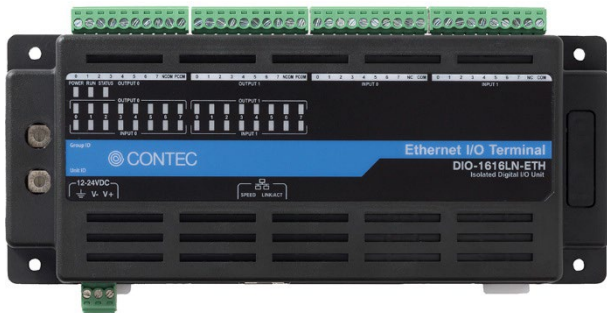# N Series for Ethernet Isolated Digital I/O Unite
16ch Di, 16ch DO
DIO-1616LN-ETH

* Specifications, color and design of the products are subject to change without notice.

This product is an Ethernet-compliant digital I/O Unit used to provide a digital signal I/O function from PC LAN port.

Digital signals can be input and output at 12 - 24VDC.

16 channels of Optocoupler isolated inputs (compatible with both current sink and current source outputs) and 16 channels of Optocoupler isolated open-collector outputs (compatible with current sink type) are equipped. Up to eight channels are used as an interrupt. Also, including a digital filter function which prevents wrong recognition of input signals, output transistor protection circuit (surge voltage protection and over current protection), and the fail-safe function which changes outputting to the specified pattern when communication errors occur.

Compact design, (188.0(W)×78.0(D)×30.5(H)mm), features flexibility in installation. The product can be set on the floor, wall, and inside the console or equipment with the DIN rail.

Windows/Linux device driver is supported with this product.

* The contents in this document are subject to change without notice.
* Visit the CONTEC website to check the latest details in the document.
* The information in the data sheets is as of July, 2024.

Features

Opto-coupler isolated input (compatible with current sink and current source output) and opto-coupler isolated open-collector output (current sink type)
This product has the 16 channels of Opto-coupler isolated inputs (compatible with current sink and current source outputs) and 16 channels of Opto-coupler isolated open-collector outputs (current sink type) whose response time is 200μsec.

Common terminal provided per 8 channels, capable of supporting a different external power supply. Supporting driver voltages of 12 - 24 VDC for I/O. The digital input can be checked with the LED indicator.

Opto-coupler bus isolation
As the Ethernet controller (PC) is isolated from the input and output interfaces by opto-couplers, this product has excellent noise performance.

8 input signals can be used as interrupt request signals *2
You can use 8 input signals as interrupt request signals and also disable or enable the interrupt in bit units and select the edge of the input signals, at which to generate an interrupt.

With a digital filter to prevent wrong recognition of input signals from carrying noise or a chattering. *1
This product has a digital filter to prevent wrong recognition of input signals from carrying noise or a chattering. All input terminals can be added a digital filter, and the setting can be performed by software.

Output circuits include Zener diodes for surge voltage protection and circuits for overcurrent protection
Zener diodes are connected to the output circuits to protect against surge voltages. Similarly, Over-current protection circuits are fitted to each group of 8channels outputs. The output rating is max. 60VDC, 100mA per channel

Operable in a wide range of 12 - 24VDC power
The product can be operated in the various environments with a wide range power supply of 12 - 24VDC. In addition, the FG terminal is equipped in the power connector.

Fail-safe function within *1
The fail-safe function changes outputting to the specified pattern when communication errors such as LAN cable disconnection occur.

Compact design not restricting installation location (188.0(W) x 78.0(D) x 30.5(H))
Compact design of 188.0(W) × 78.0(D) × 30.5(H) does not require special installation location.

Usable as an Ethernet-based digital I/O
Monitoring digital I/O is easy as it can be controlled remotely through Ethernet.

Diverse installations such as screw fastening, magnet (optional purchase), DIN rail are possible.
Installation on the floor / wall /ceiling is possible by screw fastening, with magnets (optional purchase), rubber feet, etc.

