NX-MD

CSM_NX-MD_DS_E_3_1

Digital Mixed I/O Units for High speed Synchronous Control

- DC Input/Transistor Output Units for the NX-series modular I/O system.
- Connect to other NX-series I/O Units and EtherCAT Coupler units using the high-speed NX-bus.
- One Unit enables synchronous Units to update the status of input devices to the controller and the output status of synchronous Units according to the controller's instructions every EtherCAT cycle.

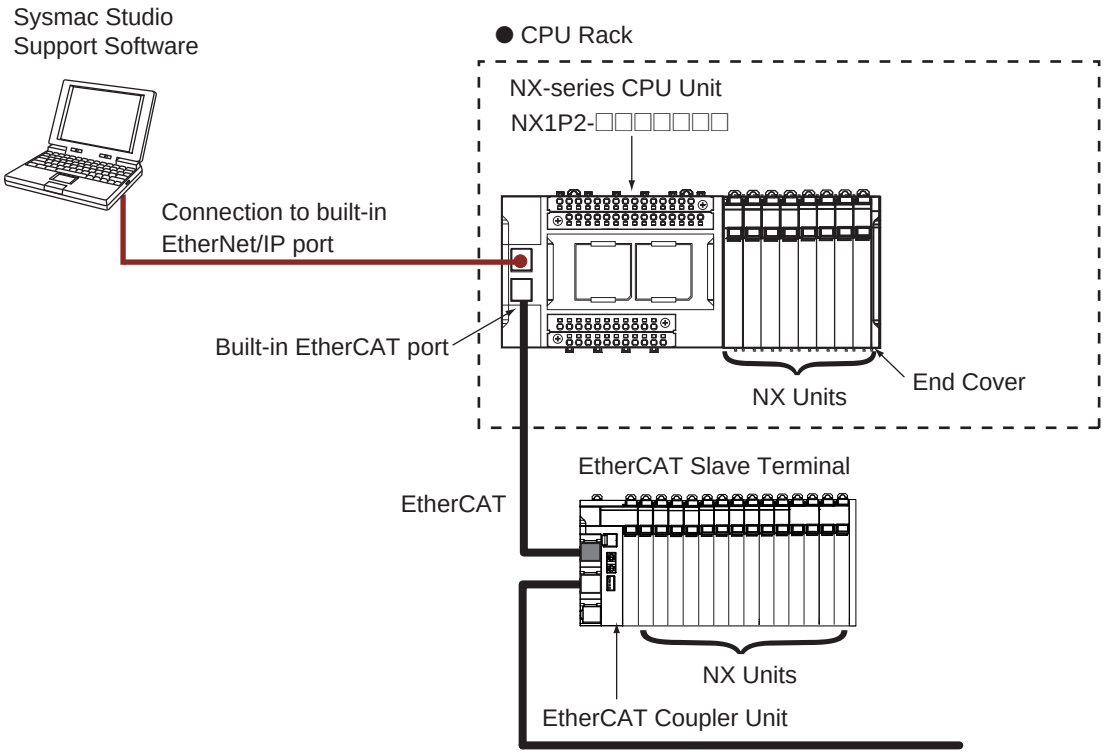
Features

- High-speed I/O refreshing is possible by connecting with the NX-series EtherCAT Coupler.
- Output refreshing can be synchronized with the control cycle of the Controller. (Synchronous refreshing)
- Connector Types significantly reduces wiring work.
- Connection to the CJ-series is possible by connecting with the EtherNet/IP™ Coupler.

System Configuration

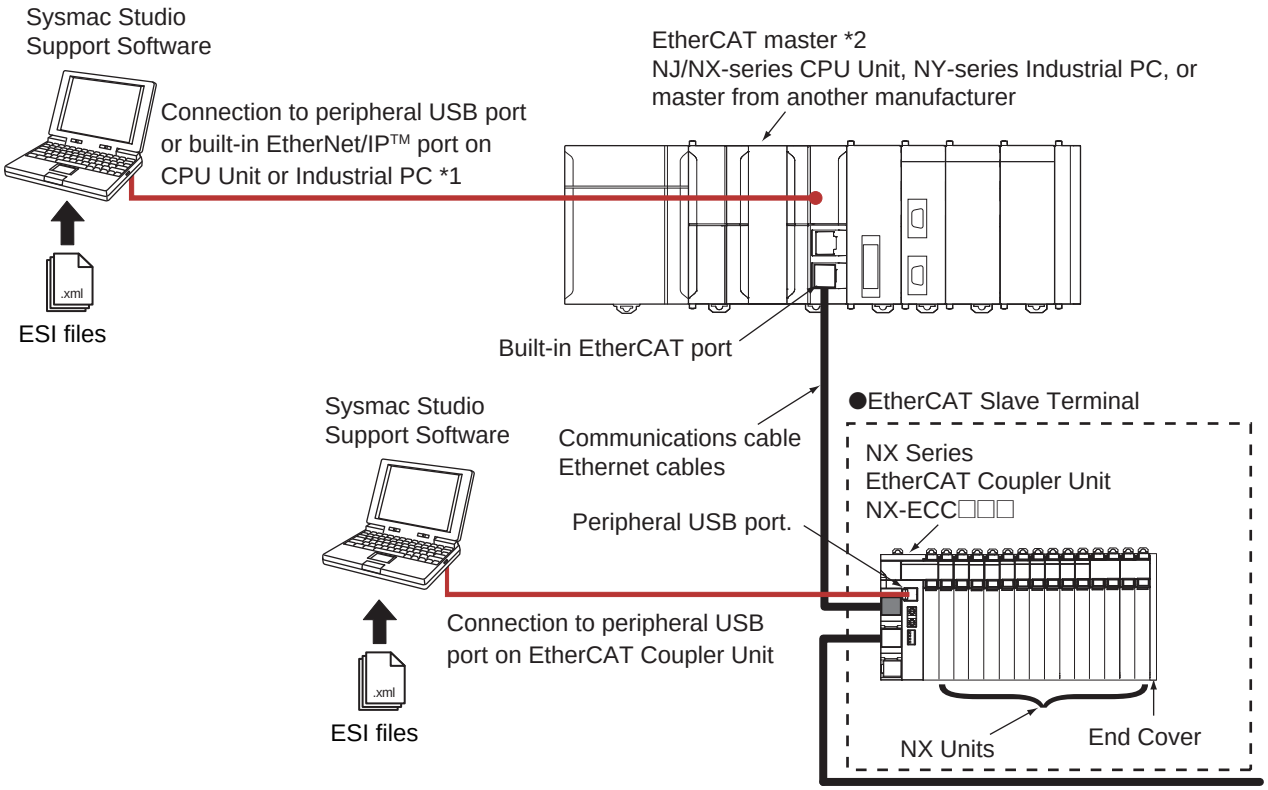
System Configuration in the Case of a CPU Unit

