New Product

NX-series Temperature Control Unit
NX-TC

Optimize Control by Detecting Status Changes Easily Satisfy Both Productivity and Quality

NX-TC2405

NX-TC3405

- Provide optimal control for wide range of temperature control. Furthermore, automatically adapts to changes in the operating environment and measurement object conditions to realize optimum control. (Adaptive control)
- Functions specialized for packaging machines (Temperature Sensors for Packaging Machines and Automatic Filter Adjustment)
- Function specialized for water-cooled extruders (Watercooling Output Adjustment)

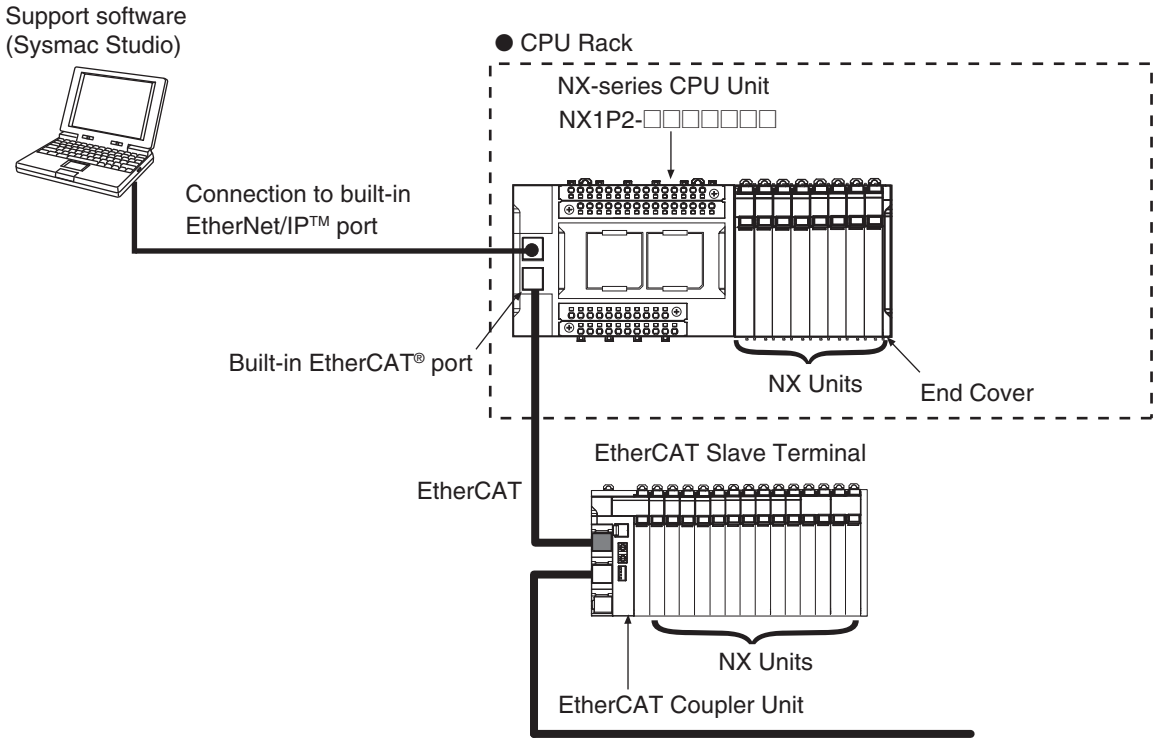
Features

- Build-in 2-or 4-loop (Ch) PID control or ON/OFF control functions not required temperature control programming
- With heater burnout alarm is available
- Multiple inputs for thermocouple and platinum resistance thermometer input models are available
- Detachable front connector with screwless Push-In Plus terminals for easy installation and maintenance
- Monitoring for ambient temperature is available

System Configurations

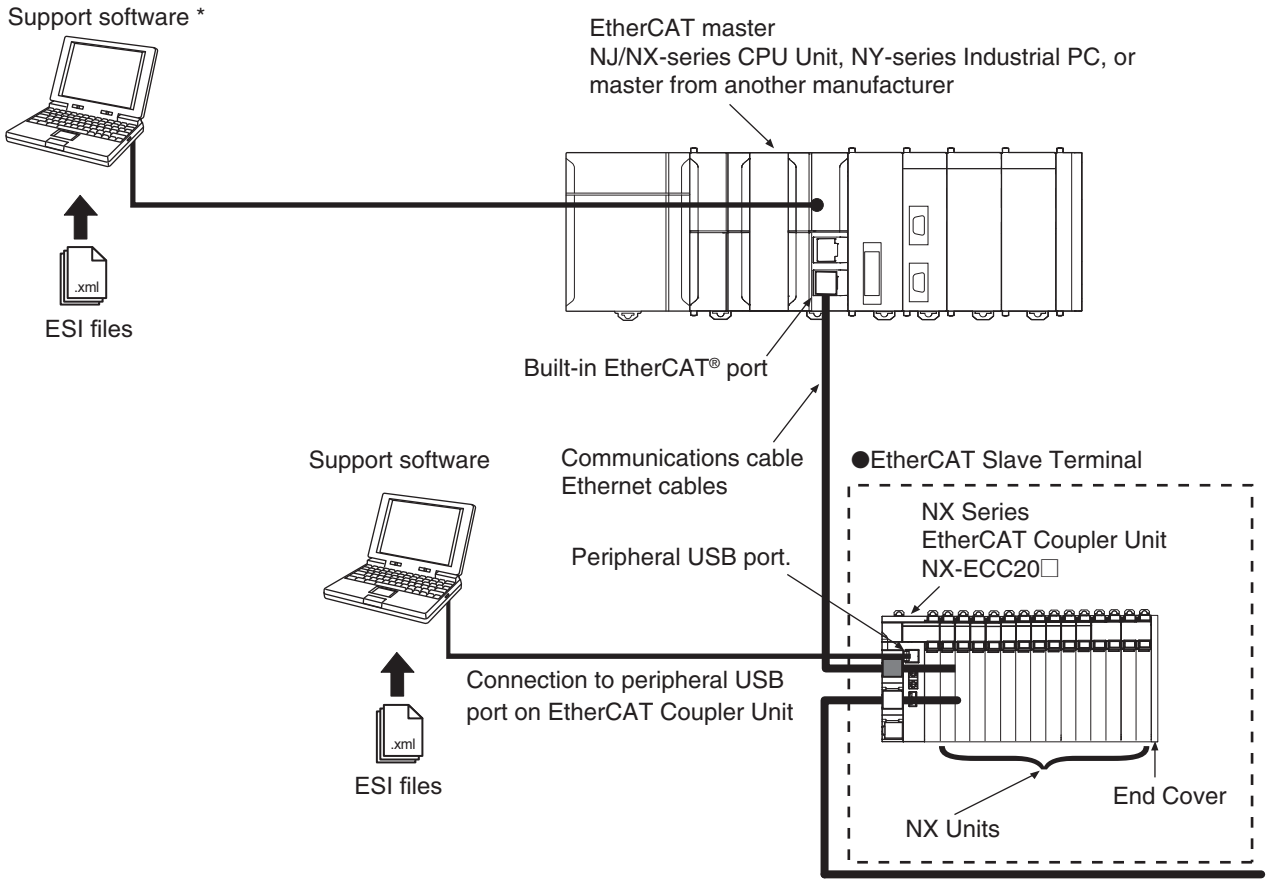
Connected to a CPU Unit

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



Connected to an EtherCAT Coupler Unit

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



✻ The connection method for the Sysmac Studio depends on the model of the CPU Unit or Industrial PC.

Note: To check whether NX Units can be connected to your CPU Unit or Communications Coupler Unit, refer to the user's manual for the CPU Unit or Communications Coupler Unit.

Model Number Structure

NX-TC□□□□

(1) (2) (3)

(1) Number of points

No.	Specification
2	2 points
3	4 points

(2) I/O type

No.	Sensor type
4	Multi-input (Thermocouple and Resistance thermometer)

(3) I/O type

No.	Control	Output		Number of CT input points per channel	I/O Refreshing Methods
		Output	Number of output points per channel		
05	Standard control	Voltage output (for driving SSR)	1 point per channel	1 point per channel	Free-Run refreshing
06			1 point per channel	None.	
07	Heating/cooling control		2 points per channel	None.	
08	Standard control	Linear current output	1 point per channel	None.	

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, CE: EU Directives, RCM: Regulatory Compliance Mark, KC: KC Registration, and EAC: EAC Mark.
- Contact your OMRON representative for further details and applicable conditions for these standards.

Temperature Control Units

Unit type	Product name	Specification								Model	Standards
		Number of channels	Input type	Output	Output capacity	CT Input capacity	Control type	Conversion time	I/O refreshing method		
NX Series Temperature Control Unit	Temperature Control Unit 2Ch type 	2 Ch	Multi-input (Thermocouple and Resistance thermometer)	Voltage output (for driving SSR)	2 points	2 points	Standard Control	50 m sec	Free-Run refreshing	**NX-TC2405**	UC1, CE, RCM, KC, EAC
						None	Standard Control			**NX-TC2406**	
				Voltage output (for driving SSR)	4 points	None	Heating and Cooling Control			**NX-TC2407**	
				Linear current output	2 points	None	Standard Control			**NX-TC2408**	
	Temperature Control Unit 4Ch type 	4 Ch		Voltage output (for driving SSR)	4 points	4 points	Standard Control			**NX-TC3405**	
						None	Standard Control			**NX-TC3406**	
				Voltage output (for driving SSR)	8 points	None	Heating and Cooling Control			**NX-TC3407**	
				Linear current output	4 points	None	Standard Control			**NX-TC3408**	

Optional Products

Product name	Specification	Model	Standards
Unit/Terminal Block Coding Pins	Pins for 10 Units (30 terminal block pins and 30 Unit pins)	**NX-AUX02**	---

Product name	Specification	Model	Standards
Current Transformer (CT)	Hole diameter: 5.8 mm	**E54-CT1**	---
	Hole diameter: 5.8 mm	**E54-CT1L** ✻	---
	Hole diameter: 12.0 mm	**E54-CT3**	---
	Hole diameter: 12.0 mm	**E54-CT3L** ✻	---

✻ Lead wires are included with these CTs. If UL certification is required, use these CTs.

Accessories

Not included.

General Specifications

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% RH (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	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
	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.
Applicable standards *		cULus: Listed (UL 61010-2-201), ANSI/ISA 12.12.01, EU: EN 61131-2, RCM, KC: KC Registration, EAC

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

List of Functions

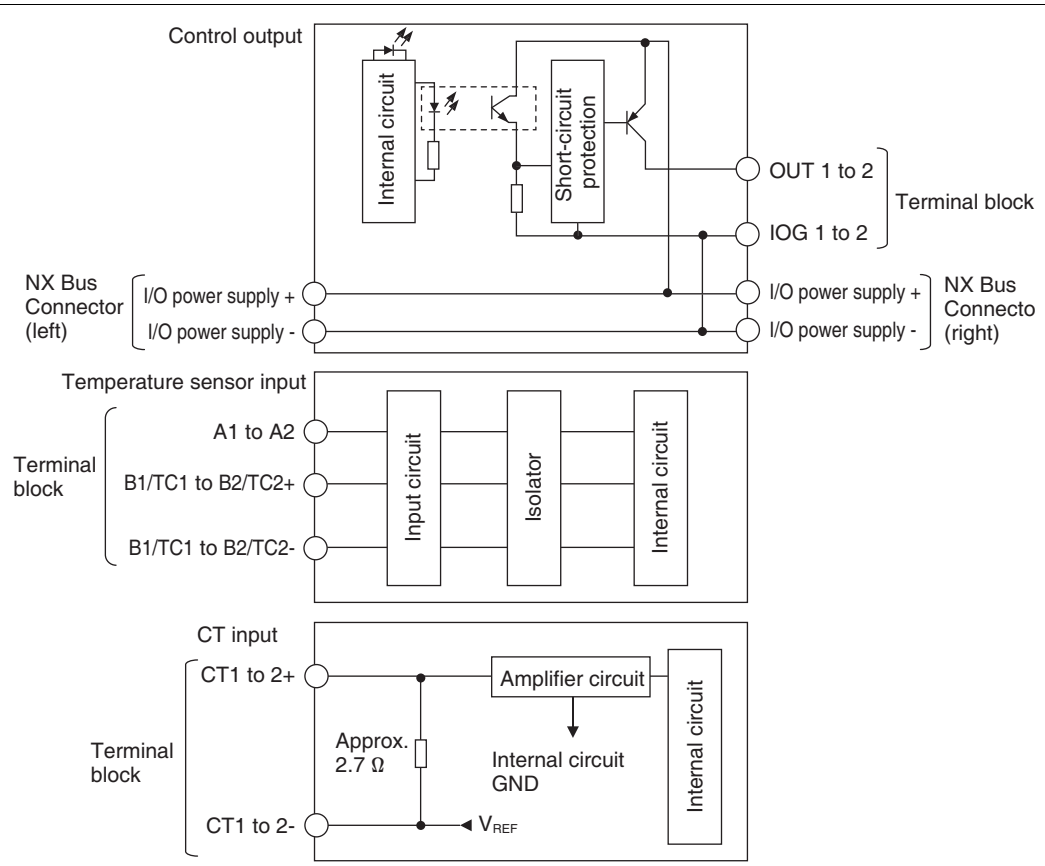
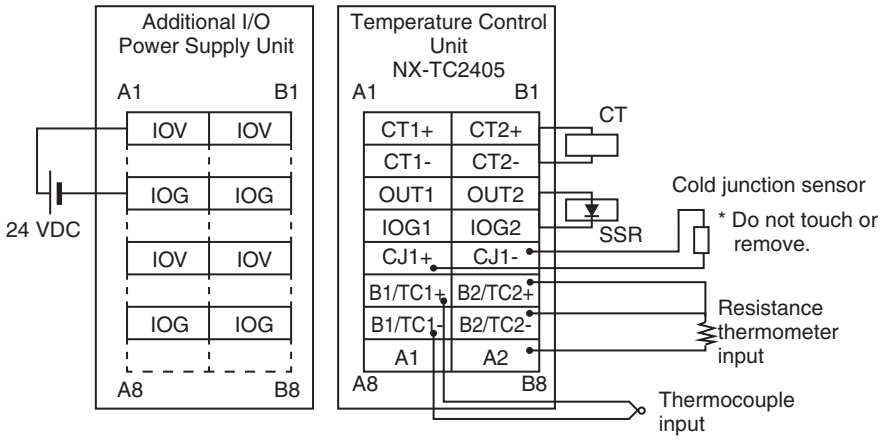
Function name		Description	Applicable units
Free-Run refreshing		With this I/O refreshing method, the refresh cycle of the NX bus and the I/O refresh cycles of the NX Units are asynchronous.	All models
Selecting channel to use		This function disables control processing, error detection, and output for unused channels. The conversion time for its own Unit will not be shortened even if errors are disabled.	All models
Input function	Input Type Settings	This function sets the input type of the sensor connected to the temperature input.	All models
	Temperature Unit (°C/°F) Setting	This function sets the temperature units for measured values to °C (Celsius) or °F (Fahrenheit).	All models
	Decimal Point Position Setting	This function sets the number of digits to be displayed after the decimal point for INT type measured values and set point parameters.	All models
	Cold Junction Compensation Enable/Disable Setting	This function enables or disables cold junction compensation using the cold junction sensor that is mounted on the terminal block when a thermocouple input is used.	All models
	Temperature input correction	This function corrects measured values. when there are variations in the sensor or when there is a difference in measured value from other measuring instruments. One-point correction and two-point correction methods are provided.	All models
	Input digital filter	This function sets the time constant applied to the first-order lag operation filter so that the noise components mixed with the measured value are eliminated.	All models
	Measuring the ambient temperature around terminals	This function measures the temperature around the terminals of the Temperature Control Unit.	All models
Control processing	ON/OFF control	This control function uses a preset set point to turn off the control output when the temperature reaches the set point during control.	All models
	PID control	PID control is a combination of proportional (P) control, integral (I) control, and differential (D) control. It is a control function that feeds back the detected value to the set point so that they conform to each other.	All models
	Heating and cooling control	This function controls both heating and cooling.	Heating and cooling control type models
	Run or stop controls	This function starts and stops temperature control.	All models
	Direct and Reverse Operation	This function specifies direct or reverse operation.	All models
	Manual manipulated variable	This function outputs the specified manipulated variable during PID control.	All models
	MV at Error (error MV)	This function outputs a fixed manipulated variable when a Sensor Disconnected Error occurs.	All models
	MV limit	This function adds a limit to the manipulated variable calculated by PID control and outputs it.	All models
	Load Rejection MV	This function performs a preset output operation if the Temperature Control Unit connected to the CPU Unit cannot receive the output setting values from the CPU Unit due to an NX bus error or CPU watchdog timer error. This function performs a preset output operation if the Slave Terminal cannot receive the output setting values due to a communications error between the Temperature Control Unit and the Communications Coupler Unit host or due to an error on the NX bus.	All models
	Load-short circuit protection	This function protects output circuits of the Temperature Control Unit when an external device connected to the control output is short-circuited.	Models with voltage outputs for driving SSR

