NX7

NX7 series machine controller

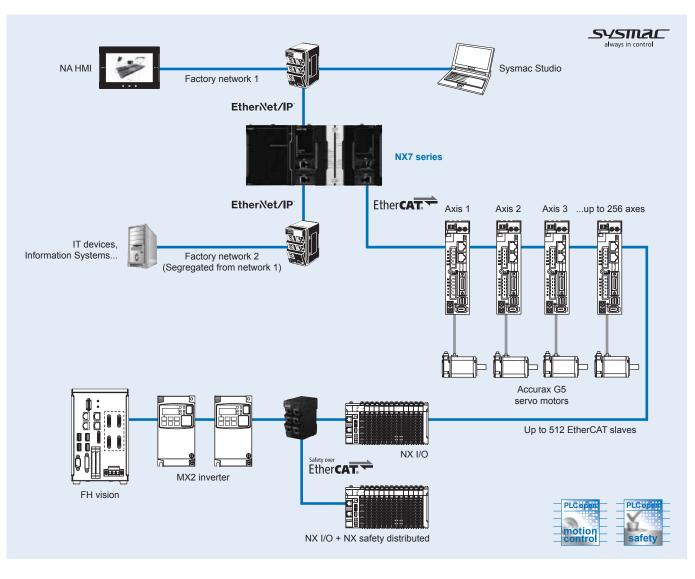
Sysmac controller - NX7 series

The NX7 series is a high performance machine controller that includes two synchronized motion cores controlling up to 256 axes.

- Fastest cycle time: 125 µs
- Number of axes: 256, 128
- Two synchronized motion cores
- Functions: Logic sequence and Motion
- Multi-tasking
- Built-in EtherCAT and two EtherNet/IP (1 Gbps) ports
- Fully conforms to IEC 61131-3 standards
- Certified PLCopen function blocks for motion control



System configuration



Specifications

General specifications

Item		NX7 CPU Unit			
Enclosure		Mounted in a panel			
Grounding		Less than 100 Ω			
CPU unit dimensions (H	× D × W)	100 mm × 100 mm × 132 mm			
Weight		880 g (including end cover)			
Power consumption		40 W (including SD Memory card and end cover)			
Operation environment	Ambient operating temperature	0 to 55°C			
	Ambient operating humidity	10% to 90% (with non condensation)			
	Atmosphere	Must be free from corrosive gases			
	Ambient storage temperature	-25 to 70°C (excluding battery)			
	Altitude	2,000 m or less			
	Pollution degree	2 or less: Conforms to JIS B3502 and IEC 61131-2.			
	Noise immunity	2 kV on power supply line (conforms to IEC 61000-4-4.)			
	Overvoltage category	Category II: Conforms to JIS B3502 and IEC 61131-2			
	EMC immunity level	Zone B			
	Vibration resistance	Conforms to IEC60068-2-6 5 to 8.4 Hz with 3.5 mm amplitude, 8.4 to 150 Hz. Acceleration of 9.8 m/s ² for 100 min in X, Y and Z directions (10 sweeps of 10 min each = 100 min total)			
	Shock resistance	Conforms to IEC60068-2-27 147 m/s ² , 3 times in X, Y and Z directions (100 m/s ² for relay output units)			
Battery	Life	2.5 years (at 25°C, power ON time rate 0% (power OFF))			
	Model	CJ1W-BAT01			
Applicable standards		Conforms to cULus, NK, LR, EC directives, RCM and KC registration.			

Performance specifications

Item			NX701-1600	NX701-1700	
Processing time	Instruction	LOAD instructions	0.42 ns		
		Math instructions	3.2 ns		
	time	(for long real data)			
Programming	Program	Size	80 MB		
	capacity ^{*1}	POU definition	6,000		
		POU instance	48,000		
	Variables	No retain attribute	Size: 256 MB		
	capacity		Number: 360,000		
		Retain attribute	Size: 4 MB		
			Number: 40,000		
	Data type	Number	8,000		
Unit configuration	Maximum num the system	ber of connectable NX units on	4,000 (on NX EtherCAT commur	nication coupler unit)	
	Number of exp	ansion racks	0		
		Model	NX-PA9001		
	unit for CPU		NX-PD7001		
	rack and ex- pansion racks	AC power supply	30 to 45 ms		
		DC power supply	5 to 20 ms		
Motion control	Number of	Number of real axes ^{*2}	128 axes max.	256 axes max.	
	controlled	Number of total axes ^{*3}	128 axes max.	256 axes max.	
	axes	Linear interpolation control	4 axes max. per axes group	·	
		Circular interpolation control	2 axes per axes group		
	Number of axe	s groups	64 groups max.		
	Position units		Pulses, millimeters, micrometers	, nanometers, degrees or inches	
	Override factor	rs	0.00% or 0.01% to 500.00%		
	Motion control	period	Same as process data communi	cations period of EtherCAT communications	
	Cams	Number of cam data points	65,535 points max. per cam table	e / 1,048,560 points max. for all cam tables	
		Number of cam tables	640 tables max.		
Communications	Peripheral	Supported services	Sysmac Studio connection		
	USB port	Physical layer	USB 2.0-compliant B-type conne	ector	
		Transmission distance	5 m max.		