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



System Configuration of Slave Terminals

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



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

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

Ordering Information

International Standards

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

Digital Mixed I/O Units

● DC Input/Transistor Output Units (MIL Connector, 30 mm Width)

Unit type	Product name	Specification					Model	Standards
		Number of points	Internal I/O common	Rated voltage	I/O refreshing method	ON/OFF response time		
NX-series Digital Mixed I/O Unit	DC Input/ Transistor Output Unit 	Outputs: 16 points Inputs: 16 points	Outputs: NPN Inputs: For both NPN/PNP	Outputs: 12 to 24 VDC Inputs: 24 VDC	Switching Synchronous I/O refreshing and Free-Run refreshing	Outputs: 0.1 ms max./0.8 ms max. Inputs: 20 µs max./400 µs max.	**NX-MD6121-5**	UC1, CE, RCM, KC
			Outputs: PNP Inputs: For both NPN/PNP	Outputs: 24 VDC Inputs: 24 VDC		Outputs: 0.5 ms max./1.0 ms max. Inputs: 20 µs max./400 µs max.	**NX-MD6256-5**	

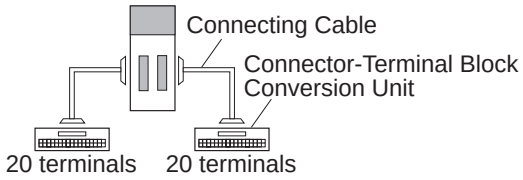
● DC Input/Transistor Output Unit (Fujitsu Connector, 30 mm Width)

Unit type	Product name	Specification					Model	Standards
		Number of points	Internal I/O common	Rated voltage	I/O refreshing method	ON/OFF response time		
NX-series Digital Output Unit	DC Input/ Transistor Output Unit 	Outputs: 16 points Inputs: 16 points	Outputs: NPN Inputs: For both NPN/PNP	Outputs: 12 to 24 VDC Inputs: 24 VDC	Switching Synchronous I/O refreshing and Free-Run refreshing	Outputs: 0.1 ms max./0.8 ms max. Inputs: 20 µs max./400 µs max.	**NX-MD6121-6**	UC1, CE, RCM, KC

Accessories

Not included.

Connection Patterns for Connector-Terminal Block Conversion Units

Pattern	Configuration	Number of connectors	Branching
C		2	None

Connections to Connector-Terminal Block Conversion Units

Unit	I/O capacity	Number of connectors	Polarity	Connection pattern	Number of branches	Connecting Cable	Connector-Terminal Block Conversion Unit	Common terminal
NX-MD6121-5	16 inputs	1 MIL connector	NPN/ PNP	C	None	XW2Z-☐☐☐X	XW2B-20G4	None
				C	None	XW2Z-☐☐☐X	XW2B-20G5	None
				C	None	XW2Z-☐☐☐X	XW2D-20G6	None
				C	None	XW2Z-☐☐☐X	XW2R-J20G-T	None
	16 outputs	1 MIL connector	NPN	C	None	XW2Z-☐☐☐X	XW2B-20G4	None
				C	None	XW2Z-☐☐☐X	XW2B-20G5	None
				C	None	XW2Z-☐☐☐X	XW2D-20G6	None
				C	None	XW2Z-☐☐☐X	XW2R-J20G-T	None
NX-MD6121-6	16 inputs	1 Fujitsu connector	NPN/ PNP	C	None	XW2Z-☐☐☐A	XW2B-20G4	None
				C	None	XW2Z-☐☐☐A	XW2B-20G5	None
				C	None	XW2Z-☐☐☐A	XW2C-20G5-IN16 *	Yes
				C	None	XW2Z-☐☐☐A	XW2C-20G6-IO16	Yes
				C	None	XW2Z-☐☐☐A	XW2D-20G6	None
				C	None	XW2Z-☐☐☐A	XW2E-20G5-IN16 *	Yes
				C	None	XW2Z-☐☐☐A	XW2F-20G7-IN16 *	Yes
				C	None	XW2Z-☐☐☐A	XW2N-20G8-IN16 *	Yes
				C	None	XW2Z-☐☐☐A	XW2R-J20G-T	None
	16 outputs	1 Fujitsu connector	NPN	C	None	XW2Z-☐☐☐A	XW2B-20G4	None
				C	None	XW2Z-☐☐☐A	XW2B-20G5	None
				C	None	XW2Z-☐☐☐A	XW2C-20G6-IO16	Yes
				C	None	XW2Z-☐☐☐A	XW2D-20G6	None
				C	None	XW2Z-☐☐☐A	XW2F-20G7-OUT16	Yes
				C	None	XW2Z-☐☐☐A	XW2R-J20G-T	None
NX-MD6256-5	16 inputs	1 MIL connector	NPN/ PNP	C	None	XW2Z-☐☐☐X	XW2B-20G4	None
				C	None	XW2Z-☐☐☐X	XW2B-20G5	None
				C	None	XW2Z-☐☐☐X	XW2D-20G6	None
				C	None	XW2Z-☐☐☐X	XW2R-J20G-T	None
	16 outputs	1 MIL connector	PNP	C	None	XW2Z-☐☐☐X	XW2B-20G4	None
				C	None	XW2Z-☐☐☐X	XW2B-20G5	None
				C	None	XW2Z-☐☐☐X	XW2D-20G6	None
				C	None	XW2Z-☐☐☐X	XW2R-J20G-T	None

