

N Series for Ethernet Digital I/O Unit with High Voltage Isolation

DIO-1616RYN-ETH



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

Features

Optocoupler isolated input (compatible with current sink output/current source output) and solid-state relay output

This product has the 16 of optocoupler isolated input (compatible with current sink output/current source output) whose response time is 200μsec and 16 of solid-state relay output whose response time is 1.0msec. Supporting driver voltages of 12 - 24VDC for input and 120VAC/DC for output with high voltage. (12 - 24VDC external circuit power supply is required separately.)

Optocoupler and solid-state relay bus isolation

As the ethernet controller (PC) is isolated from the input and output interfaces by optocoupler and solid-state relay, this product has excellent noise performance.

You can use 8 input signals as interrupt request signals

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.

This product has a digital filter to prevent wrong recognition of input signals from carrying noise or a chattering

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.

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 supply connector.

Fail-safe function within

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) x 78.0(D) x 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.

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

This product is compatible with the digital signal I/O with high voltage (input 12 - 24VDC, output 120VAC/DC) and features 16 optocoupler isolated inputs (compatible with current sink output/current source output) and 16 solid-state relay outputs. Up to eight channels are used as an interrupt. In addition, the digital filter function to prevent wrong recognition of input signals is provided.

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.

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.

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/>

Optional Products

Product Name	Model type	Note
AC-DC Power Adaptor (12VDC, 1A)	POA201-10-2	*1
CONPROSYS Series Magnet (Four Piece Set)	CPS-MAG01-4	
CONPROSYS Series 12VDC AC-DC Converter	CPS-PWD-15AW12-01	*2
CONPROSYS Series 12VDC AC-DC Converter	CPS-PWD-30AW24-01	*2
CONPROSYS Series 12VDC AC-DC Converter	CPS-PWD-90AW24-01	*2

*1 The operating ambient temperature is 0 to 40 °C. It is the same adaptor included in this package.

*2 The operating ambient temperature is -20 to 70 °C.

Specifications

Function specification

Item	Specifications
Input	
Type	Opto-Isolated Input (Both of current sink and source outputs supported)
Number of Channels	16 channels (8 channels / common)
Input resistance	3 k Ω
Current required to turn ON	3.1mA or more
Current required to turn OFF	1.0mA 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).
External circuit power supply *1	12 - 24 VDC ($\pm 10\%$)
Response time	200 μ sec within *2
Output	
Type	Solid-state relay output
Number of Channels	16ch (1 common)
Output rated voltage	120VAC/DC (Max)
Output rated current *1	100mA (par channel) (Max)
Device used	PS7221A-2A (Renesas) or equivalent *1
ON resistance	10.0 Ω or less
OFF leakage current	1.0 μ A or less
Response time	1.0msec within
LAN section *3	
Transmission standard	10BASE-T/100BASE-TX
Connector	RJ-45 connector
LED	Speed(Orange), Link / Act(Green)
Power supply	
Input voltage range	12 - 24VDC $\pm 10\%$
Current consumption	12VDC 210mA(Max), 24VDC 110mA(Max)
Power supply connector	European type terminal 3.5mm pitch 3-pin jack connector
Common	
Interface connector	European type terminal 3.5mm pitch 9-pin jack connector
Connecting distance	50m(Typ.) (depending on wiring environment)
Isolated voltage	1000Vrms
Physical dimensions (mm)	188.0(W) \times 78.0(D) \times 30.5(H) (No protrusions)
Weight	250g

- *1 External circuit power supply and output current derating is required.
50°C - 60°C : External circuit power supply should be 12VDC for Input.
Output rated current should be lower than 50mA per channel.
-20°C - 50°C : External circuit power supply can be from 12VDC to 24VDC for Input.
Output rated current can be used up to 100mA per channel.

*2 The Optocoupler's response time comes.

*3 Use an STP cable.