Function name		Description	Applicable units
Tuning	AT (Auto tuning)	This is a tuning method that derives the PID constant. This function automatically calculates the PID constant by the limit cycle method according to the characteristics of the control target.	All models
	Automatic Filter Adjustment	This is a tuning method that automatically adjusts the input digital filter. This function is primarily for packing machines. It suppresses periodic temperature variations.	Standard control models
	Water Cooling Output Adjustment	This is a tuning method that automatically adjusts hunting. This function is primarily for water-cooled extruders. It suppresses temperature variations caused by the cooling water output.	Heating and cooling control type models
	Adaptive Control	This is a tuning method that can maintain high control performance by following system changes. This function maintains control performance even if temperature variation factors such as environmental change and equipment deterioration occur during a long-term equipment operation.	Standard control models
	Notifying the update of tuning parameters	This function notifies that the Temperature Control Unit has automatically updated the parameters by tuning.	All models
Control output function	Control Period	This function sets the period when the ON/OFF time ratio is changed for voltage output (for driving SSR) in time-proportional operation.	Models with voltage outputs for driving SSR
	Minimum Output ON/OFF Band	This function specifies the minimum ON/OFF bands for the heating side control output or the cooling side control output. This function can be used to prevent deterioration of mechanical relays when mechanical relays are used in the actuators connected to the output terminals.	Models with voltage outputs for driving SSR
	Output Signal Range Setting	This function sets the output signal range of the linear current output. You can specify 4 to 20 mA or 0 to 20 mA.	Models with linear current outputs
	Limiting simultaneous outputs	This function limits the number of outputs that turn ON simultaneously by shifting the control period of each output and restricting the upper limit of the manipulated variable. You can set a delay between outputs, which allows delays in output device operation that can occur when outputs are switched.	Standard control models with voltage outputs for driving SSR
Error detection	Sensor Disconnection Detected	This function detects disconnections in temperature sensors. It also detects that the measured value of the temperature sensor is outside the input indication range.	All models
	Heater Burnout Detected	This function detects heater burnouts. A heater burnout is detected if the control output is ON and the heater current is equal to or less than the heater burnout detection current.	Models with CT inputs
	SSR Failure Detected	This function detects SSR failures. An SSR failure is detected if the control output is OFF and the leakage current is equal to or greater than the SSR failure detection current. An SSR failure is a failure that is caused by an SSR short-circuit.	Models with CT inputs

Individual Specifications

Temperature Control Unit (2-Channel Type) NX-TC2405

Unit name		Temperature Control Unit (2-Channel Type)	**Model**		NX-TC2405
Number of Channels		2 channels	**Control type**		Standard control
Number of points per channel		• Temperature input: 1 point per channel (2 points per unit) • CT Input: 1 point per channel (2 points per unit) • Control Output: 1 point per channel (2 points per unit)	**External connection terminal**		Screwless clamping terminal block (16 terminals)
I/O refreshing method		Free-Run Refreshing			
Indicators		TS indicator and output indicators 	**CT Input section**	**CT current input range**	0 to 0.125 A
				Input resistance	Approx. 2.7 Ω
				Connectable CTs	E54-CT1, E54-CT3, E54-CT1L, and E54-CT3L
				Maximum heater current	50 A AC
				Resolution	0.1 A
				Overall accuracy (25°C)	±5% (full scale) ±1 digit
				Influence of temperature (0 to 55°C)	±2% (full scale) ±1 digit
				Conversion time	50 ms/Unit
			Control Output section	**Control output type and number of control outputs per channel**	Voltage output for driving SSR, 1 point per channel
				Internal I/O common	PNP
				Control Period	0.1, 0.2, 0.5, 1 to 99s
				Manipulated variable	-5 to +105%
Sensor Input section	**Temperature sensor ✻1**	• Thermocouple input: K, J, T, E, L, U, N, R, S, B, C/W, PL II • Platinum resistance thermometer input: Pt100(three-wire), JPt100 (three-wire)		**Resolution**	---
	Input conversion range	±20°C of the input range ✻2		**Rated Voltage**	24 VDC
	Absolute maximum rating	±130 mV		**Operating Load Voltage Range**	15 to 28.8 VDC
	Input impedance	20 kΩ min.		**Maximum load current**	21 mA/point, 42 mA/Unit
	Resolution	0.1°C max.		**Maximum Inrush Current**	0.3 A/point max., 10 ms max.
	Reference accuracy	✻3		**Allowable load resistance**	---
	Temperature coefficient	✻3		**Leakage current**	0.1 mA max.
	Cold junction compensation error	±1.2°C ✻3 ✻4		**Residual voltage**	1.5 V max.
	Input disconnection detection current	Approx. 0.1 uA		**Load Short-circuit Protection**	Provided
	Input detection current	0.25 mA		**Output range**	---
	Effect of conductor resistance	• Thermocouple input: 0.1°C/Ω (100 Ω or less per conductor) • Platinum resistance thermometer input: 0.06°C/Ω (20 Ω or less per conductor)		**Overall accuracy (25°C)**	---
	Warm-up period	30 minutes		**Influence of temperature (0 to 55°C)**	---
	Conversion time	50 ms/Unit			
Dimensions		12 mm (W) ×100 mm (H) ×71 mm (D)	**Isolation method**		• Between sensor inputs and internal circuitry: Power = Transformer, Signal = Digital isolator • Between inputs: Power = Transformer, Signal = Digital isolator • No isolation between internal circuits and CT inputs • Between control output and internal circuit: Photocoupler • No isolation between control outputs
Insulation resistance		20 MΩ min. between isolated circuits (at 100 VDC)	**Dielectric strength**		510 VAC between isolated circuits for 1 minute with a leakage current of 5 mA max.
I/O power supply method		Supplied from the NX bus.	**Current capacity of I/O power supply terminals**		IOG: 0.1 A max. per terminal
NX Unit power consumption		• Connected to a CPU Unit 1.45 W max. • Connected to Communications Coupler Unit 1.10 W max.	**Current consumption from I/O power supply**		20 mA max.

Weight	75 g max.
Circuit configuration	
Installation orientation and restrictions	Mounting orientation: • Connect to CPU unit Front mounting orientation is possible • Connect to communication coupler unit Six orientations are possible Limitation: The cold junction compensation error is limited by the mounting orientation and the type or power consumption of the adjacent unit. For details, refer to *Cold Junction Compensation Error Specifications for Units That Take a Thermocouple Input Type* on page 27.
Terminal connection diagram	

***1.** For the setting ranges and indication ranges of the sensors, refer to the *Input types* on page 24.

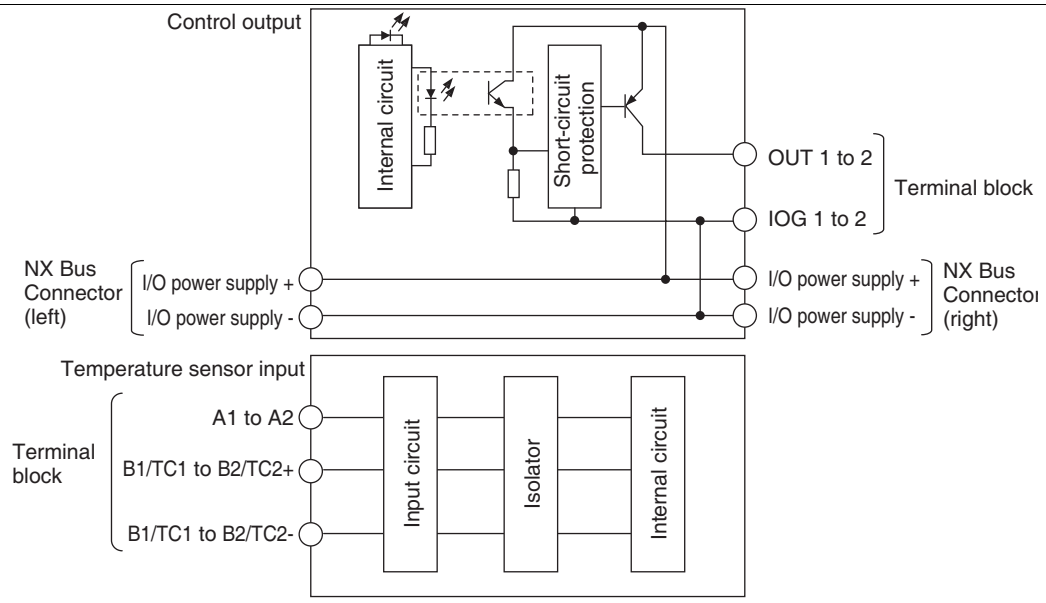
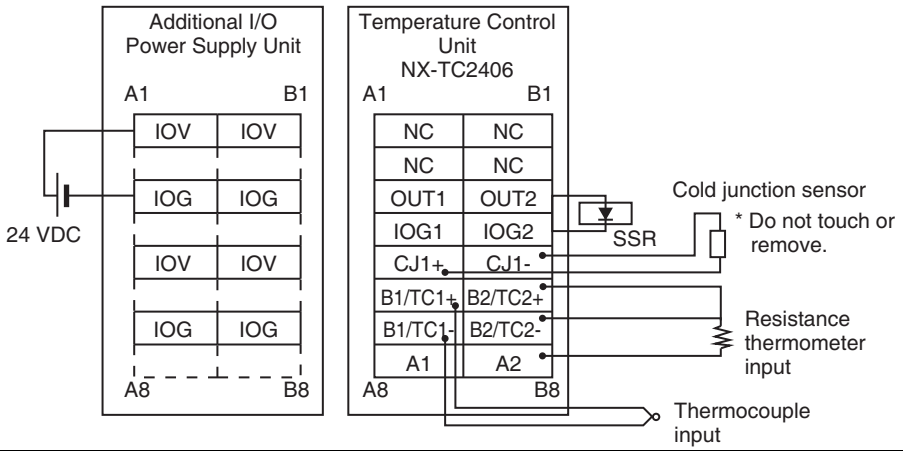
***2.** + 20°C only for the following input type settings:
1: JPt100
3: JPt100
10: T
14: U

***3.** For details, refer to the *Reference Accuracy and Temperature Coefficient Table* on page 25.
For thermocouple inputs, reference accuracy and cold junction compensation error are guaranteed for a set of a Temperature Control Unit and a terminal block on which a cold junction sensor is mounted.
Be sure to use the terminal block and the Temperature Control Unit with the same calibration control number together.
A calibration control number is displayed both on the terminal block and the Unit.
Make sure to return the terminal block to which a cold junction sensor is mounted and the Unit together.

***4.** For details, refer to *Cold Junction Compensation Error Specifications for Units That Take a Thermocouple Input Type* on page 27.

