Network Instrumentation Modules
Digital Input Modules
Model NX-DX1/DX2

Overview

Network Instrumentation Modules make optimal distributed configuration a reality. Distributed modules execute cooperative control using Ethernet connectivity. This instrumentation offers an excellent solution for productivity and energy conservation needs.

Digital input modules can accept pulse input, depending on the model.

- High-speed pulse input: 5 kHz
- Low-speed pulse input: 100 Hz

Pulse totalization is available for energy monitoring needs, such as power or flow rate monitoring. In addition, pulse input can be converted into instantaneous values.

Since the SLP-NX Smart Loader Package can be connected via Ethernet, Network Instrumentation Modules can be set up and monitored over an Ethernet communications network.

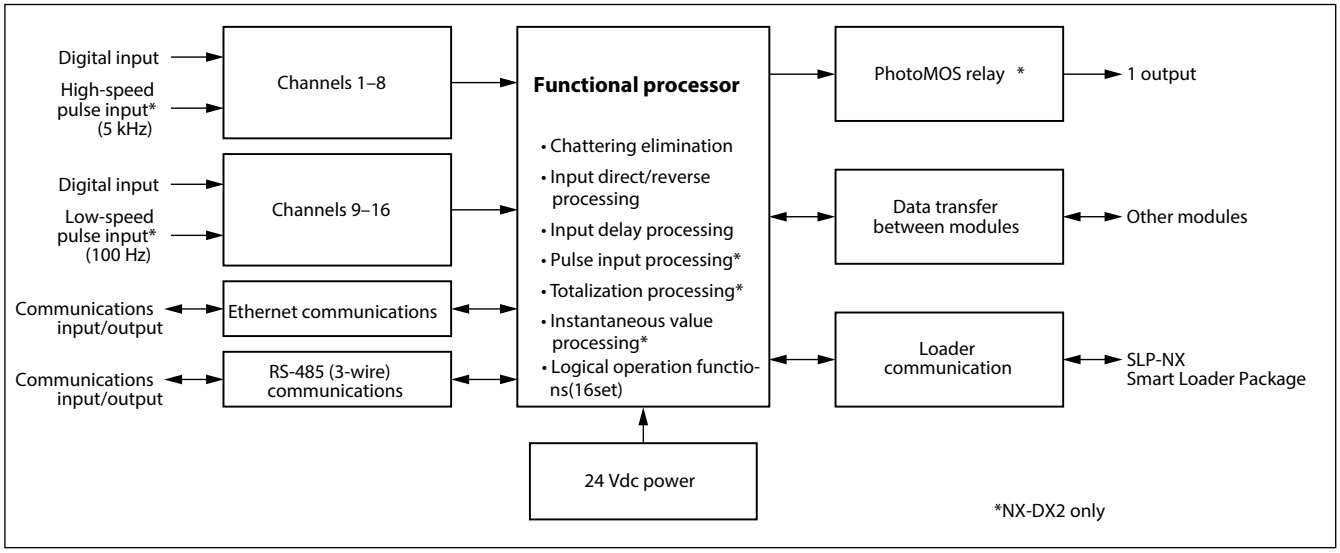
Features (common to all models)

- Ethernet and RS-485 as standard features
- Up to 16 digital inputs per module
- Side connectors for reduced wiring
- Support for reduced wiring and distributed layout through daisy-chain connection
- 6 LED indicators (18 LEDs), and additional LEDs depending on the model, provide abundant status information
- 3-part structure for easy maintenance
- Linked modules can make use of input and output from other modules.
- 16 sets of logical operation functions are possible.

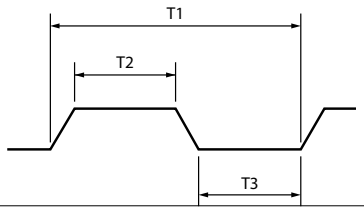
Features (NX-DX2 only)

- Channels 1–8 can be set for either high or low speed input pulses. (Channels 9–16 are fixed at low-speed pulse input.)
- Pulse totalization in engineering units
- Event output on the basis of totalized values
- Totalized values automatically backed up to nonvolatile memory
- Pulse input conversion into instantaneous values
- Event output using instantaneous values
- 1 event output

