | 0 to 1,536 words (H0 to H1,535) *4 | | | | |
| DM Area | | 0 to 32,768 words (D0 to D32,767) *4 | | | | | |
| EM Area | | 32,768 words × 25 banks (E0_0 to E18_32,767) *4 *5 | | | | | |
| Motion control | Maximum number of controlled axes | | 15 axes | | | 4 axes | |
| | | Motion control axes | 11 axes | | | --- | |
| | | Single-axis position control axes | 4 axes | | | | |
| | Maximum number of used real axes | | 12 axes | 8 axes | 6 axes | 4 axes | |
| | | Used motion control servo axes | 8 axes | 4 axes | 2 axes | --- | |
| | | Used single-axis position control servo axes | 4 axes | | | | |
| | Maximum number of axes for linear interpolation axis control | 4 axes per axes group | | | --- | | |
| | Number of axes for circular interpolation axis control | 2 axes per axes group | | | --- | | |
| | Maximum number of axes groups | 8 axes groups | | | --- | | |
| | Motion control period | The same control period as that is used for the process data communications cycle for EtherCAT. | | | | | |
| | Cams | Number of cam data points | Maximum points per cam table | 65,535 points | | | |
| Maximum points for all cam tables | | | 262,140 points | | | | |
| Maximum number of cam tables | | 160 tables | | | | | |
| Position units | Pulse, mm, μm, nm, degree, and inch | | | | | | |
| Override factors | 0.00%, or 0.01% to 500.00% | | | | | | |

| Item | | NX102- | | | | |
|---------------------------|--|---|---|-------------------------|------|--|
| | | 12□□ | 11□□ | 10□□ | 90□□ | |
| Built-in EtherNet/IP port | Number of ports | 2 | | | | |
| | Physical layer | 10BASE-T/100BASE-TX | | | | |
| | Frame length | 1,514 bytes max. | | | | |
| | Media access method | CSMA/CD | | | | |
| | Modulation | Baseband | | | | |
| | Topology | Star | | | | |
| | Baud rate | 100 Mbps (100BASE-TX) | | | | |
| | Transmission media | STP (shielded, twisted-pair) cable of Ethernet category 5, 5e or higher | | | | |
| | Maximum transmission distance between Ethernet switch and node | 100 m | | | | |
| | Maximum number of cascade connections | There are no restrictions if an Ethernet switch is used. | | | | |
| | CIP service: Tag data links (cyclic communications) | Maximum number of connections | 32 per port 64 total | | | |
| | | Packet interval *7 | Can be set for each connection. 1 to 10,000 ms in 1-ms increments | | | |
| | | Permissible communications band | 12,000 pps *8*9 (including heartbeat, CIP Safety routing) | | | |
| | | Maximum number of tag sets | 32 per port 40 total *10 | | | |
| | | Tag types | Network variables CIO/WR/HR/DM | | | |
| | | Number of tags per connection (i.e., per tag set) | 8 (7 tags if Controller status is included in the tag set.) | | | |
| | | Maximum number of tags | 256 per port 512 total | | | |
| | | Maximum link data size per node (total size for all tags) | 19,200 bytes per port 38,400 bytes total | | | |
| | | Maximum data size per connection | 600 bytes | | | |
| | | Maximum number of registrable tag sets | 32 per port 40 total *10 (1 connection = 1 tag set) | | | |
| | | Maximum tag set size | 600 bytes (Two bytes are used if Controller status is included in the tag set.) | | | |
| | | Multi-cast packet filter *11 | Supported. | | | |
| | CIP message service: Explicit messages | Class 3 (number of connections) | 32 per port 64 total (clients plus server) | | | |
| | | UCMM (non-connection type) | Maximum number of clients that can communicate at one time | 32 per port 64 total | | |
| | | | Maximum number of servers that can communicate at one time | 32 per port 64 total | | |
| | CIP Safety routing | Maximum number of routable CIP Safety connections | 16 total | | | |
| | | Maximum routable safety data length per connection | 32 bytes | | | |
| | Number of TCP sockets | 60 | | | | |
| | Secure Socket Service | Maximum number of Secure Socket | 60 | | | |
| | | TLS Version | 1.2 | | | |

Machine Automation Controller NX1

| Item | | NX102- | | | | |
|---------------------------------|----------------|---|--|---|------|--|
| | | 12□□ | 11□□ | 10□□ | 90□□ | |
| Built-in EtherNet/IP port | OPC UA Server | Support profile/Model | Micro Embedded Device Server Profile PLCopen Information Model | | | |
| | | Default Endpoint/Port | opc.tcp://192.168.250.1:4840/ | | | |
| | | Maximum number of sessions (Client) | 5 | | | |
| | | Maximum number of Monitored Items per server | 2,000 | | | |
| | | Sampling rate of Monitored Items (ms) | 0, 50, 100, 250, 500, 1000, 2000, 5,000, 10,000 (If set to 0 (zero), it is assumed that is set to 50.) | | | |
| | | Maximum number of Subscriptions per server | 100 | | | |
| | | Maximum number of variables that can be published | 10,000 | | | |
| | | Maximum number of value attributes that can be published *16 | 10,000 | | | |
| | | Maximum number of structure definitions that can be published | 100 | | | |
| | | Restrictions on variables unable to be published | <ul style="list-style-type: none"> • Variables whose size is over 1,024 bytes • Two-dimensional or higher structure arrays • Structures that include two-dimensional and higher arrays • Structures with four or higher levels of nesting • Unions • Arrays whose index number suffix does not start from 0 • Arrays with 1,024 or more elements • Structures with 100 or more members | | | |
| | | SecurityPolicy/Mode | Select one of the following. None Sign - Basic128Rsa15 Sign - Basic256 Sign - Basic256Sha256 SignAndEncrypt - Basic128Rsa15 SignAndEncrypt - Basic256 SignAndEncrypt - Basic256Sha256 | | | |
| | | Application Authentication | Authentication | X.509 | | |
| | | | Maximum number of storable certifications | Trusted certification: 32 Issuer certification: 32 Rejected certification: 32 | | |
| User Authentication | Authentication | You can set the following items. User name/password Anonymous | | | | |

