chanhvinh.com

# NX-series Load Cell Input Unit

# NX-RS□□□□

CSM_NX-RS_____DS_E_6_1

## Build a cost saving weighing/ measurement system by using load cells

- Converts the output signals from load cells into physical units such as weight or force and outputs them to the communications master



NX-RS1201

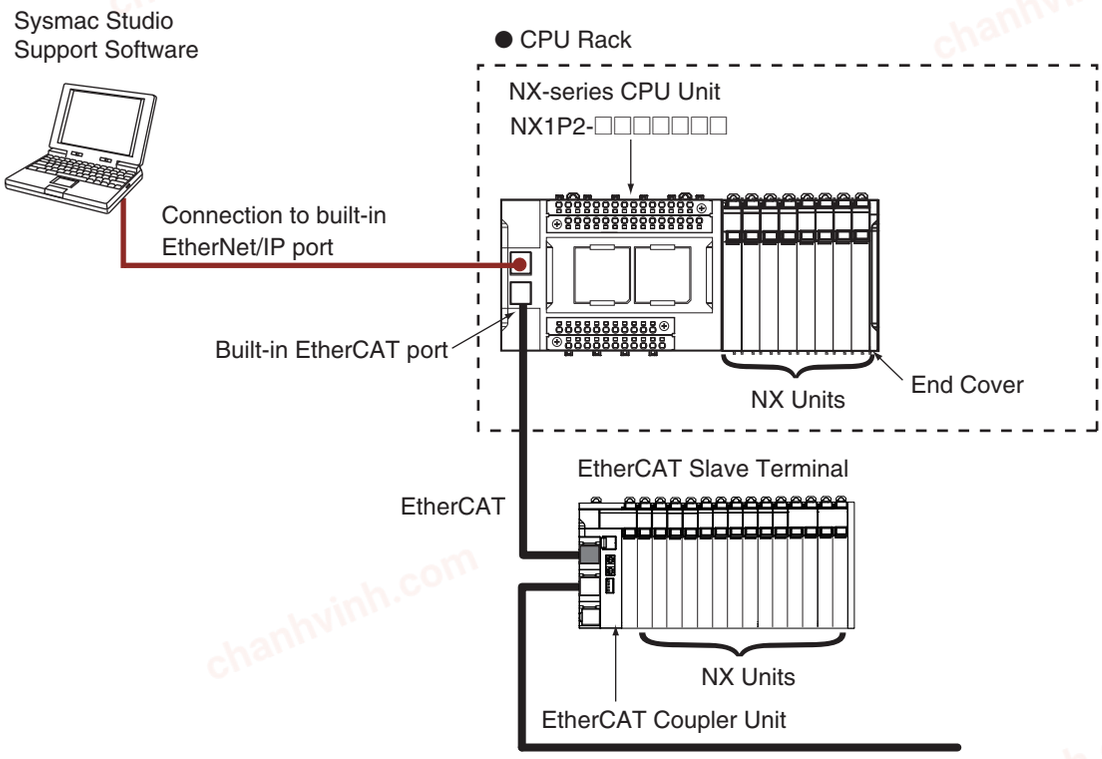
## Features

- Sampling as fast as 125 µs
- Accuracy applicable to high-precision load cells (nonlinearity: ±0.01% (full scale), zero drift: ±0.1 µV/°C RTI, gain drift: ±10 ppm/°C)
- Screwless clamping terminal block for easy wiring. Push-in connections speed up installation
- Stable measurements with digital filtering (digital low-pass filter, moving average filter 1, and moving average filter 2)
- Optimum digital filter design using data tracing
- Cable disconnection check using sensor disconnection test
- Connection to the CJ-series is possible by connecting with the EtherNet/IP™ Coupler.

## System Configuration

### System Configuration in the Case of a CPU Unit

The following figure shows a system configuration when a group of NX Units is connected to an NX-series CPU Unit.