Temperature Control Unit (2-Channel Type) NX-TC2406

Unit name		Temperature Control Unit (2-Channel Type)	**Model**		NX-TC2406
Number of Channels		2 channels	**Control type**		Standard control
Number of points per channel		• Temperature input: 1 point per channel (2 points per unit) • CT input: None • Control Output: 1 point per channel (2 points per unit)	**External connection terminal**		Screwless clamping terminal block (16 terminals)
I/O refreshing method		Free-Run Refreshing			
Indicators		TS indicator and output indicators 	**CT Input section**	**CT current input range**	---
				Input resistance	---
				Connectable CTs	---
				Maximum heater current	---
				Resolution	---
				Overall accuracy (25°C)	---
				Influence of temperature (0 to 55°C)	---
				Conversion time	---
			Control Output section	**Control output type and number of control outputs per channel**	Voltage output for driving SSR, 1 point per channel
				Internal I/O common	PNP
				Control Period	0.1, 0.2, 0.5, 1 to 99s
				Manipulated variable	-5 to +105%
Sensor Input section	**Temperature sensor ✻1**	• Thermocouple input: K, J, T, E, L, U, N, R, S, B, C/W, PL II • Platinum resistance thermometer input: Pt100 (three-wire), JPt100 (three-wire)		**Resolution**	---
	Input conversion range	±20°C of the input range ✻2		**Rated Voltage**	24 VDC
	Absolute maximum rating	±130 mV		**Operating Load Voltage Range**	15 to 28.8 VDC
	Input impedance	20 kΩ min.		**Maximum load current**	21 mA/point, 42 mA/Unit
	Resolution	0.1°C max.		**Maximum Inrush Current**	0.3 A/point max., 10 ms max.
	Reference accuracy	✻3		**Allowable load resistance**	---
	Temperature coefficient	✻3		**Leakage current**	0.1 mA max.
	Cold junction compensation error	±1.2°C ✻3 ✻4		**Residual voltage**	1.5 V max.
	Input disconnection detection current	Approx. 0.1 uA		**Load Short-circuit Protection**	Provided
	Input detection current	0.25 mA		**Output range**	---
	Effect of conductor resistance	• Thermocouple input: 0.1°C/Ω (100 Ω or less per conductor) • Platinum resistance thermometer input: 0.06°C/Ω (20 Ω or less per conductor)		**Overall accuracy (25°C)**	---
	Warm-up period	30 minutes		**Influence of temperature (0 to 55°C)**	---
	Conversion time	50 ms/Unit			
Dimensions		12 mm (W) ×100 mm (H) ×71 mm (D)	**Isolation method**		• Between sensor inputs and internal circuitry: Power = Transformer, Signal = Digital isolator • Between inputs: Power = Transformer, Signal = Digital isolator • Between control output and internal circuit: Photocoupler • No isolation between control outputs
Insulation resistance		20 MΩ min. between isolated circuits (at 100 VDC)	**Dielectric strength**		510 VAC between isolated circuits for 1 minute with a leakage current of 5 mA max.
I/O power supply method		Supplied from the NX bus.	**Current capacity of I/O power supply terminals**		IOG: 0.1 A max. per terminal

NX Unit power consumption	• Connected to a CPU Unit 1.25 W max. • Connected to Communications Coupler Unit 0.95 W max.	**Current consumption from I/O power supply**	20 mA max.
Weight	75 g max.		
Circuit configuration			
Installation orientation and restrictions	Mounting orientation: • Connect to CPU unit Front mounting orientation is possible • Connect to communication coupler unit Six orientations are possible Limitation: The cold junction compensation error is limited by the mounting orientation and the type or power consumption of the adjacent unit. For details, refer to *Cold Junction Compensation Error Specifications for Units That Take a Thermocouple Input Type* on page 27.		
Terminal connection diagram			

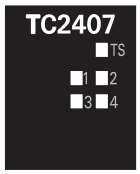
***1.** For the setting ranges and indication ranges of the sensors, refer to the *Input types* on page 24.

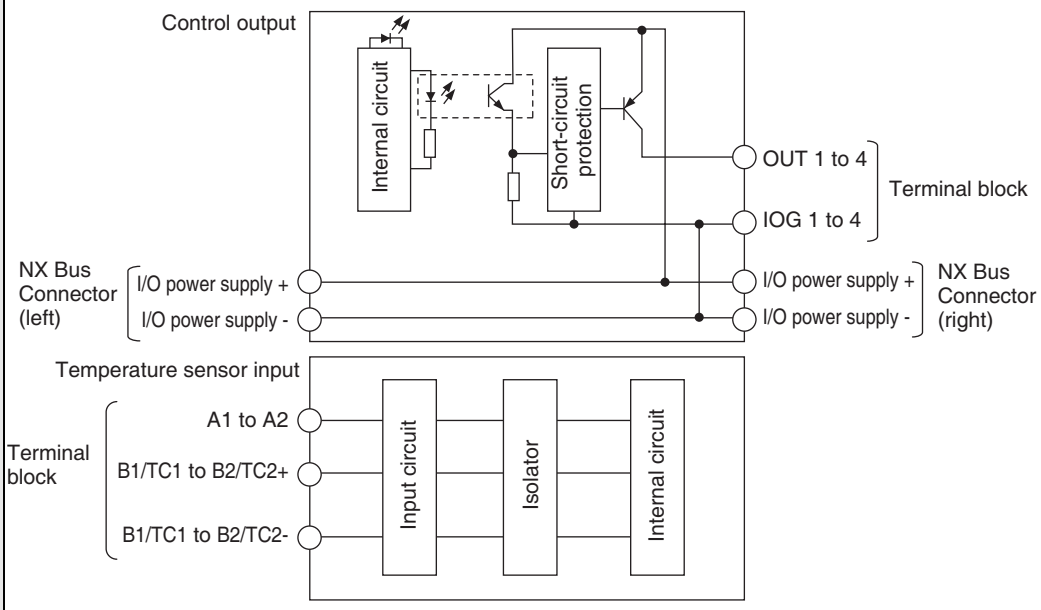
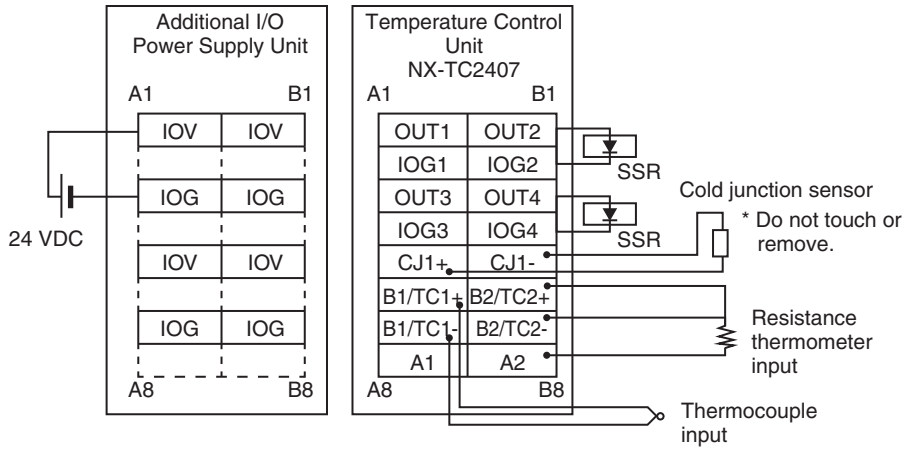
***2.** + 20°C only for the following input type settings:
1: JPt100
3: JPt100
10: T
14: U

***3.** For details, refer to the *Reference Accuracy and Temperature Coefficient Table* on page 25.
For thermocouple inputs, reference accuracy and cold junction compensation error are guaranteed for a set of a Temperature Control Unit and a terminal block on which a cold junction sensor is mounted.
Be sure to use the terminal block and the Temperature Control Unit with the same calibration control number together.
A calibration control number is displayed both on the terminal block and the Unit.
Make sure to return the terminal block to which a cold junction sensor is mounted and the Unit together.

***4.** For details, refer to *Cold Junction Compensation Error Specifications for Units That Take a Thermocouple Input Type* on page 27.

Temperature Control Unit (2-Channel Type) NX-TC2407

Unit name		Temperature Control Unit (2-Channel Type)	**Model**		NX-TC2407
Number of Channels		2 channels	**Control type**		Heating and cooling control
Number of points per channel		• Temperature input: 1 point per channel (2 points per unit) • CT input: None • Control Output: 2 point per channel (4 points per unit)	**External connection terminal**		Screwless clamping terminal block (16 terminals)
I/O refreshing method		Free-Run Refreshing			
Indicators		TS indicator and output indicators 	**CT Input section**	**CT current input range**	---
				Input resistance	---
				Connectable CTs	---
				Maximum heater current	---
				Resolution	---
				Overall accuracy (25°C)	---
				Influence of temperature (0 to 55°C)	---
				Conversion time	---
			Control Output section	**Control output type and number of control outputs per channel**	Voltage output for driving SSR, 2 point per channel
				Internal I/O common	PNP
				Control Period	0.1, 0.2, 0.5, 1 to 99s
				Manipulated variable	• Heating: 0 to +105% • Cooling: 0 to +105%
Sensor Input section	**Temperature sensor ✻1**	Thermocouple input: K, J, T, E, L, U, N, R, S, B, C/W, PL II Platinum resistance thermometer input: Pt100 (three-wire), JPt100 (three-wire)		**Resolution**	---
	Input conversion range	±20°C of the input range ✻2		**Rated Voltage**	24 VDC
	Absolute maximum rating	±130 mV		**Operating Load Voltage Range**	15 to 28.8 VDC
	Input impedance	20 kΩ min.		**Maximum load current**	21 mA/point, 84 mA/Unit
	Resolution	0.1°C max.		**Maximum Inrush Current**	0.3 A/point max., 10 ms max.
	Reference accuracy	✻3		**Allowable load resistance**	---
	Temperature coefficient	✻3		**Leakage current**	0.1 mA max.
	Cold junction compensation error	±1.2°C ✻3 ✻4		**Residual voltage**	1.5 V max.
	Input disconnection detection current	Approx. 0.1 uA		**Load Short-circuit Protection**	Provided
	Input detection current	0.25 mA		**Output range**	---
	Effect of conductor resistance	• Thermocouple input: 0.1°C/Ω (100Ω or less per conductor) • Platinum resistance thermometer input: 0.06°C/Ω (20 Ω or less per conductor)		**Overall accuracy (25°C)**	---
	Warm-up period	30 minutes		**Influence of temperature (0 to 55°C)**	---
	Conversion time	50 ms/Unit			
Dimensions		12 mm (W) ×100 mm (H) ×71 mm (D)	**Isolation method**		• Between sensor inputs and internal circuitry: Power = Transformer, Signal = Digital isolator • Between inputs: Power = Transformer, Signal = Digital isolator • Between control output and internal circuit: Photocoupler • No isolation between control outputs
Insulation resistance		20 MΩ min. between isolated circuits (at 100 VDC)	**Dielectric strength**		510 VAC between isolated circuits for 1 minute with a leakage current of 5 mA max.
I/O power supply method		Supplied from the NX bus.	**Current capacity of I/O power supply terminals**		IOG: 0.1 A max. per terminal

NX Unit power consumption	• Connected to a CPU Unit 1.30 W max. • Connected to Communications Coupler Unit 1.00 W max.	**Current consumption from I/O power supply**	20 mA max.
Weight	75 g max.		
Circuit configuration			
Installation orientation and restrictions	Mounting orientation: • Connect to CPU unit Front mounting orientation is possible • Connect to communication coupler unit Six orientations are possible Limitation: The cold junction compensation error is limited by the mounting orientation and the type or power consumption of the adjacent unit. For details, refer to *Cold Junction Compensation Error Specifications for Units That Take a Thermocouple Input Type* on page 27.		
Terminal connection diagram			

***1.** For the setting ranges and indication ranges of the sensors, refer to the *Input types* on page 24.

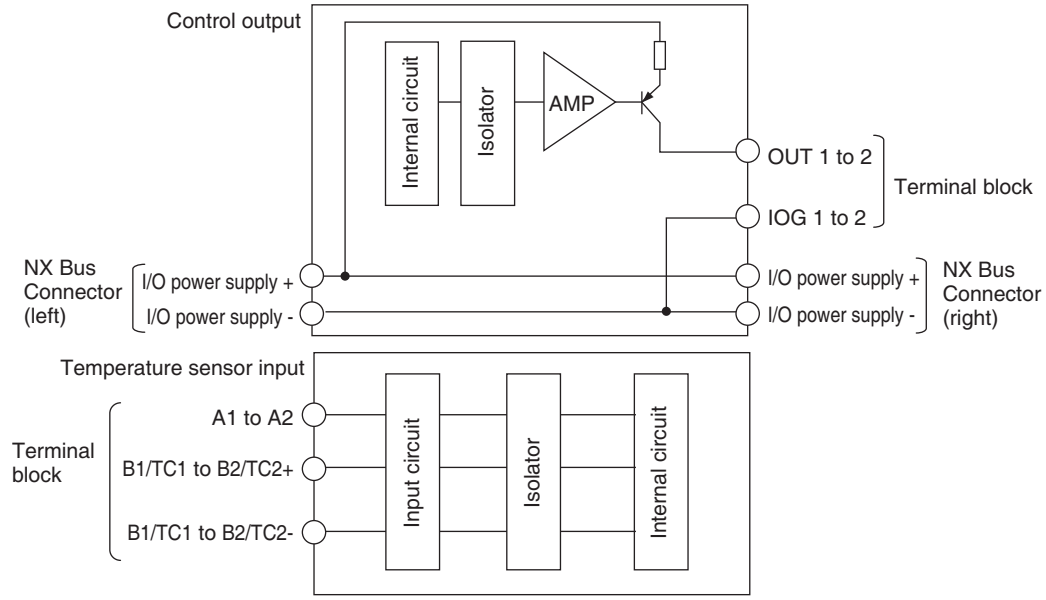
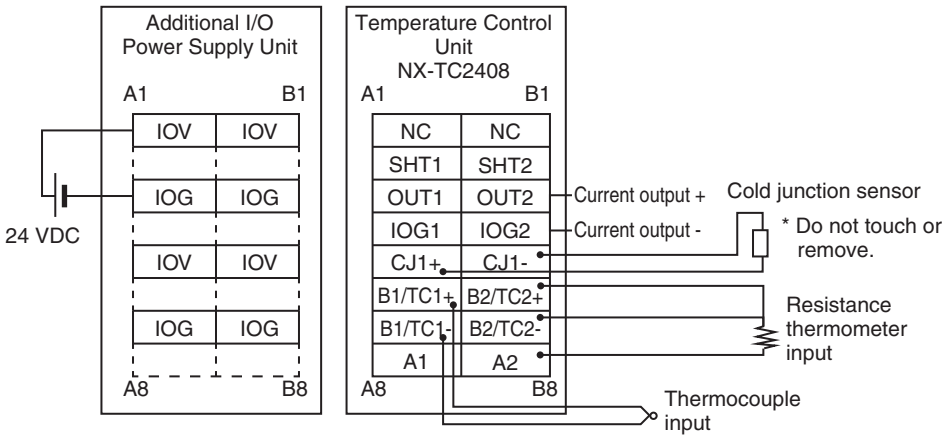
***2.** + 20°C only for the following input type settings:
1: JPt100
3: JPt100
10: T
14: U

***3.** For details, refer to the *Reference Accuracy and Temperature Coefficient Table* on page 25.
For thermocouple inputs, reference accuracy and cold junction compensation error are guaranteed for a set of a Temperature Control Unit and a terminal block on which a cold junction sensor is mounted.
Be sure to use the terminal block and the Temperature Control Unit with the same calibration control number together.
A calibration control number is displayed both on the terminal block and the Unit.
Make sure to return the terminal block to which a cold junction sensor is mounted and the Unit together.