| Item | | NX102- | | | |
|--------------------------|--|--|--|------|------|
| | | 12□□ | 11□□ | 10□□ | 90□□ |
| Built-in EtherCAT port | Communications standard | IEC 61158 Type12 | | | |
| | EtherCAT master specifications | Class B (Feature Pack Motion Control compliant) | | | |
| | Physical layer | 100BASE-TX | | | |
| | Modulation | Baseband | | | |
| | Baud rate | 100 Mbps (100BASE-TX) | | | |
| | Duplex mode | Auto | | | |
| | Topology | Line, daisy chain, branching and ring *13 | | | |
| | Transmission media | Twisted-pair cable of category 5 or higher (double-shielded straight cable with aluminum tape and braiding) | | | |
| | Maximum transmission distance between nodes | 100 m | | | |
| | Maximum number of slaves | 64 | | | |
| | Range of node addresses that can be set | 1 to 192 | | | |
| | Maximum process data size | Input: 5,736 bytes Output: 5,736 bytes *14 | | | |
| | Maximum process data size per slave | Input: 1,434 bytes Output: 1,434 bytes | | | |
| | Communications cycle | 1,000 to 32,000 μs (in 250-μs increments) | | | |
| Sync jitter | 1 μs max. | | | | |
| Unit configuration | Units on CPU Rack | Maximum number of NX Units that can be mounted to the CPU Unit | 32 | | |
| | | Maximum I/O data size that can be allocated in the CPU Unit | Inputs: 8,192 bytes *15 Outputs: 8,192 bytes *15 | | |
| | Maximum number of NX Units for entire controller | 400 | | | |
| | Power supply | Model | A non-isolated power supply for DC input is built into the CPU Unit. | | |
| Power OFF detection time | | 2 to 8 ms | | | |
| Internal clock | Accuracy | At ambient temperature of 55°C: -3.5 to 0.5 min error per month At ambient temperature of 25°C: -1.5 to 1.5 min error per month At ambient temperature of 0°C: -3 to 1 min error per month | | | |
| | Retention time of built-in capacitor | At ambient temperature of 40°C: 10 days | | | |

*1. Execution objects and variable tables (including variable names)

*2. Memory used for CJ-series Units is included.

*3. The value can be set in 1-word increments. The value is included in the total size of variables without a Retain attribute.

*4. The value can be set in 1-word increments. The value is included in the total size of variables with a Retain attribute.

*5. It is not possible to use the maximum number of words simultaneously for all banks, because the memory capacity for variables with a Retain attribute is limited to 1.5 MB.

*6. For terminology, refer to the *NJ/NX-series CPU Unit Motion Control User's Manual* (Cat. No. W507).

*7. Data will be refreshed at the set interval, regardless of the number of nodes.

*8. "pps" means packets per second, i.e., the number of communications packets that can be sent or received in one second.

*9. The allowable bandwidth varies depending on the RPI of the connection in use, the primary task period, and the number of ports simultaneously used for EtherNet/IP communications.

*10. When tag sets that exceed the total of 40 are set, a Number of Tag Sets for Tag Data Links Exceeded (840E0000 hex) occurs.

*11. As the EtherNet/IP port implements the IGMP client, unnecessary multi-cast packets can be filtered by using an Ethernet switch that supports IGMP Snooping.

*12. The number of value attributes is defined by the following formula.

Number of value attributes = (Number of basic data type variables) + (Number of array-specified elements) + (Number of values in the structure)

*13. Ring topology is supported with the project version 1.40 or later of NX102-□□□□.

Slaves on a ring topology should support a ring topology. If Omron slaves, please see the user's manual of slaves.

*14. For project unit version earlier than 1.40, the data must be within four frames.

*15. You can check the I/O allocation status with the Sysmac Studio. Refer to the *NJ/NX-series CPU Unit Software User's Manual* (Cat. No. W501) for how to check the I/O allocation status. Also, refer to the relevant manuals for specific Units for the maximum I/O data size per NX Unit.

Function Specifications

| Item | | NX102 | | | |
|---------------------------------------|---|---|---|--|--|
| Tasks | Function | I/O refreshing and the user program are executed in units that are called tasks. Tasks are used to specify execution conditions and execution priority. | | | |
| | | Periodically executed tasks | Maximum number of primary periodic tasks | 1 | |
| | | | Maximum number of periodic tasks | 2 | |
| | | Conditionally executed tasks | Maximum number of event tasks | 32 | |
| Execution condition | When Activate Event Task instruction is executed or when condition expression for variable is met | | | | |
| Programming | POU (Program Organization Unit) | Programs | | POUs that are assigned to tasks | |
| | | Function blocks | | POUs that are used to create objects with specific conditions | |
| | | Functions | | POUs that are used to create objects that determine unique outputs for the inputs, such as for data processing | |
| | Programming languages | Types | | Ladder diagrams *1 and structured text (ST) | |
| | Namespaces | | A concept that is used to group identifiers for POU definitions | | |
| | Variables | External access of variables | Network variables | The function which allows access from the HMI, host computers, or other controllers | |
| | Data types | Basic data types | Boolean | BOOL | |
| | | | Bit strings | BYTE, WORD, DWORD, LWORD | |
| | | | Integers | INT, SINT, DINT, LINT, UINT, USINT, UDINT, ULINT | |
| | | | Real numbers | REAL, LREAL | |
| | | | Durations | TIME | |
| | | | Dates | DATE | |
| | | | Times of day | TIME_OF_DAY | |
| | | | Date and time | DATE_AND_TIME | |
| | | | Text strings | STRING | |
| | | Derivative data types | | Structures, unions, enumerations | |
| | | Structures | Function | A derivative data type that groups together data with different variable types | |
| | | | Maximum number of members | 2,048 | |
| | | | Nesting maximum levels | 8 | |
| | | | Member data types | Basic data types, structures, unions, enumerations, array variables | |
| | | | Specifying member offsets | You can use member offsets to place structure members at any memory locations | |
| | | Unions | Function | A derivative data type that enables access to the same data with different data types | |
| | | | Maximum number of members | 4 | |
| | Member data types | | BOOL, BYTE, WORD, DWORD, LWORD | | |
| | Enumerations | Function | A derivative data type that uses text strings called enumerators to express variable values | | |
| | Data type attributes | Array specifications | Function | An array is a group of elements with the same data type. You specify the number (subscript) of the element from the first element to specify the element | |
| | | | Maximum number of dimensions | 3 | |
| Maximum number of elements | | | 65,535 | | |
| Array specifications for FB instances | | | Supported | | |
| Range specifications | | You can specify a range for a data type in advance. The data type can take only values that are in the specified range | | | |
| Libraries | | User libraries | | | |
| Motion control | Control modes | | Position control, velocity control, torque control | | |
| | Axis types | | Servo axes, virtual servo axes, encoder axes, virtual encoder axes, PTP axes | | |
| | Positions that can be managed | | Command positions and actual positions | | |