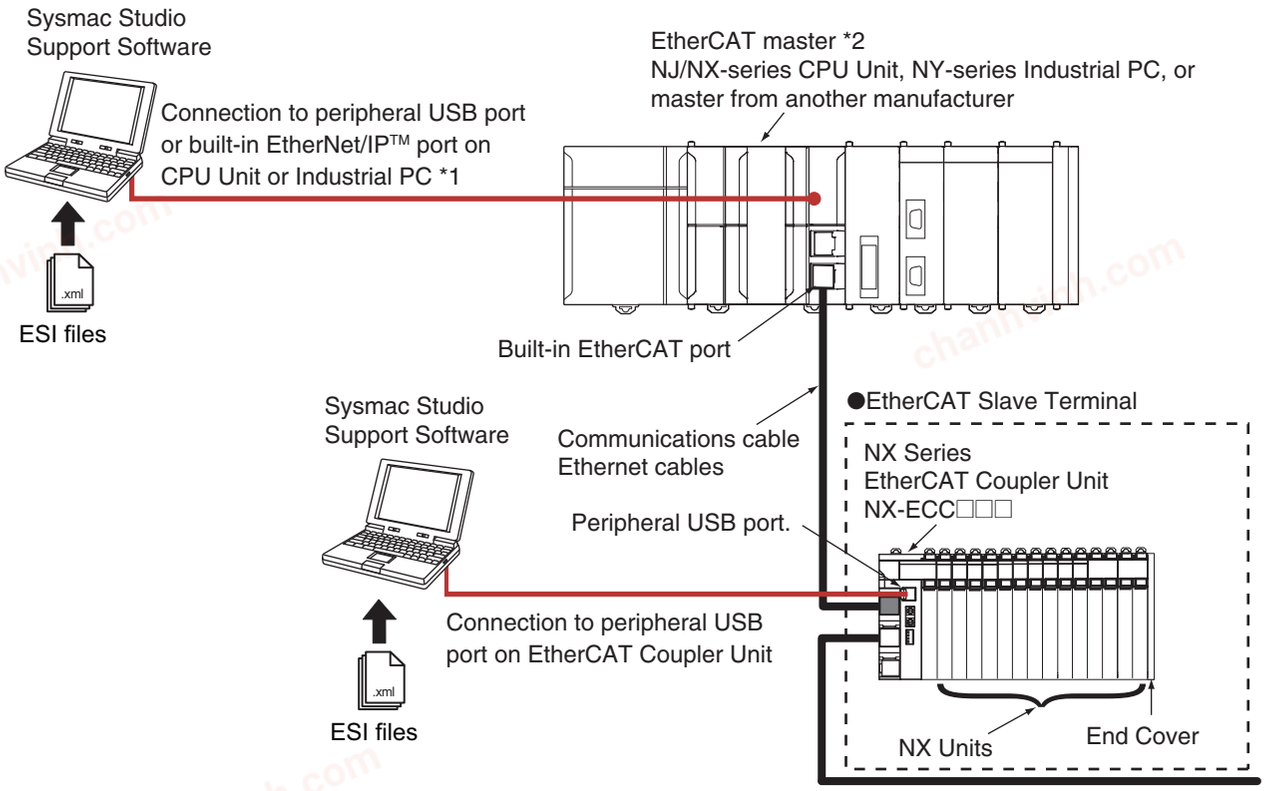

Sysmac is a trademark or registered trademark of OMRON Corporation in Japan and other countries for OMRON factory automation products. EtherCAT® is a registered trademark of Beckhoff Automation GmbH for their patented technology. EtherNet/IP™ is the trademarks of ODVA. Other company names and product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

chanhvinh.com



## System Configuration of Slave Terminals

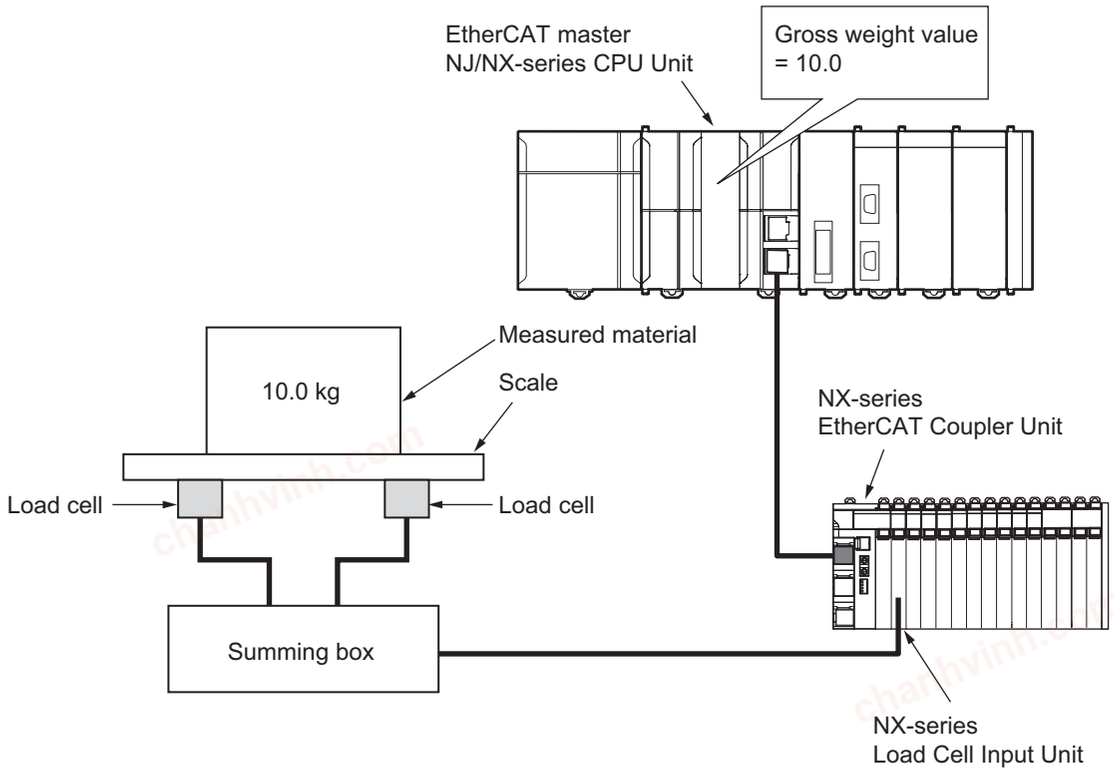
The following figure shows an example of the system configuration when an EtherCAT Coupler Unit is used as a Communications Coupler Unit.




