

NX-series Temperature Input Unit

NX-TS

CSM_NX-TS_DS_E_1_1

Temperature Input Units for Standard and High-speed*, High-precision* Temperature measurement and control

- Temperature Input Units for the NX-series modular I/O system.
- Connect to other NX-series I/O Units and EtherCAT Coupler units using the high-speed NX-bus.
- Thermocouple* and platinum resistance thermometer input models are available.



NS-TS2201



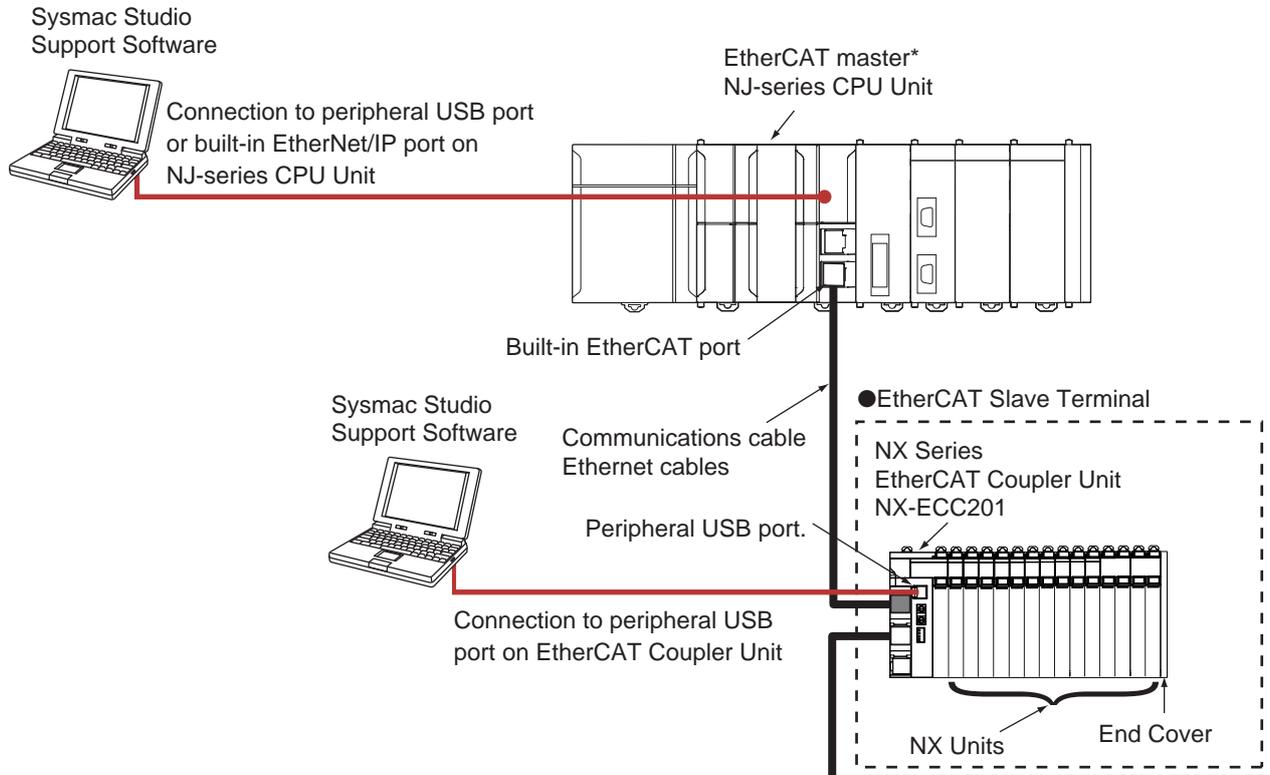
NS-TS3201

Features

- Input up to four temperature sensor signals with one Unit.
- Free-run refreshing or synchronous I/O refreshing can be selected for refreshing with the EtherCAT Coupler Unit.
- Three sampling speeds, 250 ms, 60 ms*, and 10 ms*, are available to cover a wide range from general-purpose application to high-speed, high-precision control.
- Moving average, input sensor disconnection detection function, cold junction compensation enable/disable selection function, and input compensation.
- The screwless terminal block is detachable for easy commissioning and maintenance.
- Screwless push-in terminal block significantly reduces wiring work.

* Available soon.

System Configuration



* OMRON CJ1W-NC□81/□82 Position Control Units cannot be connected to the EtherCAT Slave Terminal even though they support EtherCAT.