Basic function block of model NX-DX1/DX2



Specifications

Model No.		NX-DX1	NX-DX2
Wiring method		Regular terminal block or screwless terminal block, screw terminals on base (for power and RS-485 communications)	
Input	**No. of inputs**	16	
	Common terminal	Two for every eight channels	
	Polarity	None	
	Isolation between channels	Channels 1–8 isolated from 9–16	
	Recommended supply voltage	24 Vdc	
	Input type	+ common / – common shared	
	Compatible output type	Dry contact or transistor	
	Rated input current	Approx. 4.5 mA (at 24 Vdc)	Ch. 1–8: approx. 6.4 mA (at 24 Vdc) Ch. 9–16: approx. 4.5 mA (at 24 Vdc)
	Maximum input current	Approx. 5.0 mA (at 26.4 Vdc)	Ch. 1–8: approx. 7.1 mA (at 26.4 Vdc) Ch. 9–16: approx. 5.0 mA (at 26.4 Vdc)
	Input impedance	Approx. 4.7 kΩ	Ch. 1–8: approx. 3.3 kΩ Ch. 9–16: approx. 4.7 kΩ
	On-state voltage/current	Ch. 1–8: 18 Vdc min./2.8 mAdc min. Ch. 9–16: 18 Vdc min./3.8 mAdc min.	Ch. 1–8: 18 Vdc min./2.8 mAdc min. Ch. 9–16: 18 Vdc min./3.8 mAdc min.
	Off-state voltage/current	7 Vdc max./1.5 mAdc max.	
	Sampling cycle	50ms	
	Pulse input waveform	–––	Input channels 1–8 (when set to high-speed pulse input): T1 ≥ 200 µs, T2 and T3 ≥ 80 µs (frequency 5 kHz, duty 40–60 %) Input channels 1–8 (when set to low-speed pulse input): T1 ≥ 10 ms, T2 and T3 ≥ 4 ms (frequency 100 Hz, duty 40–60 %) Input channels 9–16: T1 ≥ 10 ms, T2 and T3 ≥ 4 ms (frequency 100 Hz, duty 40–60 %) 
	Chattering elimination	Yes	
Event output specifications	**No. of outputs**	–––	1
	Rated contact voltage	–––	24 Vdc
	Applicable voltage range	–––	20.4–27.6 Vdc
	Allowable output current	–––	100 mAdc max.
	Output type	–––	Photo MOS relay output (non-voltage Form A contact)
	Polarity	–––	None
	OFF-state leakage current	–––	100 µA max.
	ON-state maximum voltage drop	–––	2 V or less (at 24 Vdc and 0.1 A)
	Output update cycle	–––	50 ms max.
Digital input	**Input direct/reverse**	Switchable	
	ON delay	0.0–3200.0 s	
	OFF delay	0.0–3200.0 s	
Pulse input	**High-speed count (enabled: high-speed, disabled: low-speed)**	–––	Only channels 1–8 are switchable. Channels 9–16 are fixed at low speed.
	Pulse detection width	–––	1 to 1,000 ms (no software processing if set to 0 ms). Active only when set to low-speed pulse.