✻1 The connection method for the Sysmac Studio depends on the model of the CPU Unit or Industrial PC.
✻2 An EtherCAT Slave Terminal cannot be connected to any of the OMRON CJ1W-NC□81/□82 Position Control Units even though they can operate as EtherCAT masters.

**Note:** For whether NX Units can be connected to the CPU Unit or Communications Coupler Unit to be used, refer to the version information.

## Weighing system configuration using load cell input unit



chanhvinh.com



# 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.

## Load Cell Input Unit

| Product name | Specification | | | | | Model |
|---|---|---|---|---|---|---|
| | Number of points | Conversion cycle | I/O refreshing method * | Load cell excitation voltage | Input range | |
| Load Cell Input Unit  | 1 | 125µs | • Free-Run refreshing<br>• Synchronous I/O refreshing<br>• Task period prioritized refreshing | 5 VDC ± 10% | -5.0 to 5.0 mV/V | **NX-RS1201** |

* Refer to the *I/O Refreshing* in the *NX-series Load Cell Input Unit User's Manual* (Cat. No. W565) for detailed information on I/O refresh cycle.
**Note:** The NX-RS1201-K Load Cell Input Unit with the test and calibration certificate is also available. Ask your OMRON representative for details.

## Optional Products

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

| Product name | Specification | | | | Model |
|---|---|---|---|---|---|
| | No. of terminals | Terminal number indications | Ground terminal mark | Terminal current capacity | |
| **Terminal Block** | 16 | A/B | Provided | 10 A | **NX-TBC162** |

## Accessories

Not included.

chanhvinh.com



# General Specification

| Item | | Specification |
|---|---|---|
| **Enclosure** | | Mounted in a panel |
| **Grounding methods** | | Ground of 100 Ω or less |
| **Operating environment** | **Ambient operating temperature** | 0 to 55°C |
| | **Ambient operating humidity** | 10 to 95% RH (with no icing or condensation) |
| | **Atmosphere** | Must be free from corrosive gases. |
| | **Ambient storage temperature** | –25 to 70°C (with no icing or condensation) |
| | **Altitude** | 2,000 m max. |
| | **Pollution degree** | Pollution degree 2 or less: Meets IEC 61010-2-201. |
| | **Noise immunity** | Conforms to IEC 61000-4-4, 2 kV (power supply line) |
| | **Overvoltage category** | Category II: Meets IEC 61010-2-201. |
| | **EMC immunity level** | Zone B |
| | **Vibration resistance** | Conforms to IEC 60068-2-6.<br>5 to 8.4 Hz with amplitude of 3.5 mm,<br>8.4 to 150 Hz, acceleration of 9.8 $m/s^2$<br>100 min each in X, Y, and Z directions (10 sweeps of 10 min each = 100 min total) |
| | **Shock resistance** | Conforms to IEC 60068-2-27, 147 $m/s^2$, 3 times each in X, Y, and Z directions |
| **Applicable standards *** | | cULus: Listed (UL61010-2-201), ANSI/ISA 12.12.01, EU: EN 61131-2, NK, LR, RCM, KC: KC Registration |

