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

DIO-1616HN-USB

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

This product is an USB 2.0-compliant digital I/O unit that provides the input and output function of digital signal from the USB port of PC.

This product is compatible with digital input and output signals at 5 - 50VDC which features 16 channels of opto-coupler isolated inputs (compatible with current sink output) and 16 channels of opto-coupler isolated open-collector outputs(compatible with current sink type), equipped with 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.

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 February, 2025.

Features

- Opto-coupler isolated input (compatible with current sink output)
This product has 16 channels of opto-coupler isolated inputs, compatible with current sink output of 5 - 50 VDC whose response time is 200µsec. 16 channels share one common. As the power to run the opto-couplers is supplied internally, no external power supply is required.

- Opto-coupler isolated open-collector outputs (compatible with current sink type)
This product has 16 channels of opto-coupler isolated open-collector outputs (current sink type) whose response time is 200µsec, supporting driver voltages of 5- 50 VDC for I/O. The output rating is max.100mA per channel. Common terminal provided per 8 channels, capable of supporting a different external power supply.

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

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

- Compatible to USB 2.0/USB 1.1
Compatible to USB 2.0/USB 1.1 and capable to achieve high speed transfer at High Speed (480 Mbps)

- Diverse installations such as screw fastening, magnet, DIN rail are possible
Installation on the floor / wall /ceiling is possible by screw fastening, magnet, 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.

Hardware specifications

Function Specifications

Item		Specifications
Input		
Type		Opto-isolated input (Compatible with current sink output) (Negative logic *1)
Number of Channels		16 channels (1 common)
Input resistance		560Ω
Current required to turn ON		1.15mA or more
Current required to turn OFF		0.16mA or less
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 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 RD68FM(Renesas) or equivalent
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
Common		
Number of terminals used at the same time		127 terminals (Max.) *4
Allowable distance of signal extension		Approx. 50m (depending on wiring environment)
Isolated voltage		500Vrms
External circuit power supply *5		5 - 50VDC(±10%)
Current consumption		5VDC 300mA (Max.)
Physical dimensions (mm)		188.0(W)×78.0(D)×30.5(H) (No protrusions)
Weight		300g (Not including the USB cable, attachment, connector)
Attached cable		USB cable 1.8m

*1 Data "0" and "1" correspond to the High and Low levels, respectively.
*2 The Opto-coupler's response time comes.
*3 This depends on the PC environment used (OS and USB host controller).
*4 As a USB hub is also counted as one device, you cannot just connect 127 USB unit.
*5 External circuit power supply is required.

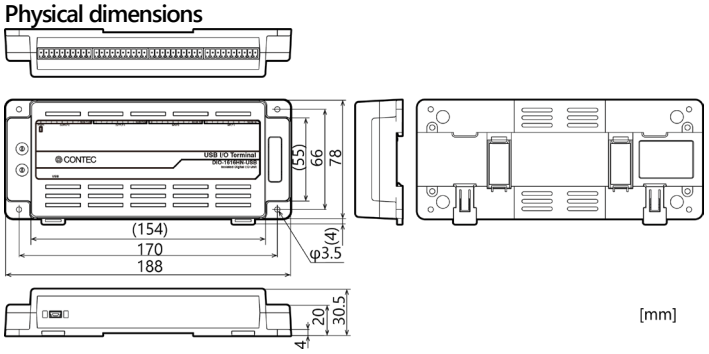
Installation Environment Requirements

Item	Specifications
Operating ambient temperature *1	0 - +50℃
Operating ambient humidity *1	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

Physical dimensions



Support Software

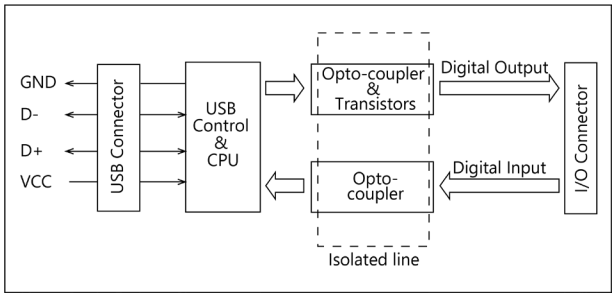
Name	Contents	How to get
Windows Version Digital I/O Driver software API-DIO(WDM)	T The Windows device driver is provided as a form of Windows API functions. Various sample programs such as C# and Visual Basic .NET, Visual C++, Python etc. and diagnostic program useful for checking operation is provided.	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/

Included Items

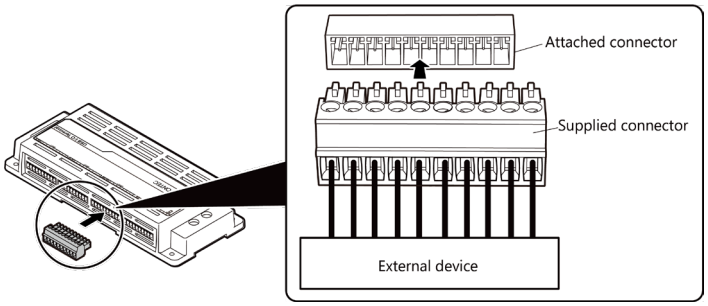
Product...1
Interface Connector...4
USB Cable Attachment on the main unit's side (For Mini B connector side)...1
Rubber feet...4
USB Cable (1.8m)...1
Magnet ...2
Please read the following...1

Block Diagram



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).