***4.** For details, refer to *Cold Junction Compensation Error Specifications for Units That Take a Thermocouple Input Type* on page 27.

Temperature Control Unit (2-Channel Type) NX-TC2408

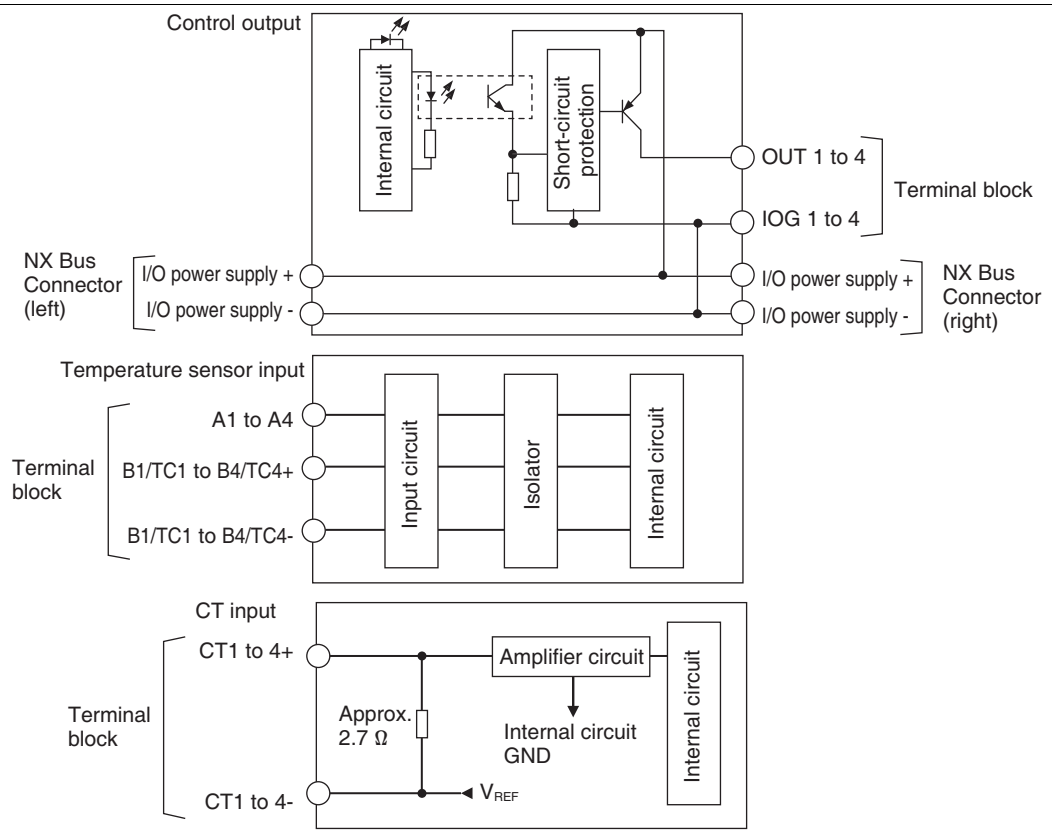
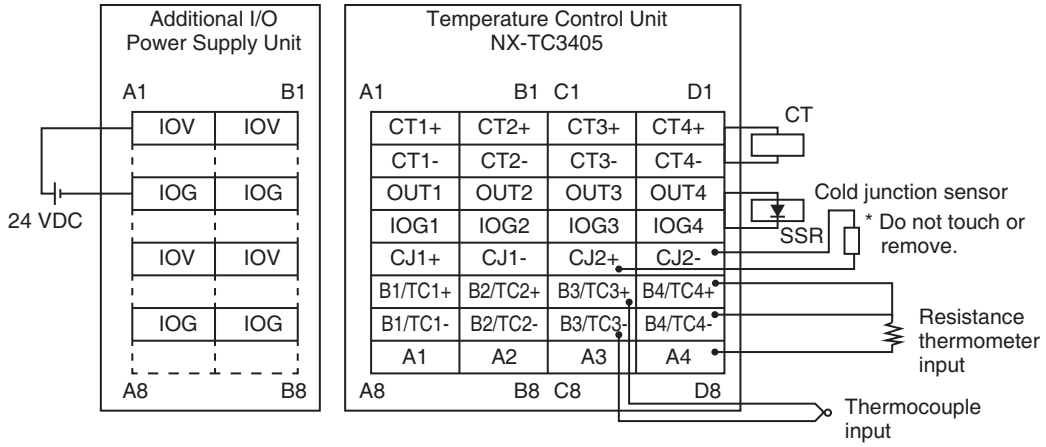
Unit name		Temperature Control Unit (2-Channel Type)	**Model**		NX-TC2408
Number of Channels		2 channels	**Control type**		Standard control
Number of points per channel		• Temperature input: 1 point per channel (2 points per unit) • CT input: None • Control Output: 1 point per channel (2 points per unit)	**External connection terminal**		Screwless clamping terminal block (16 terminals)
I/O refreshing method		Free-Run Refreshing			
Indicators		TS indicator and output indicators 	**CT Input section**	**CT current input range**	---
				Input resistance	---
				Connectable CTs	---
				Maximum heater current	---
				Resolution	---
				Overall accuracy (25°C)	---
				Influence of temperature (0 to 55°C)	---
				Conversion time	---
			Control Output section	**Control output type and number of control outputs per channel**	Linear current output, one output per channel
				Internal I/O common	---
				Control Period	---
				Manipulated variable	-5 to +105%
Sensor Input section	**Temperature sensor ✻1**	• Thermocouple input: K, J, T, E, L, U, N, R, S, B, C/W, PL II • Platinum resistance thermometer input: Pt100(three-wire), JPt100 (three-wire)		**Resolution**	1/10,000
	Input conversion range	±20°C of the input range ✻2		**Rated Voltage**	24 VDC
	Absolute maximum rating	±130 mV		**Operating Load Voltage Range**	15 to 28.8 VDC
	Input impedance	20 kΩ min.		**Maximum load current**	---
	Resolution	0.1°C max.		**Maximum Inrush Current**	---
	Reference accuracy	✻3		**Allowable load resistance**	350 Ω or less, or greater than 350 Ω but no more than 600 Ω *4
	Temperature coefficient	✻3		**Leakage current**	---
	Cold junction compensation error	±1.2°C ✻3 ✻5		**Residual voltage**	---
	Input disconnection detection current	Approx. 0.1 uA		**Load Short-circuit Protection**	---
	Input detection current	0.25 mA		**Output range**	0 to 20 mA, 4 to 20 mA
	Effect of conductor resistance	• Thermocouple input: 0.1°C/Ω (100 Ω or less per conductor) • Platinum resistance thermometer input: 0.06°C/Ω (20 Ω or less per conductor)		**Overall accuracy (25°C)**	±0.3% of full scale, but 1% of full scale at 0 to 4 mA of 0 to 20 mA range
	Warm-up period	30 minutes		**Influence of temperature (0 to 55°C)**	±0.3% (full scale)
	Conversion time	50 ms/Unit			
Dimensions		12 mm (W) ×100 mm (H) ×71 mm (D)	**Isolation method**		• Between sensor inputs and internal circuitry: Power = Transformer, Signal = Digital isolator • Between inputs: Power = Transformer, Signal = Digital isolator • Between control output and internal circuit: Photocoupler • No isolation between control outputs
Insulation resistance		20 MΩ min. between isolated circuits (at 100 VDC)	**Dielectric strength**		510 VAC between isolated circuits for 1 minute with a leakage current of 5 mA max.
I/O power supply method		Supplied from the NX bus.	**Current capacity of I/O power supply terminals**		IOG: 0.1 A max. per terminal

NX Unit power consumption	• Connected to a CPU Unit 1.25 W max. • Connected to Communications Coupler Unit 0.95 W max.	**Current consumption from I/O power supply**	20 mA max.
Weight	75 g max.		
Circuit configuration			
Installation orientation and restrictions	Mounting orientation: • Connect to CPU unit Front mounting orientation is possible • Connect to communication coupler unit Six orientations are possible Limitation: The cold junction compensation error is limited by the mounting orientation and the type or power consumption of the adjacent unit. For details, refer to *Cold Junction Compensation Error Specifications for Units That Take a Thermocouple Input Type* on page 27.		
Terminal connection diagram	 If the allowable load resistance of the linear current output will be within the following range, short SHT1 and SHT2 with a short-circuit cable. ▫ 350 Ω < Allowed load resistance 600 Ω		

***1.** For the setting ranges and indication ranges of the sensors, refer to the *Input types* on page 24.
***2.** + 20°C only for the following input type settings:
1: JPt100
3: JPt100
10: T
14: U
***3.** For details, refer to the *Reference Accuracy and Temperature Coefficient Table* on page 25.
For thermocouple inputs, reference accuracy and cold junction compensation error are guaranteed for a set of a Temperature Control Unit and a terminal block on which a cold junction sensor is mounted.
Be sure to use the terminal block and the Temperature Control Unit with the same calibration control number together.
A calibration control number is displayed both on the terminal block and the Unit.
Make sure to return the terminal block to which a cold junction sensor is mounted and the Unit together.
***4.** To use an allowable load resistance greater than 350 Ω but not exceeding 600 Ω, SHT1 and SHT2 must be shorted with a shorting cable.
For details, refer to the NX-series Temperature Control Units User's Manual (Cat. No. W523).
***5.** For details, refer to *Cold Junction Compensation Error Specifications for Units That Take a Thermocouple Input Type* on page 27.

Temperature Control Unit (4-Channel Type) NX-TC3405

Unit name		Temperature Control Unit (4-Channel Type)	**Model**		NX-TC3405
Number of Channels		4 channels	**Control type**		Standard control
Number of points per channel		• Temperature input: 1 point per channel (4 points per unit) • CT Input: 1 point per channel (4 points per unit) • Control Output: 1 point per channel (4 points per unit)	**External connection terminal**		Screwless clamping terminal block (16 terminals x 2)
I/O refreshing method		Free-Run Refreshing			
Indicators		TS indicator and output indicators 	**CT Input section**	**CT current input range**	0 to 0.125 A
				Input resistance	Approx. 2.7 Ω
				Connectable CTs	E54-CT1, E54-CT3, E54-CT1L, and E54-CT3L
				Maximum heater current	50 A AC
				Resolution	0.1 A
				Overall accuracy (25°C)	±5% (full scale) ±1 digit
				Influence of temperature (0 to 55°C)	±2% (full scale) ±1 digit
				Conversion time	50 ms/Unit
			Control Output section	**Control output type and number of control outputs per channel**	Voltage output for driving SSR, 1 point per channel
				Internal I/O common	PNP
				Control Period	0.1, 0.2, 0.5, 1 to 99s
				Manipulated variable	-5 to +105%
Sensor Input section	**Temperature sensor ✻1**	• Thermocouple input: K, J, T, E, L, U, N, R, S, B, C/W, PL II • Platinum resistance thermometer input: Pt100 (three-wire), JPt100 (three-wire)		**Resolution**	---
	Input conversion range	±20°C of the input range ✻2		**Rated Voltage**	24 VDC
	Absolute maximum rating	±130 mV		**Operating Load Voltage Range**	15 to 28.8 VDC
	Input impedance	20 kΩ min.		**Maximum load current**	21 mA/point, 84 mA/Unit
	Resolution	0.1°C max.		**Maximum Inrush Current**	0.3 A/point max., 10 ms max.
	Reference accuracy	✻3		**Allowable load resistance**	---
	Temperature coefficient	✻3		**Leakage current**	0.1 mA max.
	Cold junction compensation error	±1.2°C ✻3 ✻4		**Residual voltage**	1.5 V max.
	Input disconnection detection current	Approx. 0.1 uA		**Load Short-circuit Protection**	Provided
	Input detection current	0.25 mA		**Output range**	---
	Effect of conductor resistance	• Thermocouple input: 0.1°C/Ω (100 Ω or less per conductor) • Platinum resistance thermometer input: 0.06°C/Ω (20 Ω or less per conductor)		**Overall accuracy (25°C)**	---
	Warm-up period	30 minutes		**Influence of temperature (0 to 55°C)**	---
	Conversion time	50 ms/Unit			
Dimensions		24 mm (W) ×100 mm (H) ×71 mm (D)	**Isolation method**		• Between sensor inputs and internal circuitry: Power = Transformer, Signal = Digital isolator • Between inputs: Power = Transformer, Signal = Digital isolator • No isolation between internal circuits and CT inputs • Between control output and internal circuit: Photocoupler • No isolation between control outputs
Insulation resistance		20 MΩ min. between isolated circuits (at 100 VDC)	**Dielectric strength**		510 VAC between isolated circuits for 1 minute with a leakage current of 5 mA max.
I/O power supply method		Supplied from the NX bus.	**Current capacity of I/O power supply terminals**		IOG: 0.1 A max. per terminal
NX Unit power consumption		• Connected to a CPU Unit 1.80 W max. • Connected to Communications Coupler Unit 1.35 W max.	**Current consumption from I/O power supply**		20 mA max.

