NX-series Load Cell Input Unit

NX-RS□□□□

CSM_NX-RS_____DS_E_3_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

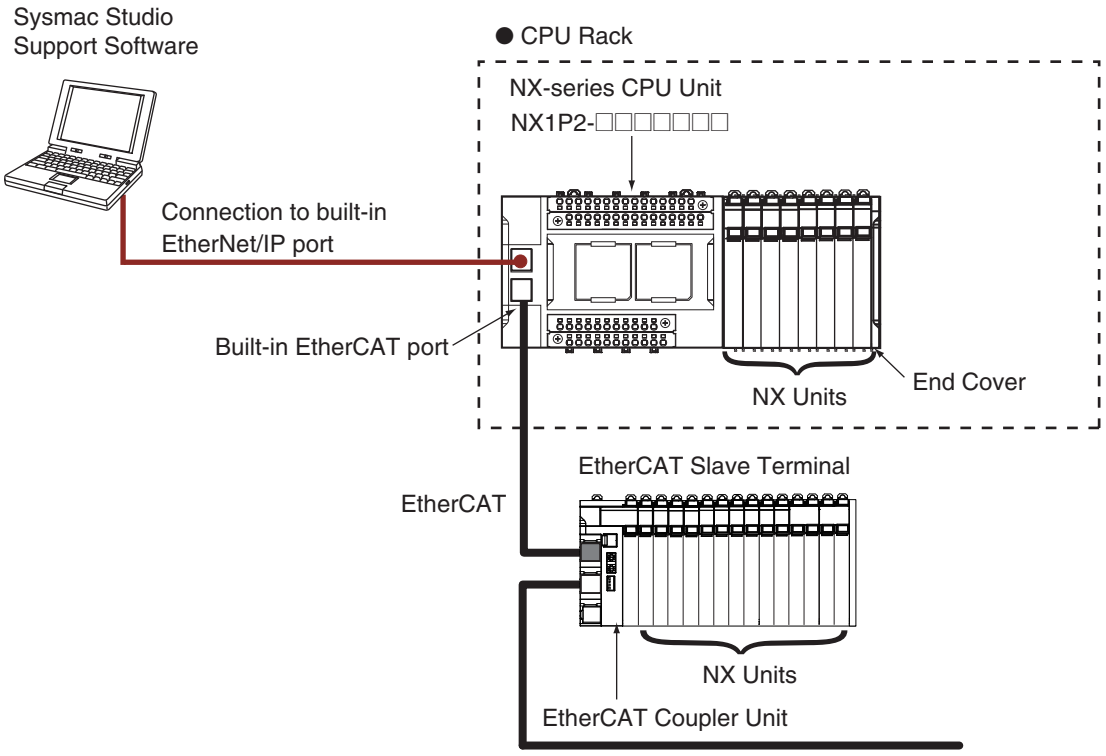
Features

- 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.