Model No.		NX-DX1	NX-DX2
Totalization function	**Pulse total range**	–––	0–1073741823 (0–3FFFFFFFH)
	Totalization count direction	–––	Up or down
	Action when high/low count limit is reached	–––	Stops at upper (lower) limit or re-counts from lower (upper) limit.
	Engineering unit settings	–––	Totalization scaling value is determined by C1 (1–32,000) and C2 (1–32,000) Formula: Totalized value = Latest totalized value + (Number of pulses at present sampling frequency × C1 / C2)
	Totalization controls	–––	Start, hold, reset, and preset
	Other functions	–––	Totalized values (after conversion to engineering units) are automatically backed up to nonvolatile memory (values up to approximately 1 s before power loss).
Totalization events	**Event types**	–––	Totalization targets, pre-target values, pre-pre-target values, and totalization high and low limits
	Setting range	–––	0–1073741823 (0–3FFFFFFFH)
	Judgment	–––	Set value ≤ Totalized value (when counting up) Set value ≥ Totalized value (when counting down) (Totalized value high and low limits are also used for operations triggered when totalized value high and low limits are reached.) (Pre-target and pre-pre target values are set by deviation from a target totalized value.)
Instantaneous value calculation function	**Range**	–––	0–32000U
	Operation triggered at instantaneous value high/low limits	–––	Limits set by high and low limit values.
	Instantaneous value update cycle	–––	1–32000 × 100 ms
	Time base cycle	–––	Set by hours, minutes, and seconds, or by the instantaneous value update cycle.
	Decimal point position	–––	Select from no decimal point up to four digits after the decimal point
	Engineering unit setting	–––	Instantaneous rate scaling value C1 (1–32,000) / C2 (1–32,000) Formula: Instantaneous value = Number of pulses in the instantaneous value update cycle × (C1/C2) × N × ratio + bias*
	Ratio	–––	0.01–320.00
	Bias	–––	0–32000U
	Instantaneous value control	–––	Reset and hold
	Other functions	–––	Filter (0.00–120.00 s)
Instantaneous value event	**Event types**	–––	Instantaneous rate high and low limit
	Setting range	–––	0 to +32000U
	Judgment	–––	Set value ≤ Instantaneous value (Instant value upper limit) Set value ≥ Instantaneous value (Instant value lower limit)
Loader communications	**Compatible loader**	SLP-NX-J70, SLP-NX-J70PRO, SLP-NX-J71, SLP-NX-J71PRO	
	Cable	Provided with the loader (SLP-NX-J70/SLP-NX-J70PRO) (USB loader cable)	
RS-485 communications	**Signal level**	Conforms to RS-485	
	Network	Multidrop (up to 31 units as slave stations for one host)	
	Communication/ synchronization method	Half-duplex, start/stop synchronization	
	Max. line length	500 m	
	No. of wires	3-wire system	
	Transmission speed	4800, 9600, 19200, 38400, 57600, or 115200 bps	
	Terminating resistor	External (150 Ω 1/2 W min.)	
	Data length	7 or 8 bits	
	Stop bit length	1 or 2 bits	
	Parity bit	Even, odd, or none	
	Protocol	Selectable from CPL, Modbus™/ASCII, and Modbus/RTU	

*N is determined by the time base setting, as shown below.
Time base setting "0" (instantaneous value update cycle): N = 1
Time base setting "1" (seconds): N = 1 / instantaneous value update cycle
Time base setting "2" (minutes): N = 1 / instantaneous value update cycle / 60
Time base setting "3" (hours): N = 1 / instantaneous value update cycle / 3600

Model No.		NX-DX1		NX-DX2
Ethernet communications (When using a communications adapter)	**Transmission path type**	IEEE 802.3u 100BASE-TX (With full duplex and auto MDI/MDI-X functions. The auto negotiation function must be activated on connected modules.)		
	Connector	RJ-45		
	Cable	UTP cable (4P) Cat 5e (straight) (ANSI/TIA/EIA-568-B both ends)		
	Protocol	CPL/TCP, Modbus/TCP		
Host communication	**RS-485 communications**	Up to 2 host communication devices can be connected (with one connection each).		
	Ethernet communications			
General specifications	**Standard conditions**	Ambient temperature	23 ±2 °C	
		Ambient humidity	60 ±5 % RH (without condensation)	
		Supply power	24 Vdc	
		Vibration	0 m/s^2	
		Shock	0 m/s^2	
		Installation angle	Reference plane ±3 °	
	Operating conditions	Ambient temperature	0 to 50 °C (under installed unit)	
		Ambient humidity	10–90 % RH (without condensation)	
		Allowable operating power voltage	21.6–26.4Vdc	
		Vibration	0 to 3.2 m/s^2 (10 to 150 Hz for 2 h each in x, y, and z directions)	
		Shock	0–9.8 m/s^2	
		Installation angle	Reference plane ±3 °	
		Dust	0.3 mg/m^3 max.	
		Corrosive gas	None	
		Altitude	2000 m max.	
		Pollution degree	2 (equivalent to a normal office environment)	
	Transportation conditions	Ambient temperature	–20 to +70 °C	
		Ambient humidity	5–90 % RH (without condensation)	
		Vibration	0–9.8 m/s^2 (10 to 150 Hz for 2 h each in x, y, and z directions)	
		Shock	0–300 m/s^2 (vertically 3 times while on DIN rail)	
		Package drop test	60 cm drop height (free drop on 1 corner, 3 edges, and 6 planes)	
	Memory backup	Nonvolatile memory (EEPROM)		
	EEPROM erase/write cycles	Up to 100,000		
	Memory for totalized data	–––		Nonvolatile memory (FeRAM)
	Power consumption	4 W max. (under operating conditions)		
	Inrush current	Max. 20 A (under operating conditions)		
	Operation after power-on	Warmup time is approx. 10 s (time until normal operation, under standard conditions).		
	Insulation resistance	500 Vdc, 20 MΩ or more (between power terminals 1 and 2, and between power terminals and isolated I/O terminals)		
	Dielectric strength	500 Vac for 1 min (between power terminals 1 and 2, and between power terminals and isolated I/O terminals)		
	External dimensions	30 × 100 × 100 mm (for details, see the external dimensions drawing)		
	Case material, color	Modified PPO resin, black		
	Standards compliance	EN61326-1 (For use in industrial locations), UL61010-1, CAN/CSA C22.2 No.61010-1		
	Mounting method	DIN rail		
	Terminal screw tightening torque	0.6 ±0.1 N·m		
	Mass	200 g max.		
	Included accessories	Manual No. CP-UM-5560JE		

