N Series for USB
Isolated Digital I/O Unit (16ch DI, 16ch DO)

DIO-1616LN-USB

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

Features

16 channels of Optocoupler isolated inputs (compatible with current sink and current source outputs) and 16 channels of Optocoupler isolated open-collector outputs (compatible with current sink type).
This product has the 16 channels of Optocoupler isolated inputs (compatible with current sink and current source outputs) and 16 channels of Optocoupler isolated open-collector outputs (current sink type) whose response speed 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.

Optocoupler bus isolation
As the USB (PC) is isolated from the input and output interfaces by Optocouplers, this product has excellent noise performance.

8 input signals as interrupt request signals.
You can use up to 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.
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

Operation with USB bus power/12 - 24VDC power supply
As the product can operate with USB bus power, power supply from the external source is unnecessary. Operation with a wide range power supply of 12 - 24 VDC is also available when the product is used such as with a laptop computer to save power consumption or when the environment requiring a separate power supply, such as using a non-power connected USB hub. Therefore, it can be used in various equipment configuration and power supply environment. In addition, the FG terminal is equipped in the power connector.

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.

This product is an USB2.0-compliant digital I/O unit that provides the input and output function of digital signal from the USB port of PC. 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, and output transistor protection circuit (surge voltage protection and over current protection).

Compact design not restricting installation location (188.0(W) x 78.0(D) × 30.5(H)) makes it easy to install the product within the panel or device using DIN rail mounting jigs, or on the floor or wall.

* The contents in this document are subject to change without notice.
* Visit the CONTEC website to check the latest details.
* The information in the data sheets is as of July, 2022.

Compatible to USB1.1/USB2.0
Compatible to USB1.1/USB2.0 and capable to achieve high speed transfer at HighSpeed (480 Mbps).

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 compatible driver libraries are attached.
Using the attached digital I/O driver API-DIO(WDM) makes it possible to create applications of Windows. In addition, a diagnostic program by which the operations of hardware can be checked is provided.

Accessories (Option)

AC adapter (input: 90 - 264VAC, output: 12VDC 1.0A) : POA201-10-2

Magnets for installation (For piece Set) : CPS-MAG01-4

* Check the CONTEC's Web site for more information on these options.

Support Software

Windows version of digital I/O driver API-DIO(WDM)
[Stored on the bundled media driver library API-USBP(WDM)]
The API-DIO(WDM) is the Windows version driver library software that provides products in the form of Win32 API functions (DLL). Various sample programs such as Visual Basic and Visual C++, etc and diagnostic program useful for checking operation is provided.
For more details on the supported OS, applicable language and how to download the updated version, please visit the CONTEC's Web site.

Packing List

Product [DIO-1616LN-USB] ...1
I/O connector...4
USB cable attachment on the main unit's side (For Mini B connector side) ...1
Rubber feet ...4
USB cable (1.8m) ...1
Disk *1 [API-USBP(WDM)] ...1
First step guide ... 1

Warranty Certificate...1
Serial Number Label ...1

*1 The bundled disk contains the driver software and User's Guide

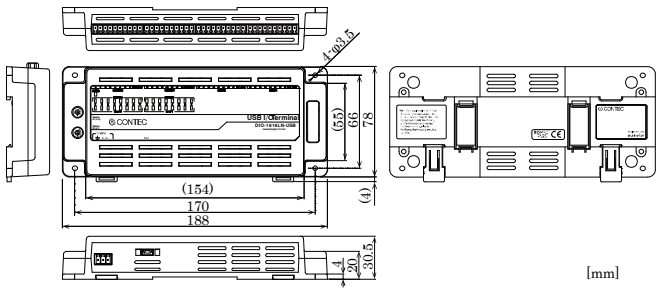
Specifications

Specification

Item			Specifications
Input			
	Number of input signal channels		16 channels (8 channels / common)
	Input format		Optocoupler isolated input (compatible with current sink output and current source output)(Negative logic *1)
	Input resistance		15kΩ
	Input ON current		0.7mA or more
	Input OFF current		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		Within 200μsec *2
Output			
	Number of output signal channels		16 channels (8 channels share 1 common)
	Output format		Opto-isolated open collector output (Compatible with current sink) (Negative logic *1)
	Output rating	Output voltage	60VDC (Max.)
		Output current	100mA (par 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 the equivalence for it
	Response time		Within 200μsec *2
USB section			
	Bus specification		USB Specification 2.0/1.1standard
	USB transfer rate		12Mbps (Full-speed), 480Mbps (High-speed) *3
	Power supply		Bus power / Self-power *4
Common section			
	Dielectric strength		1000VAC
	External circuit power supply *5		12 - 24VDC (±10%)
	Current consumption (Max.)		12VDC 200mA, 24VDC 100mA
	Operating conditions *6		-20 - 60ºC, 10 - 90%RH (No condensation)
	Allowable distance of signal extension		Approx. 50m (depending on wiring environment)
	Physical dimensions (mm)		188.0(W)×78.0(D)×30.5(H) (No protrusions)
	Weight		300g (Not including the USB cable, attachment, connector)
	Connector		10 pin (screw-terminal) plug header x4
	Attached cable		USB cable 1.8m
	Standard		VCCI Class A, FCC Class A, CE Marking (EMC Directive Class A, RoHS Directive), UKCA