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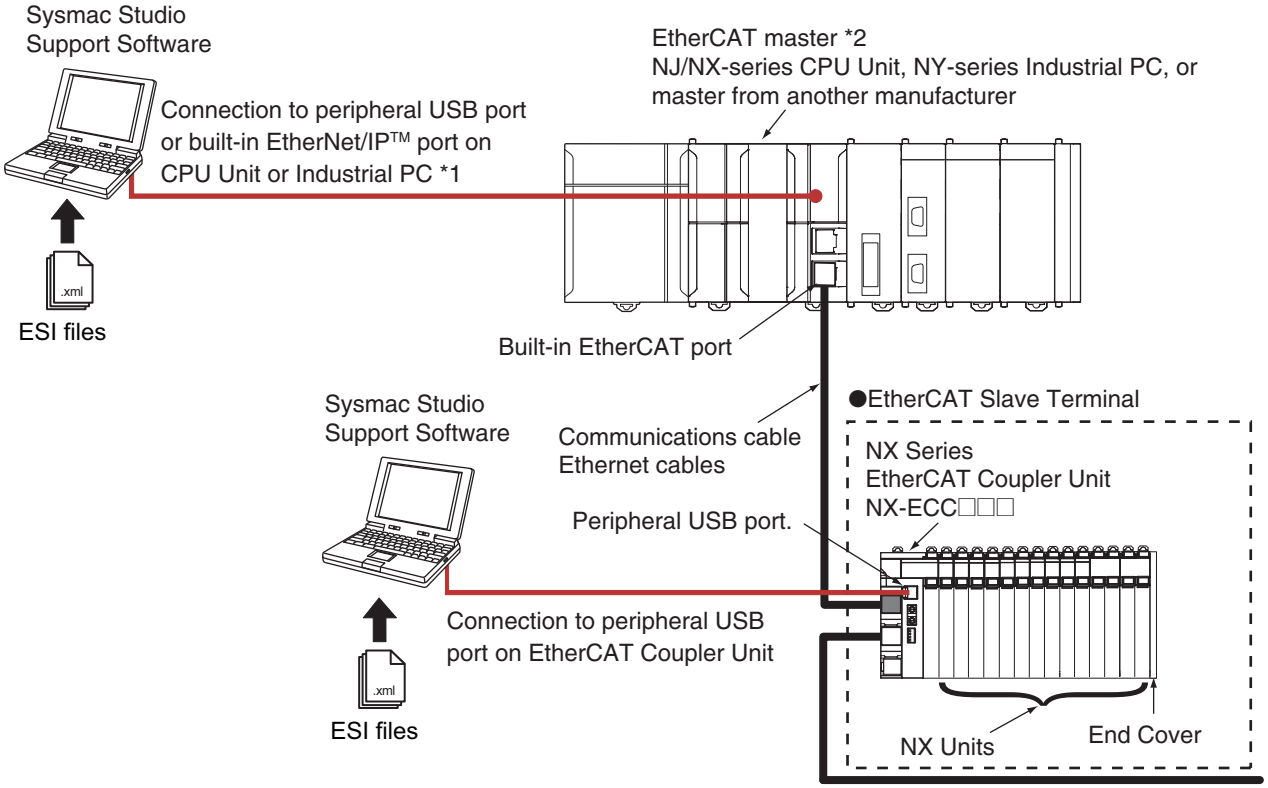
System Configuration of Slave Terminals

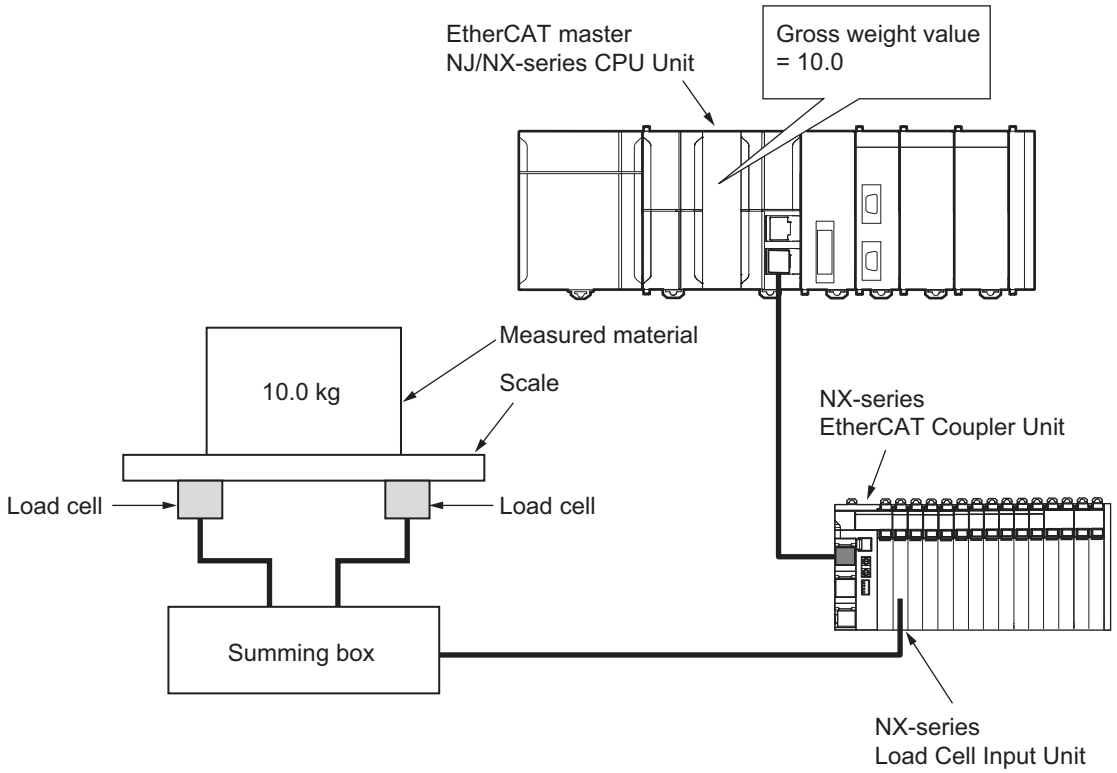
The following figure shows an example of the system configuration when an EtherCAT Coupler Unit is used as a Communications Coupler Unit.