Installation Environment Requirements

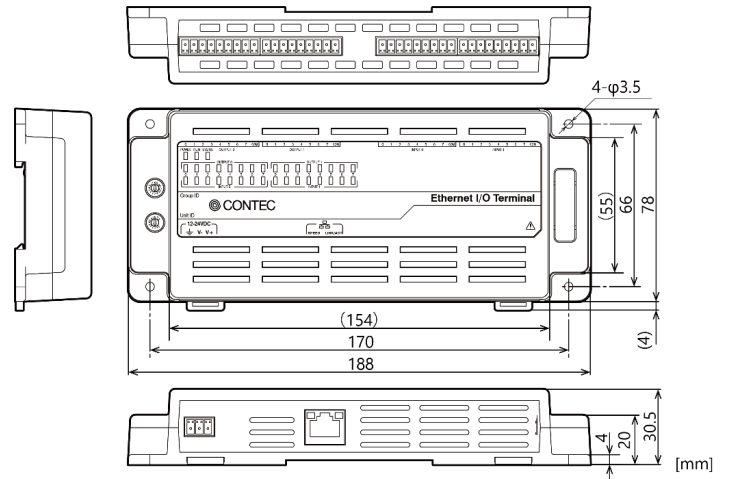
Item	Specifications
Operating ambient temperature *1	-20 - +60°C *2
Operating ambient humidity	10 - 90%RH (No condensation)
Floating dust particles	Not to be excessive
Corrosive gases	None
Line-noise resistance *3	Line noise AC Line/ ± 2 kV, Signal Line/ ± 1 kV (IEC61000-4-4 Level 3, EN61000-4-4 Level 3)
	Static electricity resistance Contact discharge / ± 4 kV (IEC61000-4-2 Level 2, EN61000-4-2 Level 2) Air discharge / ± 8 kV (IEC61000-4-2 Level 3, EN61000-4-2 Level 3)
Vibration resistance	Sweep resistance 10 - 57Hz /semi-amplitude vibration 0.15mm, 57 - 150Hz/2G 40minutes each in X, Y, and Z directions (JIS C60068-2-6-compliant, IEC60068-2-6-compliant)
Shock resistance	147m/s ² (15G)/11ms/half-sine shock (JIS C 60068-2-27-compliant, IEC 60068-2-27-compliant)
Standard	VCCI Class A, FCC Class A, CE Marking (EMC Directive Class A, Low Voltage Directive, RoHS Directive), UKCA

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

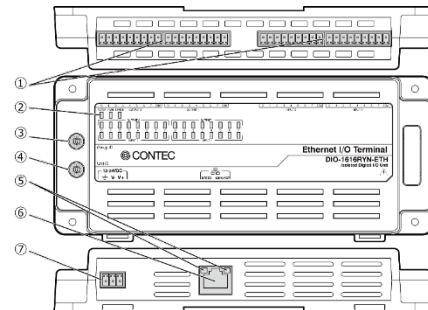
*2 When using the supplied AC adaptor POA 201-10-2, it is 0 - 40°C.

*3 When using the supplied AC adaptor POA 201-10-2.

Physical Dimensions



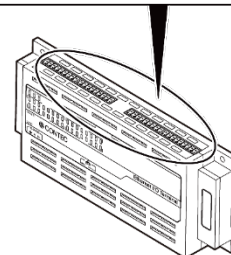
Component Name



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		

Signal Layout on the Interface Connector

OUTPUT0	OUTPUT1	INPUT0	INPUT1
OUT 00 OUT 01 OUT 02 OUT 03 OUT 04 OUT 05 OUT 06 OUT 07 COM	OUT 10 OUT 11 OUT 12 OUT 13 OUT 14 OUT 15 OUT 16 OUT 17 COM	IN 00 IN 01 IN 02 IN 03 IN 04 IN 05 IN 06 IN 07 COM	IN 10 IN 11 IN 12 IN 13 IN 14 IN 15 IN 16 IN 17 COM



* IN00 - IN07 can be used as interrupt signal.

IN00 -- IN17	Digital input pins. The numbers correspond to input bits.
OUT00 -- OUT17	Digital output pins. The numbers correspond to output bits.
COM	Common pin for input signals or output signals.

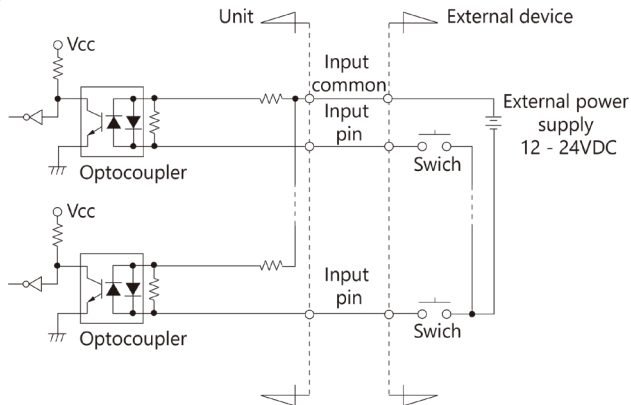
Connecting Input Signals

Input Circuit

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

The connection requires an external power supply to feed currents.