* The inputs are NPN. For PNP inputs, reverse the polarity of the external power supply connections to the power supply terminals on the Connector-Terminal Block Conversion Unit.

Note: For details of connection patterns for I/O relay terminals, refer to the *NX-series Digital I/O Units User's Manual* (Cat. No. W521).

General Specification

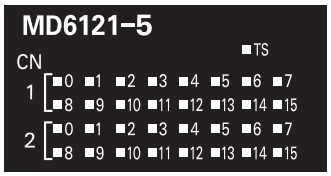
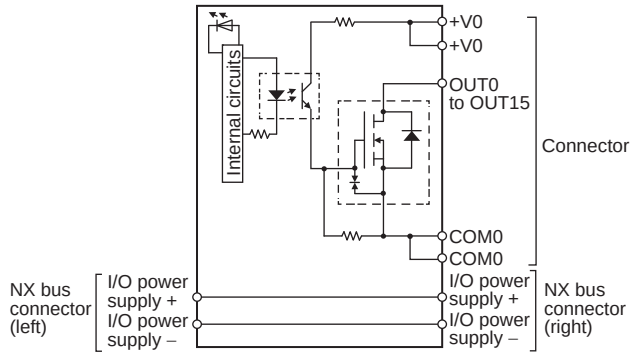
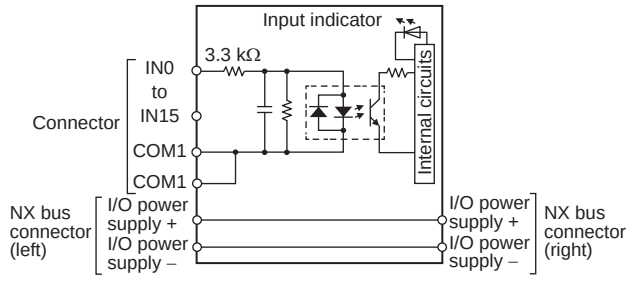
Item		Specification
Enclosure		Mounted in a panel
Grounding method		Ground to 100 Ω or less
Operating environment	**Ambient operating temperature**	0 to 55°C
	Ambient operating humidity	10% to 95% (with no condensation or icing)
	Atmosphere	Must be free from corrosive gases.
	Ambient storage temperature	−25 to 70°C (with no condensation or icing)
	Altitude	2,000 m max.
	Pollution degree	2 or less: Conforms to JIS B3502 and IEC 61131-2.
	Noise immunity	2 kV on power supply line (Conforms to IEC61000-4-4.)
	Overvoltage category	Category II: Conforms to JIS B3502 and IEC 61131-2.
	EMC immunity level	Zone B
	Vibration resistance *1	Conforms to IEC 60068-2-6. 5 to 8.4 Hz with 3.5-mm amplitude, 8.4 to 150 Hz, acceleration of 9.8 m/s^2, 100 min each in X, Y, and Z directions (10 sweeps of 10 min each = 100 min total)
	Shock resistance *1	Conforms to IEC 60068-2-27. 147 m/s^2, 3 times each in X, Y, and Z directions
Applicable standards *2		cULus: Listed (UL508) or Listed (UL 61010-2-201), ANSI/ISA 12.12.01, EU: EN 61131-2 or EN 61010-2-201, C-Tick or RCM, KC: KC Registration, NK, LR

*1. For the Relay Output Unit, refer to the Digital Input Unit Specifications.
*2. Refer to the OMRON website or consult your OMRON representative for the most recent applicable standards for each model.

Digital Mixed I/O Unit Specifications

● DC Input/Transistor Output Units (MIL Connector, 30 mm Width)