In addition, DIN rail mounting mechanism is equipped as standard with the product, making it easy to install the product within the panel or the device.

Easy-to-wire terminal connector adopted
Adoption of terminal connector (with screws) enables to achieve easy wiring.

Windows/Linux support device driver
Using the device driver API-TOOL makes it possible to create applications of Windows/Linux. In addition, a diagnostic program by which the operations of hardware can be checked is provided.

*1: this is available in firmware version 1.10 or higher.

*2: this is available in firmware version 1.20 or higher.

Included Items

Product ...1   Rubber feet...4
Interface connector...4   Please read the following...1
Power supply connector...1

Support Software

Name	Contents	How to get
Windows Version Digital I/O Driver software API-DIO(WDM)	The Windows device driver is provided as a form of Windows API functions. Various sample programs such as C# and Visual Basic .NET , Visual C++, Python etc. and diagnostic program useful for checking operation is provided.	Download from the CONTEC website *1
Linux Version Digital I/O Driver software API-DIO(LNX)	The Linux device driver is provided as a shared library. The software includes various sample programs such as gcc (C, C++) and Python programs, as well as a configuration tool to configure the device settings.	Download from the CONTEC website *1
Software Development Tool Kits (SDK) and Support Software	In addition to the device drivers, we offer many software programs for using CONTEC devices in an easier manner.	Download from the CONTEC website *2

*1 Download the files from the following URL.
      https://www.contec.com/download/

*2 For supported software, search the CONTEC website for this product and view the product page.
      https://www.contec.com/

Specifications

Function specification

Item		Specifications
Input		
	Type	Opto-isolated input (Compatible with current sink output and current source output) (Negative logic *1)
	Number of Channels	16 channels (8 channels share 1 common)
	Input resistance	15kΩ
	Current required to turn ON	0.7mA or more
	Current required to turn OFF	0.15mA or less
	Interrupt	8 interrupt input signals are arranged into a single output of interrupt signal. An interrupt is generated at the falling (HIGH-to-LOW transition) or rising (LOW-to-HIGH transition) edge (set by software).
	Response time	200μsec within *2
Output		
	Type	Opto-isolated open collector output (Compatible with current sink) (Negative logic *1)
	Number of Channels	16 channels (8 channels share 1 common)
	Output rating — Output rated voltage	60VDC (Max.)
	Output rating — Output rated current	100mA/channel (Max.)
	Residual voltage with output on	0.5V or less (Output current ≤ 50mA), 1.0V or less (Output current ≤ 100mA)
	Surge protector	Zener diode CMZB68(TOSHIBA) or equivalent
	Response time	Within 200μsec *2
LAN section		
	Transmission standard	10BASE-T/100BASE-TX
	Connector	RJ-45 connector
	LED	Speed(Yellow), Link / Act(Green)
Common		
	Allowable distance of signal extension	Approx. 50m (depending on wiring environment)
	Isolated voltage	1000VAC
	External circuit power supply *3	12 - 24VDC(±10%)
	Current consumption	12VDC　250mA (Max.), 24VDC　150mA (Max.)
	Physical dimensions (mm)	188.0(W)×78.0(D)×30.5(H) (No protrusions)
	Weight	300g (Not including the connector)

*1　Data "0" and "1" correspond to the High and Low levels, respectively.

*2　The Opto-coupler's response time comes.

*3　External circuit power supply is required.

Installation Environment Requirements

Item	Specifications
Operating ambient temperature *1	-20 - +60°C
Operating ambient humidity	10 - 90%RH (No condensation)
Floating dust particles	Not to be excessive
Corrosive gases	None
Standard	VCCI Class A, CE Marking (EMC Directive Class A, RoHS Directive), UKCA