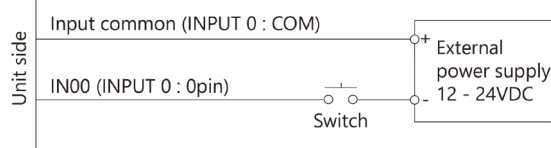
The product inputs the ON/OFF state of the current-driven device as a digital value.



* INxx represents the input pin.

The input specification is fixation from 12 - 24VDC for this product. The signal inputs are isolated by opto-couplers (Both of current sink and source outputs supported). The board therefore requires an external power supply to drive the inputs. The power capacity required for driving each input channel is about 4 mA when the signal voltage is 12VDC.

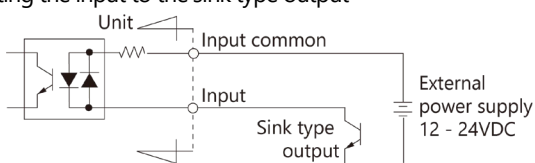
Connecting a Switch (An Example to use Input IN00)



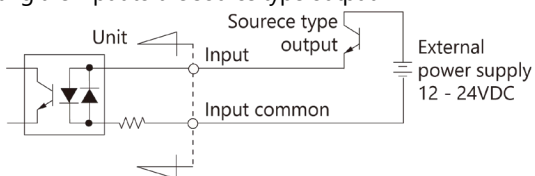
When switch is "ON", the corresponding bit is "1".
When switch is "OFF" in contrast, the corresponding bit is "0".

Examples of Connecting the Unit to an External Device

Connecting the input to the sink type output



Connecting the input to the source type output



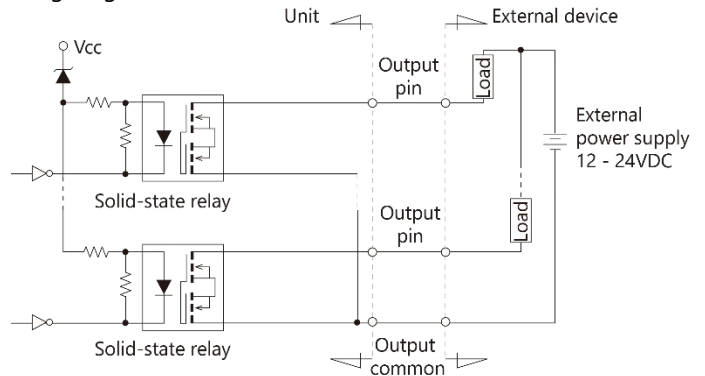
Connecting Output Signals

Output Circuit

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

The connection requires an external power supply to feed currents.

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



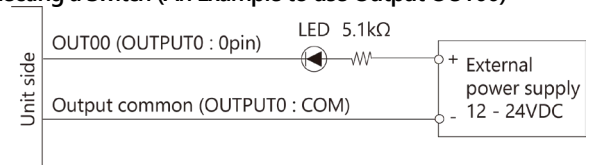
* OUTxx represents the output pin.

The signal outputs are solid-state relay outputs using a rated output current of up to 100 mA per channel.

CAUTION

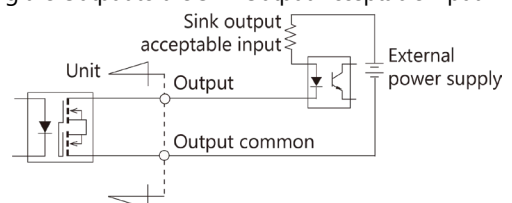
When the PC is turned on, all output are reset to OFF.

Connecting a Switch (An Example to use Output OUT00)

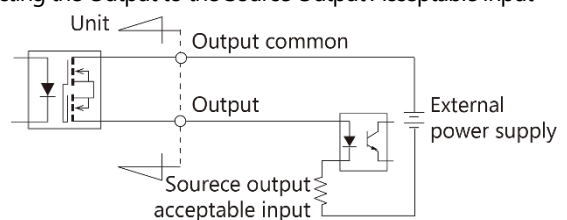


Examples of Connecting the Unit to an External Device

Connecting the Output to the Sink Output Acceptable Input



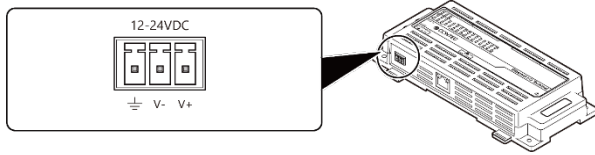
Connecting the Output to the Source Output Acceptable Input



Power Supply Connector

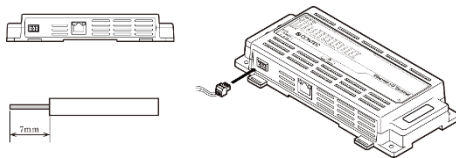
Connect this product to the external power supply with the supplied power input connector.