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

chanhvinh.com



# Function Specification

Supported: Functions that are used in target applications
-: Functions that are not used in target applications

| Function | Application | | Description |
|---|---|---|---|
| | Weight measurement *1 | Force measurement *2 | |
| **I/O refreshing method setting *3** | Supported. | Supported. | Sets Free-Run refreshing, synchronous I/O refreshing,*4 or task period prioritized refreshing*5 for the I/O refreshing*6 method. |
| **Actual load calibration** | Supported. | Supported. | This is a user calibration function that is performed by placing an actual load on the load cell. |
| **Equivalent input calibration** | Supported. | Supported. | This is a user calibration function that is performed by inputting the rated output, rated capacity, and zero balance values of the load cell. |
| **Gravity acceleration correction** | Supported. | --- | This function corrects errors in the gross weight values that occur due to the difference of gravity acceleration at each site when the site where the actual load calibration of the device is executed and the installation site are different. |
| **Digital filtering** | Supported. | Supported. | This function uses the digital filter to remove noise components that are contained in input signals to suppress fluctuations of measurement values. You can use the digital low-pass filter and moving average filter. |
| **Zero set/zero reset** | Supported. | Supported. | The zero set function corrects the gross weight value/force measurement value to be the zero point within the set range at a desired time.<br>The zero reset function resets the zero point correction that is performed with the zero set function. |
| **Zero tracking** | Supported. | --- | This function automatically corrects the zero point within the set range. |
| **Zero point range over detection** | Supported. | Supported. | This function detects when the gross weight value/force measurement value exceeds the set zero point range. |
| **Tare subtraction** | Supported. | --- | This function subtracts the tare weight value from the gross weight value to acquire the net weight value. There are two types of this function: one-touch tare subtraction and digital tare subtraction. |
| **One-touch tare subtraction** | Supported. | --- | This function stores the gross weight value at the specified timing as the tare value and subtracts it from a given gross weight value to acquire the net weight value. |
| **Digital tare subtraction** | Supported. | --- | This function subtracts the preset digital tare value from the gross weight value to acquire the net weight value. |
| **Stable detection** | Supported. | --- | This function detects whether the gross weight value is stable. |
| **Over range/under range detection** | Supported. | Supported. | This function detects when the input signal exceeds the input conversion range. |
| **Sensor disconnection test** | Supported. | Supported. | This function tests if the cable that connects the Load Cell Input Unit and load cell is disconnected. During the sensor disconnection test, you cannot measure the weight or force. |
| **Input value refreshing stop** | Supported. | Supported. | This function stops refreshing the input value in a specified period. |
| **Peak hold/bottom hold** | --- | Supported. | This function continues holding the peak value or the bottom value of the force measurement value in a specified period. |
| **Data tracing** | Supported. | Supported. | This function records the values in REAL data in the buffer of the Load Cell Input Unit and exports the data to a CSV file.<br>These values indicate the gross weight values/force measurement values before and after the digital filtering in a specified period. |
| **Decimal point position setting** | Supported. | Supported. | This function sets the number of digits which is displayed after the decimal point for each DINT data. |

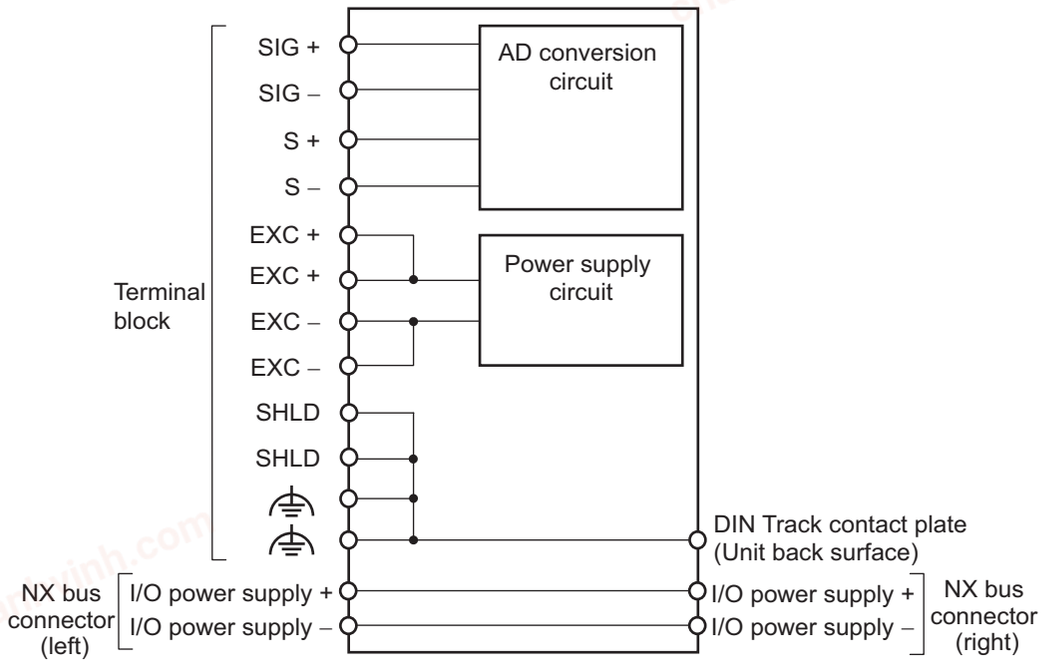
*1. It is used to measure the weight in the unit of kg or t.
*2. It is used to measure the force in the unit of N or kN.
*3. Select with the Communications Coupler Unit setting. Refer to the NX-series Load Cell Input Unit User's Manual (W565) for details on the setting method.
*4. You can select this option only when the Unit is used with an EtherCAT Coupler Unit with EtherCAT communications in DC Mode.
*5. You can select this option only when the Unit is used with an EtherCAT Coupler Unit NX-ECC203 with EtherCAT communications in DC Mode.
*6. This is the data exchange with the Controller.