Weight	140 g max.
Circuit configuration	
Installation orientation and restrictions	Mounting orientation: • Connect to CPU unit Front mounting orientation is possible • Connect to communication coupler unit Six orientations are possible Limitation: The cold junction compensation error is limited by the mounting orientation and the type or power consumption of the adjacent unit. For details, refer to *Cold Junction Compensation Error Specifications for Units That Take a Thermocouple Input Type* on page 27.
Terminal connection diagram	

***1.** For the setting ranges and indication ranges of the sensors, refer to the *Input types* on page 24.

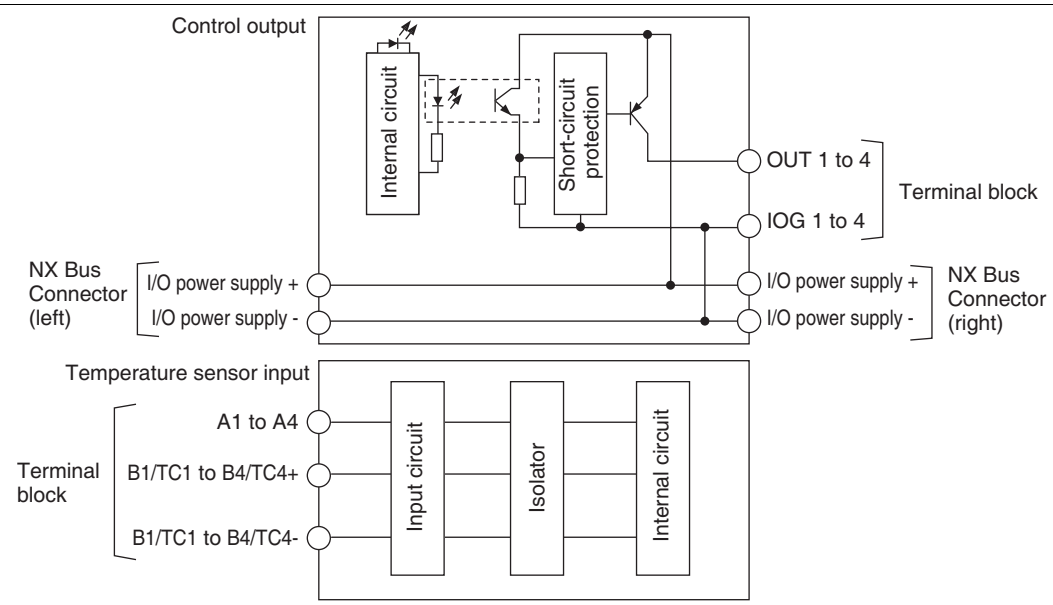
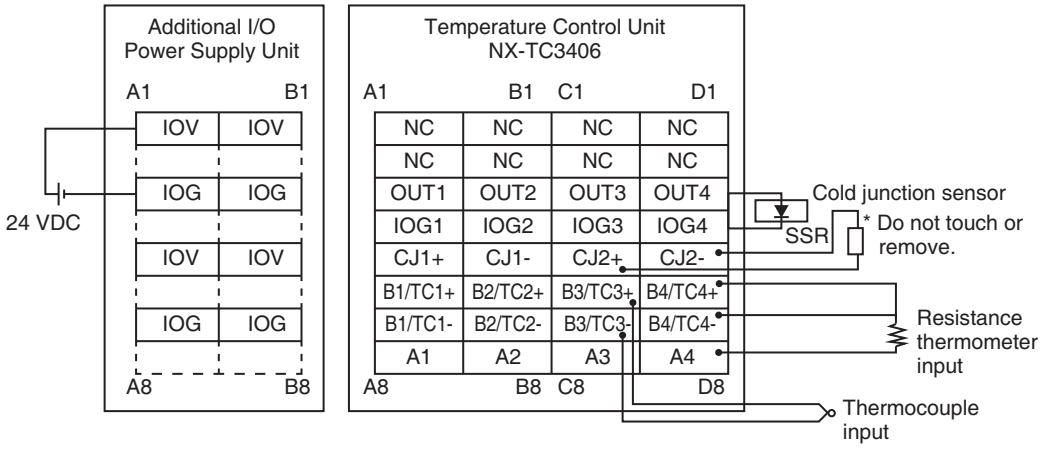
***2.** + 20°C only for the following input type settings:
1: JPt100
3: JPt100
10: T
14: U

***3.** For details, refer to the *Reference Accuracy and Temperature Coefficient Table* on page 25.
For thermocouple inputs, reference accuracy and cold junction compensation error are guaranteed for a set of a Temperature Control Unit and a terminal block on which a cold junction sensor is mounted.
Be sure to use the terminal block and the Temperature Control Unit with the same calibration control number together.
A calibration control number is displayed both on the terminal block and the Unit.
In order to distinguish left and right terminal blocks, each terminal block has either a letter "L" (left side) or "R" (right side) appended at the end of a calibration control number.
Make sure to return the terminal block to which a cold junction sensor is mounted and the Unit together.

***4.** For details, refer to *Cold Junction Compensation Error Specifications for Units That Take a Thermocouple Input Type* on page 27.

Temperature Control Unit (4-Channel Type) NX-TC3406

Unit name		Temperature Control Unit (4-Channel Type)	**Model**		NX-TC3406
Number of Channels		4 channels	**Control type**		Standard control
Number of points per channel		• Temperature input: 1 point per channel (4 points per unit) • CT input: None • Control Output: 1 point per channel (4 points per unit)	**External connection terminal**		Screwless clamping terminal block (16 terminals x 2)
I/O refreshing method		Free-Run Refreshing			
Indicators		TS indicator and output indicators 	**CT Input section**	**CT current input range**	---
				Input resistance	---
				Connectable CTs	---
				Maximum heater current	---
				Resolution	---
				Overall accuracy (25°C)	---
				Influence of temperature (0 to 55°C)	---
				Conversion time	---
			Control Output section	**Control output type and number of control outputs per channel**	Voltage output for driving SSR, 1 point per channel
				Internal I/O common	PNP
				Control Period	0.1, 0.2, 0.5, 1 to 99s
				Manipulated variable	-5 to +105%
Sensor Input section	**Temperature sensor ✻1**	• Thermocouple input: K, J, T, E, L, U, N, R, S, B, C/W, PL II • Platinum resistance thermometer input: Pt100(three-wire), JPt100 (three-wire)		**Resolution**	---
	Input conversion range	±20°C of the input range ✻2		**Rated Voltage**	24 VDC
	Absolute maximum rating	±130 mV		**Operating Load Voltage Range**	15 to 28.8 VDC
	Input impedance	20 kΩ min.		**Maximum load current**	21 mA/point, 84 mA/Unit
	Resolution	0.1°C max.		**Maximum Inrush Current**	0.3 A/point max., 10 ms max.
	Reference accuracy	✻3		**Allowable load resistance**	---
	Temperature coefficient	✻3		**Leakage current**	0.1 mA max.
	Cold junction compensation error	±1.2°C ✻3 ✻4		**Residual voltage**	1.5 V max.
	Input disconnection detection current	Approx. 0.1 uA		**Load Short-circuit Protection**	Provided
	Input detection current	0.25 mA		**Output range**	---
	Effect of conductor resistance	• Thermocouple input: 0.1°C/Ω (100 Ω or less per conductor) • Platinum resistance thermometer input: 0.06°C/Ω (20 Ω or less per conductor)		**Overall accuracy (25°C)**	---
	Warm-up period	30 minutes		**Influence of temperature (0 to 55°C)**	---
	Conversion time	50 ms/Unit			
Dimensions		24 mm (W) ×100 mm (H) ×71 mm (D)	**Isolation method**		• Between sensor inputs and internal circuitry: Power = Transformer, Signal = Digital isolator • Between inputs: Power = Transformer, Signal = Digital isolator • Between control output and internal circuit: Photocoupler • No isolation between control outputs
Insulation resistance		20 MΩ min. between isolated circuits (at 100 VDC)	**Dielectric strength**		510 VAC between isolated circuits for 1 minute with a leakage current of 5 mA max.
I/O power supply method		Supplied from the NX bus.	**Current capacity of I/O power supply terminals**		IOG: 0.1 A max. per terminal

NX Unit power consumption	• Connected to a CPU Unit 1.70 W max. • Connected to Communications Coupler Unit 1.25 W max.	**Current consumption from I/O power supply**	20 mA max.
Weight	140 g max.		
Circuit configuration			
Installation orientation and restrictions	Mounting orientation: • Connect to CPU unit Front mounting orientation is possible • Connect to communication coupler unit Six orientations are possible Limitation: The cold junction compensation error is limited by the mounting orientation and the type or power consumption of the adjacent unit. For details, refer to *Cold Junction Compensation Error Specifications for Units That Take a Thermocouple Input Type* on page 27.		
Terminal connection diagram			

***1.** For the setting ranges and indication ranges of the sensors, refer to the *Input types* on page 24.

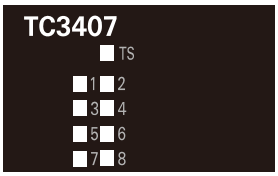
***2.** + 20°C only for the following input type settings:

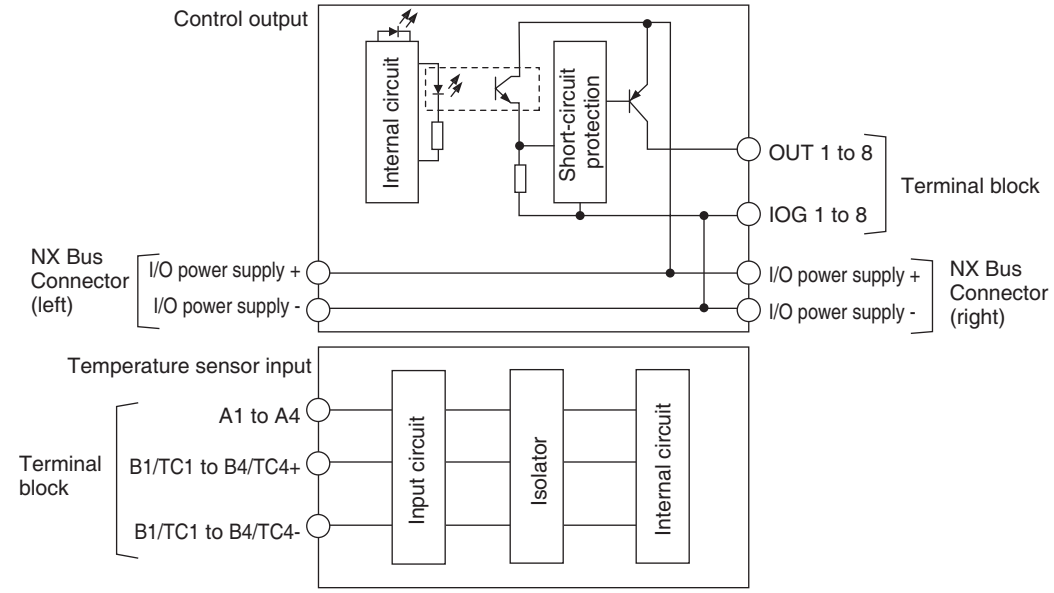
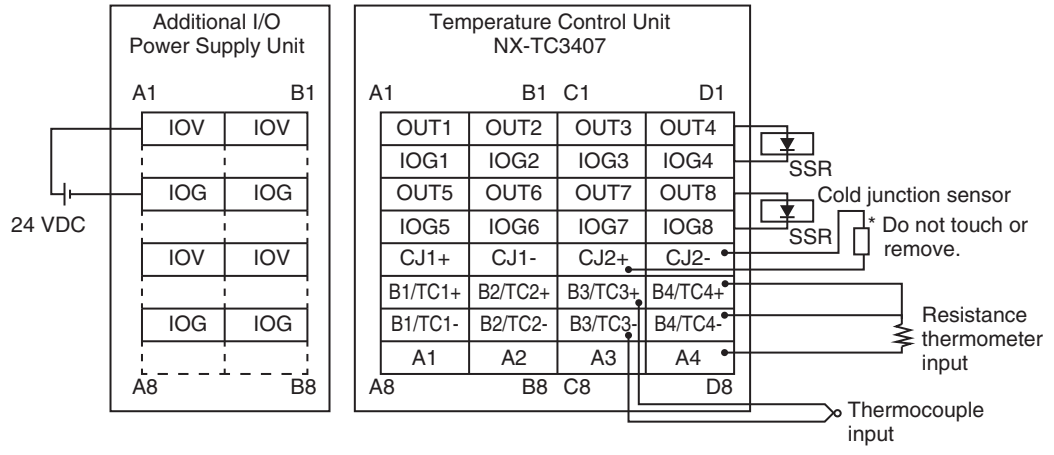
1: JPt100
3: JPt100
10: T
14: U

***3.** For details, refer to the *Reference Accuracy and Temperature Coefficient Table* on page 25.
For thermocouple inputs, reference accuracy and cold junction compensation error are guaranteed for a set of a Temperature Control Unit and a terminal block on which a cold junction sensor is mounted.
Be sure to use the terminal block and the Temperature Control Unit with the same calibration control number together.
A calibration control number is displayed both on the terminal block and the Unit.
In order to distinguish left and right terminal blocks, each terminal block has either a letter "L" (left side) or "R" (right side) appended at the end of a calibration control number.
Make sure to return the terminal block to which a cold junction sensor is mounted and the Unit together.