| | | Item | NX102 | |
|--|----------------------------------|--|--|--|
| Motion control | Single axes | Single-axis position control | Absolute positioning | Positioning is performed for a target position that is specified with an absolute value |
| | | | Relative positioning | Positioning is performed for a specified travel distance from the command current position |
| | | | Interrupt feeding | Positioning is performed for a specified travel distance from the position where an interrupt input was received from an external input |
| | | | Cyclic synchronous absolute positioning | A positioning command is output each control period in Position Control Mode |
| | | Single-axis velocity control | Velocity control | Velocity control is performed in Position Control Mode |
| | | | Cyclic synchronous velocity control | A velocity command is output each control period in Velocity Control Mode |
| | | Single-axis torque control | Torque control | The torque of the motor is controlled |
| | | Single-axis synchronized control | Starting cam operation | A cam motion is performed using the specified cam table |
| | | | Ending cam operation | The cam motion for the axis that is specified with the input parameter is ended |
| | | | Starting gear operation | A gear motion with the specified gear ratio is performed between a master axis and slave axis |
| | | | Positioning gear operation | A gear motion with the specified gear ratio and sync position is performed between a master axis and slave axis |
| | | | Ending gear operation | The specified gear motion or positioning gear motion is ended |
| | | | Synchronous positioning | Positioning is performed in sync with a specified master axis |
| | | | Master axis phase shift | The phase of a master axis in synchronized control is shifted |
| | | Combining axes | The command positions of two axes are added or subtracted and the result is output as the command position | |
| | | Single-axis manual operation | Powering the Servo | The Servo in the Servo Drive is turned ON to enable axis motion |
| | | | Jogging | An axis is jogged at a specified target velocity |
| | | Auxiliary functions for single-axis control | Resetting axis errors | Axes errors are cleared |
| | | | Homing | A motor is operated and the limit signals, home proximity signal, and home signal are used to define home |
| | | | Homing with parameter | The parameters are specified, the motor is operated, and the limit signals, home proximity signal, and home signal are used to define home |
| | | | High-speed homing | Positioning is performed for an absolute target position of 0 to return to home |
| | | | Stopping | An axis is decelerated to a stop |
| | | | Immediately stopping | An axis is stopped immediately |
| | | | Setting override factors | The target velocity of an axis can be changed |
| | Changing the current position | | The command current position or actual current position of an axis can be changed to any position. | |
| | Enabling external latches | | The position of an axis is recorded when a trigger occurs | |
| | Disabling external latches | | The current latch is disabled | |
| | Zone monitoring | | You can monitor the command position or actual position of an axis to see when it is within a specified range (zone) | |
| | Enabling digital cam switches | | You can turn a digital output ON and OFF according to the position of an axis | |
| | Monitoring axis following error | | You can monitor whether the difference between the command positions or actual positions of two specified axes exceeds a threshold value | |
| | Resetting the following error | | The error between the command current position and actual current position is set to 0 | |
| | Torque limit | | The torque control function of the Servo Drive can be enabled or disabled and the torque limits can be set to control the output torque | |
| | Slave Axis Position Compensation | | This function compensates the position of the slave axis currently in synchronized control. | |
| | Cam monitor | | Outputs the specified offset position for the slave axis in synchronous control. | |
| | Start velocity | You can set the initial velocity when axis motion starts | | |
| | Axes groups | Multi-axes coordinated control | Absolute linear interpolation | Linear interpolation is performed to a specified absolute position |
| Relative linear interpolation | | | Linear interpolation is performed to a specified relative position | |
| Circular 2D interpolation | | | Circular interpolation is performed for two axes | |
| Axes group cyclic synchronous absolute positioning | | | A positioning command is output each control period in Position Control Mode | |

| Item | | | NX102 | |
|-----------------------|----------------------------|--|--|---|
| Motion control | Axes groups | Auxiliary functions for multi-axes coordinated control | Resetting axes group errors | Axes group errors and axis errors are cleared |
| | | | Enabling axes groups | Motion of an axes group is enabled |
| | | | Disabling axes groups | Motion of an axes group is disabled |
| | | | Stopping axes groups | All axes in interpolated motion are decelerated to a stop |
| | | | Immediately stopping axes groups | All axes in interpolated motion are stopped immediately |
| | | | Setting axes group override factors | The blended target velocity is changed during interpolated motion |
| | | | Reading axes group positions | The command current positions and actual current positions of an axes group can be read |
| | | | Changing the axes in an axes group | The Composition Axes parameter in the axes group parameters can be overwritten temporarily |
| | Common items | Cams | Setting cam table properties | The end point index of the cam table that is specified in the input parameter is changed |
| | | | Saving cam tables | The cam table that is specified with the input parameter is saved in non-volatile memory in the CPU Unit |
| | | | Generating cam tables | The cam table is generated from the cam property and cam node that is specified in input parameters |
| | | Parameters | Writing MC settings | Some of the axis parameters or axes group parameters are overwritten temporarily |
| | | | Changing axis parameters | The axis parameters can be accessed or changed from the user program |
| | Auxiliary functions | Count modes | | You can select either Linear Mode (finite length) or Rotary Mode (infinite length). |
| | | Unit conversions | | You can set the display unit for each axis according to the machine |
| | | Acceleration/deceleration control | Automatic acceleration/deceleration control | Jerk is set for the acceleration/deceleration curve for an axis motion or axes group motion |
| | | | Changing the acceleration and deceleration rates | You can change the acceleration or deceleration rate even during acceleration or deceleration |
| | | In-position check | | You can set an in-position range and in-position check time to confirm when positioning is completed |
| | | Stop method | | You can set the stop method to the immediate stop input signal or limit input signal |
| | | Re-execution of motion control instructions | | You can change the input variables for a motion control instruction during execution and execute the instruction again to change the target values during operation |
| | | Multi-execution of motion control instructions (Buffer Mode) | | You can specify when to start execution and how to connect the velocities between operations when another motion control instruction is executed during operation |
| | | Continuous axes group motions (Transition Mode) | | You can specify the Transition Mode for multi-execution of instructions for axes group operation |
| | | Monitoring functions | Software limits | The movement range of an axis is monitored |
| | | | Following error | The error between the command current value and the actual current value is monitored for each axis |
| | | | Velocity, acceleration rate, deceleration rate, torque, interpolation velocity, interpolation acceleration rate, interpolation deceleration rate | You can set and monitor warning values for each axis and each axes group |
| | | Absolute encoder support | | You can use an OMRON 1S-series Servomotor or G5-series Servomotor with an Absolute Encoder to eliminate the need to perform homing at startup |
| | | Input signal logic inversion | | You can inverse the logic of immediate stop input signal, positive limit input signal, negative limit input signal, or home proximity input signal |
| | External interface signals | | | The Servo Drive input signals listed below are used. Home signal, home proximity signal, positive limit signal, negative limit signal, immediate stop signal, interrupt input signal |
| Unit (I/O) management | EtherCAT slaves | Maximum number of slaves | 64 | |
| Communications | Built-in EtherNet/IP port | Communications protocol | | TCP/IP, UDP/IP |
| | | TCP/IP functions | CIDR | The function which performs IP address allocations without using a class (class A to C) of IP address |
| | | | IP Forwarding | The function which forwards IP packets between interfaces |
| | | | Packet Filter | The function which checks the IP packet to determine whether to receive and send it based on the source IP address and TCP port number |