*1　To suppress the heating, ensure that there are spaces for ventilation (about 5cm) around this product.
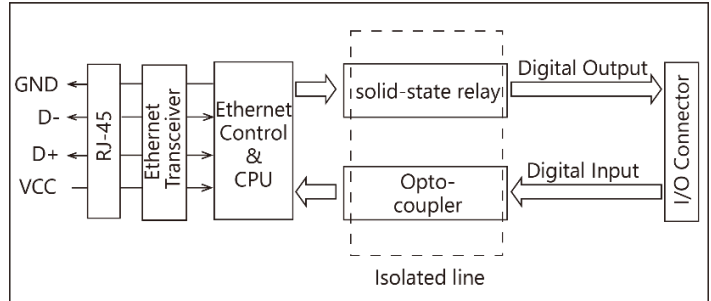
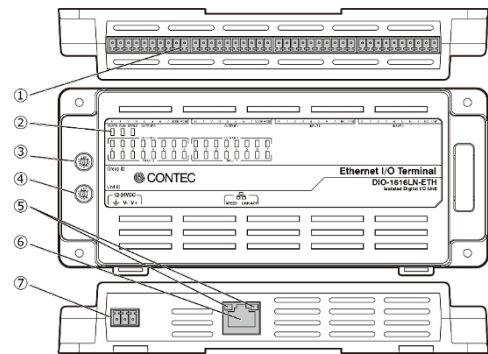## Physical Dimensions
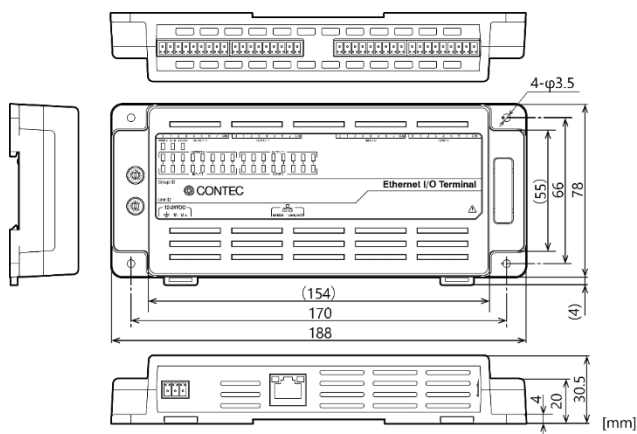
Optional Products

Product Name	Model type	Note
AC-DC Power Adaptor (12VDC, 1A)	POA201-10-2	
CONPROSYS Series Magnet (Four Piece Set)	CPS-MAG01-4	

Visit the CONTEC website for the latest optional products.

Circuit Block Diagram

Component Name

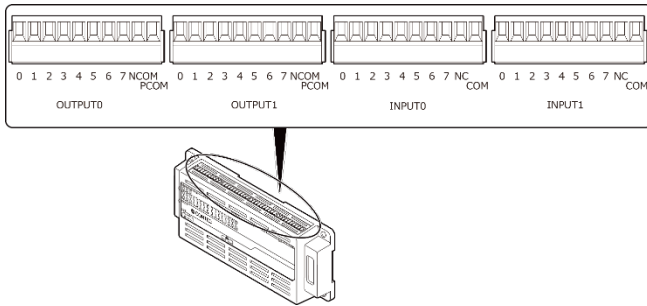| No.	Name	No.	Name
1	Interface Connector	5	LAN LED
2	LED Indicator	6	Ethernet Connector
3	Setting Switch: Group ID	7	Power Supply Connector (Attached connector)
4	Setting Switch: Unit ID		

Connecting an Interface Connector

Use the supplied interface connector (plug connector) to connect the product to an external device.

The following example describes how to make the connecting cable with the interface connector (connector plug).
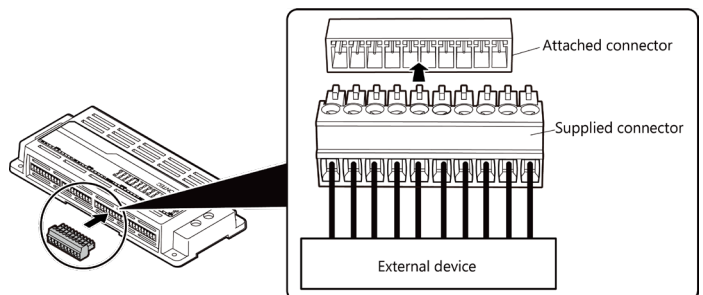
Signal Layout on the Interface Connector