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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: EC Directives, and KC: KC Registration.
- Contact your OMRON representative for further details and applicable conditions for these standards.

Temperature Input Unit

Unit type	Product Name	Specification							NX Unit power consumption	Model	Standards
		Capacity	Input type	Resolution	Over all accuracy (25°C)	Conversion time	I/O refreshing method	Terminals			
NX Series Temperature Input Unit	Resistance Thermometer Input type 	2 points	Resistance Thermometer	0.1°C max.	Refer to Reference accuracy and temperature coefficient according to the input type and measurement temperature	250ms	Free-Run refreshing	16 points	0.90W max.	NX-TS2201	UC1, CE, KC
		4 points							1.30W max.	NX-TS3201	

Option

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

Accessories

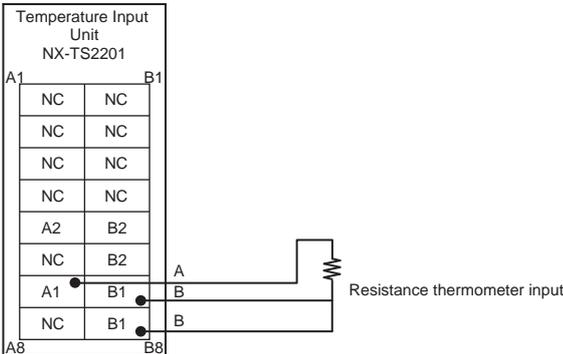
Not included.

General Specification

Item		Specification
Enclosure		Mounted in a panel
Grounding method		Ground to 100 Ω or less
Operating environment	Ambient operating temperature	0 to 55°C
	Ambient operating humidity	10% to 95% (with no condensation or icing)
	Atmosphere	Must be free from corrosive gases.
	Ambient storage temperature	-25 to 70°C (with no condensation or icing)
	Altitude	2,000 m max.
	Pollution degree	2 or less: Conforms to JIS B3502 and IEC 61131-2.
	Noise immunity	2 kV on power supply line (Conforms to IEC61000-4-4.)
	Overvoltage category	Category II: Conforms to JIS B3502 and IEC 61131-2.
	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)
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 UL508 and ANSI/ISA 12.12.01 EC: EN 61131-2 and C-Tick, KC Registration

Temperature Input Unit Specifications

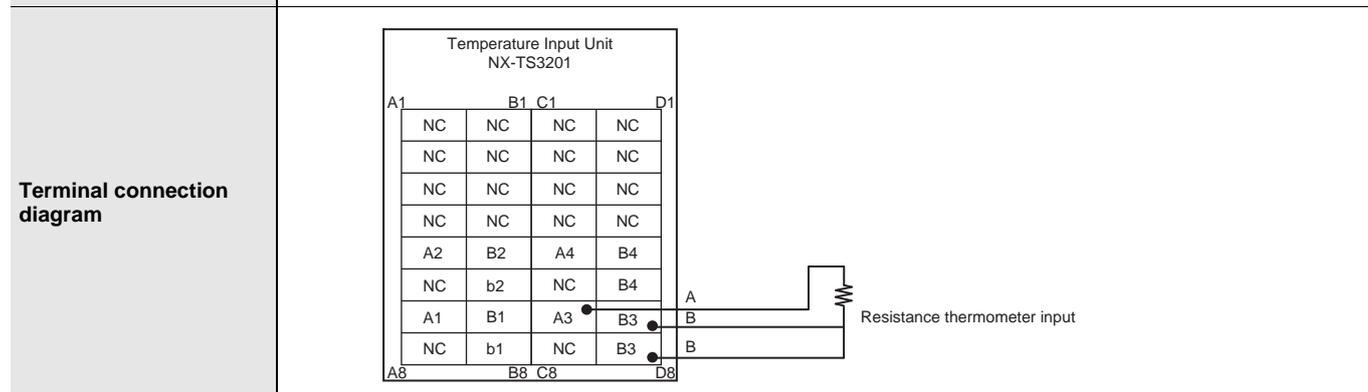
Temperature Input Unit (Resistance Thermometer Input type) 2 points NX-TS2201