Item				NX701-1600 NX701-1700
Communications	Built-in	Numb	per of ports	2
	EtherNet/IP		ical layer	- 10BASE-T/100BASE-TX/1000BASE-T
	port		e length	1514 max.
		-	a access method	CSMA/CD
		Modulation		Baseband
				Star
		Baud rate		1 Gbps (1000BASE-T)
		Transmission media		STP (shielded, twisted-pair) cable of Ethernet category 5, 5e or higher
			mission distance	100 m max. (distance between Ethernet switch and node)
		Cascade connections number		
		Number of connections		There are no restrictions if an switching hub is used 256 per port, total 512
			Packet interval ^{*4}	
		data links ications)	Packet Interval	0.5 to 10,000 ms in 0.5-ms increments. Can be set for each connection.
			Permissible	40,000 pps ^{*5} (including heartbeat)
		il i	communications band	40,000 pps * (including flearbear)
		lata cat	Number of tag sets	256 per port, total 512
		a c ini		Network variables
		CIP service: Tag data link (cyclic communications)	Tag types	
		se: Om	Number of tags	8 (7 tags if controller status is included in the tag set.)
		S ≤	Link data size per node	369,664 bytes max. (total size for all tags.)
		cli Sel	Data size per connection	
		CIP (cV	Number of registrable tag sets	256 per port, total 512 (1 connection = 1 tag set)
		0 -		1,444 bytes max. (two bytes are used if controller status is included in the tag set.)
			Tag set size	
			Multi-cast packet filter ^{*6}	Supported.
		ie o	Class 3 (number of connections)	128 per port, total 256 (clients plus server)
		CIP message service: Explicit messages	(number of connections)	(clients plus server)
			UCMM	Number of clients that can communicate at one time: 32 per port, total 64
			(non-connection type)	Number of servers that can communicate at one time: 32 per port, total 64
		ы Ш		
	Built-in	Numb	per of TCP socket service	30 max.
	EtherCAT port		nunications standard	IEC 61158, Type 12
		EtherCAT master specifications Physical layer		Class B (feature pack motion control compliant)
				100BASE-TX
			lation	Baseband
		Baud		100 Mbps (100Base-TX)
			ex mode	Automatic
		Topol		Line, daisy chain and branching
			mission media	Twisted-pair cable of category 5 or higher (double-shielded straight cable with aluminum tape
		TIANS		and braiding)
		Trans	mission distance	Distance between nodes: 100 m max.
			per of slaves	512 max.
			ess data size	Inputs/Outputs: 11,472 bytes max.
			ess data size per slave	Inputs/Outputs: 1,472 bytes max.
			-	
		Com	nunications period	 Primary periodic task: 125 μs,
				250 μs to 8 ms (in 250 μs increments)
				 Priority-5 periodic task:
				125 μs,
				250 μs to 100 ms (in 250 μs increments)
		Sync	jitter	1 μs max.
Internal clock				At ambient temperature of 55°C: -3.5 to +0.5 min error per month
1				At ambient temperature of 25°C: -1.5 to +1.5 min error per month
				At ambient temperature of 0°C: -3 to +1 min error per month

^{*1} This is the capacity for the execution objects and variable tables (including variable names).
 ^{*2} This is the total number of axes that are set as servo axes or encoder axes and are also set as used axes.
 ^{*3} This is the total for all axis types.
 ^{*4} Data is updated on the line in the specified interval regardless of the number of nodes.
 ^{*5} Means packets per second, i.e., the number of communication packets that can be sent or received in one second.
 ^{*6} An IGMP client is mounted for the EtherNet/IP port. If an Ethernet switch that supports IGMP snooping is used, filtering of unnecessary multicast packets is performed.