Model Number

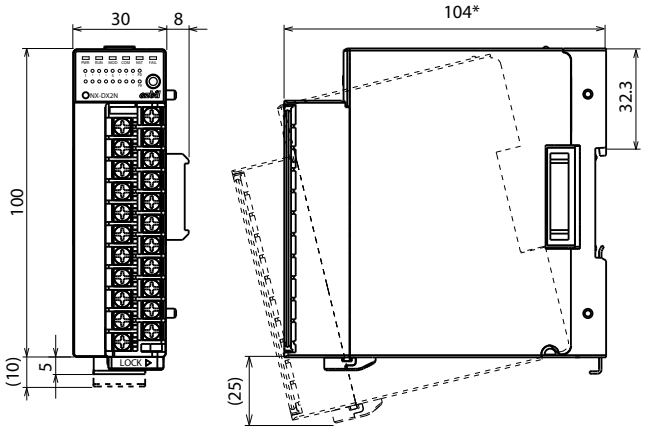
Basic model No.	Type	Ring connection	Wiring method	Channels	Option	Addition	Description
NX-							Network Instrumentation Module
	DX1						Digital input (+ common / – common shared)
	DX2						Pulse input (+ common / – common shared) *
		N					Non-ring connection
		R					Ring connection
			T				Regular terminal block
			S				Screwless terminal block
				16			16
					0		None
						0	None
						D	Inspection certificate
						T	Tropicalization treatment
						K	Anti-sulfide treatment
						B	Tropicalization treatment + inspection certificate
						L	Anti-sulfide treatment + inspection certificate

* Channels 1–8: 5kHz. Channels 9–16: 100 Hz.

External Dimensions

■ External dimensions

- Regular terminal block model

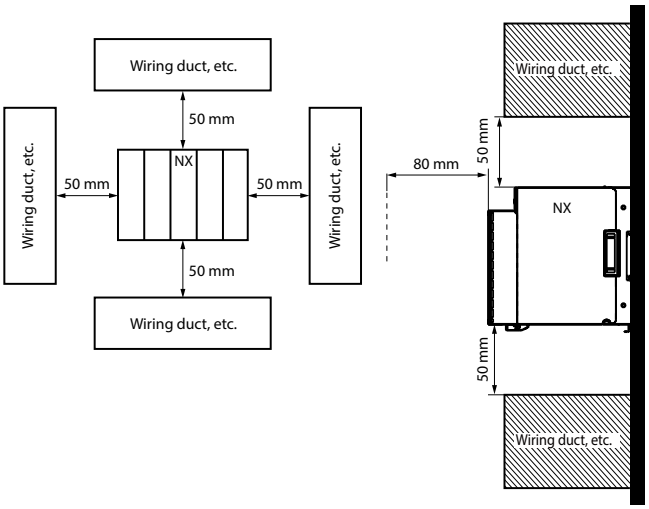


*98 for screwless terminal block models

Mounting

■ Location

The minimum required clearances are shown below.



Do not install in a location having any of the following characteristics:

- No high/low temperature/humidity.
- Free from sulfide gas or corrosive gas.
- Not dusty or sooty.
- Protected from direct sunlight, wind, and rain.
- Not exposed to airflow from a heating/cooling system or fan
- Little mechanical vibration or shock.
- Not close to high voltage line, welding machine or other electrical noise generating source.
- At least 15meters away from the high voltage ignition device for a boiler.
- No strong magnetic fields.
- Indoors
- I/O common mode voltages: voltage to ground is 30Vrms max., 42.4V peak max., and 60VDC max. (not in a wet location).