***4.** For details, refer to *Cold Junction Compensation Error Specifications for Units That Take a Thermocouple Input Type* on page 27.

Temperature Control Unit (4-Channel Type) NX-TC3407

Unit name		Temperature Control Unit (4-Channel Type)	**Model**		NX-TC3407
Number of Channels		4 channels	**control type**		heating and cooling control
Number of points per channel		• Temperature input: 1 point per channel (4 points per unit) • CT input: None • Control Output: 2 point per channel (8 points per unit)	**External connection terminal**		Screwless clamping terminal block (16 terminals x 2)
I/O refreshing method		Free-Run Refreshing			
Indicators		TS indicator and output indicators 	**CT Input section**	**CT current input range**	---
				Input resistance	---
				Connectable CTs	---
				Maximum heater current	---
				Resolution	---
				Overall accuracy (25°C)	---
				Influence of temperature (0 to 55°C)	---
				Conversion time	---
			Control Output section	**Control output type and number of control outputs per channel**	Voltage output for driving SSR, 2 point per channel
				Internal I/O common	PNP
				Control Period	0.1, 0.2, 0.5, 1 to 99s
				Manipulated variable	• Heating: 0 to +105% • Cooling: 0 to +105%
Sensor Input section	**Temperature sensor ✻1**	• Thermocouple input: K, J, T, E, L, U, N, R, S, B, C/W, PL II • Platinum resistance thermometer input: Pt100 (three-wire), JPt100 (three-wire)		**Resolution**	---
	Input conversion range	±20°C of input range ✻2		**Rated Voltage**	24 VDC
	Absolute maximum rating	±130 mV		**Operating Load Voltage Range**	15 to 28.8 VDC
	Input impedance	20 kΩ min.		**Maximum load current**	21 mA/point, 168 mA/Unit
	Resolution	0.1°C max.		**Maximum Inrush Current**	0.3 A/point max., 10 ms max.
	Reference accuracy	✻3		**Allowable load resistance**	---
	Temperature coefficient	✻3		**Leakage current**	0.1 mA max.
	Cold junction compensation error	±1.2°C ✻3 ✻4		**Residual voltage**	1.5 V max.
	Input disconnection detection current	Approx. 0.1 uA		**Load Short-circuit Protection**	Provided
	Input detection current	0.25 mA		**Output range**	---
	Effect of conductor resistance	• Thermocouple input: 0.1°C/Ω (100 Ω or less per conductor) • Platinum resistance thermometer input: 0.06°C/Ω (20 Ω or less per conductor)		**Overall accuracy (25°C)**	---
	Warm-up period	30 minutes		**Influence of temperature (0 to 55°C)**	---
	Conversion time	50 ms/Unit			
Dimensions		24 mm (W) ×100 mm (H) ×71 mm (D)	**Isolation method**		• Between sensor inputs and internal circuitry: Power = Transformer, Signal = Digital isolator • Between inputs: Power = Transformer, Signal = Digital isolator • Between control output and internal circuit: Photocoupler • No isolation between control outputs
Insulation resistance		20 MΩ min. between isolated circuits (at 100 VDC)	**Dielectric strength**		510 VAC between isolated circuits for 1 minute with a leakage current of 5 mA max.
I/O power supply method		Supplied from the NX bus.	**Current capacity of I/O power supply terminals**		IOG: 0.1 A max. per terminal

NX Unit power consumption	• Connected to a CPU Unit 1.75 W max. • Connected to Communications Coupler Unit 1.30 W max.	**Current consumption from I/O power supply**	20 mA max.
Weight	140 g max.		
Circuit configuration			
Installation orientation and restrictions	Mounting orientation: • Connect to CPU unit Front mounting orientation is possible • Connect to communication coupler unit Six orientations are possible Limitation: The cold junction compensation error is limited by the mounting orientation and the type or power consumption of the adjacent unit. For details, refer to *Cold Junction Compensation Error Specifications for Units That Take a Thermocouple Input Type* on page 27.		
Terminal connection diagram			

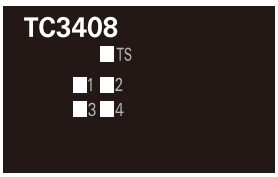
***1.** For the setting ranges and indication ranges of the sensors, refer to the *Input types* on page 24.

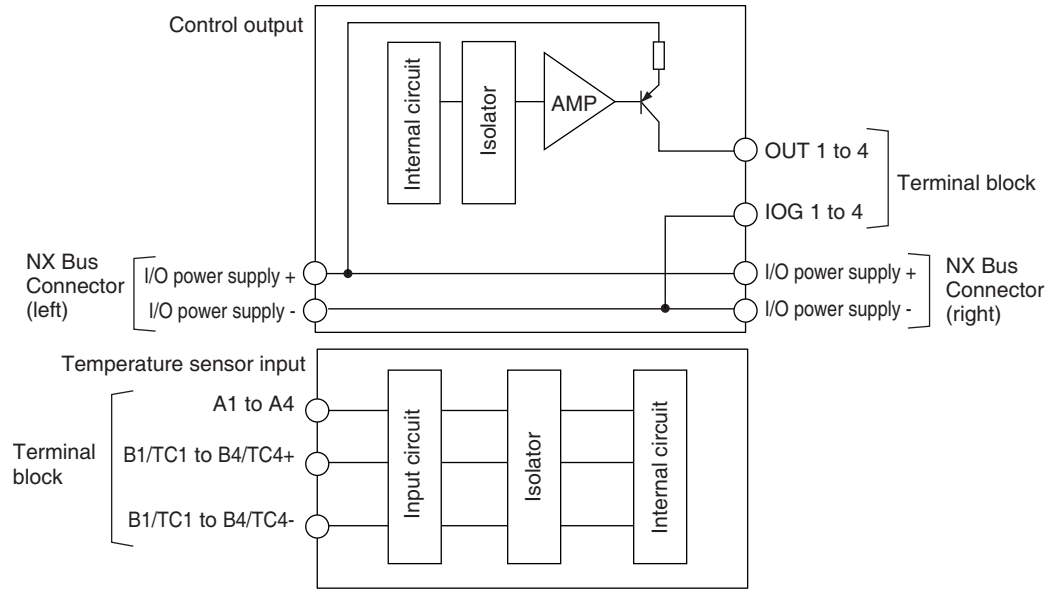
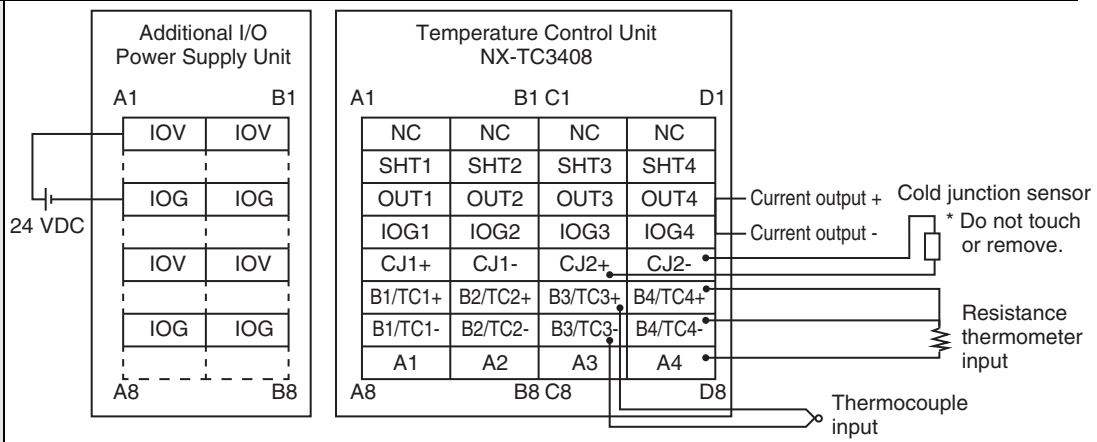
***2.** + 20°C only for the following input type settings:
1: JPt100
3: JPt100
10: T
14: U

***3.** For details, refer to the *Reference Accuracy and Temperature Coefficient Table* on page 25.
For thermocouple inputs, reference accuracy and cold junction compensation error are guaranteed for a set of a Temperature Control Unit and a terminal block on which a cold junction sensor is mounted.
Be sure to use the terminal block and the Temperature Control Unit with the same calibration control number together.
A calibration control number is displayed both on the terminal block and the Unit.
In order to distinguish left and right terminal blocks, each terminal block has either a letter "L" (left side) or "R" (right side) appended at the end of a calibration control number.
Make sure to return the terminal block to which a cold junction sensor is mounted and the Unit together.

***4.** For details, refer to *Cold Junction Compensation Error Specifications for Units That Take a Thermocouple Input Type* on page 27.

Temperature Control Unit (4-Channel Type) NX-TC3408

Unit name		Temperature Control Unit (4-Channel Type)	**Model**		NX-TC3408
Number of Channels		4 channels	**Control type**		Standard control
Number of points per channel		• Temperature input: 1 point per channel (4 points per unit) • CT input: None • Control Output: 1 point per channel (4 points per unit)	**External connection terminal**		Screwless clamping terminal block (16 terminals x 2)
I/O refreshing method		Free-Run Refreshing			
Indicators		TS indicator and output indicators 	**CT Input section**	**CT current input range**	---
				Input resistance	---
				Connectable CTs	---
				Maximum heater current	---
				Resolution	---
				Overall accuracy (25°C)	---
				Influence of temperature (0 to 55°C)	---
				Conversion time	---
			Control Output section	**Control output type and number of control outputs per channel**	Linear current output, one output per channel
				Internal I/O common	---
				Control Period	---
				Manipulated variable	-5 to +105%
Sensor Input section	**Temperature sensor ✻1**	• Thermocouple input: K, J, T, E, L, U, N, R, S, B, C/W, PL II • Platinum resistance thermometer input: Pt100 (three-wire), JPt100 (three-wire)		**Resolution**	1/10,000
	Input conversion range	±20°C of the input range ✻2		**Rated Voltage**	24 VDC
	Absolute maximum rating	±130 mV		**Operating Load Voltage Range**	15 to 28.8 VDC
	Input impedance	20 kΩ min.		**Maximum load current**	---
	Resolution	0.1°C max.		**Maximum Inrush Current**	---
	Reference accuracy	✻3		**Allowable load resistance**	350 Ω or less, or greater than 350 Ω but no more than 600 Ω ✻4
	Temperature coefficient	✻3		**Leakage current**	---
	Cold junction compensation error	±1.2°C ✻3 ✻5		**Residual voltage**	---
	Input disconnection detection current	Approx. 0.1 uA		**Load Short-circuit Protection**	---
	Input detection current	0.25 mA		**Output range**	0 to 20 mA, 4 to 20 mA
	Effect of conductor resistance	• Thermocouple input: 0.1°C/Ω (100 Ω or less per conductor) • Platinum resistance thermometer input: 0.06°C/Ω (20 Ω or less per conductor)		**Overall accuracy (25°C)**	±0.3% of full scale, but 1% of full scale at 0 to 4 mA of 0 to 20 mA range
	Warm-up period	30 minutes		**Influence of temperature (0 to 55°C)**	±0.3% (full scale)
	Conversion time	50 ms/Unit			
Dimensions		24 mm (W) ×100 mm (H) ×71 mm (D)	**Isolation method**		• Between sensor inputs and internal circuitry: Power = Transformer, Signal = Digital isolator • Between inputs: Power = Transformer, Signal = Digital isolator • Between control output and internal circuit: Photocoupler • No isolation between control outputs
Insulation resistance		20 MΩ min. between isolated circuits (at 100 VDC)	**Dielectric strength**		510 VAC between isolated circuits for 1 minute with a leakage current of 5 mA max.
I/O power supply method		Supplied from the NX bus.	**Current capacity of I/O power supply terminals**		IOG: 0.1 A max. per terminal
NX Unit power consumption		• Connected to a CPU Unit 1.65 W max. • Connected to Communications Coupler Unit 1.25 W max.	**Current consumption from I/O power supply**		30 mA max.

Weight	140 g max.
Circuit configuration	
Installation orientation and restrictions	Mounting orientation: • Connect to CPU unit Front mounting orientation is possible • Connect to communication coupler unit Six orientations are possible Limitation: The cold junction compensation error is limited by the mounting orientation and the type or power consumption of the adjacent unit. For details, refer to *Cold Junction Compensation Error Specifications for Units That Take a Thermocouple Input Type* on page 27.
Terminal connection diagram	 If the allowable load resistance of the OUT1 and OUT2 linear current output will be within the following range, short SHT1 and SHT2 with a short-circuit cable. ▫ 350 Ω < Allowed load resistance 600 Ω If the allowable load resistance of the OUT3 and OUT4 linear current output will be within the following range, short SHT3 and SHT4 with a short-circuit cable. ▫ 350 Ω < Allowed load resistance 600 Ω

✻1. For the setting ranges and indication ranges of the sensors, refer to the *Input types* on page 24.

✻2. + 20°C only for the following input type settings:
1: JPt100
3: JPt100
10: T
14: U

✻3. For details, refer to the *Reference Accuracy and Temperature Coefficient Table* on page 25.
For thermocouple inputs, reference accuracy and cold junction compensation error are guaranteed for a set of a Temperature Control Unit and a terminal block on which a cold junction sensor is mounted.
Be sure to use the terminal block and the Temperature Control Unit with the same calibration control number together.
A calibration control number is displayed both on the terminal block and the Unit.
In order to distinguish left and right terminal blocks, each terminal block has either a letter "L" (left side) or "R" (right side) appended at the end of a calibration control number.
Make sure to return the terminal block to which a cold junction sensor is mounted and the Unit together.