NX-MD6121-5

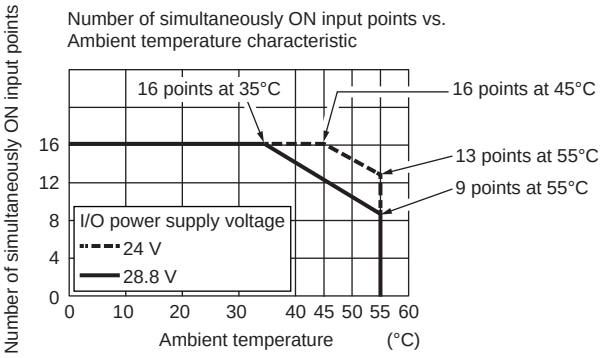
Unit name		DC Input/Transistor Output Unit	**Model**		NX-MD6121-5
Number of points		16 inputs/16 outputs	**External connection terminals**		2 MIL connectors (20 terminals)
I/O refreshing method		Switching Synchronous I/O refreshing and Free-Run refreshing			
Output section (CN1)	**Internal I/O common**	NPN	**Input section (CN2)**	**Internal I/O common**	For both NPN/PNP
	Rated voltage	12 to 24 VDC		**Rated input voltage**	24 VDC (15 to 28.8 VDC)
	Operating load voltage range	10.2 to 28.8 VDC		**Input current**	7 mA typical (at 24 VDC)
	Maximum value of load current	0.5 A/point, 2 A/Unit		**ON voltage/ON current**	15 VDC min./3 mA min. (between COM and each signal)
	Maximum inrush current	4.0 A/point, 10 ms max.		**OFF voltage/OFF current**	5 VDC max./1 mA max. (between COM and each signal)
	Leakage current	0.1 mA max.		**ON/OFF response time**	20 μs max./400 μs max.
	Residual voltage	1.5 V max.		**Input filter time**	No filter, 0.25 ms, 0.5 ms, 1 ms (default), 2 ms, 4 ms, 8 ms, 16 ms, 32 ms, 64 ms, 128 ms, 256 ms
	ON/OFF response time	0.1 ms max./0.8 ms max.			
Indicators		TS indicator, I/O indicators 	**Dimensions**		30 (W) x 100 (H) x 71 (D)
			Isolation method		Photocoupler isolation
			Insulation resistance		20 MΩ min. between isolated circuits (at 100 VDC)
			Dielectric strength		510 VAC between isolated circuits for 1 minute at a leakage current of 5 mA max.
			I/O power supply method		Supply from external source
			Current capacity of I/O power supply terminal		Without I/O power supply terminals
			NX Unit power consumption		• Connected to a CPU Unit 1.00 W max. • Connected to a Communications Coupler Unit 0.70 W max.
			Current consumption from I/O power supply		30 mA max.
			Weight		105 g max.
Circuit layout		CN1 (left) output circuit  CN2 (right) input circuit 			

Installation orientation and restrictions

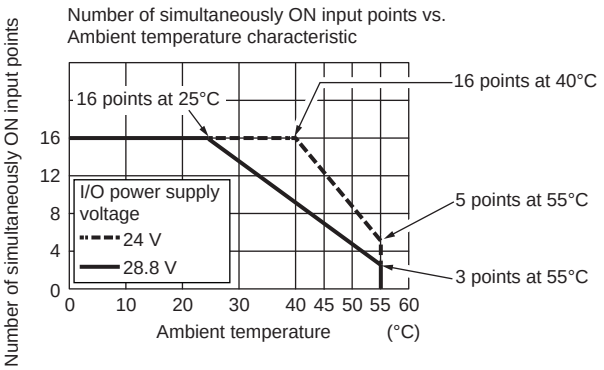
Installation orientation:
- Connected to a CPU Unit: Possible in upright installation.
- Connected to a Communications Coupler Unit: Possible in 6 orientations.

Restrictions: As shown in the following.

• For upright installation

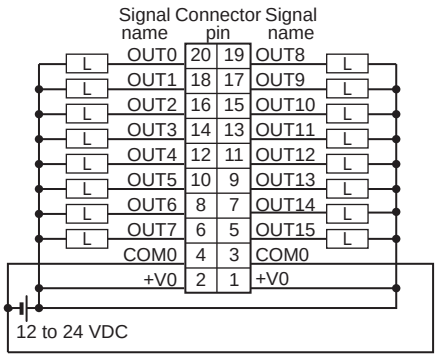


• For any installation other than upright



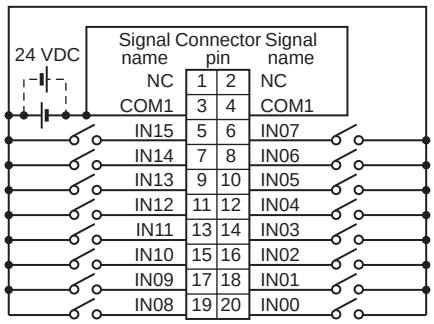
Terminal connection diagram

CN1 (left) output terminal



• Be sure to wire both pins 3 and 4 (COM0) of CN1.
• Be sure to wire both pins 1 and 2 (+V0) of CN1.

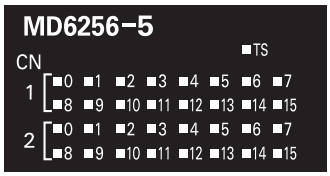
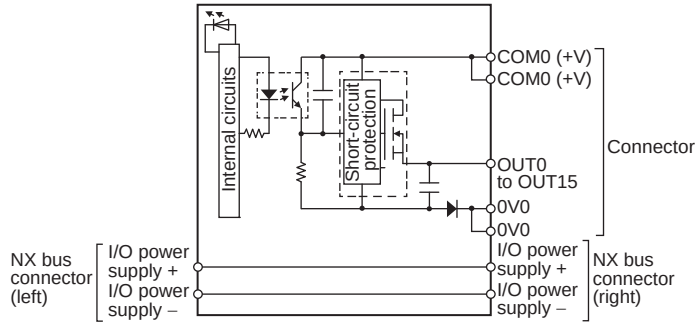
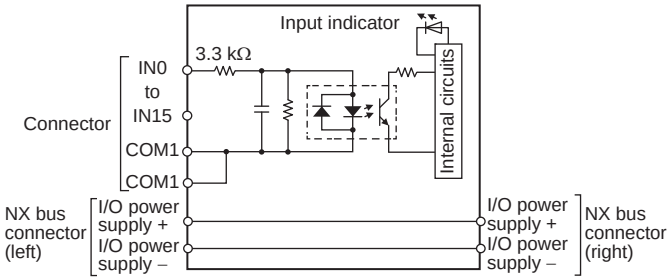
CN2 (right) input terminal



• The polarity of the input power supply of CN2 can be connected in either direction.
• Be sure to wire both pins 3 and 4 (COM1) of CN2, and set the same polarity for both pins.