Unit name	Temperature Input Unit (resistance thermometer input type)	Model	NX-TS2201
Capacity	2 points	External connection terminals	Screwless clamping terminal block (16 terminals)
I/O refreshing method	Free-Run refreshing		
Indicator	TS indicator 	Temperature sensor	Pt100 (three-wire)/Pt1000 (three-wire)
		Input conversion range	±20°C of the input range
		Input detection current	Approx. 0.25 mA
		Resolution	0.1°C max.
		Reference accuracy	*1
		Temperature coefficient	*1
	Effect of conductor resistance	0.06°C/Ω max. (also 20 Ω max.)	
Warm-up period	5 minutes	Conversion time	250 ms/Unit
Dimensions	12 (W) x 100 (H) x 71 (D)	Isolation method	Between the input and the NX bus: Power = Transformer, Signal = Photocoupler Between inputs: Power = Transformer, Signal = Photocoupler
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	0.90 W max.	I/O current consumption	No consumption
Weight	70 g max.		
Installation orientation and restrictions	Installation orientation: Possible in 6 orientations. Restrictions: No restrictions		
Terminal connection diagram			

*1. Refer to Reference accuracy and temperature coefficient according to the input type and measurement temperature.

Temperature Input Unit (Resistance Thermometer Input type) 4 points NX-TS3201

Unit name	Temperature Input Unit (resistance thermometer input type)	Model	NX-TS3201
Capacity	4 points	External connection terminals	Screwless clamping terminal block (16 terminals)
I/O refreshing method	Free-Run refreshing		
Indicator	TS indicator 	Temperature sensor	Pt100 (three-wire)/Pt1000 (three-wire)
		Input conversion range	±20°C of the input range
		Input detection current	Approx. 0.25 mA
		Resolution	0.1°C max.
		Reference accuracy	*1
		Temperature coefficient	*1
Effect of conductor resistance	0.06°C/Ω max. (also 20 Ω max.)		
Warm-up period	5 minutes	Conversion time	250 ms/Unit
Dimensions	12 (W) x 100 (H) x 71 (D)	Isolation method	Between the input and the NX bus: Power = Transformer, Signal = Photocoupler Between inputs: Power = Transformer, Signal = Photocoupler
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	1.30 W max.	I/O current consumption	No consumption
Weight	140 g max.		
Installation orientation and restrictions	Installation orientation: Possible in 6 orientations. Restrictions: No restrictions		



*1. Refer to Reference accuracy and temperature coefficient according to the input type and measurement temperature.

Reference accuracy and temperature coefficient according to the input type and measurement temperature *1

Conversion time	Input type		Measured temperature (°C)	Reference accuracy °C (%)	Temperature coefficient °C/°C (ppm/°C *2)
	Input type	Temperature range (°C)			
250 ms	Pt100	-200 to 850	-200 to 300	±1.0 (±0.1%)	±0.1 (±100 ppm/°C)
			300 to 700	±2.0 (±0.2%)	±0.2 (±200 ppm/°C)
			700 to 850	±2.5 (±0.25%)	±0.25 (±250 ppm/°C)
	Pt1000	-200 to 850	-200 to 300	±1.0 (±0.1%)	±0.1 (±100 ppm/°C)
			300 to 700	±2.0 (±0.2%)	±0.2 (±200 ppm/°C)
			700 to 850	±2.5 (±0.25%)	±0.25 (±250 ppm/°C)

*1. To convert the temperature unit from Celsius to Fahrenheit, use the following equation.

$$\text{Fahrenheit temperature (°F)} = \text{Celsius temperature (°C)} \times 1.8 + 32$$

*2. The ppm value is for the full scale.

Version Information

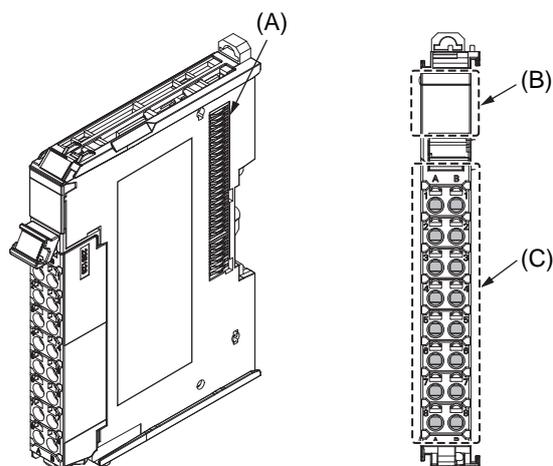
NX Series Temperature Input Unit and Sysmac Studio