chanhvinh.com



# Individual Specifications

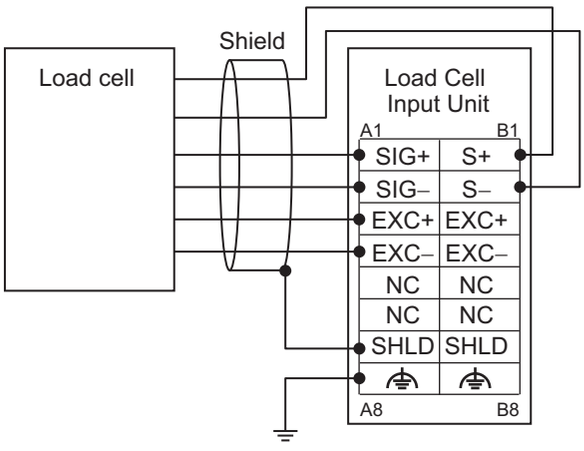
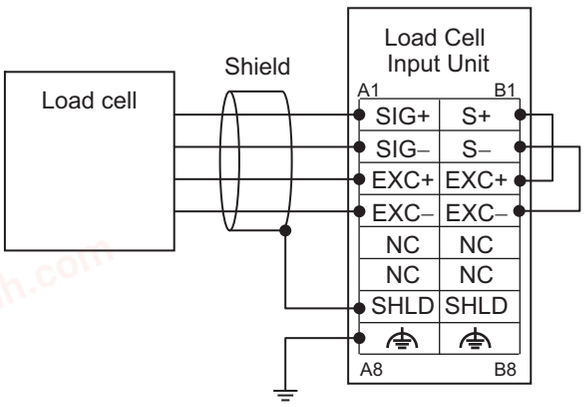
## Load Cell Input Unit
## NX-RS1201

| | | | | |
|---|---|---|---|---|
| **Unit name** | Load Cell Input Unit | **Model** | | NX-RS1201 |
| **Number of points** | 1 point | **External connection terminals** | | Screwless clamping terminal block (16 terminals) |
| **I/O refreshing method** | Free-Run refreshing, synchronous I/O refreshing, or task period prioritized refreshing | | | |
| **Indicators** | TS indicator   | **Input range** | | –5.0 to 5.0 mV/V |
| | | **Input conversion range** | | –5.5 to 5.5 mV/V |
| | | **Load cell excitation voltage** | | 5 VDC ± 10%, Output current: 60 mA max. |
| | | **Zero point adjustment range** | | –5.0 to 5.0 mV/V |
| | | **Gain point adjustment range** | | –5.0 to 5.0 mV/V |
| | | **Accuracy *1** | **Nonlinearity** | ±0.01% (full scale) *2 |
| | | | **Zero drift** | ±0.1 μV/°C RTI |
| | | | **Gain drift** | ±10 ppm/°C |
| | | **A/D converter resolution** | | 24 bits |
| **Warm-up period** | 30 minutes | **Conversion cycle** | | 125 μs |
| **Dimensions** | 12 (W) × 100 (H) × 71 (D) | **Isolation method** | | Between the input and the NX bus: Power = Transformer, Signal = Digital isolator |
| **Insulation resistance** | 20 MΩ min. between isolated circuits (at 100 VDC) | **Dielectric strength** | | 510 VAC between isolated circuits for 1 minute at a leakage current of 5 mA max. |
| **I/O power supply method** | No supply | **Current capacity of I/O power supply terminal** | | Without I/O power supply terminals |
| **NX Unit power consumption** | • Connected to a CPU Unit<br>2.05 W max.<br>• Connected to a Communications Coupler Unit<br>1.70 W max. | **Current consumption from I/O power supply** | | No consumption |
| **Weight** | 70 g max. | | | |
| **Circuit layout** |   | | | |
| **Installation orientation and restrictions** | Installation orientation:<br>• Connected to a CPU Unit: Possible in upright installation.<br>• Connected to a Communications Coupler Unit: Possible in 6 orientations.<br>Restrictions: No restrictions | | | |