Disconnection/Short-circuit detection	Not supported.	**Protective function**	Not supported.

NX-MD6256-5

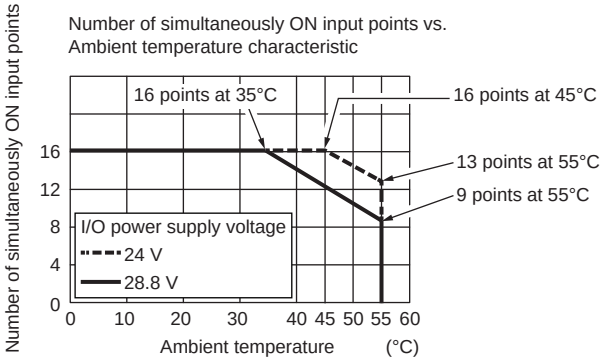
Unit name		DC Input/Transistor Output Unit	**Model**		NX-MD6256-5
Number of points		16 inputs/16 outputs	**External connection terminals**		2 MIL connectors (20 terminals)
I/O refreshing method		Switching Synchronous I/O refreshing and Free-Run refreshing			
Output section (CN1)	**Internal I/O common**	PNP	**Input section (CN2)**	**Internal I/O common**	For both NPN/PNP
	Rated voltage	24 VDC		**Rated input voltage**	24 VDC (15 to 28.8 VDC)
	Operating load voltage range	20.4 to 28.8 VDC		**Input current**	7 mA typical (at 24 VDC)
	Maximum value of load current	0.5 A/point, 2 A/Unit		**ON voltage/ON current**	15 VDC min./3 mA min. (between COM and each signal)
	Maximum inrush current	4.0 A/point, 10 ms max.		**OFF voltage/OFF current**	5 VDC max./1 mA max. (between COM and each signal)
	Leakage current	0.1 mA max.		**ON/OFF response time**	20 µs max./400 µs max.
	Residual voltage	1.5 V max.		**Input filter time**	No filter, 0.25 ms, 0.5 ms, 1 ms (default), 2 ms, 4 ms, 8 ms, 16 ms, 32 ms, 64 ms, 128 ms, 256 ms
	ON/OFF response time	0.5 ms max./1.0 ms max.			
Indicators		TS indicator, I/O indicators 	**Dimensions**		30 (W) x 100 (H) x 71 (D)
			Isolation method		Photocoupler isolation
			Insulation resistance		20 MΩ min. between isolated circuits (at 100 VDC)
			Dielectric strength		510 VAC between isolated circuits for 1 minute at a leakage current of 5 mA max.
			I/O power supply method		Supply from external source
			Current capacity of I/O power supply terminal		Without I/O power supply terminals
			NX Unit power consumption		• Connected to a CPU Unit 1.10 W max. • Connected to a Communications Coupler Unit 0.75 W max.
			Current consumption from I/O power supply		40 mA max.
			Weight		110 g max.
Circuit layout		CN1 (left) output circuit  CN2 (right) input circuit 			

Installation orientation and restrictions

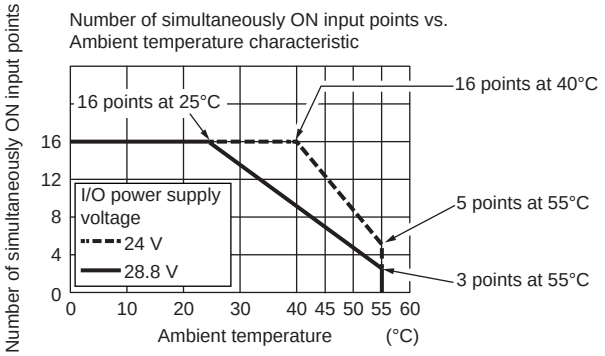
Installation orientation:
- Connected to a CPU Unit: Possible in upright installation.
- Connected to a Communications Coupler Unit: Possible in 6 orientations.

Restrictions: As shown in the following.

• For upright installation

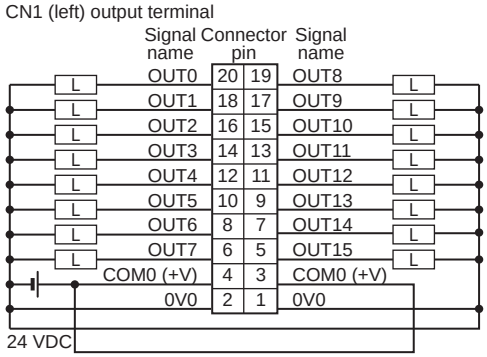


• For any installation other than upright



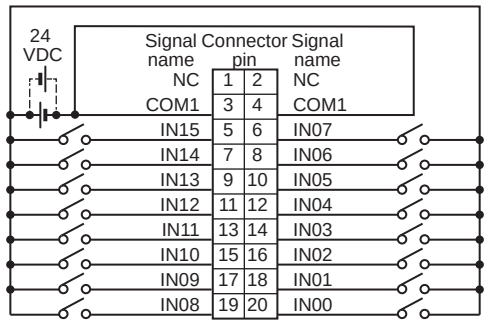
Terminal connection diagram

CN1 (left) output terminal



• Be sure to wire both pins 3 and 4 (COM0 (+V)) of CN1.
• Be sure to wire both pins 1 and 2 (0V0) of CN1.