| Item | | | | NX102 | |
|------------------------|-----------------------------|---------------------------------------|--|---|---|
| Communications | Built-in EtherNet/IP port | CIP communications service | Tag data links | Programless cyclic data exchange is performed with the devices on the EtherNet/IP network | |
| | | | Message communications | CIP commands are sent to or received from the devices on the EtherNet/IP network | |
| | | | CIP Safety routing | Routing function for CIP Safety on the EtherNet/IP network. The endpoint of CIP Safety is NX-SL5□00 in the system | |
| | | TCP/IP applications | Socket services | Data is sent to and received from any node on Ethernet using the UDP or TCP protocol. Socket communications instructions are used | |
| | | | Secure Socket service (Client) | Establishes a TLS session with the TCP protocol, and sends and receives arbitrary data to and from the server and any node on the Ethernet using instructions for secure socket communication | |
| | | | FTP client | Files are transferred via FTP from the CPU Unit to computers or controllers at other Ethernet nodes. FTP client communications instructions are used | |
| | | | FTP server | Files can be read from or written to the SD Memory Card in the CPU Unit from computers at other Ethernet nodes | |
| | | | Automatic clock adjustment | Clock information is read from the NTP server at the specified time or at a specified interval after the power supply to the CPU Unit is turned ON. The internal clock time in the CPU Unit is updated with the read time | |
| | | SNMP agent | Built-in EtherNet/IP port internal status information is provided to network management software that uses an SNMP manager | | |
| | | OPC UA | Server function | The function to respond to requests from clients on the OPC UA network | |
| | EtherCAT port | Supported services | Process data communications | A communications method to exchange control information in cyclic communications between the EtherCAT master and slaves. This communications method is defined by CoE | |
| | | | SDO communications | A communications method to exchange control information in noncyclic event communications between EtherCAT master and slaves. This communications method is defined by CoE | |
| | | Network scanning | | Information is read from connected slave devices and the slave configuration is automatically generated | |
| | | DC (Distributed Clock) | | Time is synchronized by sharing the EtherCAT system time among all EtherCAT devices (including the master) | |
| | | Enable/disable settings for slaves | | The slaves can be enabled or disabled as communications targets | |
| | | Disconnecting/connecting slaves | | Temporarily disconnects a slave from the EtherCAT network for maintenance, such as for replacement of the slave, and then connects the slave again | |
| | | Supported application protocol | CoE | SDO messages of the CAN application can be sent to slaves via EtherCAT | |
| | Communications instructions | | | | CIP communications instructions, socket communications instructions, SDO message instructions, no-protocol communications instructions, FTP client instructions, Modbus RTU protocol instructions, Modbus TCP protocol instructions |
| | System management | Event logs | Function | | Events are recorded in the logs |
| | | | Maximum number of events | System event log | 768 *2 [containing] • For CPU Unit: 512 • For NX Unit without MPU: 256 |
| Access event log | | | | 576 [containing] • For CPU Unit: 512 • For NX Unit without MPU: 64 | |
| User-defined event log | | | | 512 | |
| Debugging | Online editing | Single | | Programs, function blocks, functions, and global variables can be changed online. More than one operators can change POU's individually via network | |
| | Forced refreshing | | | The user can force specific variables to TRUE or FALSE | |
| | | Maximum number of forced variables | Device variables for EtherCAT slaves | 64 | |
| | MC Test Run | | | | Motor operation and wiring can be checked from the Sysmac Studio |
| | Synchronizing | | | | The project file in the Sysmac Studio and the data in the CPU Unit can be made the same when online |
| | Differential monitoring | | | | You can monitor when a variable changes to TRUE or changes to FALSE |
| | | Maximum number of monitored variables | | 8 | |

Machine Automation Controller NX1

| Item | | | NX102 | |
|---|---|--|--|--|
| Debugging | Data tracing | Types | Single triggered trace | When the trigger condition is met, the specified number of samples are taken and then tracing stops automatically |
| | | | Continuous trace | Data tracing is executed continuously and the trace data is collected by the Sysmac Studio |
| | | Maximum number of simultaneous data traces | | 2 |
| | | Maximum number of records | | 10,000 |
| | | Sampling | Maximum number of sampled variables | 48 |
| | | Timing of sampling | | Sampling is performed for the specified task period, at the specified time, or when a sampling instruction is executed |
| | | Triggered traces | | Trigger conditions are set to record data before and after an event |
| | | | | <ul style="list-style-type: none"> When BOOL variable changes to TRUE or FALSE Comparison of non-BOOL variable with a constant. Comparison method: Equals (=), Greater than (>), Greater than or equals (≥), Less than (<), Less than or equals (≤), Not equal (≠) |
| | | | You can set the percentage of sampling before and after the trigger condition is met | |
| | Safety data logging | Function | | Records variables used in the safety program of the Safety CPU Unit in a chronological order |
| | | Targets | Target Safety CPU Unit | NX-SL5□□00 *3 |
| | | | Target variable types | Exposed variables and device variables used in the safety program |
| | | | Maximum number of logged variables | 100 |
| | | | Data types | SAFEBOOL, SAFEBYTE, SAFEWORD, SAFEINT, SAFEDINT, BOOL, BYTE, WORD, INT, DINT |
| | | | Maximum logging time | 480 s (Depends on logging interval) |
| Logging interval | Select from minimum value which stores from primary periodic task cycle or adds constant number multiple (x1, x2, x3, x4) of primary periodic task cycle *4 | | | |
| Maximum number of simultaneous executions | | 2 | | |
| Simulation | | The operation of the CPU Unit is emulated in the Sysmac Studio | | |
| Reliability functions | Self-diagnosis | Controller errors | Levels | Major faults, partial faults, minor faults, observation, information |
| | | User-defined errors | | User-defined errors are registered in advance and then records are created by executing instructions |
| | | Levels | | 8 |
| Security | Protecting software assets and preventing operating mistakes | CPU Unit names and serial IDs | | When going online to a CPU Unit from the Sysmac Studio, the CPU Unit name in the project is compared to the name of the CPU Unit being connected to |
| | | Protection | User program transfer with no restoration information | You can prevent reading data in the CPU Unit from the Sysmac Studio |
| | | | CPU Unit write protection | You can prevent writing data to the CPU Unit from the Sysmac Studio or SD Memory Card |
| | | | Overall project file protection | You can use passwords to protect .smc files from unauthorized opening on the Sysmac Studio |
| | | | Data protection | You can use passwords to protect POU's on the Sysmac Studio |
| | | Verification of operation authority | | Online operations can be restricted by operation rights to prevent damage to equipment or injuries that may be caused by operating mistakes |
| | | Number of groups | | 5 |
| Verification of user program execution ID | | The user program cannot be executed without entering a user program execution ID from the Sysmac Studio for the specific hardware (CPU Unit) | | |
| SD Memory Card functions | Storage type | | SD Memory Card, SDHC Memory Card | |
| | Application | Automatic transfer from SD Memory Card | When the power supply to the controller is turned ON, the data that is stored in the autoload directory of the SD Memory Card is transferred to the controller | |
| | | Program transfer from SD Memory Card | With the specification of the system-defined variable, you can transfer a program that is stored in the SD Memory Card to the controller | |
| | | SD Memory Card operation instructions | You can access SD Memory Cards from instructions in the user program | |
| | | File operations from the Sysmac Studio | You can perform file operations for controller files in the SD Memory Card and read/write standard document files on the computer | |
| | | SD Memory Card life expiration detection | Notification of the expiration of the life of the SD Memory Card is provided in a system-defined variable and event log | |