NX Series Temperature Input Unit	Sysmac Studio	
	Version 1.05 or lower	Version 1.06 or higher
NX-TS□□□□	Not supported	Supported

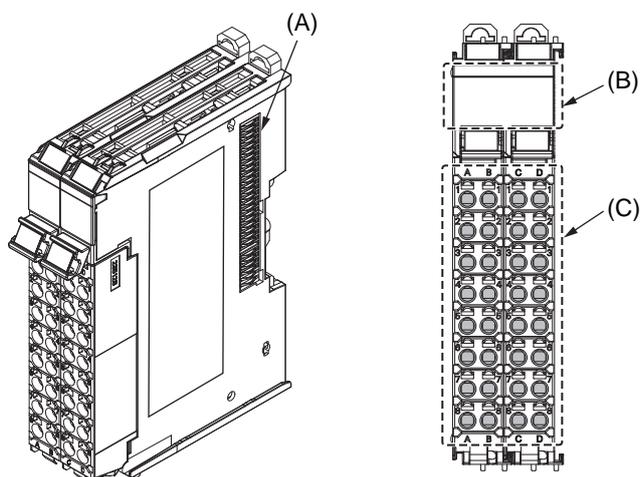
External Interface

Temperature Input Unit (Resistance Thermometer Input type)

NX-TS2201
12mm Width

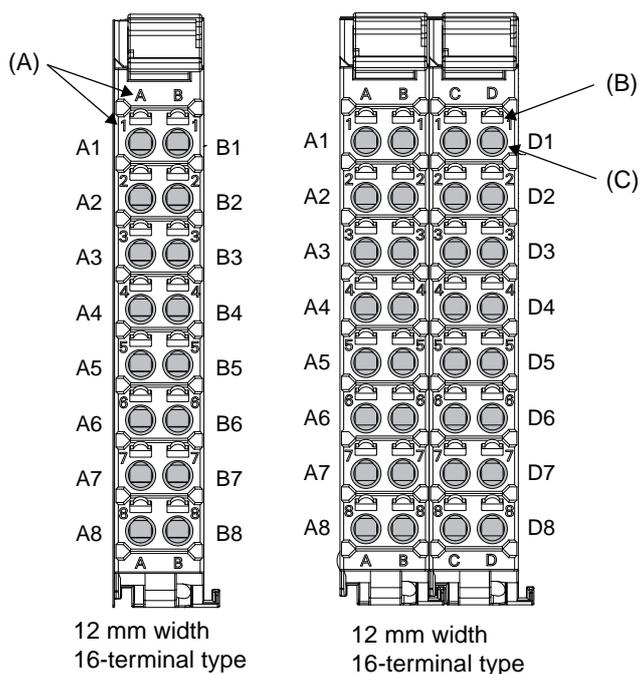


NX-TS3201
24mm Width



Symbol	Name	Function
(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	The terminal block is used to connect external devices. The number of terminals depends on the type of Unit.

Terminal Blocks



Symbol	Name	Function
(A)	Terminal number indications	Terminal numbers for which A to D indicate the column, and 1 to 8 indicate the line are displayed. The terminal number is a combination of column and line, so A1 to A8 and B1 to B8 are displayed. For models of 16-terminal type x 2, A1 to A8 and B1 to B8 are terminal number of the left terminal block, C1 to C8 and D1 to D8 are terminal numbers of the right terminal block. The terminal number indications are the same regardless of the number of terminals on the terminal block.
(B)	Release holes	Insert a flat-blade screwdriver into these holes to connect and remove the wires.
(C)	Terminal holes	The wires are inserted into these holes.

Applicable 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 one-pin ferrules. Do not use two-pin ferrules.

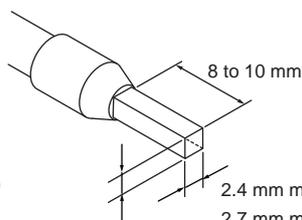
The applicable ferrules, wires, and crimping tool are given in the following table.

Terminal types	Manufacturer	Ferrule model number	Applicable wire (mm 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 , AWG24 to 10)
		AI0,5-8	0.5 (#20)	
		AI0,5-10		
		AI0,75-8	0.75 (#18)	
		AI0,75-10		
		AI1,0-8	1.0 (#18)	
		AI1,0-10		
		AI1,5-8	1.5 (#16)	
Ground terminals	Phoenix Contact	AI1,5-10		
		AI2,5-10	2.0 *	
Terminals other than ground terminals	Weidmuller	H0.14/12	0.14 (#26)	Weidmuller (The figure in parentheses is the applicable wire size.) 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 mm² and cannot be used in the screwless clamping terminal block.