Function specifications

Item				NX7 CPU Unit
Tasks	Function	Function		I/O refreshing and the user program are executed in units that are called tasks.
		Deriedicelly ex		Tasks are used to specify execution conditions and execution priority. Maximum number of primary periodic tasks: 1
		Periodically exercise	eculed lasks	Maximum number of periodic tasks: 1
I		Conditionally executed tasks		Maximum number of even tasks: 32
		-		When active even task instruction is executed or when condition expression for variable is met
Programming	POUs	Programs Function blocks		POUs that are assigned to tasks.
I	(program organization			POUs that are used to create objects with specific conditions.
	units)	Functions		POUs that are used to create an object that determine unique outputs for the inputs, such as for data processing.
I	Programming	Types		Ladder diagrams ⁻¹ and structured text (ST).
I	languages	0 11		
	Namespaces	•		A concept that is used to group identifiers for POU definitions.
	Variables	External access	s of variables	Network variables (the function which allows access from the HMI, host computers or other controllers)
	Data types	Basic data type	25	BOOL, BYTE, WORD, DWORD, LWORD, INT, SINT, DINT, LINT, UINT, USINT, UDINT, ULINT, REAL, LREAL, TIME (durations), DATE, TIME_OF_DAY, DATE_AND_TIME and STRING (text strings)
I		Derivative data		Structures, unions, enumerations
		Structures	Function	A derivative data type that groups together data with different variable types. Number of members: 2,048 max. Nesting levels: 8 max.
			Member data types	Basic data types, structures, unions, enumerations, array variables
			Specifying member offsets	You can use member offsets to place structure members at any memory locations. ³³
		Unions	Function	A derivative data type that groups together data with different variable types. Number of members: 4 max.
			Member data types	BOOL, BYTE, WORD, DWORD and LWORD.
		Enumerations	Function	A derivative data type that uses text strings called enumerators to express variable values.
	Data type	Array	Function	An array is a group of elements with the same data type. You specify the number (subscript) of
	attributes	specifications		the element from the first element to specify the element. Number of dimensions: 3 max. Number of elements: 65,535 max.
			Array specifications for FB instances	Supported.
		Range specific		You can specify a range for a data type in advance. The data type can take only values that
		go opeenie		are in the specified range.
		Libraries		User libraries.
Motion control	Control modes			Position control, velocity control, torque control
	Axis types			Servo axes, virtual servo axes, encoder axes and virtual encoder axes
	Positions that c Single-axis	an be managed Single-axis	Absolute	Command positions and actual positions Positioning is performed for a target position that is specified with an absolute value.
I	Single-axis	position	positioning	Positioning is performed for a target position that is specified with an absolute value.
I		contol	Relative	Positioning is performed for a specified travel distance from the command current position.
I			positioning	
I				
1			Interrupt	Positioning is performed for a specified travel distance from the position where an interrupt
			feeding Cyclic synchro-	input was received from an external input. The function which output command positions in every control period in the position control
			feeding Cyclic synchro- nous absolute positioning	input was received from an external input. The function which output command positions in every control period in the position control mode.
		Single-axis	feeding Cyclic synchro- nous absolute positioning Velocity control	input was received from an external input. The function which output command positions in every control period in the position control mode. Velocity control is performed in position control mode.
		Single-axis velocity control	feeding Cyclic synchro- nous absolute positioning Velocity control Cyclic synchronous	input was received from an external input. The function which output command positions in every control period in the position control mode.
		velocity control Single-axis	feeding Cyclic synchro- nous absolute positioning Velocity control Cyclic	input was received from an external input. The function which output command positions in every control period in the position control mode. Velocity control is performed in position control mode.
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		velocity control Single-axis torque control	feeding Cyclic synchro- nous absolute positioning Velocity control Cyclic synchronous velocity control Torque control Starting cam operation Ending cam	input was received from an external input. The function which output command positions in every control period in the position control mode. Velocity control is performed in position control mode. A velocity command is output each control period in the velocity control mode. The torque of the motor is controlled.
		velocity control Single-axis torque control Single-axis synchronized	feeding Cyclic synchro- nous absolute positioning Velocity control Cyclic synchronous velocity control Torque control Starting cam operation Starting gear	input was received from an external input. The function which output command positions in every control period in the position control mode. Velocity control is performed in position control mode. A velocity command is output each control period in the velocity control mode. The torque of the motor is controlled. A cam motion is performed using the specified cam table.
		velocity control Single-axis torque control Single-axis synchronized	feeding Cyclic synchro- nous absolute positioning Velocity control Cyclic synchronous velocity control Torque control Torque control Starting cam operation Starting gear operation Positioning gear	input was received from an external input. The function which output command positions in every control period in the position control mode. Velocity control is performed in position control mode. A velocity command is output each control period in the velocity control mode. The torque of the motor is controlled. A cam motion is performed using the specified cam table. The cam motion for the axis that is specified with the input parameter is ended. A gear motion with the specified gear ratio is performed between a master axis and slave axis. A gear motion with the specified gear ratio and sync position is performed between a master
		velocity control Single-axis torque control Single-axis synchronized	feeding Cyclic synchro- nous absolute positioning Velocity control Cyclic synchronous velocity control Torque control Starting cam operation Starting gear operation Positioning gear operation Ending gear	input was received from an external input. The function which output command positions in every control period in the position control mode. Velocity control is performed in position control mode. A velocity command is output each control period in the velocity control mode. The torque of the motor is controlled. A cam motion is performed using the specified cam table. The cam motion for the axis that is specified with the input parameter is ended. A gear motion with the specified gear ratio is performed between a master axis and slave axis.
		velocity control Single-axis torque control Single-axis synchronized	feeding Cyclic synchro- nous absolute positioning Velocity control Cyclic synchronous velocity control Torque control Starting cam operation Ending cam operation Starting gear operation Positioning gear operation Ending gear operation Synchronous	input was received from an external input. The function which output command positions in every control period in the position control mode. Velocity control is performed in position control mode. A velocity command is output each control period in the velocity control mode. The torque of the motor is controlled. A cam motion is performed using the specified cam table. The cam motion for the axis that is specified with the input parameter is ended. A gear motion with the specified gear ratio is performed between a master axis and slave axis A gear motion with the specified gear ratio and sync position is performed between a master axis and slave axis.
		velocity control Single-axis torque control Single-axis synchronized	feeding Cyclic synchro- nous absolute positioning Velocity control Cyclic synchronous velocity control Torque control Torque control Starting cam operation Starting gear operation Starting gear operation Ending gear operation Ending gear operation Synchronous positioning Master axis	input was received from an external input. The function which output command positions in every control period in the position control mode. Velocity control is performed in position control mode. A velocity command is output each control period in the velocity control mode. The torque of the motor is controlled. A cam motion is performed using the specified cam table. The cam motion for the axis that is specified with the input parameter is ended. A gear motion with the specified gear ratio is performed between a master axis and slave axis. The specified gear motion or positioning gear motion is ended.
		velocity control Single-axis torque control Single-axis synchronized	feeding Cyclic synchro- nous absolute positioning Velocity control Cyclic synchronous velocity control Torque control Torque control Starting cam operation Starting gear operation Starting gear operation Ending gear operation Ending gear operation Synchronous positioning Master axis phase shift	input was received from an external input. The function which output command positions in every control period in the position control mode. Velocity control is performed in position control mode. A velocity command is output each control period in the velocity control mode. The torque of the motor is controlled. A cam motion is performed using the specified cam table. The cam motion for the axis that is specified with the input parameter is ended. A gear motion with the specified gear ratio is performed between a master axis and slave axis A gear motion with the specified gear ratio and sync position is performed between a master axis and slave axis. The specified gear motion or positioning gear motion is ended. Positioning is performed in sync with a specified master axis. The phase of a master axis in synchronized control is shifted.
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Interpretation Torque limit can be set to control function of the serve drive can be enabled or disabled and the torque limit can be set to control the output torque. Axes groups Multi-axes coordinated control Multi-axes star velocity You can set the initial velocity when axis motion starts. Axes groups Multi-axes coordinated control Multi-axes star velocity Compensation Second star velocity Axes groups Multi-axes coordinated control Multi-axes (cricular 2D interpolation Cincular interpolation is performed to a specified absolute position. Relative linear interpolation Cincular 2D circular 2D interpolation Circular 2D circular 2D circular 2D circular positioning command is output each control period in Position control mode. Auxiliary functions for multi-axes coordinated control Resetting axes group are ors stopping axes groups Axes group is enabled. Stopping axes groups All axes in interpolated motion are decelerated to a stop. Motion of an axes group is disabled. Stopping axes groups The blended target velocity is changed during interpolated motion. The command current positions and actual current positions of an axes group can be read. Common items Cams Setting axes group The command current positions and actual current positions of an axes group can be read. CPU unit. The command current positions and actual current po					You can monitor whether the difference between the command positions or actual positions o two specified axes exceeds a threshold value.
Axes groups Multi-axes coordinated control Multi-axes biolinated control Circular 2D circular 2D cir					The error between the command current position and actual current position is set to 0.