Connector name	Pin No.	Signal Name	Meaning
OUTPUT0	0	OUT00	+2 port (output)
	1	OUT01	
	2	OUT02	
	3	OUT03	
	4	OUT04	
	5	OUT05	
	6	OUT06	
	7	OUT07	
	NCOM	COM0(-)	Minus common for OUTPUT0
	PCOM	COM0(+)	Plus common for OUTPUT0
OUTPUT1	0	OUT10	+3 port (output)
	1	OUT11	
	2	OUT12	
	3	OUT13	
	4	OUT14	
	5	OUT15	
	6	OUT16	
	7	OUT17	
	NCOM	COM1(-)	Minus common for OUTPUT1
	PCOM	COM1(+)	Plus common for OUTPUT1

Connector name	Pin No.	Signal Name	Meaning
INPUT0	0	IN00	+0 port (input)
	1	IN01	
	2	IN02	
	3	IN03	
	4	IN04	
	5	IN05	
	6	IN06	
	7	IN07	
	NC	N.C.	Not Connected
	COM	COM	Plus / minus common for INPUT0
INPUT1	0	IN10	+1 port (input)
	1	IN11	
	2	IN12	
	3	IN13	
	4	IN14	
	5	IN15	
	6	IN16	
	7	IN17	
	NC	N.C.	Not Connected
	COM	COM	Plus / minus common for INPUT1

* IN00 - IN07 can be used as interrupt signal.

IN00 - IN17	16 input signal pins. Connect output signals from the external device to these pins.
OUT00 – OUT17	16 output signal pins. Connect these pins to the input signal pins of the external device.
N.C.	This pin is left unconnected.
COM	Connect the positive or negative side of the external signal.　These pins are common to 8 input signal pins.
COM0(-) - COM1(-)	Connect the negative side of the external signal.　These pins are common to 8 output signal pins.
COM0(+) - COM1(+)	Connect the positive side of the external signal.　These pins are common to 8 output signal pins.

Connecting Input Signals

Input Circuit
Connect the input signals to a device which can be current-driven, such as a switch or transistor output device.

The product inputs the ON/OFF state of the current-driven device as a digital value.
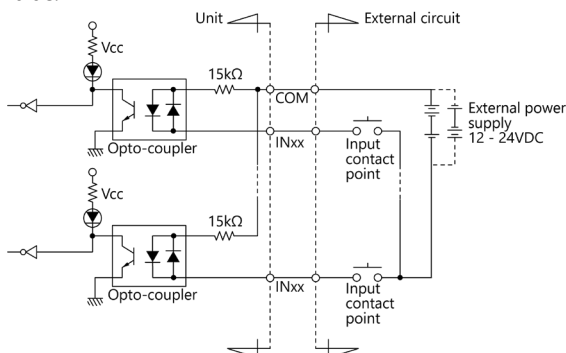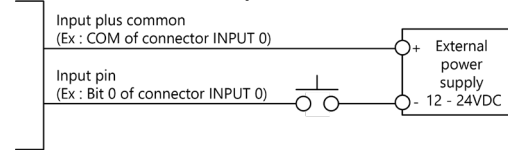

The signal input section consists of an Opto-coupler isolated input (compatible with both current sink output and current source output). An external power supply is therefore required to drive the input section of
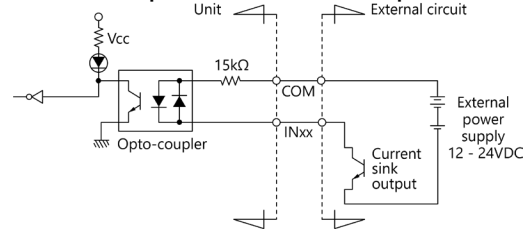
this product.
The power requirement for this product is about 0.8 mA per input channel at 12VDC (about 1.6 mA at 24 VDC).
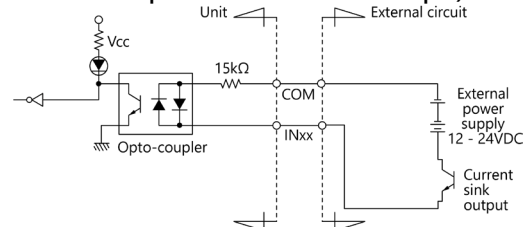
Example of Connection (An Example to use Bit0 of INPUT0)