*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 user's manual for the CPU Unit or Communications Coupler Unit to be used.

Weighing system configuration using load cell input unit



Ordering Information

International Standards

- The standards are abbreviated as follows: U: UL, U1: UL(Class I Division 2 Products for Hazardous Locations), C: CSA, UC: cULus, UC1: cULus (Class I Division 2 Products for Hazardous Locations), CU: cUL, N: NK, L: Lloyd, CE: EU Directives, RCM: Regulatory Compliance Mark, and KC: KC Registration.
- Contact your OMRON representative for further details and applicable conditions for these standards.

Load Cell Input Unit

Unit type	Product name	Specification					Model	Standards
		Number of points	Conversion cycle	I/O refreshing method *	Load cell excitation voltage	Input range		
NX-Series Load Cell Input Unit	Load Cell Input Unit	1	125µs	• Free-Run refreshing • Synchronous I/O refreshing • Task period prioritized refreshing	5 VDC ± 10%	-5.0 to 5.0 mV/V	**NX-RS1201**	UC1, CE, N, RCM, KC

* 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	Standards
Unit/Terminal Block Coding Pins	For 10 Units (Terminal Block: 30 pins, Unit: 30 pins)	**NX-AUX02**	---

Product name	Specification				Model	Standards
	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.

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: Conforms to JIS B 3502 and IEC 61131-2.
	Noise immunity	Conforms to IEC 61000-4-4, 2 kV (power supply line)
	Overvoltage category	Category II: Conforms to JIS B 3502 and IEC 61131-2.
	EMC immunity level	Zone B
	Vibration resistance	Conforms to IEC 60068-2-6. 5 to 8.4 Hz with amplitude of 3.5 mm, 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)
	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, 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.

Function Specification

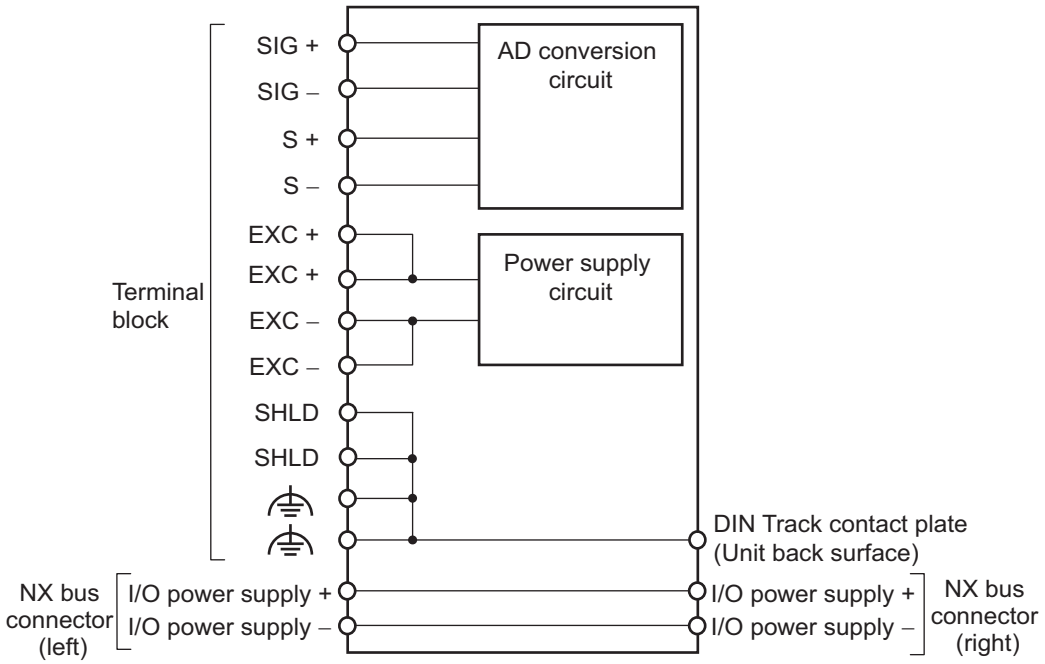
Supported: Functions that are used in target applications
-: Functions that are not used in target applications