Axes groups Multi-axes coordinated control Concentration Start velocity You can set the initial velocity when axis motion starts. Axes groups Multi-axes control Absolute linear Interpolation Linear interpolation is performed to a specified absolute position. Control Relative linear Interpolation Linear interpolation is performed to a specified relative position. Circular 2D Circular 2D Circular interpolation is performed for two axes. Auxiliary functions for multi-axes coordinated control Resetting axes groups Axes group errors and axis errors are cleared. Interpolation Resetting axes groups Motion of an axes group is enabled. The binding axes groups Interpolation group errors All axes in interpolated motion are stopped immediately. All axes in interpolated motion are stopped immediately. Stopping axes groups Stopping axes group positions The blended target velocity is changed during interpolated motion. Common items Cams Setting axes group positions The compandu current position axes parameter in the axes group parameters can be overwritten temporarily axes in a group Common items Cams Setting cam table properties The compandu current position axes parameter in the axes group parameters can be overwritten temporarily axes in a group <				Torque limit	The torque control function of the servo drive can be enabled or disabled and the torque limits can be set to control the output torque.
Axes groups Multi-axes Multi-axes coordinated control Start velocity interpolation You can set the initial velocity when axis motion starts. Axes groups Multi-axes Multi-axes Multi-axes Absolute linear Interpolation Linear interpolation is performed to a specified absolute position. Relative linear Interpolation Circular 12D Circular 2D Circular 2D Circular interpolation is performed for two axes. Auxiliary functions for multi-axes coordinated control Resetting axes roup errors Axes group cyclic synchro- nous absolute positioning Axes group errors and axis errors are cleared. Multi-axes coordinated control Resetting axes groups Motion of an axes group is enabled. Disabiling axes groups Motion of an axes group is disabled. Immediately stopping axes group override factors All axes in interpolated motion are stopped immediately. Maxes in a group stopping axes group positions group override factors The blended target velocity is changed during interpolated motion. Common items Cams Stefting axes group position and actual current positions and actual current positions of an axes group can be read. Common items Cams Stefting axes group override factors The composition axes parameter in the axes group parameters can be overwritten temporarily and cam mode. Quint. Generarting gar					The function which compensate the position for the axis in operation.
Axes groups Multi-axes coordinated control Linear interpolation Relative linear interpolation Linear interpolation is performed to a specified absolute position. Relative linear interpolation Linear interpolation is performed to a specified relative position. Circular 2D Circular interpolation is performed for two axes. Auxiliary evelle synchro- nous absolute coordinated control Axes group areas A positioning command is output each control period in Position control mode. Pauxiliary coordinated control Resetting axes groups Axes group or an axes group is enabled. Coordinated control Enabling axes groups All axes in interpolated motion are decelerated to a stop. Immediately stopping axes groups All axes in interpolated motion are stopped immediately. Stopping axes groups The blended target velocity is changed during interpolated motion. Common items Cams Setting axes group position The command current positions and actual current positions of an axes group can be read. Common items Cams Setting axes group position The composition axes parameter in the axes group parameters can be overwritten temporarily axes in a group Reading axes group positions The composition axes parameter in the axes group parameters can be overwritten temporarily axes in a group Reading axes gr					You can set the initial velocity when axis motion starts
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Auxiliary functions for multi-axes coordinated control Resetting axes group errors Axes group errors and axis errors are cleared. Disabiling axes groups Resetting axes group errors Motion of an axes group is enabled. Coordinated control Disabiling axes groups Motion of an axes group is disabled. Disabiling axes groups All axes in interpolated motion are decelerated to a stop. Immediately stopping axes groups All axes in interpolated motion are stopped immediately. Setting axes groups The blended target velocity is changed during interpolated motion. Common items Cams Setting axes group positions The composition axes parameter in the axes group parameters can be overwritten temporarily axes in a group at table properties Common items Cams Setting axes group coverride The composition axes parameter in the axes group parameters can be overwritten temporarily axing cam table properties Setting cam tables The cam table that is specified with the input parameter is changed. Cenerating cam tables The cam table that is specified with the input parameter is changed. Parameters Writing MC settings Some of the axis parameters or axes group parameters are overwritten temporarily.				Circular 2D	Circular interpolation is performed for two axes.
Auxiliary functions for multi-axes coordinated control Resetting axes groups Axes group errors and axis errors are cleared. Disabiling axes coordinated control Enabling axes groups Motion of an axes group is enabled. Disabiling axes groups Motion of an axes group is disabled. Disabiling axes groups All axes in interpolated motion are decelerated to a stop. Stopping axes groups All axes in interpolated motion are stopped immediately. Stopping axes groups The blended target velocity is changed during interpolated motion. Setting axes group override factors The command current positions and actual current positions of an axes group can be read. Common items Cams Setting cam axes in a group The composition axes parameter in the axes group parameters can be overwritten temporarily axes in a group Common items Cams Setting cam table properties The cam table that is specified with the input parameter is saved in non-volatile memory in th tables Parameters Writing MC setting axis Some of the axis parameters or axes group parameters are overwritten temporarily.				cyclic synchro- nous absolute	A positioning command is output each control period in Position control mode.
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control Disabling axes groups Motion of an axes group is disabled. Stopping axes groups Stopping axes groups All axes in interpolated motion are decelerated to a stop. Immediately stopping axes groups All axes in interpolated motion are stopped immediately. Setting axes group override factors The blended target velocity is changed during interpolated motion. Reading axes group positions The command current positions and actual current positions of an axes group can be read. Common items Cams Setting cam table properties Saving cam tables The composition index of the cam table that is specified in the input parameter is changed. Parameters Writing MC settings Some of the axis parameters or axes group parameters are overwritten temporarily. Vou can access and change the axis parameters from the user program. Some of the axis parameters or axes group parameters from the user program.				Enabling axes	Motion of an axes group is enabled.
Stopping axes groups All axes in interpolated motion are decelerated to a stop. Immediately stopping axes groups All axes in interpolated motion are stopped immediately. Setting axes group override factors The blended target velocity is changed during interpolated motion. Reading axes group positions The command current positions and actual current positions of an axes group can be read. Common items Cams Setting cam table properties Saving cam tables The cam table that is specified with the input parameter is saved in non-volatile memory in th cPU unit. Generating cam tables The cam table that is specified with the input parameter is generated from the cam property and cam mode. Parameters Writing MC Settings Some of the axis parameters or axes group parameters are overwritten temporarily.				Disabling axes	Motion of an axes group is disabled.
Setting axes groups The blended target velocity is changed during interpolated motion. Setting axes group override factors The blended target velocity is changed during interpolated motion. Reading axes group positions The command current positions and actual current positions of an axes group can be read. Common items Cams The composition axes parameter in the axes group parameters can be overwritten temporarily Setting cam table properties The end point index of the cam table that is specified in the input parameter is changed. Saving cam tables The cam table that is specified with the input parameter is generated from the cam property and cam mode. Parameters Writing MC settings Some of the axis parameters or axes group parameters are overwritten temporarily.				Stopping axes	All axes in interpolated motion are decelerated to a stop.
group override factors Reading axes group positions The command current positions and actual current positions of an axes group can be read. Changing the axes in a group The composition axes parameter in the axes group parameters can be overwritten temporarily Common items Cams Setting cam table properties Saving cam tables The cam table that is specified with the input parameter is saved in non-volatile memory in the CPU unit. Generating cam tables The cam table that is specified with the input parameter is generated from the cam property and cam mode. Parameters Writing MC settings You can access and change the axis parameters from the user program.				stopping axes	All axes in interpolated motion are stopped immediately.
group positions Granging the axes in a group The composition axes parameter in the axes group parameters can be overwritten temporarily Common items Cams Setting cam table properties The end point index of the cam table that is specified in the input parameter is changed. Saving cam tables The cam table that is specified with the input parameter is saved in non-volatile memory in the CPU unit. Generating cam tables The cam table that is specified with the input parameter is generated from the cam property and cam mode. Parameters Writing MC settings Some of the axis parameters or axes group parameters are overwritten temporarily. Changing axis You can access and change the axis parameters from the user program.				group override	The blended target velocity is changed during interpolated motion.
axes in a group axes in a group Common items Cams Setting cam table properties The end point index of the cam table that is specified in the input parameter is changed. Saving cam tables The cam table that is specified with the input parameter is saved in non-volatile memory in th CPU unit. Generating cam tables The cam table that is specified with the input parameter is generated from the cam property and cam mode. Parameters Writing MC settings Changing axis You can access and change the axis parameters from the user program.					The command current positions and actual current positions of an axes group can be read.
Common items Cams Setting cam table properties The end point index of the cam table that is specified in the input parameter is changed. Saving cam table properties Saving cam table properties The cam table that is specified with the input parameter is saved in non-volatile memory in the CPU unit. Generating cam tables The cam table that is specified with the input parameter is generated from the cam property and cam mode. Parameters Writing MC settings Changing axis You can access and change the axis parameters from the user program.					The composition axes parameter in the axes group parameters can be overwritten temporarily
tables CPU unit. Generating cam tables The cam table that is specified with the input parameter is generated from the cam property and cam mode. Parameters Writing MC settings Some of the axis parameters or axes group parameters are overwritten temporarily. Changing axis You can access and change the axis parameters from the user program.		Common items	Cams	Setting cam	The end point index of the cam table that is specified in the input parameter is changed.
tables and cam mode. Parameters Writing MC settings Some of the axis parameters or axes group parameters are overwritten temporarily. Changing axis You can access and change the axis parameters from the user program.					The cam table that is specified with the input parameter is saved in non-volatile memory in the CPU unit.
Parameters Writing MC settings Some of the axis parameters or axes group parameters are overwritten temporarily. Changing axis You can access and change the axis parameters from the user program.				•	The cam table that is specified with the input parameter is generated from the cam property and cam mode.
Changing axis You can access and change the axis parameters from the user program.			Parameters	Writing MC	
parameters				Changing axis	You can access and change the axis parameters from the user program.