✻4. To use an allowable load resistance greater than 350 Ω but not exceeding 600 Ω, either SHT1 and SHT2, or SHT3 and SHT4 must be shorted with a shorting cable.
For details, refer to the NX-series Temperature Control Units User's Manual (Cat. No. W523).

✻5. For details, refer to *Cold Junction Compensation Error Specifications for Units That Take a Thermocouple Input Type* on page 27.

Input types

The settings are shown in the following table.

Setting name*1	Display of support software	Description	Default	Setting range	Unit	Change application timing
Ch□ input type	Ch□ Input Type	Sets the input type of sensors connected to temperature input.	5: K -200 to 1300°C	*2	No	After unit restart

***1.** □ represents the channel number.
***2.** The setting range is as follows:

Set values	Input types		Input indication range	Remarks
	Sensor	Input setting range		
0	Pt100	-200 to 850°C/-300 to 1500°F	-220 to 870°C/-340 to 1540°F	Resistance thermometer
1	Pt100	-199.9 to 500.0°C/-199.9 to 900.0°F	-219.9 to 520.0°C/-239.9 to 940.0°F	
2	Pt100	-0.0 to 100.0°C/0.0 to 210.0°F	-20.0 to 120.0°C/-40.0 to 250.0°F	
3	JPt100	-199.9 to 500.0°C/-199.9 to 900.0°F	-219.9 to 520.0°C/-239.9 to 940.0°F	
4	JPt100	-0.0 to 100.0°C/0.0 to 210.0°F	-20.0 to 120.0°C/-40.0 to 250.0°F	
5	K	-200 to 1300°C/-300 to 2300°F	-220 to 1320°C/-340 to 2340°F	Thermocouple
6	K	-20.0 to 500.0°C/0.0 to 900.0°F	-40.0 to 520.0°C/-40.0 to 940.0°F	
7	J	-100 to 850°C/-100.0 to 1500°F	-120 to 870°C/-140 to 1540°F	
8	J	-20.0 to 400.0°C/0.0 to 750.0°F	-40.0 to 420.0°C/-40.0 to 790.0°F	
9	T	-200 to 400°C/-300 to 700°F	-220 to 420°C/-340 to 740°F	
10	T	-199.9 to 400.0°C/-199.9 to 700.0°F	-219.9 to 420.0°C/-239.9 to 740°F	
11	E	-200 to 600°C/-300 to 1100°F	-220 to 620°C/-340 to 1140°F	
12	L	-100 to 850°C/-100 to 1500°F	-120 to 870°C/-140 to 1540°F	
13	U	-200 to 400°C/-300 to 700°F	-220 to 420°C/-340 to 740°F	
14	U	-199.9 to 400.0°C/-199.9 to 700.0°F	-219.9 to 420.0°C/-239.9 to 740°F	
15	N	-200 to 1300°C/-300 to 2300°F	-220 to 1320°C/-340 to 2340°F	
16	R	0 to 1700°C/0 to 3000°F	-20 to 1720°C/-40 to 3040°F	
17	S	0 to 1700°C/0 to 3000°F	-20 to 1720°C/-40 to 3040°F	
18	B	0 to 1800°C/0 to 3200°F	-20 to 1820°C/-40 to 3240°F	
19	C/W	0 to 2300°C/0 to 3200°F	-20 to 2320°C/-40 to 3240°F	
20	PLII	0 to 1300°C/0 to 2300°F	-20 to 1320°C/-40 to 2340°F	

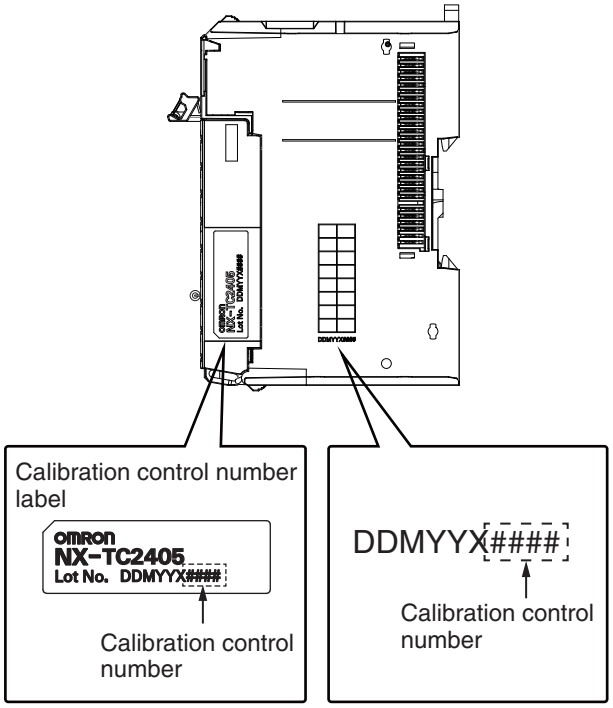
Reference Accuracy and Temperature Coefficient Table

Reference accuracies and temperature coefficients are shown below by input type and measurement temperature.
To convert the temperature unit from Celsius to Fahrenheit, use the following equation.
Fahrenheit temperature (°F) = Celsius temperature (°C) x 1.8 + 32

Set values	Input type		Measurement temperature (°C)	Reference accuracy °C (%) ✻2	Temperature coefficient °C/°C ✻3 (ppm/°C ✻4)
	Sensor	Temperature range (°C) ✻1			
0	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)
1	Pt100	-199.9 to 500.0	-199.9 to 300.0	±0.8 (±0.12%)	±0.1 (±150 ppm/°C)
			300.0 to 500.0	±0.8 (±0.12%)	±0.2 (±300 ppm/°C)
2	Pt100	0.0 to 100.0	0.0 to 100.0	±0.8 (±0.8%)	±0.1 (±1000 ppm/°C)
3	JPt100	-199.9 to 500.0	-199.9 to 300.0	±0.8 (±0.12%)	±0.1 (±150 ppm/°C)
			300.0 to 500.0	±0.8 (±0.12%)	±0.2 (±300 ppm/°C)
4	JPt100	0.0 to 100.0	0.0 to 100.0	±0.8 (±0.8%)	±0.1 (±1000 ppm/°C)
5	K	-200 to 1300	-200 to -100	±1.5 (±0.1%)	±0.15 (±100 ppm/°C)
			-100 to 400		±0.30 (±200 ppm/°C)
			400 to 1300		±0.38 (±250 ppm/°C)
6	K	-20.0 to 500.0	-20.0 to 400.0	±1.0 (±0.2%)	±0.30 (±600 ppm/°C)
			400.0 to 500.0		±0.38 (±760 ppm/°C)
7	J	-100 to 850	-100 to 400	±1.4 (±0.15%)	±0.14 (±150 ppm/°C)
			400 to 850	±1.2 (±0.13%)	±0.28 (±300 ppm/°C)
8	J	-20.0 to 400.0	-20.0 to 400.0	±1.0 (±0.24%)	±0.14 (±350 ppm/°C)
9	T	-200 to 400	-200 to -100	±1.2 (±0.2%)	±0.30 (±500 ppm/°C)
			-100 to 400		±0.12 (±200 ppm/°C)
10	T	-199.9 to 400.0	-199.9 to -100.0	±1.2 (±0.2%)	±0.30 (±500 ppm/°C)
			-100.0 to 400.0		±0.12 (±200 ppm/°C)
11	E	-200 to 600	-200 to 400	±1.2 (±0.15%)	±0.12 (±150 ppm/°C)
			400 to 600	±2.0 (±0.25%)	±0.24 (±300 ppm/°C)
12	L	-100 to 850	-100 to 300	±1.1 (±0.12%)	±0.11 (±120 ppm/°C)
			300 to 700	±2.2 (±0.24%)	±0.22 (±240 ppm/°C)
			700 to 850		±0.28 (±300 ppm/°C)
13	U	-200 to 400	-200 to 400	±1.2 (±0.2%)	±0.12 (±200 ppm/°C)
14	U	-199.9 to 400.0	-199.9 to 400.0	±1.2 (±0.2%)	±0.12 (±200 ppm/°C)
15	N	-200 to 1300	-200 to 400	±1.5 (±0.1%)	±0.30 (±200 ppm/°C)
			400 to 1000		
			1000 to 1300		±0.38 (±250 ppm/°C)
16	R	0 to 1700	0 to 500	±1.75 (±0.11%)	±0.44 (±260 ppm/°C)
			500 to 1200	±2.5 (±0.15%)	
			1200 to 1700		
17	S	0 to 1700	0 to 1700	±2.5 (±0.15%)	±0.44 (±260 ppm/°C)
18	B	0 to 1800	0 to 400	Reference accuracy cannot be guaranteed	Reference accuracy cannot be guaranteed
			400 to 1200	±3.6 (±0.2%)	±0.45 (±250 ppm/°C)
			1200 to 1800	±5.0 (±0.28%)	±0.54 (±300 ppm/°C)
19	C/W	0 to 2300	0 to 300	±1.15 (±0.05%)	±0.46 (±200 ppm/°C)
			300 to 800	±2.3 (±0.1%)	
			800 to 1500	±3.0 (±0.13%)	
			1500 to 2300		±0.691 (±300 ppm/°C)
20	PL II	0 to 1300	0 to 400	±1.3 (±0.1%)	±0.23 (±200 ppm/°C)
			400 to 800	±2.0 (±0.15%)	±0.39 (±300 ppm/°C
			800 to 1300		±0.65 (±500 ppm/°C)

✻1. The decimal point position of the various input types is "no decimal point" or "decimal point 1 digit". When calculating measured value error, round up calculation results in accordance with the decimal point position of the temperature range.

∗2. The overall accuracy of the Temperature Control Unit is guaranteed for a set consisting of a cold junction sensor that is mounted on the terminal block and a Temperature Control Unit. Be sure to use the terminal block and Temperature Control Unit with the same calibration control number together. For the 24mm width model, also be sure the left and right terminal blocks are correctly attached.



∗3. An error for a measured value when the ambient temperature changes by 1°C.
The following formula is used to calculate the error of the measured value for thermocouple inputs..
Overall accuracy = Reference accuracy + Temperature characteristic x Change in the ambient temperature + Cold junction compensation error
For resistance thermometer inputs, there is no cold junction compensation error.
(Calculation example)

- Conditions

Item	Description
Ambient temperature	30°C
Measured value	100°C
Thermocouple	K: -200 to 1300°C

- The characteristic values are formulated from the datasheet or reference accuracy and temperature coefficient table under the above conditions

Item	Description
Reference accuracy	-100 to 400°C: ±1.5°C
Temperature coefficient	-100 to 400°C: ±0.30°C/°C
Change in the ambient temperature	25°C -> 30°C 5 deg
Cold junction compensation error	±1.2°C

Therefore,
Overall accuracy = Reference accuracy + Temperature characteristic x Change in the ambient temperature + Cold junction compensation error
= ±1.5°C +(±0.30°C/°C) x 5 deg + ±1.2°C
= ±4.2°C

-200 to 1300°C without decimal point. the calculation result is round up after the decimal point.
Then the overall accuracy is ±5°C.

∗4. The ppm value is for the full scale of the temperature range.

Cold Junction Compensation Error Specifications for Units That Take a Thermocouple Input Type

This section describes the cold junction compensation errors for thermocouple inputs, which differ by installation orientation of this Unit, type of adjacent Units, and current consumed by the adjacent Units.

When the Adjacent Units are Temperature Control Units

This section describes the cold junction compensation errors when the adjacent Units are Temperature Control Units. The error differs by installation orientation.

(a) For upright installation

The cold junction compensation error is ±1.2°C.

However, there are exceptions depending on the input type and temperature. Those conditions and the cold junction compensation error are as in the table below.

Input type and temperature range	Cold junction compensation error
T below -90°C	±3.0°C
J, E, K and N below -100°C	
U, L and PLII	
R and S below 200°C	
B below 400°C	Not guaranteed
C/W	±3.0°C

(b) For other than upright installation

The cold junction compensation error is ±4.0°C.

However, there are exceptions depending on the input type and temperature. Those conditions and the cold junction compensation error are as in the table below.

Input type and temperature range	Cold junction compensation error
T below -90°C	±7.0°C
J, E, K and N below -100°C	
U, L and PLII	
R and S below 200°C	
B below 400°C	Not guaranteed
C/W	±9.0°C

When the Adjacent Units are not Temperature Control Units

This section describes the cold junction compensation errors when the adjacent Units are not Temperature Control Units. The error differs by the installation orientation and power consumption by the adjacent Units.

(a) For upright installation, when the power consumption is 1.5 W or less for both the left and right adjacent Units

The cold junction compensation error is ±1.2°C.

However, there are exceptions depending on the input type and temperature. Those conditions and the cold junction compensation error are as in the table below.

Input type and temperature range	Cold junction compensation error
T below -90°C	±3.0°C
J, E, K and N below -100°C	
U, L and PLII	
R and S below 200°C	
B below 400°C	Not guaranteed
C/W	±3.0°C

(b) When the power consumption of either the left or the right adjacent Unit is more than 1.5 W but less than 3.9 W. Or for any installation other than upright, when the power consumption of both the left and right adjacent Units is less than 3.9 W

The cold junction compensation error is ±4.0°C.

However, there are exceptions depending on the input type and temperature. Those conditions and the cold junction compensation error are as in the table below.

Input type and temperature range	Cold junction compensation error
T below -90°C	±7.0°C
J, E, K and N below -100°C	
U, L and PLII	
R and S below 200°C	
B below 400°C	Not guaranteed
C/W	±9.0°C

(c) When the power consumption exceeds 3.9 W for either the left or right adjacent Unit

Do not use the above condition (c) because the cold junction compensation error is not guaranteed in this condition.