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. 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. 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.

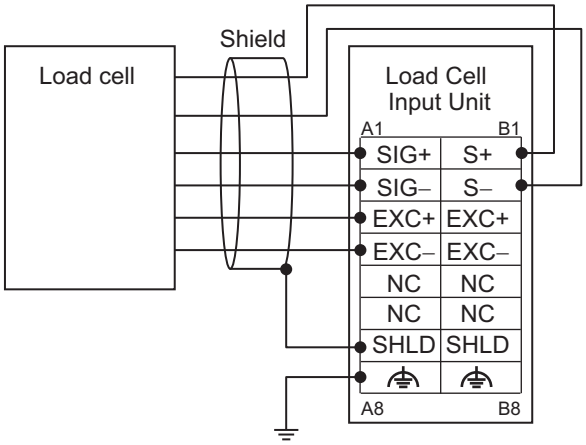
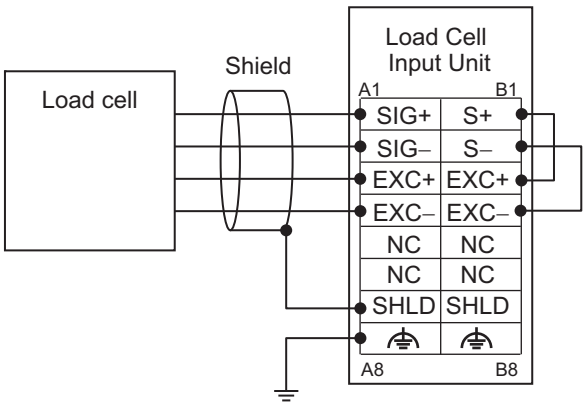
*1. It is used to measure the weight in the unit of kg or t.
*2. It is used to measure the force in the unit of N or kN.
*3. Select with the Communications Coupler Unit setting. Refer to the NX-series Load Cell Input Unit User's Manual (W565) for details on the setting method.
*4. You can select this 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.

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 2.05 W max. • Connected to a Communications Coupler Unit 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: • Connected to a CPU Unit: Possible in upright installation. • Connected to a Communications Coupler Unit: Possible in 6 orientations. 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

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

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 versions *	
Model	Unit version	CPU Unit	Sysmac Studio
NX-RS1201	Ver.1.0	Ver.1.13 or later	Ver.1.17 or higher

* 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.

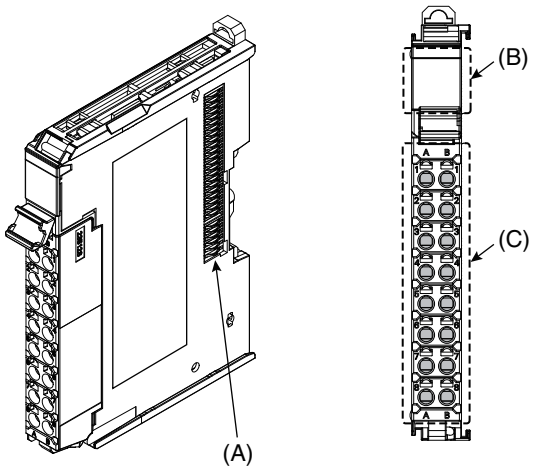
Connecting with Coupler Units

NX Unit		Corresponding versions *				
		EtherCAT			EtherNet/IP	
Model	Unit version	Communications Coupler Unit	NJ/NX-series CPU Units or NY-series Industrial PCs	Sysmac Studio	Communications Coupler Unit	Sysmac Studio
NX-RS1201	Ver.1.0	Ver.1.0 or later	Ver.1.05 or later	Ver.1.16 or higher	Ver.1.0 or later	Ver.1.16 or higher

* 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.