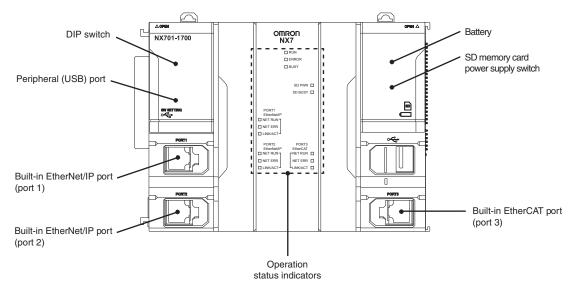
Item				NX7 CPU Unit		
Motion control	Auxiliary	Count modes		You can select either linear mode (finite length) or rotary mode (infinite length).		
	functions	Unit conversion	ns	You can set the display unit for each axis according to the machine.		
		Acceleration/ deceleration control	Automatic acceleration/ deceleration control	Jerk is set for the acceleration/deceleration curve for an axis motion or axes group motion.		
			Changing the acceleration and deceleration rates	You can change the acceleration or deceleration rate even during acceleration or deceleration		
		In-position che	ck	You can set an in-position range and in-position check time to confirm when positioning is completed.		
		Stop method		You can set the stop method to the immediate stop input signal or limit input signal.		
		instructions	f motion control	You can change the input variables for a motion control instruction during execution and execute the instruction again to change the target values during operation.		
		Multi-execution control instruct mode)	tions (buffer	You can specify when to start execution and how to connect the velocities between operations when another motion control instruction is executed during operation.		
		Continuous axes group motions (transition mode) Monitoring Software limits		You can specify the transition mode for multi-execution of instructions for axes group operation		
				Software limits are set for each axis.		
		functions	Following error	The error between the command current value and the actual current value is monitored for an axis.		
			Velocity, accel- eration/decelera- tion rate, torque, interpolation velocity and interpolation acceleration/de-	You can set warning values for each axis and each axes group.		
		celeration rate Absolute encoder support		You can use an OMRON Accurax-G5 series servomotor with an absolute encoder to eliminat		
		Input signal log	jic inversion	the need to perform homing at startup. You can inverse the logic of immediate stop input signal, positive limit input signal, negative		
				limit input signal or home proximity input signal.		
	External interface signals			The servo drive input signals listed on below are used. Home signal, home proximity signal, positive limit signal, negative limit signal, immediate stop signal and interrupt input signal.		
Unit (I/O) management	EtherCAT slaves	Number of slav	es	512 max.		
Communica- tions	Peripheral USB	•		A port for communications with various kinds of support software running on a personal computer.		
	EtherNet/IP	Communication		TCP/IP, UDP/IP		
	port	CIP communi- cations service	Message communications	Programless cyclic data exchange is performed with the devices on the EtherNet/IP network CIP commands are sent to or received from the devices on the EtherNet/IP network.		
		TCP/IP applications	Socket services	Data is sent to and received from any node on EtherNet using the UDP or TCP protocol. Socket communications instructions are used.		
			FTP client	File can be read from or written to computers to other Ethernet nodes from the CPU unit. FTF client communications instructions are used.		
			FTP server	Files can be read from or written to the SD memory card in the CPU unit from computers at other Ethernet nodes.		
			Automatic clock adjustment	Clock information is read from the NTP server at the specified time or at specified interval after the power supply to the CPU unit is turned ON. The internal clock time in the CPU unit is updated with the read time.		
			SNMP agent	Built-in EtherNet/IP port internal status information is provided to network management software that uses an SNMP manager.		
	EtherCAT port	Supported services	Process data communications	A communication method to exchange control information in cyclic communications betweer the EtherCAT master and slaves. This communications method is defined by CoE.		
		301 11003	SDO	A communication method to exchange control information in noncyclic event communications		
		Network scann	communications ing			
		DC (distributed	•	generated. Time is synchronized by sharing the EtherCAT system time between all EtherCAT devices		
		Packet monitor	ing	(including the master). The frames that are sent by the master and the frames that are received by the master can b		
		Enable/disable	settings for	saved. The data that is saved can be viewed with WireShark or other applications. The slaves can be enabled or disabled as communications targets.		
		slaves Disconnecting/		Temporarily disconnects a slave from the EtherCAT network for maintenance, such as for		
		slaves Supported	CoE	replacement of the slave and then connects the slave again. SDO messages of the CAN application can be sent to slaves via EtherCAT.		
		application protocol				
	Communicatio	ns instructions		The following instructions are supported: CIP communications instructions, socket communications instructions, SDO message in-		
				structions and FTP client instructions.		