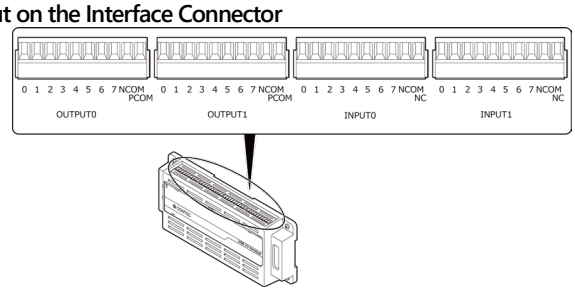


[Attached connector]: European type terminal 3.5 pitch 10-pin jack connector
[Supplied connector]: European type terminal 3.5 pitch 10-pin plug connector
[Compatible cable]: AWG28 - 16

⚠ CAUTION

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

Layout on the Interface Connector



Connector name	Pin No.	Signal Name	Meaning
OUTPUT0	0	OUT00	+0 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	+1 port (output)
	1	OUT11	
	2	OUT12	
	3	OUT13	
	4	OUT14	
	5	OUT15	
	6	OUT 16	
	7	OUT 17	
	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	
	NCOM	COM(-)	Minus Common for INPUT0/1
	N.C.	N.C.	Not Connected
INPUT1	0	IN10	+1 port (input)
	1	IN11	
	2	IN12	
	3	IN13	
	4	IN14	
	5	IN15	
	6	IN16	
	7	IN17	
	NCOM	COM(-)	Minus Common for INPUT0/1
	N.C.	N.C.	Not Connected

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(-)	Common pins for 16 input signals. These pins are common to 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.

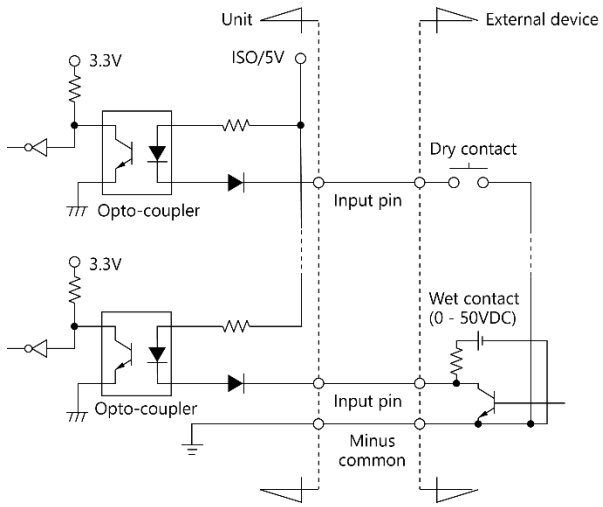
⚠ CAUTION

To perform input/output using this product with the CONTEC device driver, specify logical ports and logical bits when calling each function. For details, refer to the "Relationships between API-TOOL Logical Ports/Bits and Connector Signal Pins".

Connecting Digital I/O Signals

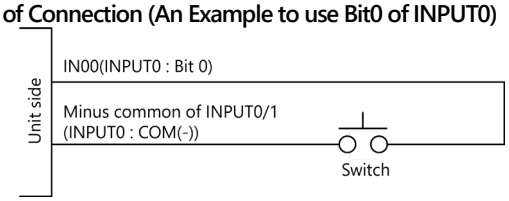
Input Circuit

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.



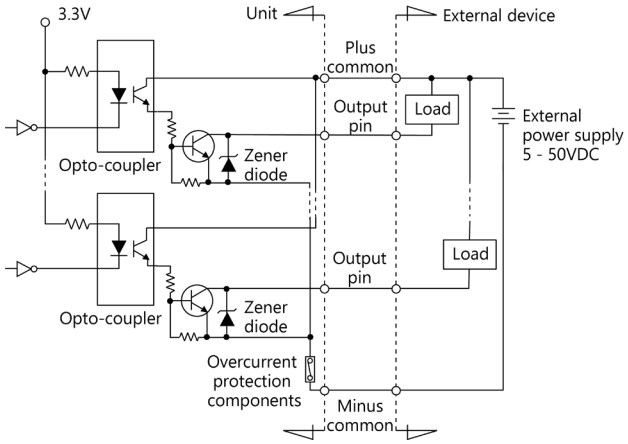
Each input channel accepts either dry contact or 0 - 50 VDC wet contact inputs. The signal input section is a Optocoupler isolated input (current sink output compatible). To turn the input ON, a current of 1.15 mA or more must flow, and to turn the input OFF, the leakage current must be 0.16 mA or less. In addition, as the power to run the opto-couplers for input section is supplied internally (5VDC), no external power supply is required.

Example of Connection (An Example to use Bit0 of INPUT0)



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 is an opto-coupler isolated open-collector output (current sink type), driving the output section requires an external power supply.

The rated output current per channel is 100mA at maximum.

The output section can also be connected to a TTL level input as it uses a low-saturated transistor for output. The residual voltage (low-level voltage) between the collector and emitter with the output on is 0.5V or less at an output current within 50mA or at most 1.0V at an output current within 100mA.

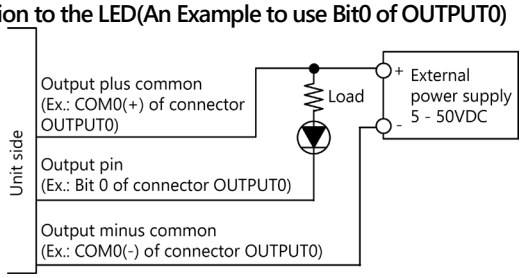
Although a zener diode is connected to the output transistor for protection from surge voltages, to perform other measures for surge voltage in the load side when driving an instruction load such as a relay or a lamp by this product is recommended.

Otherwise, a overcurrent protection components based overcurrent protector is provided for every eight output transistors. When the overcurrent protector works, the output section of the board is temporarily disabled. In this case, turn of the power to the PC and the external power supply and wait for a few minutes, then turn them on back.

⚠ CAUTION

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

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



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