CN2 (right) input terminal



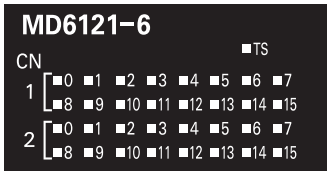
• The polarity of the input power supply of CN2 can be connected in either direction.
• Be sure to wire both pins 3 and 4 (COM1) of CN2, and set the same polarity for both pins.

Disconnection/Short-circuit detection	Not supported.	**Protective function**	With load short-circuit protection.

● DC Input/Transistor Output Units (Fujitsu Connector, 30 mm Width)

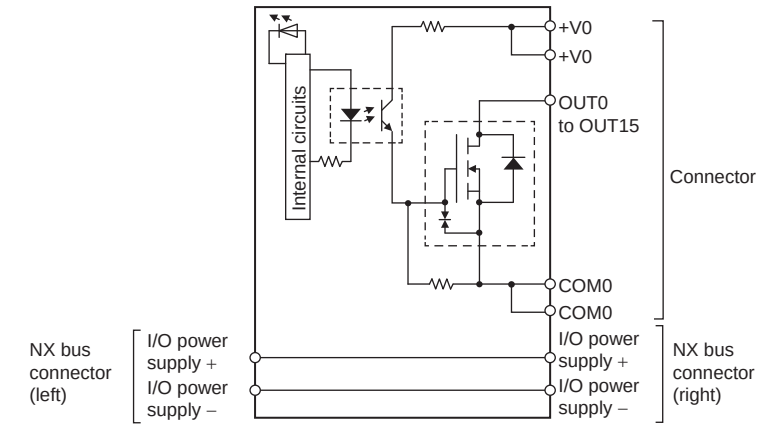
NX-MD6121-6

Unit name		DC Input/Transistor Output Unit	**Model**		NX-MD6121-6
Number of points		16 inputs/16 outputs	**External connection terminals**		2 Fujitsu connectors (24 terminals)
I/O refreshing method		Switching Synchronous I/O refreshing and Free-Run refreshing			
Output section (CN1)	**Internal I/O common**	NPN	**Input section (CN2)**	**Internal I/O common**	For both NPN/PNP
	Rated voltage	12 to 24 VDC		**Rated input voltage**	24 VDC (15 to 28.8 VDC)
	Operating load voltage range	10.2 to 28.8 VDC		**Input current**	7 mA typical (at 24 VDC)
	Maximum value of load current	0.5 A/point, 2 A/Unit		**ON voltage/ON current**	15 VDC min./3 mA min. (between COM and each signal)
	Maximum inrush current	4.0 A/point, 10 ms max.		**OFF voltage/OFF current**	5 VDC max./1 mA max. (between COM and each signal)
	Leakage current	0.1 mA max.		**ON/OFF response time**	20 μs max./400 μs max.
	Residual voltage	1.5 V max.		**Input filter time**	No filter, 0.25 ms, 0.5 ms, 1 ms (default), 2 ms, 4 ms, 8 ms, 16 ms, 32 ms, 64 ms, 128 ms, 256 ms
	ON/OFF response time	0.1 ms max./0.8 ms max.			
Indicators		TS indicator, I/O indicators	**Dimensions**		30 (W) x 100 (H) x 71 (D)
			Isolation method		Photocoupler isolation
			Insulation resistance		20 MΩ min. between isolated circuits (at 100 VDC)
			Dielectric strength		510 VAC between isolated circuits for 1 minute at a leakage current of 5 mA max.
			I/O power supply method		Supply from external source
			Current capacity of I/O power supply terminal		Without I/O power supply terminals
			NX Unit power consumption		• Connected to a CPU Unit 1.00 W max. • Connected to a Communications Coupler Unit 0.70 W max.
			Current consumption from I/O power supply		30 mA max.
			Weight		95 g max.

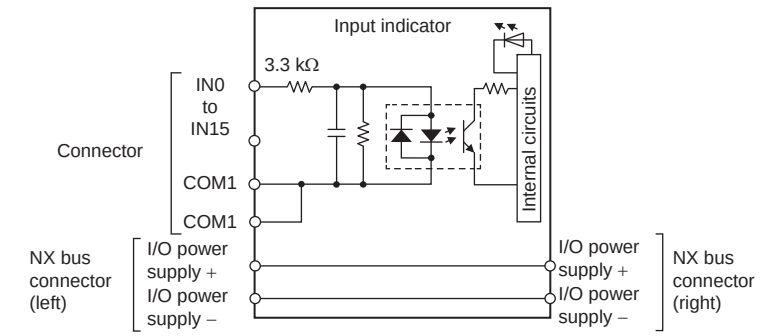


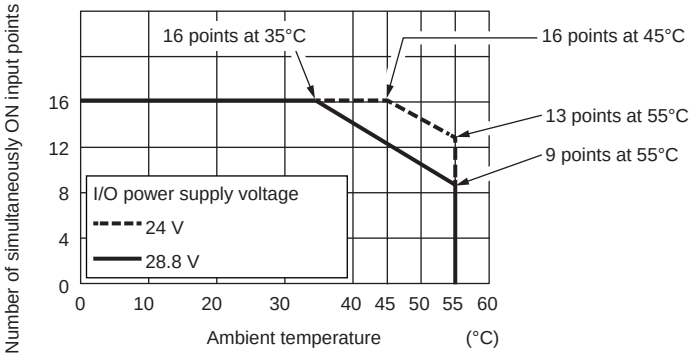
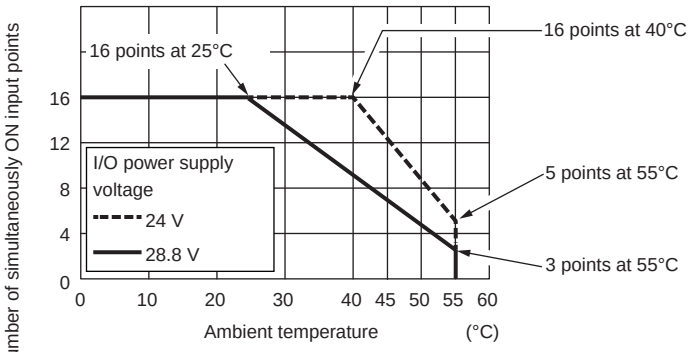
Circuit layout