Item				NX7 CPU Unit				
System	Event logs	Categories		Events are recorded in the following logs:				
management				System event log				
				Access event log				
				User-defined event log				
Debugging	Online editing	Number of eve	nts per event log	1,024 max.				
Debugging	Online editing			Programs, function blocks, functions and global variables can be changed online. Different op- erators can change different POUs across a network.				
	Forced	Forced refreshing		The user can force specific variables to TRUE or FALSE.				
	refreshing	Number of	For EtherCAT	64 max.				
		forced	slaves					
		variables						
	MC test Run			Motor operation and wiring can be checked from the Sysmac Studio.				
	Synchronization	า		The project file in the Sysmac Studio and the data in the CPU unit can be made the same when online.				
	Differentiation	Differentiation	monitoring	Rising/falling edge of contacts can be monitored.				
	monitoring	Number of con		8 max.				
	Data tracing	Types	Single triggered	When the trigger condition is met, the specified number of samples are taken and then tracing				
	, in the second se		trace Continuous	stops automatically. Data tracing is executed continuously and the trace data is collected by the Sysmac Studio.				
		Number of sim	trace ultaneous data	4 max.				
l		trace						
		Number of reco		10,000 max.				
		Sampling	Number of sam- pled variables	192 variables max.				
		Timing of samp	bling	Sampling is performed for the specified task period, at the specified time or when a sampling instruction is executed.				
l		Triggered	Triggered traces	Trigger conditions are set to record data before and after an event.				
		traces	Trigger	When BOOL variable changes to TRUE or FALSE.				
			conditions	Comparison of non-BOOL variable with a constant. Comparison method: Equals (=), greater than (>), greater than or equals (\geq), less than (<), less than or equals (\leq), not equal (\neq).				
			Delay	Trigger position setting: A slider is used to set the percentage of sampling before and after the trigger condition is met.				
	Simulation	•	•	The operation of the CPU unit is emulated in the Sysmac Studio.				
Reliability	Self-diagnosis	Controller erro	1	Major fault, partial fault, minor fault, observation and information.				
		User-defined	User-defined	User-defined errors are registered in advance and then records are created by executing				
		errors	errors	instructions.				
Security	Protecting	CPI I unit name	Levels s and serial IDs	8 levels When going online to a CPU Unit from the Sysmac Studio, the CPU Unit name in the project is				
coounty	software assets			compared to the name of the CPU Unit being connected to.				
	and preventing operating mistakes	Protection	User program transfer with no restoration	You can prevent reading data in the CPU unit from the Sysmac Studio.				
			information CPU unit write	You can prevent writing data to the CPU unit from the Sysmac Studio or SD memory card.				
			protection Overall project	You can use passwords to protect .smc files from unauthorized opening on the Sysmac Studio.				
			file protection					
			Data protection	You can use passwords to protect POUs on the Sysmac Studio.				
		Verification of operation authority	Verification of operation authority	Online operations can be restricted by operation rights to prevent damage to equipment or in- juries that may be caused by operating mistakes.				
			Number of groups	5				
		Verification of		The user program cannot be executed without entering a user program execution ID from the				
		execution ID		Sysmac Studio for the specific hardware (CPU unit).				
SD memory	Storage type			SD memory card, SDHC memory card				
card	Application	Automatic tran memory card	ster from SD	The data in the autoload folder on an SD memory card is automatically loaded when the power supply to the controller is turned ON				
		SD memory card	rd operation	supply to the controller is turned ON. You can access SD memory cards from instructions in the user program.				
		instructions	a operation	The car access of memory cards norm metadulons in the daer program.				
				You can perform file operations for Controller files in the SD memory card and read/write				
		File operations						
		Studio	-	standard document files on the computer.				
		Studio	rd life expiration					
Backup	SD memory card backup	Studio SD memory car	rd life expiration Using front switch	Notification of the expiration of the life of the SD memory card is provided in a system-defined				
Backup		Studio SD memory car detection	rd life expiration	Notification of the expiration of the life of the SD memory card is provided in a system-defined variable and event log.				
Backup	card backup	Studio SD memory car detection	d life expiration Using front switch Using system- defined variable Memory card operations	Notification of the expiration of the life of the SD memory card is provided in a system-defined variable and event log. You can use front switch to backup, compare or restore data. You can use system-defined variables to backup or compare data.				
Backup	card backup	Studio SD memory car detection	d life expiration Switch Using system- defined variable Memory card operations dialog box Using	Notification of the expiration of the life of the SD memory card is provided in a system-defined variable and event log. You can use front switch to backup, compare or restore data. You can use system-defined variables to backup or compare data. Backup and verification operations can be performed from the SD memory card operations di-				
Backup	card backup	Studio SD memory car detection	d life expiration Using front switch Using system- defined variable Memory card operations dialog box	Notification of the expiration of the life of the SD memory card is provided in a system-defined variable and event log. You can use front switch to backup, compare or restore data. You can use system-defined variables to backup or compare data. Backup and verification operations can be performed from the SD memory card operations di- alog box on the Sysmac Studio.				
Backup	card backup	Studio SD memory can detection Operation	d life expiration Switch Using system- defined variable Memory card operations dialog box Using instruction	Notification of the expiration of the life of the SD memory card is provided in a system-defined variable and event log. You can use front switch to backup, compare or restore data. You can use system-defined variables to backup or compare data. Backup and verification operations can be performed from the SD memory card operations dialog box on the Sysmac Studio. Backup operation can be performed by using instruction.				