When using a commercially available DC output power supply, follow the same procedure described here.



Mark	Signal Name
\perp	Frame ground (FG)
V-	Power supply (GND)
V+	Power supply (12 - 24VDC)

Connecting to an External Power Supply for Driving the Product



When supplying power using the supplied power supply connector or the compatible connector, strip off approximately 7mm (± 0.5 mm) of the covered part of the cable and insert it into the connector and securely screw it in place.

When connecting the FG pin of the product to ground (earth), follow the same procedure.

Use the power cable described below.

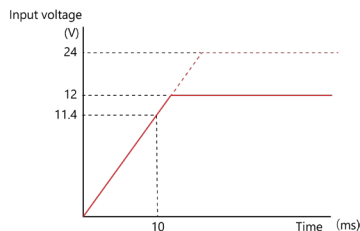
Cable	Twisted pair cable (when using a single wire, twist V+ wire and V- wire)
Cable Diameter	AWG24 - 16(0.2mm ² - 1.25mm ²)
Cable Length	Within 3 meters

Use the FG cable described below.

Cable Diameter	AWG18 - 16(0.75mm ² - 1.25mm ²)
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About a power rise

When using a commercially available DC output power supply, use a power supply with an input voltage that rises to above 11.4VDC and below 12 to 24VDC (+10%) within 10ms. A power supply that does not rise to this level may not operate the product properly or may cause a product failure or accident.

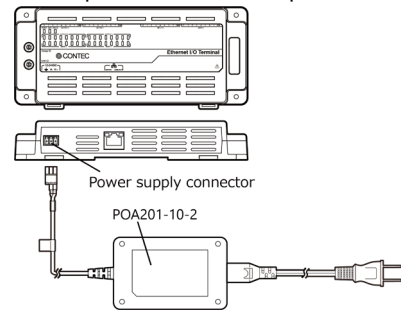


Connecting an external power supply

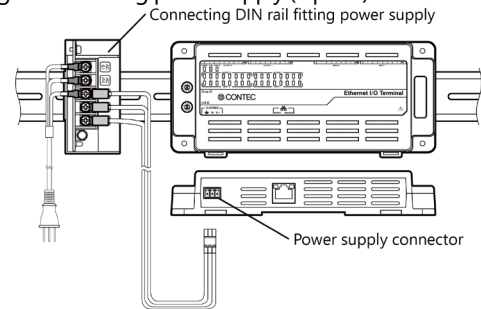
Use an external power supply as necessary for the environment and application.

When using the separately sold AC adapter POA201-10-2 or DIN rail fitting power supply, connect the connector included with that product to the power supply connector, and do not use the supplied power supply connector. Use an external power supply as necessary for the environment and application.

Connecting the AC Adapter POA201-10-2 (Option)



Connecting DIN rail fitting power supply (Option)



CAUTION

- Refer to the specifications in "Function Specifications" for the required input power specifications per unit of this product.
- The tightening torque for the supplied power supply connector is 0.25N·m.
- If the maximum output current of the external power supply does not include a sufficient margin compared with the maximum current consumption of the product, abnormal operation may occur due to the inrush current at startup or load fluctuations, or a start failure may occur due to degradation of the power supply over time.
- When the product is not used, leave the 12 - 24VDC power supply (such as the separately sold AC adapter) unplugged.
- Connect the 12-24VDC power supply (such as the separately sold AC adapter) to the power supply connector of the product first. When unplugging, unplug it from the power outlet side of the AC adapter first.
- Grasping the cable to remove the power supply connector of the 12-24VDC can break the wire. Always grasp the connector to remove it.
- When the 12-24VDC power supply is supplied, do not disconnect the 12-24VDC power supply from the power supply connector.
- If you use this product in a noisy environment, connect the FG pin of the product to the ground (earth) to stabilize the operation.
- Using the separately sold AC adapter in a heated state continuously affects its life.
- Use the separately sold AC adapter not in a closed place but in a well-ventilated place to prevent the product from being overheated.
- Do not remove the power supply connector [MC1,5/3-ST-3,5] that is attached to the separately sold AC adapter.

Circuit Block Diagram