(d) The power consumption of adjacent Units

The power consumption of adjacent Units is the total of the following values.

- The power consumption of the NX Unit power supply and I/O power supply for the NX Units adjacent to the Temperature Input Unit. If the adjacent Unit is an Input Unit, it is the total power consumption according to the input current.

Version Information

Connected to a CPU Unit

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

NX Unit		Corresponding version ✻1	
Model	Unit Version	CPU Unit	Sysmac Studio
NX-TC2405	Ver.1.0	Ver. 1.13	Ver.1.21
NX-TC2406			
NX-TC2407			
NX-TC2408			
NX-TC3405			
NX-TC3406			
NX-TC3407			
NX-TC3408			

✻1. 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.

Connected to a Communications EtherCAT Coupler Unit

NX Unit		Corresponding version ✻1		
Model	Unit Version	EtherCAT Coupler Unit	CPU Unit or Industrial PC	Sysmac Studio
NX-TC2405	Ver.1.0	Ver. 1.0 ✻2	Ver. 1.05	Ver.1.21
NX-TC2406				
NX-TC2407				
NX-TC2408				
NX-TC3405				
NX-TC3406				
NX-TC3407				
NX-TC3408				

✻1. 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.
✻2. To connect to a master of a different manufacturer, use a unit version 1.5 or later EtherCAT coupler unit.

Connected to a Communications EtherNet/IP Coupler Unit

NX Unit		Corresponding version✻1					
Model	Unit Version	Application with an NJ/NX/NY-series Controller ✻2			Application with an CS/CJ/CP-series PLC ✻3		
		EtherNet/IP Coupler Unit	CPU Unit or Industrial PC	Sysmac Studio	EtherNet/IP Coupler Unit	Sysmac Studio	NX-IO Configurator
NX-TC2405	Ver.1.0	Ver.1.2	Ver.1.14	Ver.1.21	Ver. 1.2	Ver.1.21	Ver. 1.02
NX-TC2406							
NX-TC2407							
NX-TC2408							
NX-TC3405							
NX-TC3406							
NX-TC3407							
NX-TC3408							

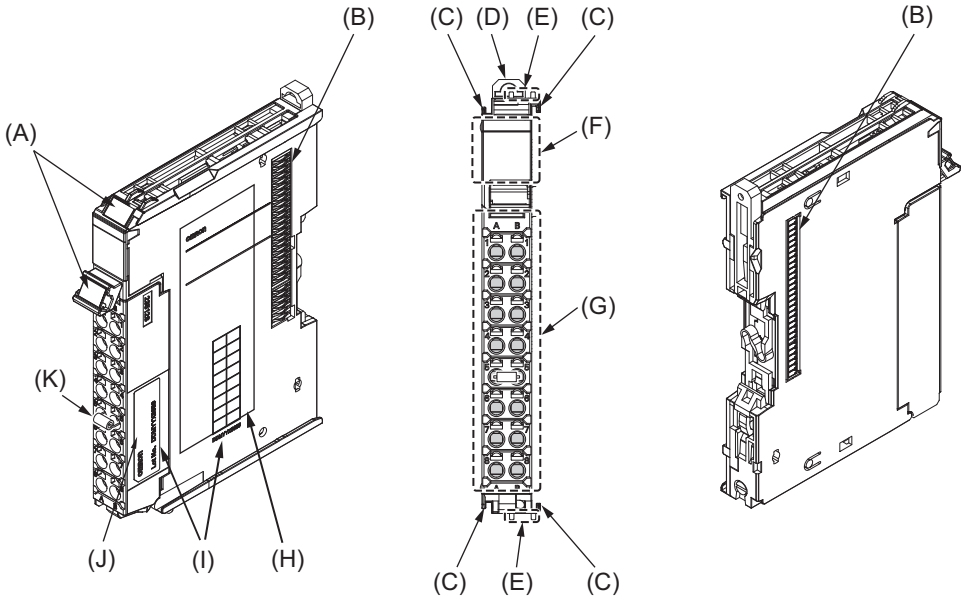
✻1. Some Units do not have all of the versions given in the above table. If a Unit does not have the specified version, support is provided by the oldest available version after the specified version. Refer to the user's manuals for the specific Units for the relation between models and versions.
✻2. Refer to the user's manual of the EtherNet/IP Coupler Unit for the unit versions of EtherNet/IP Units corresponding to EtherNet/IP Coupler Units.
✻3. Refer to the user's manual of the EtherNet/IP Coupler Unit for the unit versions of CPU Units and EtherNet/IP Units corresponding to EtherNet/IP Coupler Units.

External Interface

Temperature Control Unit

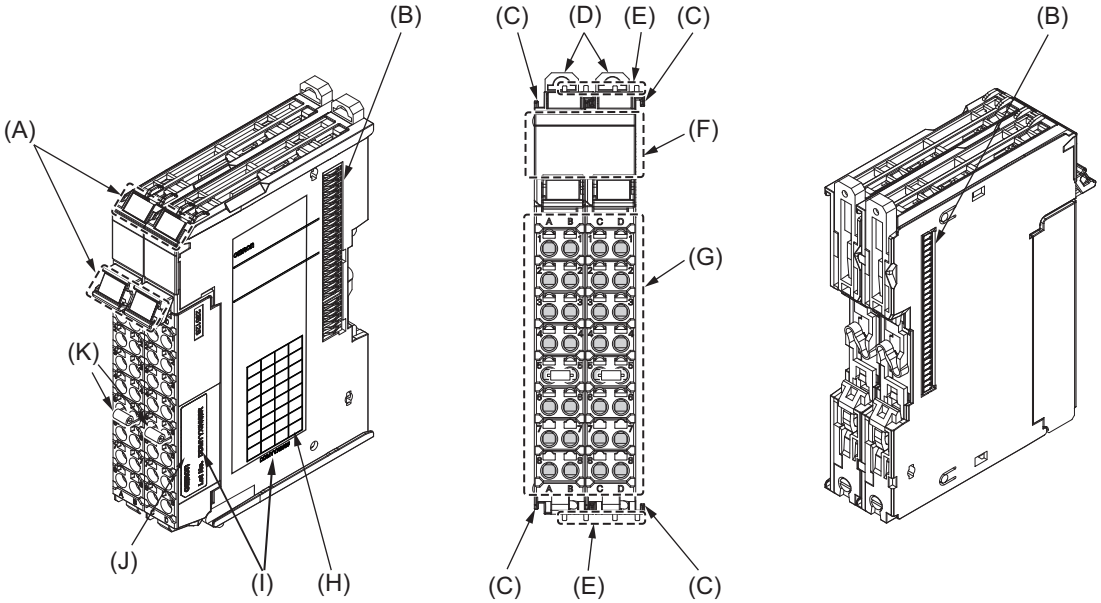
NX-TC2405/2406/2407/2408 (2 Ch Type)

12mm Width



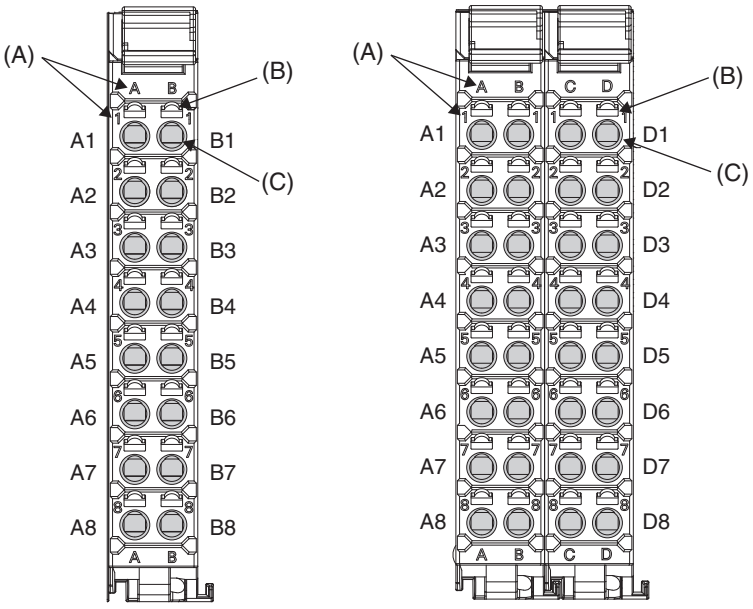
NX-TC3405/3406/3407/3408 (4 Ch Type)

24mm Width



Letter	Item	Specification
(A)	Marker attachment locations	The locations where markers are attached. The markers made by OMRON are installed for the factory setting. Commercially available markers can also be installed.
(B)	NX bus connector	This connector is used to connect each Unit.
(C)	Unit hookup guides	These guides are used to connect two Units.
(D)	DIN Track mounting hooks	These hooks are used to mount the NX Unit to a DIN Track.
(E)	Protrusions for removing the Unit	The protrusions to hold when removing the Unit.
(F)	Indicators	The indicators show the current operating status of the Unit.
(G)	Terminal block	The terminal block is used to connected external devices. The number of terminals depends on the type of Unit.
(H)	Unit specifications	The specifications of the Unit are given.
(I)	Calibration control number	The calibration control number is used to guarantee overall accuracy. The overall accuracy is guaranteed by using the terminal block and the Unit as a set that have the same calibration control number.
(J)	Calibration control number label	The label attached on the terminal block with a calibration control number written on it. With 24 mm wide models, the labels are attached on both left and right terminal blocks. "L" or "R" is appended at the end of the calibration control number to identify left or right.
(K)	Cold junction sensor	This sensor is used to perform the cold junction compensation. The sensors are mounted on both left and right terminal blocks for models with 24 mm width.

Terminal Blocks



Letter	Item	Specification
(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, i.e. A1 to A8 and B1 to B8. For models of 24 mm width, 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 plated one-pin ferrules. Do not use unplated ferrules or two-pin ferrules.

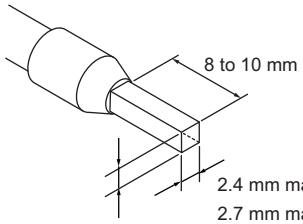
The applicable ferrules, wires, and crimping tool are given in the following table.

Terminal type	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, 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)	
		AI1,5-10		
Ground terminals		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 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.

Finished Dimensions of Ferrules



1.6 mm max. (except ground terminals)
2.0 mm max. (ground terminals)

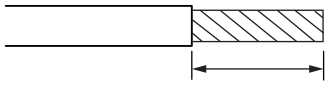
2.4 mm max. (except ground terminals)
2.7 mm max. (ground terminals)

Using Twisted Wires/Solid Wires

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

Terminals		Wire type				Wire size	Conductor length (stripping length)
		Twisted wires		Solid wire			
Classification	Current capacity	Plated	Unplated	Plated	Unplated		
All terminals except ground terminals	2 A or less	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)

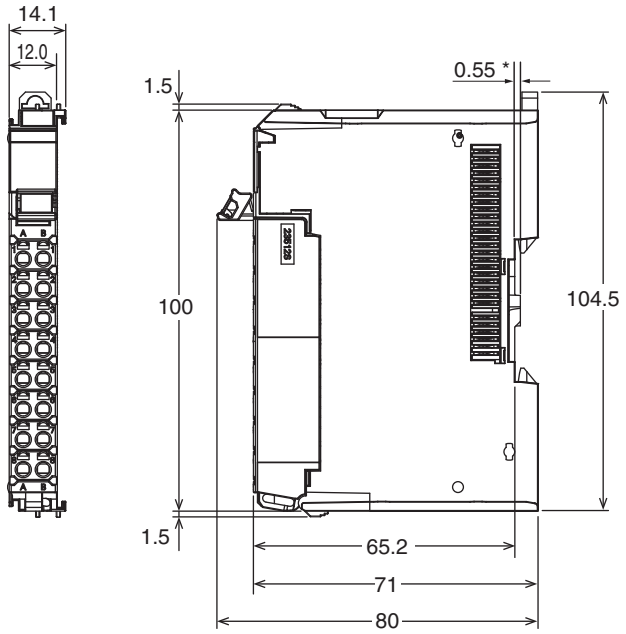
Note: <Additional Information> If more than 2 A will flow on the wires, use plated wires or use ferrules.

Dimensions

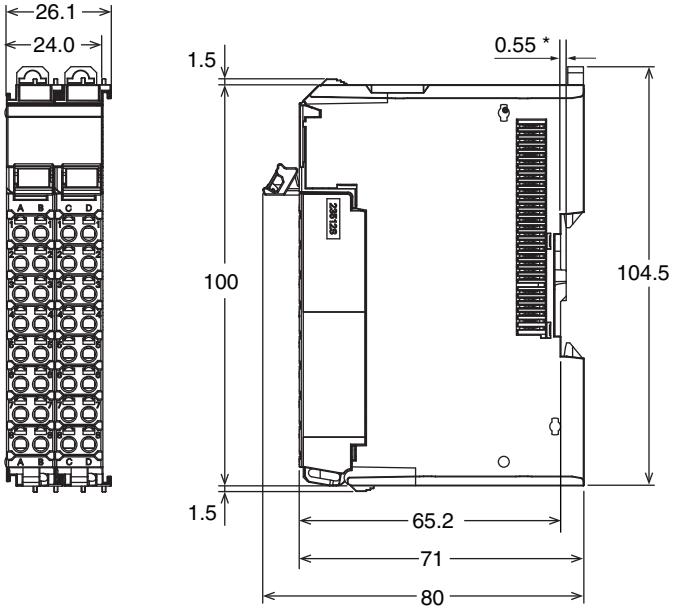
(Unit/mm)

Temperature Control Unit

NX-TC□□□
12 mm Width



24 mm Width



Related Manual

Cat. No.	Model number	Manual name	Application	Description
H228	NX-TC□□□□	NX-series User's Manual for Temperature Control Units	Learning how to use NX-series Temperature Control Units	The hardware, setup methods, and functions of the NX-series Temperature Control Units are described.

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