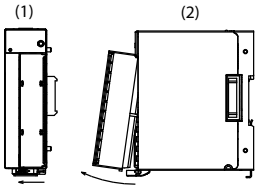
■ Terminal block mounting and removal

[!] Handling Precautions

- Do not remove the terminal block other than for work, such as:
  - When wiring before installing the unit
  - During maintenance

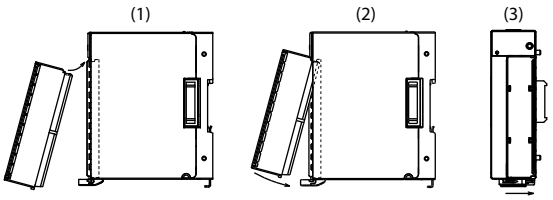
- Removal method

(1) Slide the lock lever of the terminal block to the left to unlock the terminal block.
(2) Pull the bottom of the terminal block out towards you.



- Mounting method

(1) Tilt the terminal block and insert the upper part of the terminal block into the groove in the case.
(2) Install by pushing in the lower side of the terminal block.
(3) Slide the lock lever of the terminal block to the right to lock the terminal block.



■ Module connection

Connect this module to other modules using the connectors on the left and right sides of the base.
Connect modules together before installing them on the DIN rail. Connecting the modules connects the power and communication of each module, reducing the amount of wiring that is required. With RS-485 communication, the module on the right side can be disconnected using the RS-485 cutoff switch on the base.

■ Mounting method

Use this unit after securing it to a DIN rail.
After mounting the DIN rail, pull open the locking tab an adequate amount and then attach the base to the rail. Next, push in the DIN rail locking tab upwards until it clicks into place.

[!] Handling Precautions

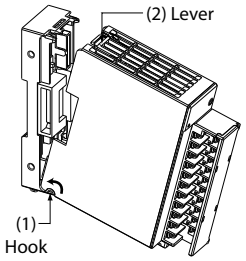
- Mount the unit so that it is vertical with the DIN rail locking tab at the bottom.
- Link this unit before installing it on the DIN rail.

■ Attaching the main unit to the base

[!] Handling Precautions

- Use the base and main unit from the same package together as a pair.
- First attach the hook at the bottom of the main unit to the base. Not doing so might cause damage.

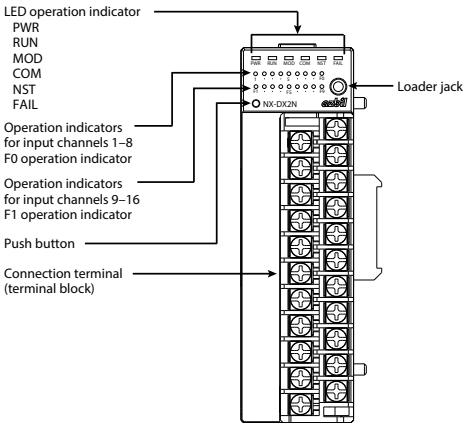
(1) Attach the hook at the bottom of the main unit to the base.
(2) Insert the upper part of the main unit until the lever clicks into place.



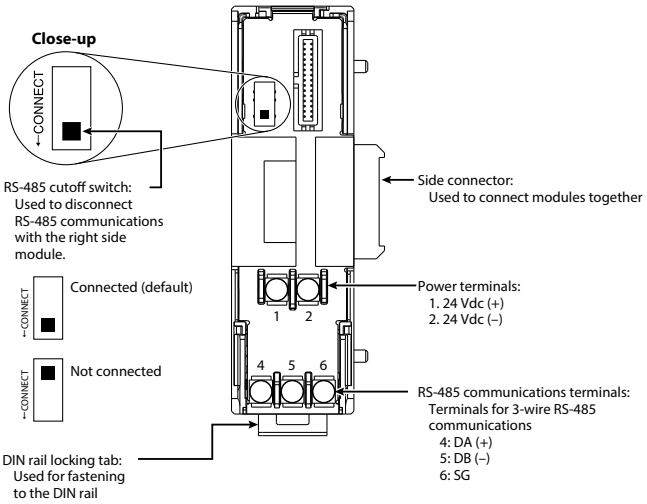
To remove, press the lever on the top and pull the unit towards you.