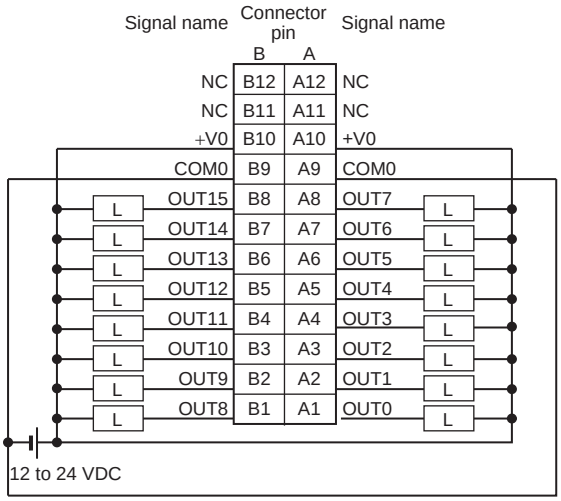
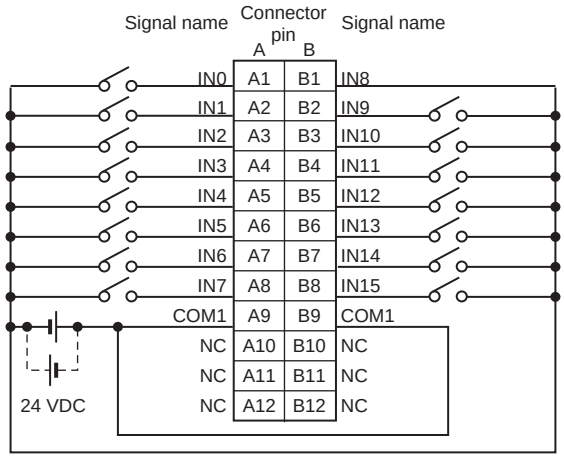
CN1 (left) output circuit



CN2 (right) input circuit



Installation orientation and restrictions	Installation orientation: • Connected to a CPU Unit: Possible in upright installation. • Connected to a Communications Coupler Unit: Possible in 6 orientations. Restrictions: As shown in the following. • For upright installation Number of simultaneously ON input points vs. Ambient temperature characteristic  • For any installation other than upright Number of simultaneously ON input points vs. Ambient temperature characteristic 

Terminal connection diagram	CN1 (left) output terminal  • Be sure to wire both pins A9 and B9 (COM0) of CN1. • Be sure to wire both pins A10 and B10 (+V0) of CN1. CN2 (right) input terminal  • The polarity of the input power supply of CN2 can be connected in either direction. • Be sure to wire both pins A9 and B9 (COM1) of CN2, and set the same polarity for both pins.

Disconnection/Short-circuit detection	Not supported.	**Protective function**	Not supported.

Version Information

Connecting with CPU Units

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

NX Unit		Corresponding versions *	
Model	Unit version	CPU Unit	Sysmac Studio
NX-MD6121-5	Ver.1.0	Ver.1.13 or later	Ver.1.17 or higher
NX-MD6121-6			
NX-MD6256-5			

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

Connecting with Coupler Units

NX Unit		Corresponding versions *				
		EtherCAT			EtherNet/IP	
Model	Unit version	Communications Coupler Unit	NJ/NX-series CPU Units or NY-series Industrial PCs	Sysmac Studio	Communications Coupler Unit	Sysmac Studio
NX-MD6121-5	Ver.1.0	Ver.1.0 or later	Ver.1.05 or later	Ver.1.10 or higher	Ver.1.0 or later	Ver.1.10 or higher
NX-MD6121-6				Ver.1.13 or higher		Ver.1.13 or higher
NX-MD6256-5				Ver.1.10 or higher		Ver.1.10 or higher

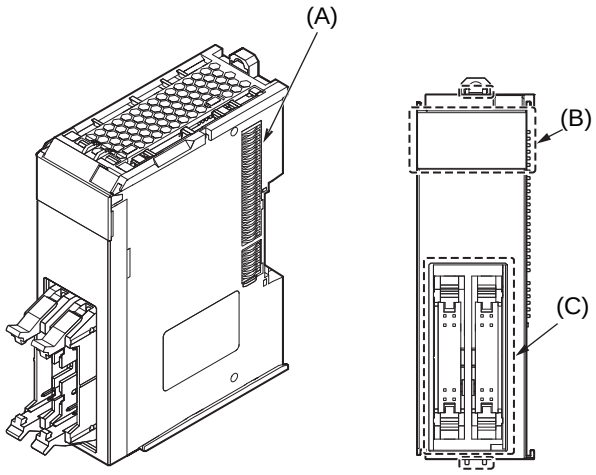
* Some Units do not have all of the versions given in the above table. If a Unit does not have the specified version, support is provided by the oldest available version after the specified version. Refer to the user's manuals for the specific Units for the relation between models and versions.