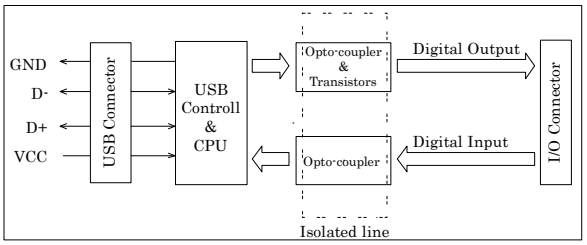
*1 Data "0" and "1" correspond to the High and Low levels, respectively.
*2 The Optocoupler's response time comes.
*3 This depends on the PC environment used (OS and USB host controller).
*4 The product can be operated with both Bus power and Self-powered.
*5 External circuit power supply is required.
*6 To suppress the heating, ensure that there are spaces for ventilation (about 5cm) around this product.

Physical Dimensions



[mm]

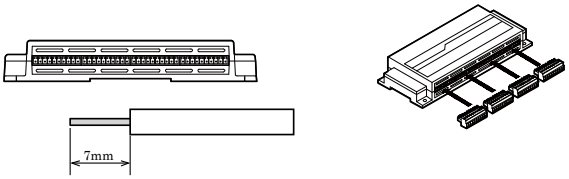
Block Diagram



Connection Method

Connecting an Interface Connector

When connecting the unit to an external device, you can use the supplied connector plug. When wiring the unit, strip off approximately 7 mm of the covering for the cable, and insert the bare wire by pressing the orange button on the connector plug. Releasing the orange button after the wire is inserted fixes the cable. Compatible wires are AWG 28 - 16.



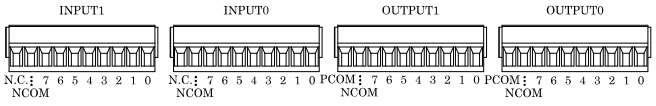
- Connector used:
  3.5mm pitch, 10 pin type of rated current 9.0A
  MC 1,5/10-G-3,5 [mfd. by PHOENIX CONTACT] (Equivalent)
- Compatible plug (supplied)
  MC 1.5/10-ST-3.5 [mfd. by PHOENIX CONTACT] (Equivalent)
  Compatibule wires : AWG28-16

⚠ CAUTION

- Removing the connector plug by grasping the cable can break the wire.
- Do not set or remove the interface connector when the power is on or during the communication.

Signal Layout on the Interface Connector

The unit can be connected to an external device using 10-pin connectors that is provided on the unit face.



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	
	N.C.	N.C.	Not Connected
	COM	COM	Common plus / minus pin for +0 ports
INPUT1	0	IN10	+1 port (input)
	1	IN11	
	2	IN12	
	3	IN13	
	4	IN14	
	5	IN15	
	6	IN16	
	7	IN17	
	N.C.	N.C.	Not Connected
	COM	COM	Common plus / minus pin for +1 ports

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(-)	Common minus pin for +2 ports
	PCOM	COM0(+)	Common plus pin for +2 port
OUTPUT1	0	OUT10	+3 port (output)
	1	OUT11	
	2	OUT12	
	3	OUT13	
	4	OUT14	
	5	OUT15	
	6	OUT16	
	7	OUT17	
	NCOM	COM1(-)	Common minus pin for +3 ports
	PCOM	COM1(+)	Common plus pin for +3 ports

IN00 - 17	16 input signal pins. Connect output signals from the external device to these pins.
OUT00 - 17	16 output signal pins. Connect these pins to the input signal pins of the external device.
N.C.	This pin is left unconnected.
COM	Common pins for 8 input signals. These pins are common to positive or negative side of external signals.
COM0(-)-COM1(-)	Common pins for 8 output signals. These pins are common to negative side of external signals.
COM0(+)-COM1(+)	Common pins for 8 output signals. These pins are common to positive side of external signals.