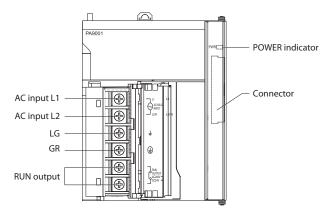
 $^{\rm *1}\,$ Inline ST is supported (Inline ST is ST that is written as an element in a ladder diagram).

Nomenclature

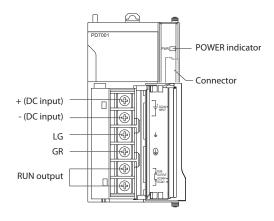
NX7 CPU unit



100 to 240 VAC power supply unit (NX-PA9001)

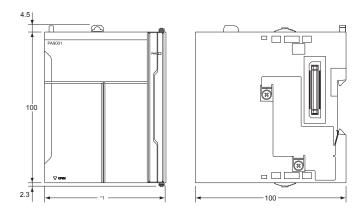


24 VDC power supply unit (NX-PD7001)



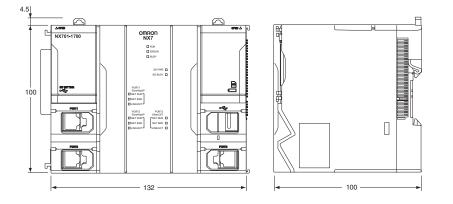
Dimensions

Power supply unit (NX-PA9001/PD7001)

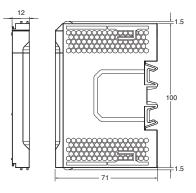


Note: 1. This dimension depends on the selected power supply unit: - 51 mm: NX-PD7001 - 80 mm: NX-PA9001

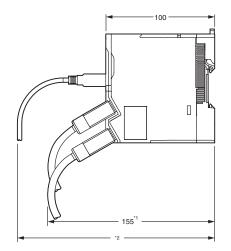
NX7 CPU unit



End cover (NX-END01)



Mounting height

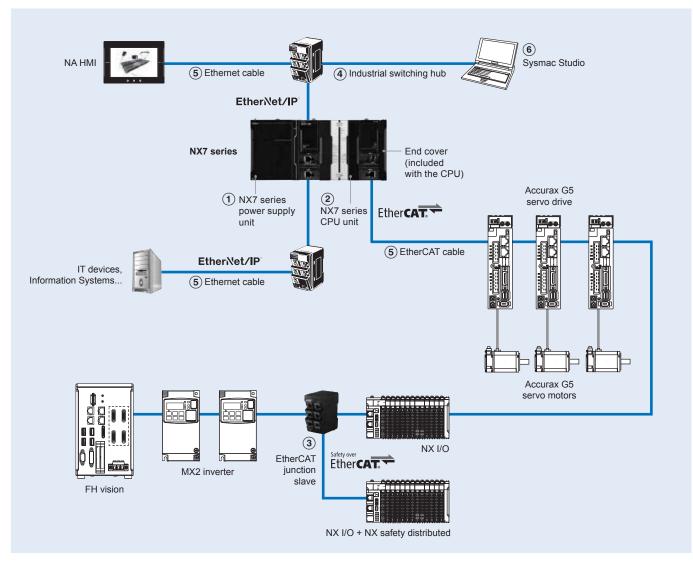


Note: 1. This is the dimension from the back of the unit to the communication cables: - 155 mm: When an XS6G-T421-1 connector is used.

2. This dimension depends on the specifications of the commercially available USB cable.

Ordering information

NX7 series system



Power supply units

Symbol	Description	Output capacity	RUN output	Model
Symbol	Description	Total	Non output	wouer
(1)	100 to 240 VAC power supply unit for NX7 CPU	90 W	Supported	NX-PA9001
	24 VDC power supply unit for NX7 CPU	70 W		NX-PD7001

NX7 series CPU units

Symbol		Program capacity	Variables capacity	Specifications	Number of axes	Model
(2)	NX701	80 MB	4 MB: Retained	Power consumption: 40 W	256	NX701-1700
0			256 MB: Not retained		128	NX701-1600

Note: The end cover unit NX-END01 is included with the CPU unit.

EtherCAT junction slave

Symbol				Current consumption (A)	Dimensions (W x D x H)	Weight	Model	Appearance
3	EtherCAT junction slave		20.4 to 28.8 VDC (24 VDC –15 to 20%)	0.08	25 mm × 78 mm × 90 mm	165 g	GX-JC03	
		6		0.17	48 mm × 78 mm × 90 mm	220 g	GX-JC06	tee

Note: 1. Please do not connect EtherCAT junction slave with OMRON position control unit, Model CJ1W-NC 81/ 82.