External Interface

Connector Types

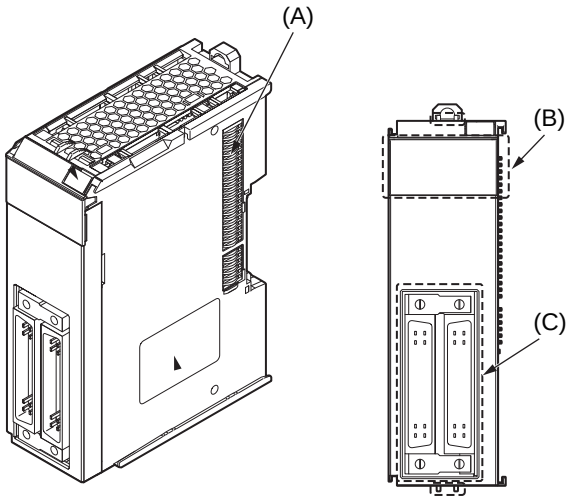
NX Units (30 mm Width)

● Units with MIL Connectors (2 Connectors with 20 Terminals)



Letter	Name	Function
(A)	NX bus connector	This connector is used to connect each Unit.
(B)	Indicators	The indicators show the current operating status of the Unit.
(C)	Connectors	The connectors are used to connect to external devices. The number of terminals depends on the type of Unit.

● Units with Fujitsu Connectors (2 Connectors with 24 Terminals)



Letter	Name	Function
(A)	NX bus connector	This connector is used to connect each Unit.
(B)	Indicators	The indicators show the current operating status of the Unit.
(C)	Connectors	The connectors are used to connect to external devices.

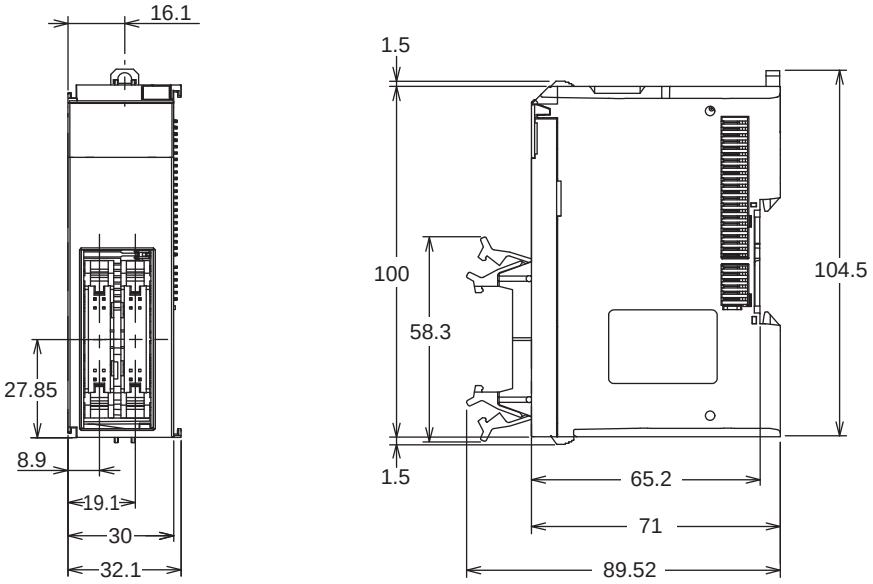
Dimensions

(Unit/mm)

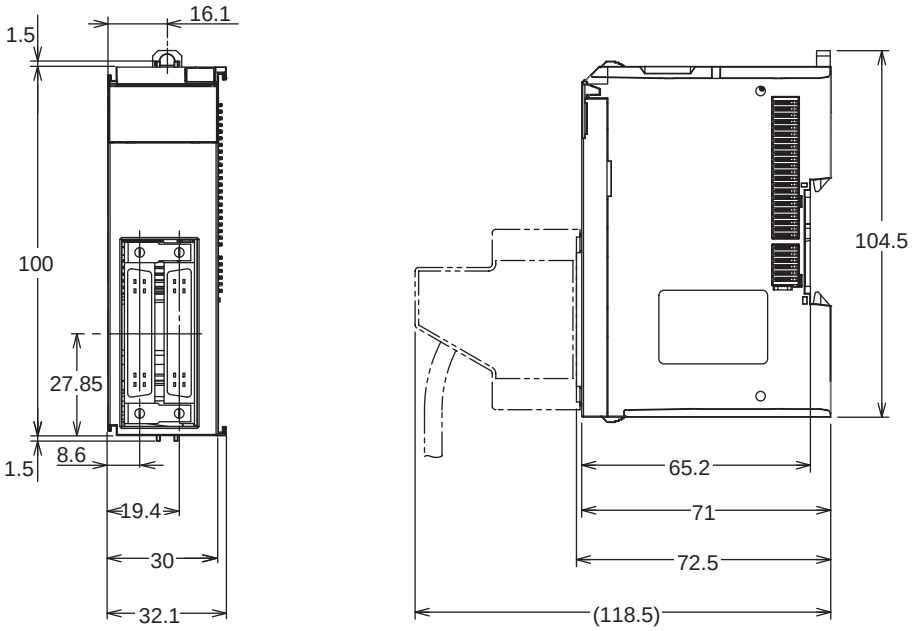
Connector Types

30 mm Width

● **Units with MIL Connectors (2 Connectors with 20 Terminals)**



● **Units with Fujitsu Connectors (2 Connectors with 24 Terminals)**



Related Manuals

Cat. No.	Model number	Manual name	Application	Description
W521	NX-IA□□□□ NX-ID□□□□ NX-OD□□□□ NX-OC□□□□ NX-MD□□□□	NX-series Digital I/O Units User's Manual	Learning how to use NX-series Digital I/O Units	The hardware, setup methods, and functions of the NX-series Digital I/O Units are described.

Terms and Conditions Agreement

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

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

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

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

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

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

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

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

2016.10

OMRON Corporation
Industrial Automation Company