*1. Accuracy for when the load cell and the Load Cell Input Unit are connected with the 6-wire connection.
*2. The value for when the Load Cell Unit is used under the following conditions.
Full scale: 0.0 to 5.0 mV/V or -5.0 to 0.0 mV/V
Ambient temperature: 25°C
Setting of digital filtering: Default

chanhvinh.com



| | |
|---|---|
| **Terminal connection diagram** | Diagram of the 6-wire connection between the Unit and a load cell.<br><br><br>Ground of 100 Ω or less<br>Diagram of the 4-wire connection between the Unit and a load cell.<br><br><br>Ground of 100 Ω or less |

chanhvinh.com



# Version Information

## Connecting with CPU Units

Refer to the user's manual for the CPU Unit for the CPU Unit to which NX Units can be connected.

| NX Unit | | Corresponding unit versions/versions | |
|---|---|---|---|
| Model | Unit version | CPU Unit | Sysmac Studio |
| NX-RS1201 | Ver.1.0 | Ver.1.13 | Ver.1.17 |

**Note:** Some Units do not have all of the versions given in the above table. If a Unit does not have the specified version, support is provided by the oldest available version after the specified version. Refer to the user's manuals for the specific Units for the relation between models and versions.

## Connecting with an EtherCAT Coupler Units

| NX Unit | | Corresponding unit versions/versions | | |
|---|---|---|---|---|
| | | EtherCAT | | |
| Model | Unit version | EtherCAT Coupler Unit | CPU Units or Industrial PCs | Sysmac Studio |
| NX-RS1201 | Ver.1.0 | Ver.1.0 | Ver.1.05 | Ver.1.16 |

**Note:** Some Units do not have all of the versions given in the above table. If a Unit does not have the specified version, support is provided by the oldest available version after the specified version. Refer to the user's manuals for the specific Units for the relation between models and versions.

## Connecting with EtherNet/IP Coupler Unit

| NX Unit | | Corresponding unit versions/versions | | | | | |
|---|---|---|---|---|---|---|---|
| | | Application with an NJ/NX/NY-series Controller *1 | | | Application with a CS/CJ/CP-series PLC *2 | | |
| Model | Unit version | EtherNet/IP Coupler Unit | CPU Unit or Industrial PC | Sysmac Studio | EtherNet/IP Coupler Unit | Sysmac Studio | NX-IO Configurator *3 |
| NX-RS1201 | Ver. 1.0 | Ver. 1.2 | Ver. 1.14 | Ver. 1.19 | Ver. 1.0 | Ver. 1.16 | Ver. 1.00 |

**Note:** Some Units do not have all of the versions given in the above table. If a Unit does not have the specified version, support is provided by the oldest available version after the specified version. Refer to the user's manuals for the specific Units for the relation between models and versions.

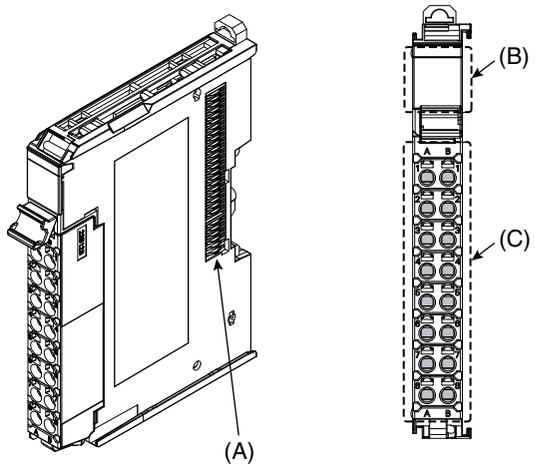
*1. Refer to the user's manual for the EtherNet/IP Coupler Units for information on the unit versions of EtherNet/IP Units that are compatible with EtherNet/IP Coupler Units.
*2. Refer to the user's manual for the EtherNet/IP Coupler Units for information on the unit versions of CPU Units and EtherNet/IP Units that are compatible with EtherNet/IP Coupler Units.
*3. For connection to an EtherNet/IP Coupler Unit with unit version 1.0, You can connect only to the peripheral USB port on the EtherNet/IP Coupler Unit. You cannot connect with any other path. If you need to connect by another path, use an EtherNet/IP Coupler Unit with unit version 1.2 or later.