Connecting Input Signals

Input Circuit

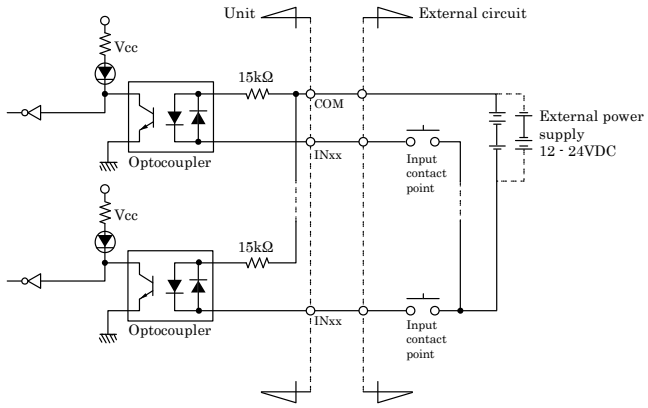
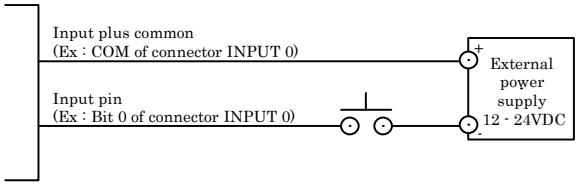


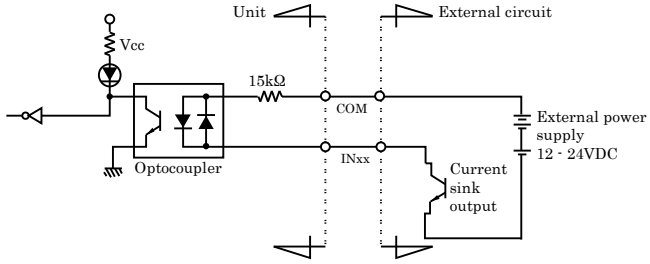
Figure shows the input equivalent circuit for the interface section of this product.
The signal input section consists of an Optocoupler isolated input (compatible with both current sink output and current source output). An external power supply is therefore required to drive the input section of this 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

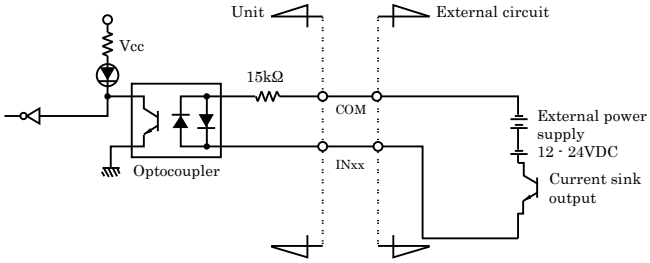


Examples of Connection to an External Device

Example of a Connection between Input and Current Sink Output



Example of a Connection between Input and Current Source Output



Connecting Output Signals

Output Circuit

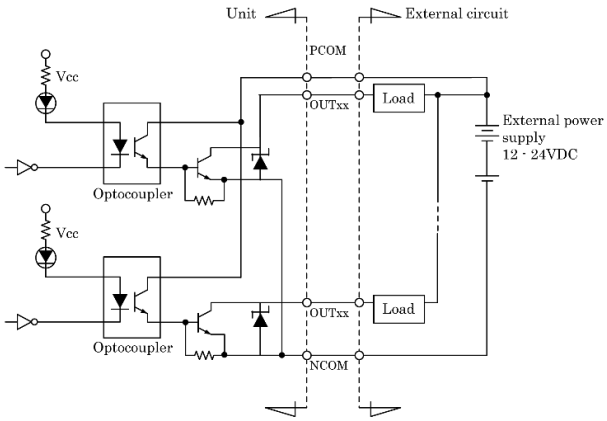
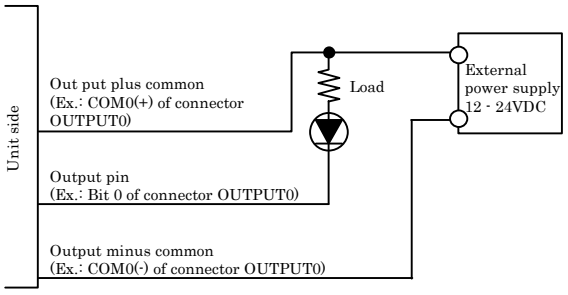


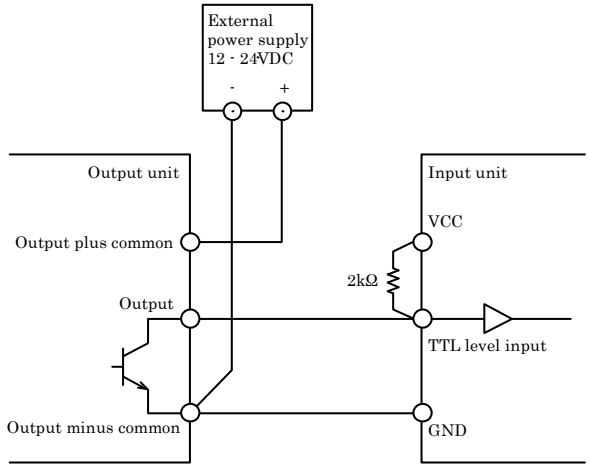
Figure shows the output circuit for the interface section of this product.
The signal output section consists of an Optocoupler isolated open collector output (current sink type). An external power supply is therefore required to drive the output section of this product.
The maximum output current rating 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 power is turned on, all output will be OFF.

Connection to the LED



Example of Connection to TTL Level Input



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.