| Item | | | NX102 | |
|----------------------------------|---|--------------------------------------|---|---|
| Backing up data | SD Memory Card backups | Operating methods | CPU Unit front-panel DIP switch | You can perform backup, verification, and restoration operations by manipulating the front-panel DIP switch on the CPU Unit |
| | | | Specification with system-defined variables | You can perform backup, verification, and restoration operations by manipulating system-defined variables |
| | | | SD Memory Card Window in Sysmac Studio | Backup and verification operations are performed from the SD Memory Card Window of the Sysmac Studio |
| | | Special instruction | The special instruction is used to backup data | |
| | Protection | Disabling backups to SD Memory Cards | Backing up data to a SD Memory Card is prohibited | |
| | Safety Unit Restore from SD Memory Card | | | Restores the data of the Safety CPU Unit using the front-panel DIP switch on the Safety CPU Unit and SD Memory Card |
| Sysmac Studio Controller backups | | | The Sysmac Studio is used to backup, restore, or verify controller data | |

*1. Inline ST is supported. (Inline ST is ST that is written as an element in a ladder diagram.)

*2. Up to 512 system logs for events in the CPU Unit and 256 system logs in the NX Unit can be recorded.

*3. When connected to a CPU rack.

*4. Minimum value fulfills all these conditions.

- Larger than 5 ms
- Constant number multiple of primary periodic task cycle

Function Specifications of the Database Connection CPU Units

Besides functions of the NX102-□□□□, functions supported by the NX102-□□20 are as follows.

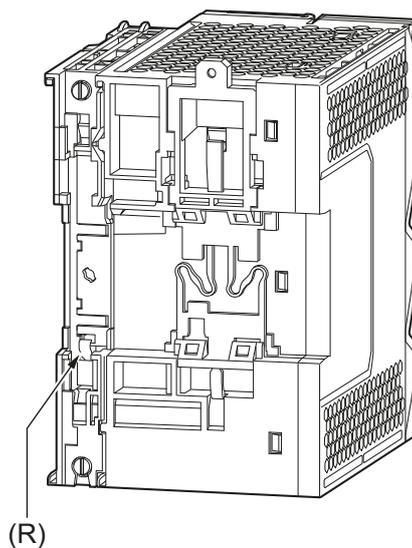
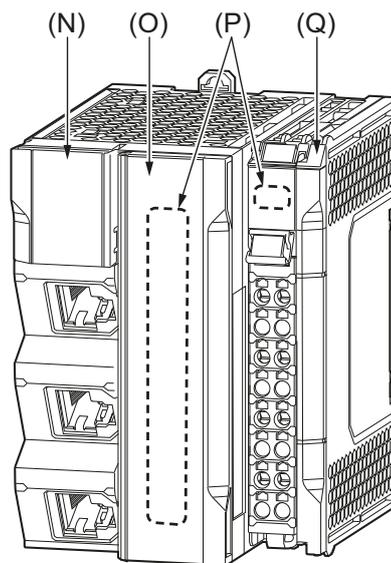
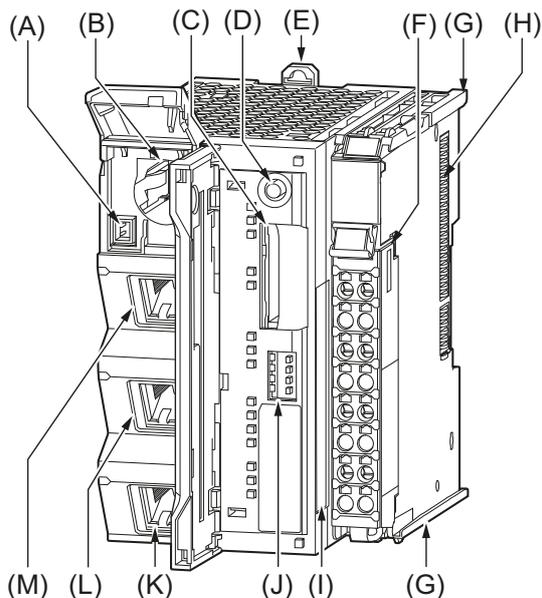
| Item | Description | | | | |
|---|---|---|--|------------|--|
| | NX102-1220 | NX102-1120 | NX102-1020 | NX102-9020 | |
| Supported port | Built-in EtherNet/IP port | | | | |
| Supported DB versions *1 *2 | SQL Server by Microsoft | 2012/2014/2016/2017/2019 | | | |
| | Oracle Database by Oracle | 11g/12c/18c/19c | | | |
| | DB2 for Linux, UNIX and Windows by IBM | 9.7/10.1/10.5/11.1 | | | |
| | MySQL Community Edition by Oracle*3 | 5.6/5.7/8.0 | | | |
| | Firebird by Firebird Foundation | 2.5 | | | |
| | PostgreSQL by PostgreSQL Global Development Group | 9.4/9.5/9.6/10/11/12/13 | | | |
| Number of DB Connections (Number of databases that can be connected at the same time) | 2*4 *5 | | | | |
| Instruction | Supported operations | The following operations can be performed by executing DB Connection Instructions in the CPU Units: Inserting records (INSERT), Updating records (UPDATE), Retrieving records (SELECT), Deleting records (DELETE), Execute Stored Procedure*6, and Execute Batch Insert*6 | | | |
| | Max. number of instructions for simultaneous execution | 32 | | | |
| | Max. number of columns in an INSERT operation | SQL Server: 1,024 Oracle: 1,000 DB2: 1,000 MySQL: 1,000 Firebird: 1,000 PostgreSQL: 1,000 | | | |
| | Max. number of columns in an UPDATE operation | SQL Server: 1,024 Oracle: 1,000 DB2: 1,000 MySQL: 1,000 Firebird: 1,000 PostgreSQL: 1,000 | | | |
| | Max. number of columns in a SELECT operation | SQL Server: 1,024 Oracle: 1,000 DB2: 1,000 MySQL: 1,000 Firebird: 1,000 PostgreSQL: 1,000 | | | |
| | Max. number of records in the output of a SELECT operation | 65,535 elements, 4 MB | | | |
| | Stored procedure call *6 | Supported databases | <ul style="list-style-type: none"> • SQL Server • Oracle Database • MySQL Community Edition • PostgreSQL | | |
| | | Argument (Sum of IN, OUT and INOUT) | Up to 256 variables*7 | | |
| | | Return value | One variable | | |
| | | Result set | Supported | | |
| | Batch insert execution *6 | Spool function | Not supported | | |
| | | Supported databases | <ul style="list-style-type: none"> • SQL Server • Oracle Database • MySQL Community Edition • PostgreSQL | | |
| | | Supported data size | Less than 1,000 columns and upper limit (8 MB) of structure variable size or less*8 | | |
| Max. number of DB Map Variables for which a mapping can be connected*9 | Spool function | Not supported | | | |
| | | SQL Server: 30*10 Oracle: 20*10 DB2: 20*10 MySQL: 20*10 Firebird: 15 PostgreSQL: 20*10 | | | |
| Run mode of the DB Connection Service | Operation Mode or Test Mode <ul style="list-style-type: none"> • Operation Mode: When each instruction is executed, the service actually accesses the DB • Test Mode: When each instruction is executed, the service ends the instruction normally without accessing the DB actually | | | | |
| Spool function | Used to store SQL statements when an error occurred and resend the statements when the communications are recovered from the error | | | | |
| | Spool capacity*11 | 192 KB | | | |
| Operation Log function | The following three types of logs can be recorded: <ul style="list-style-type: none"> • Execution Log: Log for tracing the executions of the DB Connection Service • Debug Log: Detailed log for SQL statement executions of the DB Connection Service • SQL Execution Failure Log: Log for execution failures of SQL statements in the DB | | | | |
| DB Connection Service Shutdown function | Used to shut down the DB Connection Service after automatically saving the operation log files into the SD Memory Card | | | | |
| Encrypted Communication | Supported databases | <ul style="list-style-type: none"> • SQL Server • Oracle Database • MySQL Community Edition • PostgreSQL | | | |
| | TLS Ver. | TLS 1.2 | | | |