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

Finished Dimensions of Ferrules



1.6 mm max. (except ground terminals)

2.0 mm max. (ground terminals)

2.4 mm max. (except ground terminals)

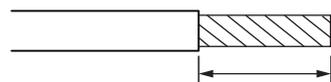
2.7 mm max. (ground terminals)

Using Twisted Wires/Solid Wires

If you use the twisted wires or the solid wires, the applicable wire range and conductor length (stripping length) are as follows.

Use the twisted wires to connect the ground wire to a ground of 100 Ω or less. Do not use the solid wires.

Terminal types	Applicable wires	Conductor length (stripping length)
Ground terminals	2.0 mm ²	9 to 10 mm
Terminals other than ground terminals	0.08 to 1.5 mm ² AWG28 to 16	8 to 10 mm

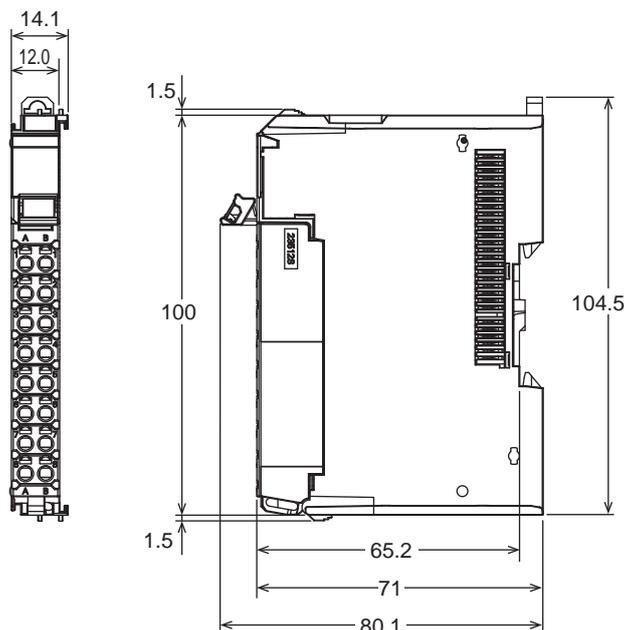


Conductor length (stripping length)

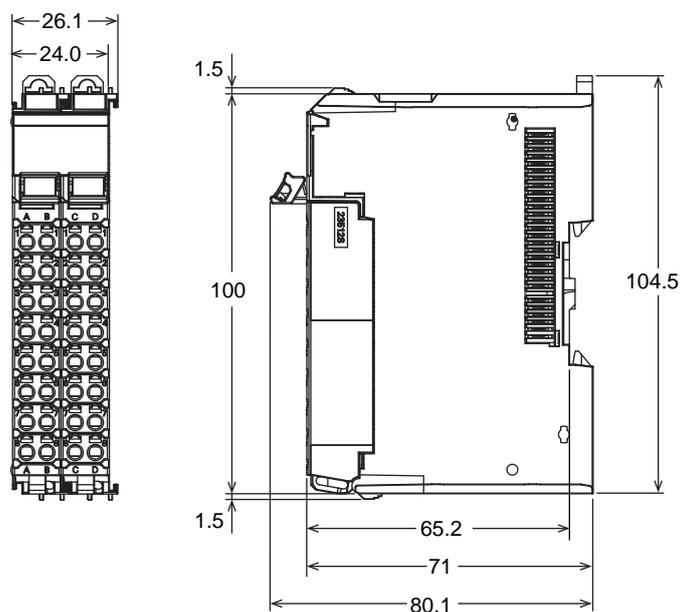
Dimensions

Temperature Input Unit

NX-TS□□□□
12 mm Width



24 mm Width



Related Manuals

Cat. No.	Model number	Manual name	Application	Description
W522	NX-AD□□□□ NX-DA□□□□ NX-TS□□□□	NX-series Analog I/O Units User's Manual	Learning how to use NX-series Analog I/O Units and Temperature Input Units	The hardware, setup methods, and functions of the NX-series Analog I/O Units and Temperature Input Units are described.

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