2. EtherCAT junction slave cannot be used for Ethernet/IP and Ethernet.

Industrial switching hub

	Specifications		Current				
Symbol	Functions		Failure detection		consump- tion (A)	Model	Appearance
(4)	Quality of Service (QoS): EtherNet/IP control data	3	No	Power supply connector	0.08	W4S1-03B	
	priority.		No		0.12	W4S1-05B	\leq
	Failure detection: Broadcast storm and LSI error detection 10/100 BASE-TX, Auto-Negotiation	5		Power supply connector and connector for inform- ing error	0.12	W4S1-05C	

Recommended EtherCAT and EtherNet/IP communication cables

Symbol	Item			Manufacturer	Colour	Cable length (m)	Model
(5)	Ethernet	Cat 6a, AWG27, 4-pair cable	Standard type	OMRON	Yellow	0.2	XS6W-6LSZH8SS20CM-Y
0	patch cable	Cable sheath material: LSZH ^{*1}	Cable with connectors on both			0.3	XS6W-6LSZH8SS30CM-Y
		Note: This cable is available in yel-	ends (RJ45/RJ45)			0.5	XS6W-6LSZH8SS50CM-Y
		low, green and blue colours.				1	XS6W-6LSZH8SS100CM-Y
		, g	·			1.5	XS6W-6LSZH8SS150CM-Y
						2	XS6W-6LSZH8SS200CM-Y
						3	XS6W-6LSZH8SS300CM-Y
						5	XS6W-6LSZH8SS500CM-Y
						7.5	XS6W-6LSZH8SS750CM-Y
						10	XS6W-6LSZH8SS1000CM-Y
						15	XS6W-6LSZH8SS1500CM-Y
						20	XS6W-6LSZH8SS2000CM-Y
					Green	0.2	XS6W-6LSZH8SS20CM-G
						0.3	XS6W-6LSZH8SS30CM-G
						0.5	XS6W-6LSZH8SS50CM-G
						1	XS6W-6LSZH8SS100CM-G
						1.5	XS6W-6LSZH8SS150CM-G
						2	XS6W-6LSZH8SS200CM-G
						3	XS6W-6LSZH8SS300CM-G
						5	XS6W-6LSZH8SS500CM-G
						7.5	XS6W-6LSZH8SS750CM-G
						10	XS6W-6LSZH8SS1000CM-G
						15	XS6W-6LSZH8SS1500CM-G
						20	XS6W-6LSZH8SS2000CM-G
		Cat 5, AWG26, 4-pair cable	Standard type	-	Green	0.5	XS6W-5PUR8SS50CM-G
		Cable sheath material: PUR ^{*1}	Cable with connectors on both			1	XS6W-5PUR8SS100CM-G
			ends (RJ45/RJ45)			1.5	XS6W-5PUR8SS150CM-G
						2	XS6W-5PUR8SS200CM-G
						3	XS6W-5PUR8SS300CM-G
						5	XS6W-5PUR8SS500CM-G
						7.5	XS6W-5PUR8SS750CM-G
						10	XS6W-5PUR8SS1000CM-G
						15	XS6W-5PUR8SS1500CM-G
						20	XS6W-5PUR8SS2000CM-G
		Cat5, AWG22, 2-pair cable	Rugged type	-	Grey	0.3	XS5W-T421-AMD-K
			Cable with connectors on both		0.109	0.5	XS5W-T421-BMD-K
			ends (RJ45/RJ45)			1	XS5W-T421-CMD-K
			15			2	XS5W-T421-DMD-K
			10			3	XS5W-T421-EMD-K
						5	XS5W-T421-GMD-K
						10	XS5W-T421-JMD-K
						15	XS5W-T421-KMD-K
	1	I		1		15	

Symbol	Item			Manufacturer	Colour	Cable length (m)	Model
5	Ethernet	Cat5, AWG22, 2-pair cable	Rugged type	OMRON	Grey 0.3	XS5W-T421-AMC-K	
\smile	patch cable		Cable with connectors on both	I		0.5	XS5W-T421-BMC-K
			ends (M12 straight/RJ45)			1	XS5W-T421-CMC-K
			A			2	XS5W-T421-DMC-K
			-0			3	XS5W-T421-EMC-K
						5	XS5W-T421-GMC-K
						10	XS5W-T421-JMC-K
						15	XS5W-T421-KMC-K
			Rugged type		Grey	0.3	XS5W-T422-AMC-K
			Cable with connectors on both			0.5	XS5W-T422-BMC-K
			ends (M12 L right angle/RJ45)			1	XS5W-T422-CMC-K
			-			2	XS5W-T422-DMC-K
			F O			3	XS5W-T422-EMC-K
						5	XS5W-T422-GMC-K
						10	XS5W-T422-JMC-K
						15	XS5W-T422-KMC-K
	Ethernet installation	Cat 5, SF/UTP, 4 × 2 × AWG 2 (PUR)	24/1 (solid core), Polyurethane	Weidmüller	Green	100	WM IE-5IC4x2xAWG24/1-PUR
	cable	Cat 5, SF/UTP, $4 \times 2 \times AWG$ 26/7 (stranded core), Polyurethane (PUR)			Green	100	WM IE-5IC4x2xAWG26/7-PUR
	Connectors	RJ45 metallic connector For AWG22 to AWG26	10 m		-	-	WM IE-T0-RJ45-FH-BK
		RJ45 plastic connector For AWG22 to AWG24	20	OMRON	-	-	XS6G-T421-1
	RJ45 socket	DIN-rail mount socket to termin cabinet	nate installation cable in the	Weidmüller	-	-	WM IE-T0-RJ45-FJ-B

WE70 FA wireless LAN units

Name	Area	Туре	Model	Appearance
WE70 FA wireless LAN units	Europe	Access point (Master)	WE70-AP-EU	
		Client (Slave)	WE70-CL-EU	
Directional magnetic-base antenna		1 set with two antennas, 2.4 GHz/5 GHz Dual-band com- patible	WE70-AT001H	
DIN rail mounting bracket		For TH35 7.5	WT30-FT001	
		For TH35 15	WT30-FT002	
Antenna extension cable		5 m	WE70-CA5M	

Note: Special versions are available for USA, Canada, China and Japan.

Accessories (included with the CPU unit)

Specifications		Model	Appearance
SD memory card	2 GB	HMC-SD291	
	4 GB	HMC-SD491	2GB
DIN track	Length: 0.5 m; height: 7.3 mm	PFP-50N	
	Length: 1 m; height: 7.3 mm	PFP-100N	
	Length: 1 m; height: 16 mm	PFP-100N2	
Battery for NX7/NJ CPU unit (The battery is in	cluded with the CPU unit)	CJ1W-BAT01	
End cover (The end cover is included with the rack)	CPU unit. Necessary to be connected to the right end of the CPU	NX-END01	
Fan unit (The fan unit is included with the CPU	l unit)	NX-FAN01	

Computer software

Symbol	Specifications	Model
6	Sysmac Studio version 1.13 or higher	SYSMAC-SE2

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. SysCat_I186E-EN-01 In the interest of product improvement, specifications are subject to change without notice.