- *1. SQL Server 2014, Oracle Database 12c and PostgreSQL 9.4 are supported by the DB Connection Service Version 1.02 or higher.
SQL Server 2016, MySQL 5.7, DB2 11.1 and PostgreSQL 9.5/9.6 are supported by the DB Connection Service Version 1.03 or higher.
SQL Server 2017 is supported by the DB Connection Service Version 1.04 or higher.
Oracle Database 18c, MySQL Community Edition 8.0 and PostgreSQL 10 are supported by the DB Connection Service Version 2.00 or higher.
You cannot use Oracle 10g with the DB Connection Service version 2.00 or higher.
SQL Server 2019, Oracle Database 19c and PostgreSQL 11/12/13 are supported by the DB Connection Service Version 2.01 or higher.
- *2. Connection to the DB on the cloud is not supported.
- *3. The supported storage engines of the DB are InnoDB and MyISAM.
- *4. When two or more DB Connections are established, the operation cannot be guaranteed if you set different database types for the connections.
- *5. For the DB Connection Service Version lower than 1.04, Number of DB Connection is 1.
- *6. The function is available for the DB Connection Service Version 2.00 or higher.
- *7. Depends on members of a structure.
- *8. Constrained by the memory capacity for variables. See the specifications for the memory capacity for variables.
- *9. Even if the number of DB Map Variables has not reached the upper limit, the maximum total number of members of structures used as data type of DB Map Variables is 10,000.
- *10. For DB Connection Service Version lower than 1.04, Max. number of DB Map Variables for which a mapping can be connected is 15.
- *11. Refer to the *NJ/NX-series Database Connection CPU Units User's Manual* (Cat. No. W527) for the information.

Note: The extended support for databases has ended for the following DB versions.
Please consider replacing the current database with a new version.

| Item | Description |
|--|-------------|
| Microsoft Corporation: SQL Server | 2008/2008R2 |
| Oracle Corporation: Oracle Database | 10g |
| Oracle Corporation: MySQL Community Edition | 5.1/5.5 |
| International Business Machines Corporation (IBM): DB2 for Linux, UNIX and Windows | 9.5 |
| Firebird Foundation Incorporated: Firebird | 2.1 |
| The PostgreSQL Global Development Group: PostgreSQL | 9.2/9.3 |

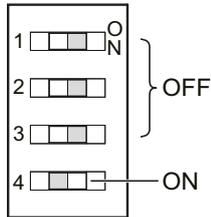
Part Names and Functions



| Letter | Name | Function |
|--------|------------------------------------|--|
| A | Battery connector | Connects a separately-sold backup battery to the CPU Unit. |
| B | Battery slot | Allows a separately-sold backup battery to be mounted into the CPU Unit. |
| C | SD Memory Card connector | Connects the SD Memory Card to the CPU Unit. |
| D | SD Memory Card power supply switch | Turns OFF the power supply so that you can remove the SD Memory Card. <i>NX-series NX102 CPU Unit Hardware User's Manual (W593)</i> |
| E | DIN Track mounting hook | This hook is used to mount the NX Unit to a DIN Track. |
| F | Terminal block | The terminal block is used for wiring for the Unit power supply and grounding cable. |
| G | Unit hookup guides | These guides are used to mount an NX Unit or the End Cover. |
| H | NX bus connector | This connector is used to connect the NX Unit mounted on the right side. |
| I | ID information indication | Shows the ID information of the CPU Unit. |
| J | DIP switch | Used in Safe Mode*1 or when backing up data*2. Normally, turn OFF all of the pins. |
| K | Built-in EtherCAT port (port 3) | Connects the built-in EtherCAT with an Ethernet cable. |
| L | Built-in EtherNet/IP port (port 2) | Connects the built-in EtherNet/IP with an Ethernet cable. |
| M | Built-in EtherNet/IP port (port 1) | Use port 1 to perform OPC UA communications. |
| N | Battery cover | A cover for the battery slot. It opens upward. |
| O | SD Memory Card | A cover for the SD Memory Card and the DIP switch. It opens toward the left. |
| P | Operation Status Indicators | Shows the operation status of the CPU Unit by multiple indicators. |

| Letter | Name | Function |
|--------|-------------------------|--|
| Q | End Cover | A cover to protect the NX Unit and CPU Unit. One End Cover is provided with the CPU Unit. |
| R | DIN Track contact plate | This plate is used to contact the functional ground terminal with a DIN Track. |

*1. To use Safe Mode, set the DIP switch as shown below and then turn ON the power supply to the Controller.



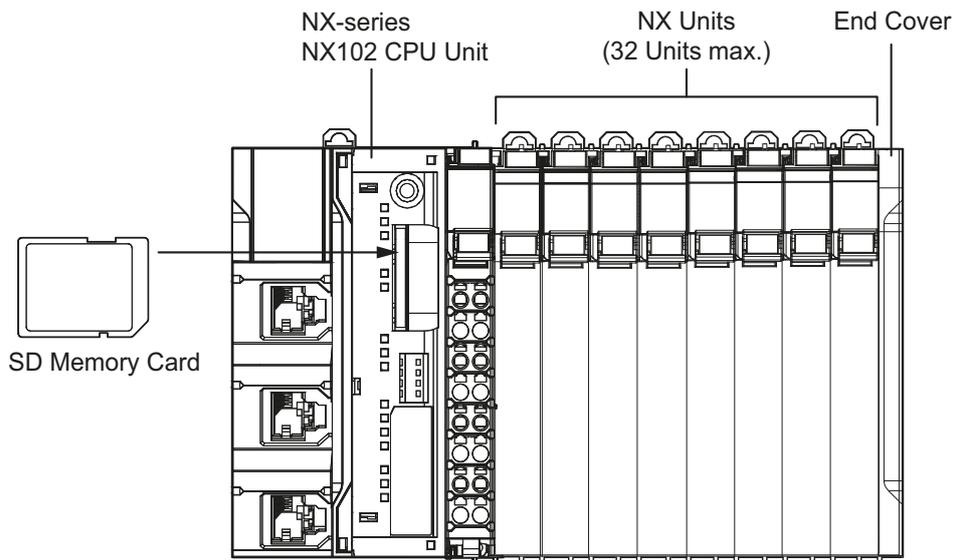
If the power supply to the Controller is turned ON with the CPU Unit in Safe Mode, the CPU Unit will start in PROGRAM mode. Use the Safe Mode if you do not want to execute the user program when the power supply is turned ON or if it is difficult to connect the Sysmac Studio. For information on Safe Mode, refer to the *NJ/NX-series Troubleshooting Manual* (Cat. No. W503).