chanhvinh.com



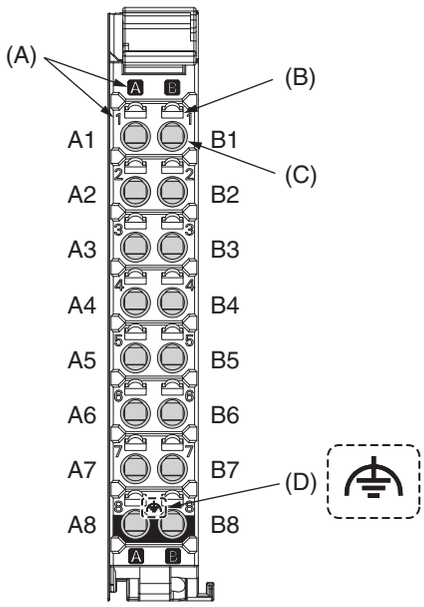
# External Interface

### NX-RS1201




| Letter | Item | Specification |
|---|---|---|
| (A) | NX bus connector | This connector is used to connect each Unit. |
| (B) | Indicators | The indicators show the current operating status of the Unit. |
| (C) | Terminal block | This terminal block is used to connect the load cell of the external device. |

### Terminal Blocks




| Letter | Item | Specification |
|---|---|---|
| (A) | Terminal number indication | The terminal numbers are given by column letters A and B, and row numbers 1 to 8.<br>The combination of the column and row gives the terminal numbers from A1 to A8 and B1 to B8. |
| (B) | Release hole | Insert a flat-blade screwdriver into this hole to connect and remove the wire. |
| (C) | Terminal hole | The wire is inserted into this hole. |
| (D) | Ground terminal mark | This mark indicates the ground terminals. |

### Applicable Terminal Blocks for Each Unit Model

| Unit model | Terminal Blocks | | | | |
|---|---|---|---|---|---|
| | Model | No. of terminals | Terminal number indications | Ground terminal mark | Terminal current capacity |
| NX-RS1201 | NX-TBC162 | 16 | A/B | Provided | 10A |

chanhvinh.com



# Applicable Wires

## Using Ferrules

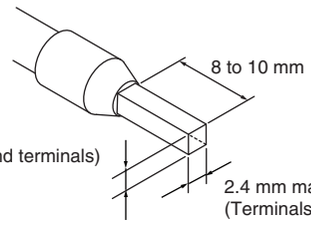
If you use ferrules, attach the twisted wires to them.
Observe the application instructions for your ferrules for the wire stripping length when attaching ferrules.
Always use plated one-pin ferrules. Do not use unplated ferrules or two-pin ferrules.

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

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

* Some AWG 14 wires exceed 2.0 $mm^2$ and cannot be used in the screwless clamping terminal block.

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



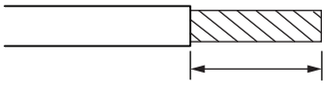

1.6 mm max.
(Terminals other than ground terminals)
2.0 mm max.
(Ground terminals)
2.4 mm max.
(Terminals other than ground terminals)
2.7 mm max.
(Ground terminals)

## Using Twisted Wires/Solid Wires

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

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

*1. Secure wires to the screwless clamping terminal block. Refer to the Securing Wires in the USER'S MANUAL for how to secure wires.
*2. With the NX-TB□□□1 Terminal Block, use twisted wires to connect the ground terminal. Do not use a solid wire.



Conductor length (stripping length)

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

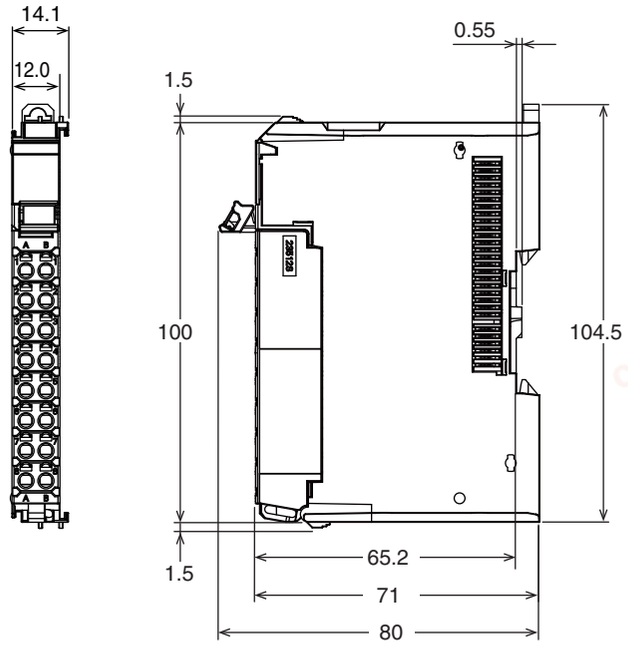
chanhvinh.com



## Dimensions

(Unit: mm)