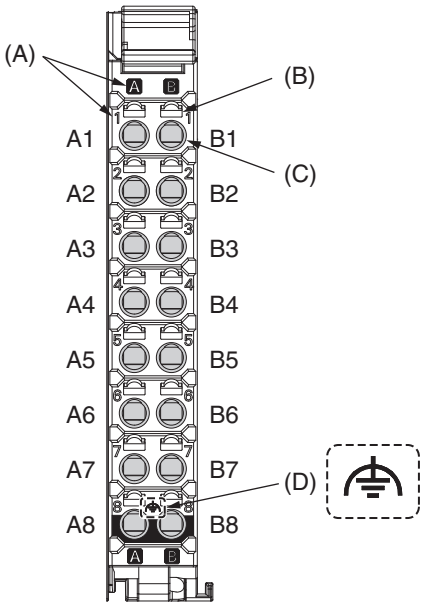
External Interface

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. 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

Applicable Wires

Using Ferrules

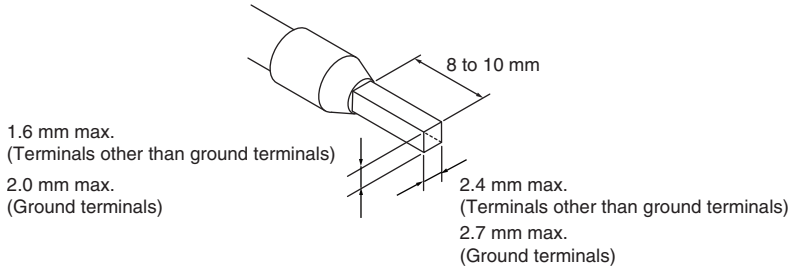
If you use ferrules, attach the twisted wires to them.
Observe the application instructions for your ferrules for the wire stripping length when attaching ferrules.
Always use plated one-pin ferrules. Do not use unplated ferrules or two-pin ferrules.

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.) 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.) 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.

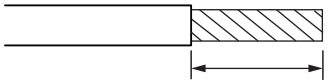


Using Twisted Wires/Solid Wires

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.



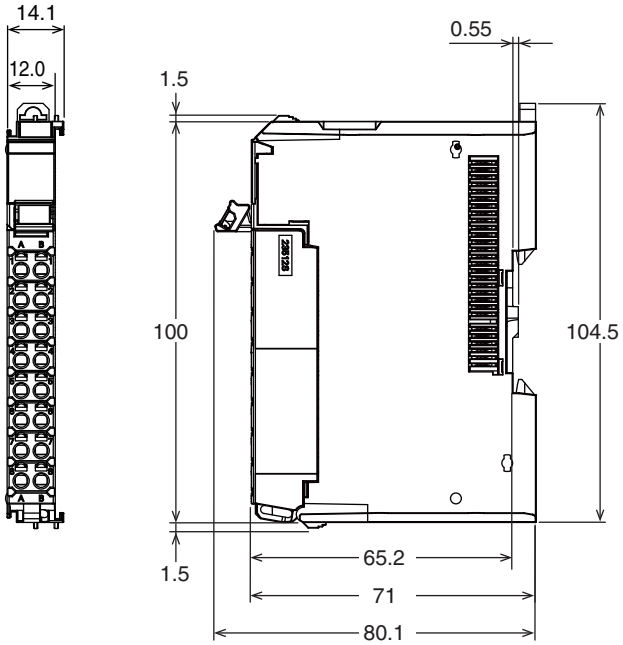
Conductor length (stripping length)

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

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.

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