*2. Refer to the *NJ/NX-series CPU Unit Software User's Manual* (Cat. No. W501) for details on backing up data.

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.



| Series | Configuration | Remarks | |
|--------------|------------------------------|--|--|
| NX-series | NX-series NX102 CPU Unit | One required for every CPU Rack. | |
| | End Cover | Must be connected to the right end of the CPU Rack. One End Cover is provided with the CPU Unit. | |
| | NX Units | Digital I/O Unit | Up to 32 Units can be mounted to each CPU Rack. Refer to <i>NX-series NX102 CPU Unit Hardware User's Manual</i> (W593) for information such as restrictions on the NX Units. For information on the most recent lineup of NX Units, refer to NX-series catalogs or OMRON websites, or ask your OMRON representative. |
| | | Analog I/O Unit | |
| | | System Unit | |
| | | Position Interface Unit | |
| | Communication Interface Unit | | |
| | Load Cell Input Unit | | |
| NJ/NX-series | SD Memory Card | Install as required. | |

Battery

The battery is not mounted when the product is shipped.

To turn OFF the power supply to the equipment for a certain period of time by using the clock data for programming, event logs, etc., you need a separately-sold battery to retain the clock data.

The following describes the purpose of the battery mounting, the battery model, and the battery-related error detection and clock data settings.

Purpose of the Battery Mounting

The battery is used to retain the clock data while the power is not supplied to the CPU Unit. The clock data is retained by the built-in capacitor whether the battery is mounted or not, but the retention period depends on the continuous power-ON time of the CPU Unit, as shown below.

| Continuous power-ON time of CPU Unit *1 | Retention period during no power supply at an ambient temperature of 40°C |
|---|---|
| 100 hours | Approx. 10 days |
| 8 hour | Approx. 8 days |
| 1 hour | Approx. 7 days |

*1. This is equivalent to the time to charge a built-in capacitor in which no electric charge is accumulated.

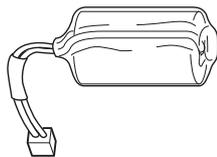
When you use the clock data for programming, use a battery if you cannot ensure the continuous power-ON time shown above or the power-OFF time is longer than the above power-ON time.

The following data (other than the clock data) is retained in the built-in non-volatile memory, so they are not lost even if the battery and built-in capacitor are fully discharged.

- User program
- Set values
- Variables retained during power interruption
- Event logs

Battery Model

The table below shows the model and specifications of the battery that can be used.

| Model | Appearance | Specification |
|------------|--|--|
| CJ1W-BAT01 |  | Service life: 5 years For the battery lifetime, refer to <i>NX-series NX102 CPU Unit Hardware User's Manual (W593)</i> . The clock information is retained during power interruptions. |

Sysmac Studio

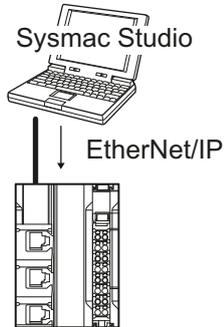
Connection

With an NX102 CPU Unit, you can connect the Sysmac Studio online in the following ways.

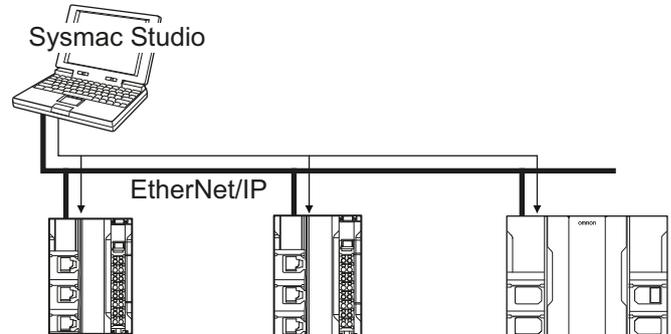
Configuration

Connection with EtherNet/IP

- 1: 1 Connection



- 1: N Connection



- A direct connection is made from the Sysmac Studio. The IP address and connection device do not need to be specified. *1
- You can make the connection whether or not an Ethernet switch is used.
- Support for Auto-MDI enables the use of cross cables or straight cables if a direct connection is made.
- 1: 1 connection is possible only for the built-in EtherNet/IP port 1.

Directly specify the IP address of the remote device.

*1. With the NX102 CPU Unit, this is possible only when you connect the Unit to the built-in EtherNet/IP port (port 1).

Version Information

Unit Versions and Corresponding Sysmac Studio Versions

Refer to *NX-series NX102 CPU Unit Hardware User's Manual (W593)*.

Unit Versions, DB Connection Service Versions and Sysmac Studio Versions (Database Connection CPU Units)

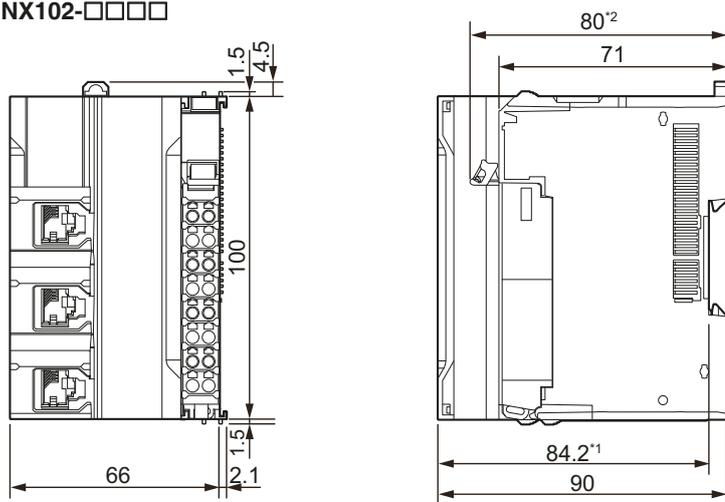
Refer to *NJ/NX-series Database Connection CPU Units User's Manual (W527)*.