Examples of Connection to an External Device(Example of a Connection between Input and Current Sink Output)
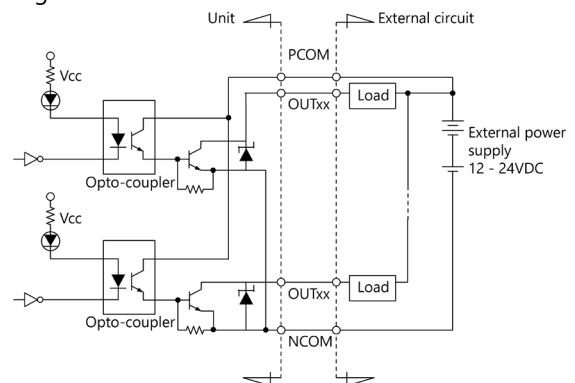

Examples of Connection to an External Device(Example of a Connection between Input and Current Source Output)

Output Circuit
Connect the output signals to a current-driven controlled device such as a relay or LED.

The product controls turning on/off the current-driven controlled device using a digital value.

The signal output section consists of an Optocoupler isolated open collector output (current sink type). An external power supply is therefore required to drive the output section of this product.

The maximum output current rating per channel is 100 mA for the product.

As low saturation is used for outputting, connecting with TTL level input is also possible.
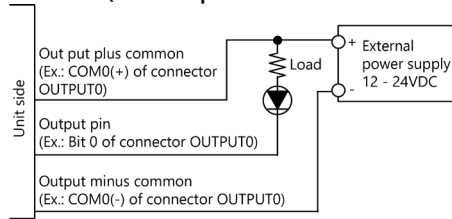
When outputting is on, residual voltages (low level voltage) between the collector and emitter are 0.5V or less at output current 50mA, and 1.0V or less at output current 100mA.

Zener diodes are connected to the output circuits to protect against surge voltages.　Similarly, Over-current protection circuits are fitted to each group of 8channels outputs.
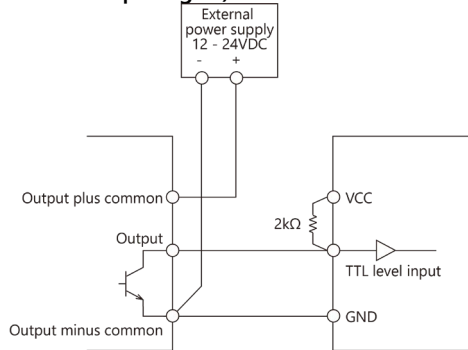
⚠ **CAUTION**

When the PC is turned on, all outputs are reset to OFF.

Connection to the LED(An Example to use Bit0 of OUTPUT0)

Unit side

Out put plus common
(Ex.: COM0(+) of connector OUTPUT0)

Load

+ External power supply
- 12 - 24VDC

Output pin
(Ex.: Bit 0 of connector OUTPUT0)

Output minus common
(Ex.: COM0(-) of connector OUTPUT0)

Example of Connection to TTL Level Input(Connection Example of Output and TTL level Input Signal)

External power supply
12 - 24VDC
−   +

Output plus common

VCC

2kΩ

Output

TTL level input

Output minus common

GND

How to connect between output (sink type) and input (compatible with sink output)

Figure below shows the example of a connection between output (sink type) and input (compatible with sink output). See this example when connecting the device to the product.

External power supply
12 - 24VDC
−   +

Output Side

Input Side

Output plus common

Input plus common

Output (sink type)

Input (Compatible with sink output)

Output minus common