### NX-RS1201




## Related Manuals

| Man. No | Model | Manual | Application | Description |
|---|---|---|---|---|
| W565 | NX-RS□□□□ | NX-series Load Cell Input Unit User's Manual | Learning how to use an NX-series Load Cell Input Unit | The hardware, setup methods, and functions of the NX-series Load Cell Input Unit are described. |

chanhvinh.com

# Terms and Conditions Agreement

Read and understand this catalog.
Please read and understand this catalog before purchasing the products. Please consult your OMRON representative if you have any questions or comments.

Warranties.
(a) Exclusive Warranty. Omron's exclusive warranty is that the Products will be free from defects in materials and workmanship for a period of twelve months from the date of sale by Omron (or such other period expressed in writing by Omron). Omron disclaims all other warranties, express or implied.
(b) Limitations. OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, ABOUT NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OF THE PRODUCTS. BUYER ACKNOWLEDGES THAT IT ALONE HAS DETERMINED THAT THE
PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE.
Omron further disclaims all warranties and responsibility of any type for claims or expenses based on infringement by the Products or otherwise of any intellectual property right. (c) Buyer Remedy. Omron's sole obligation hereunder shall be, at Omron's election, to (i) replace (in the form originally shipped with Buyer responsible for labor charges for removal or replacement thereof) the non-complying Product, (ii) repair the non-complying Product, or (iii) repay or credit Buyer an amount equal to the purchase price of the non-complying Product; provided that in no event shall Omron be responsible for warranty, repair, indemnity or any other claims or expenses regarding the Products unless Omron's analysis confirms that the Products were properly handled, stored, installed and maintained and not subject to contamination, abuse, misuse or inappropriate modification. Return of any Products by Buyer must be approved in writing by Omron before shipment. Omron Companies shall not be liable for the suitability or unsuitability or the results from the use of Products in combination with any electrical or electronic components, circuits, system assemblies or any other materials or substances or environments. Any advice, recommendations or information given orally or in writing, are not to be construed as an amendment or addition to the above warranty.
See http://www.omron.com/global/ or contact your Omron representative for published information.

Limitation on Liability; Etc.
OMRON COMPANIES SHALL NOT BE LIABLE FOR SPECIAL, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS OR PRODUCTION OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCTS, WHETHER SUCH CLAIM IS BASED IN CONTRACT, WARRANTY, NEGLIGENCE OR STRICT LIABILITY.
Further, in no event shall liability of Omron Companies exceed the individual price of the Product on which liability is asserted.

Suitability of Use.
Omron Companies shall not be responsible for conformity with any standards, codes or regulations which apply to the combination of the Product in the Buyer's application or use of the Product. At Buyer's request, Omron will provide applicable third party certification documents identifying ratings and limitations of use which apply to the Product. This information by itself is not sufficient for a complete determination of the suitability of the Product in combination with the end product, machine, system, or other application or use. Buyer shall be solely responsible for determining appropriateness of the particular Product with respect to Buyer's application, product or system. Buyer shall take application responsibility in all cases.
NEVER USE THE PRODUCT FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY OR IN LARGE QUANTITIES WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCT(S) IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

Programmable Products.
Omron Companies shall not be responsible for the user's programming of a programmable Product, or any consequence thereof.

Performance Data.
Data presented in Omron Company websites, catalogs and other materials is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of Omron's test conditions, and the user must correlate it to actual application requirements. Actual performance is subject to the Omron's Warranty and Limitations of Liability.

Change in Specifications.
Product specifications and accessories may be changed at any time based on improvements and other reasons. It is our practice to change part numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the Product may be changed without any notice. When in doubt, special part numbers may be assigned to fix or establish key specifications for your application. Please consult with your Omron's representative at any time to confirm actual specifications of purchased Product.

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

2020.2

**In the interest of product improvement, specifications are subject to change without notice.**

**OMRON Corporation**
**Industrial Automation Company**

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

(c)Copyright OMRON Corporation 2020 All Right Reserved.