Dimensions

(Unit: mm)

NX-Series NX102 CPU Unit

NX102-□□□□



Unit: [mm]

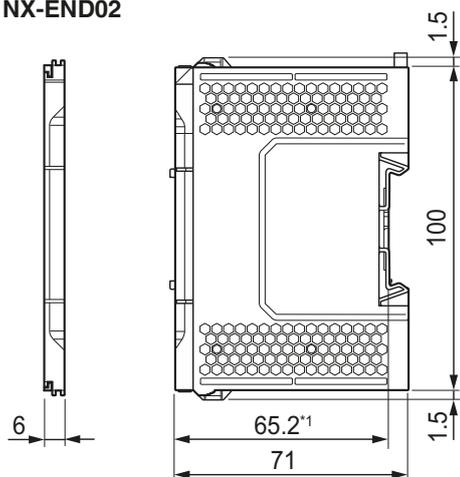
*1. The dimension from the attachment surface of the DIN Track to the front surface of the CPU Unit.

*2. The dimension from the terminal block lock lever to the back surface of the CPU Unit.

For dimensions after attaching the communications cables, refer to *NX-series NX102 CPU Unit Hardware User's Manual (W593)*.

End cover

NX-END02



Unit: [mm]

*1. The dimension from the attachment surface of the DIN Track to the front surface of the end cover.

Related Manuals

The following manuals are related. Use these manuals for reference.

| Manual name | Cat. No. | Model numbers | Application | Description |
|--|----------|--|--|---|
| 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"> • Features and system configuration • Introduction • Part names and functions • General specifications • Installation and wiring • Maintenance and Inspection |
| NJ/NX-series CPU Unit Software User's Manual | W501 | NX701-□□□□ NX102-□□□□ NX1P2-□□□□ NJ501-□□□□ NJ301-□□□□ NJ101-□□□□ | Learning how to program and set up an NJ/NX-series CPU Unit. Mainly software information is provided. | The following information is provided on a Controller built with an NJ/NX-series CPU Unit. <ul style="list-style-type: none"> • CPU Unit operation • CPU Unit features • Initial settings • Programming based on IEC 61131-3 language specifications |
| NJ/NX-series Instructions Reference Manual | W502 | NX701-□□□□ NX102-□□□□ NX1P2-□□□□ NJ501-□□□□ NJ301-□□□□ NJ101-□□□□ | Learning detailed specifications on the basic instructions of an NJ/NX-series CPU Unit. | The instructions in the instruction set (IEC 61131-3 specifications) are described. |
| NJ/NX-series CPU Unit Motion Control User's Manual | W507 | NX701-□□□□ NX102-□□□□ NX1P2-□□□□ NJ501-□□□□ NJ301-□□□□ NJ101-□□□□ | Learning about motion control settings and programming concepts. | The settings and operation of the CPU Unit and programming concepts for motion control are described. |
| NJ/NX-series Motion Control Instru- ctions Reference Manual | W508 | NX701-□□□□ NX102-□□□□ NX1P2-□□□□ NJ501-□□□□ NJ301-□□□□ NJ101-□□□□ | Learning about the specifications of the motion control instructions. | The motion control instructions are described. |
| NJ/NX-series CPU Unit Built-in EtherCAT® Port User's Manual | W505 | NX701-□□□□ NX102-□□□□ NX1P2-□□□□ NJ501-□□□□ NJ301-□□□□ NJ101-□□□□ | Using the built-in EtherCAT port on an NJ/NX-series CPU Unit. | Information on the built-in EtherCAT port is provided. This manual provides an introduction and provides information on the configuration, features, and setup. |
| NJ/NX-series CPU Unit Built-in EtherNet/IP™ Port User's Manual | W506 | NX701-□□□□ NX102-□□□□ NX1P2-□□□□ NJ501-□□□□ NJ301-□□□□ NJ101-□□□□ | Using the built-in EtherNet/IP port on an NJ/NX-series CPU Unit. | Information on the built-in EtherNet/IP port is provided. Information is provided on the basic setup, tag data links, and other features. |
| NJ/NX-series CPU Unit OPC UA User's Manual | W588 | NX102-□□□□ NX701-1□□□ NJ501-1□□□ | Using the OPC UA. | Describes the OPC UA. |
| NX-series CPU Unit FINS Function User's Manual | W596 | NX701-□□20 NX102-□□□□ | Using the FINS function of an NX-series CPU Unit. | Describes the FINS function of an NX-series CPU Unit. |
| NJ/NX-series Database Connection CPU Units User's Manual | W527 | NX701-□□20 NX102-□□20 NJ501-□□20 NJ101-□□20 | Using the database connection service with NJ/NX-series Controllers. | Describes the database connection service. |

Machine Automation Controller NX1

| Manual name | Cat. No. | Model numbers | Application | Description |
|--|----------|--|---|---|
| NJ/NX-series Troubleshooting Manual | W503 | NX701-□□□□ NX102-□□□□ NX1P2-□□□□ NJ501-□□□□ NJ301-□□□□ NJ101-□□□□ | Learning about the errors that may be detected in an NJ/NX-series Controller. | Concepts on managing errors that may be detected in an NJ/NX-series Controller and information on individual errors are described. |
| 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 EtherCAT® Coupler Unit User's Manual | W519 | NX-ECC□□□□ | 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. |
| 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. |
| NX-series NX Units User's Manual | W521 | NX-ID□□□□ NX-IA□□□□ NX-OC□□□□ NX-OD□□□□ NX-MD□□□□ | Learning how to use NX Units. | Describes the hardware, setup methods, and functions of the NX Units. Manuals are available for the following Units. Digital I/O Units, Analog I/O Units, System Units, Position Interface Units, Communications Interface Units, Load Cell Input Unit, and IO-Link Master Units. |
| | W522 | NX-AD□□□□ NX-DA□□□□ | | |
| | W566 | NX-TS□□□□ NX-HB□□□□ | | |
| | W523 | NX-PD1□□□□ NX-PF0□□□□ NX-PC0□□□□ NX-TBX01 | | |
| | W524 | NX-EC0□□□□ NX-ECS□□□□ NX-PG0□□□□ | | |
| | W540 | NX-CIF□□□□ | | |
| | W565 | NX-RS□□□□ | | |
| | W567 | NX-ILM□□□□ | | |
| NX-series Safety Control Unit User's Manual | Z930 | NX-SL□□□□ NX-SI□□□□ NX-SO□□□□ | Learning how to use NX-series Safety Control Units. | Describes the hardware, setup methods, and functions of the NX-series Safety Control Units. |
| NA-series Programmable Terminal Software User's Manual | V118 | NA5-□W□□□□ | Learning about NA-series PT pages and object functions. | Describes the pages and object functions of the NA-series Programmable Terminals. |
| NS-series Programmable Terminals Programming Manual | V073 | NS15-□□□□□□ NS12-□□□□□□ NS10-□□□□□□ NS8-□□□□□□ NS5-□□□□□□ | Learning how to use the NS-series Programmable Terminals. | Describes the setup methods, functions, etc. of the NS-series Programmable Terminals. |

Applicable Models for Cable Redundancy Function

For more information on applicable models of Cable Redundancy function, refer to the Applicable Models of Cable Redundancy Function (Cat. No. R200).

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