Names and Functions of Parts

■ Main unit



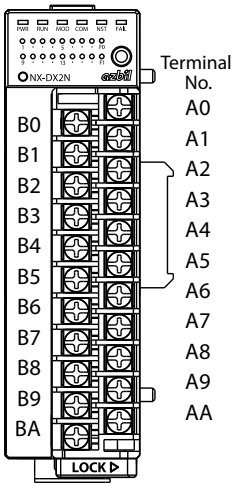
■ Base

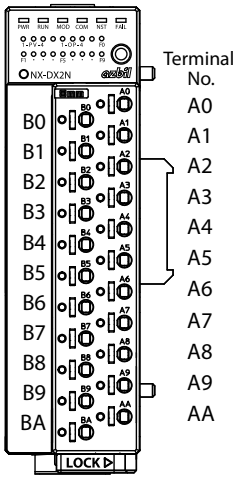


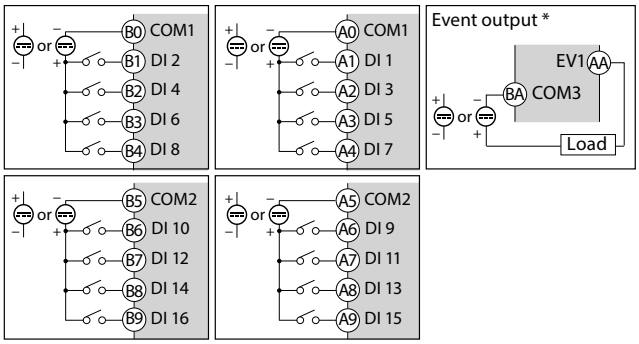
Terminal Wiring Diagram

■ Wiring diagram

- Screw terminal block
- Screwless terminal block







* Event outputs are available for the NX-DX2 only.

Note 1. Terminals A0 and B0 and terminals A5 and B5 are internally connected to each other as COM1 and COM2 respectively.

Note 2. Both digital and pulse input models have the same wiring.

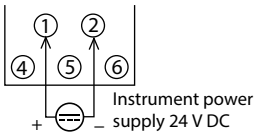
■ Wiring precautions

- Make sure that the wiring follows regulations for indoor wiring and technical standards for electrical equipment.
- To avoid damage caused by lightning, do not run wiring outdoors.
- When connecting wires to the power terminals, use crimp terminals with insulating sleeves.
- Before wiring the unit, verify the device's model No. and terminal Nos. written on the wiring diagram on the side of the main unit.
- Use M3 crimp terminal lugs for wiring to regular (screw) terminal blocks.
- Make sure that no crimp terminal lugs touch adjacent terminals.
- Leave a distance of at least 60 cm between I/O wires and communications wires or power wires. Also, do not pass such wires through the same conduit or wiring duct.
- When connecting the unit to another device in parallel, check its connection requirements carefully before instrumentation.
- To ensure stability, the unit is designed so that after the power is turned ON, it will not operate for about 10 seconds.
- After wiring, check that there are no wiring mistakes before turning the power ON.

■ Power connections

Connect the power terminals as shown below.

The power supply unit must be a UL Class 2 power supply unit.

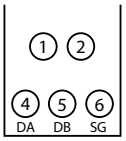


! Handling Precautions

- Linked modules supply power to each other. Supply power to one of the linked modules.
- I/O wiring to the terminal block or elsewhere should be connected directly to the power supply for I/O, not connected via the base unit.
- If there are multiple wires to the power supply or some other wiring difficulty, add a relay terminal or the like.
- Use a power supply that can supply the total power requirement of the linked modules.

■ RS-485 communication connections

Connect CPL and Modbus (RS-485 communication) as shown below.



! Handling Precautions

- Attach a 0.5 W or greater terminating resistor of 150 Ω ± 5 % at each end of the communications lines. If a device does not allow terminating resistor to be placed in the same line, follow the instructions for that device.
- Be sure to connect the SG terminals together. Failure to do so might cause unstable communications.
- Use twisted pair cable for communication wiring.

■ I/O isolation

The solid lines in the diagram below indicate isolation from the rest of the circuit.

Power (including side connectors)* 1	Digital/pulse input channels 1–8* 3
Logic circuits Loader jack RS-485 communications, side connector Ethernet communications *1 Display portion (LED, push button, etc.)	Digital/pulse input channels 9–16* 3
Side connector ring communication *1	Event output 1* 2

*1. The power, ring communication, and RS-485 and Ethernet communications are isolated from each other and connected by me ans of the side connector.
*2. NX-DX2 only.
*3. The NX-DX1 does not support a pulse input function.

Please read the "Terms and Conditions" from the following URL before ordering or use:

https://www.azbil.com/products/factory/order.html

Specifications are subject to change without notice.

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