

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.

Features

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.

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.

Easy-to-wire terminal connector adopted

Adoption of terminal connector (with screws) enables to achieve easy wiring.

Optocoupler isolated input (compatible with current sink output)

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

Optocoupler 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 speed 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 I/F on PC is isolated from the input and output interfaces by opto-couplers, this product has excellent noise performance.

Compatible to USB1.1/USB2.0

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

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.

LabVIEW is supported by a plug-in of dedicated library VI-DAQ.

Using the dedicated library VI-DAQ makes it possible to make a LabVIEW application.

This product is an USB2.0-compliant digital I/O unit that extends the input and output function of digital signal from the USB port of PC.

Compact design not restricting installation location (188.0(W) x 78.0(D) x 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.

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).

Windows driver library is supplied. Possible to be used as a data recording device for LabVIEW, with dedicated libraries.

Specification

Item	Specification
Input	
Number of input signal channels	16 channels (1 common)
Input format	Opto-isolated input (Compatible with current sink output) (Negative logic *1)
Input resistance	560Ω
Input ON current	1.15mA or more
Input OFF current	0.16mA or less
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 RD68FM(NEC) or the equivalence for it
Response time	Within 200μsec *2
USB section	
Bus specification	USB Specification 2.0/1.1 standard
USB transfer rate	12Mbps (Full-speed), 480Mbps (High-speed) *3
Power supply	Bus power
Common section	
Number of terminals used at the same time	127 terminals (Max.) *4
Dielectric strength	500Vrms
External circuit power supply *5	5 - 50VDC (±10%)
Current consumption (Max.)	5VDC 300mA
Operating conditions*6	0 - 50°C, 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	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 As a USB hub is also counted as one device, you cannot just connect 127 USB unit.

*5 External circuit power supply is required.

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

Support Software

Windows version of digital I/O driver API-DIO(WDM) [Stored on the bundled CD-ROM driver library API-USBP(WDM)]

It is the library software, and which supplies command of hardware produced by our company in the form of standard Win32 API function (DLL). Using programming languages supporting Win32API functions, such as Visual Basic and Visual C++ etc., you can develop high-speed application software with feature of hardware produced by our company. In addition, you can verify the operation of hardware using Diagnostic programs.

Adaptation language Visual Basic, Visual C++, Visual C# .etc

You can download the updated version from the CONTEC's Web site. For more details on the supported OS, applicable language and new information, please visit the CONTEC's Web site.

Data acquisition VI library for LabVIEW VI-DAQ (Available for downloading (free of charge) from the CONTEC web site.)

This is a VI library to use in National Instruments LabVIEW. VI-DAQ is created with a function form similar to that of LabVIEW's Data Acquisition VI, allowing you to use various devices without complicated settings.

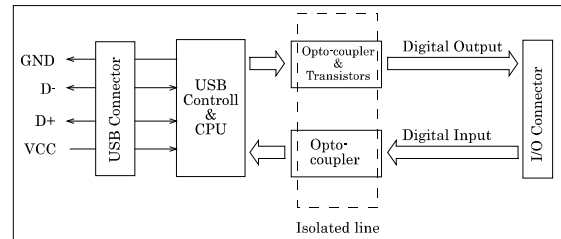
See CONTEC's Web site for details and download of VI-DAQ.

Packing List

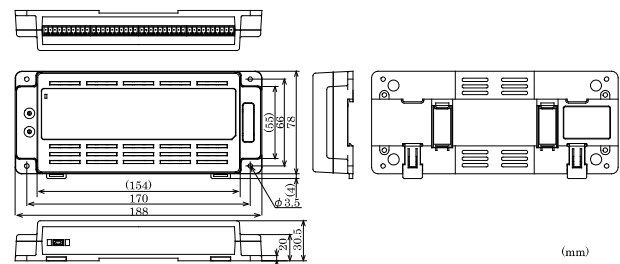
Unit [DIO-1616HN-USB] ...1
 USB cable (1.8m) ...1
 USB cable attachment on the main unit's side
 (For Mini B connector side) ...1
 First step guide ... 1
 I/O connector...4
 Rubber feet ...4
 Magnet ...2
 CD-ROM *1 [API-USBP(WDM)] ...1

*1 The CD-ROM contains the driver software and User's Guide (this guide)

Block Diagram



Physical Dimensions

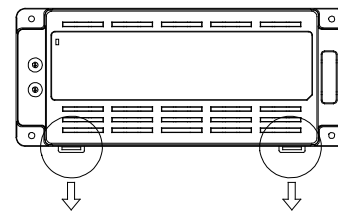


Installing Method

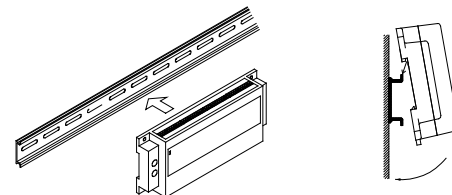
Mounting on a DIN Rail

Mounting procedure

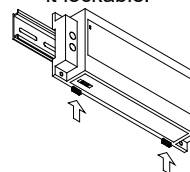
- (1) Push the fixing hook up using a slotted screwdriver to make it unlockable.



- (2) Hook the product from the upper part of the DIN rail, and press the lower part on to the DIN rail.

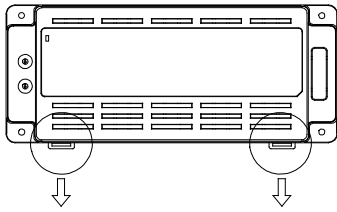


- (3) Push the fixing hook up using a slotted screwdriver to make it lockable.

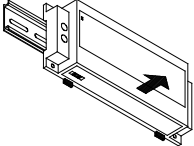


Removal procedure

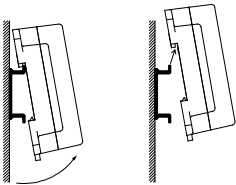
(1) Pull down the fixing hook of the unit to unlock it.



(2) With the fixing hook unlocked, pull the lower part of this unit toward you.

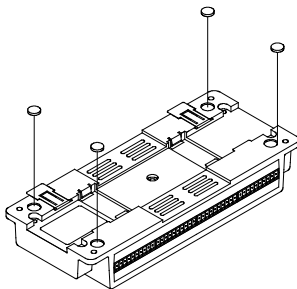


(3) By lifting this unit, you can easily remove it from the DIN rail.



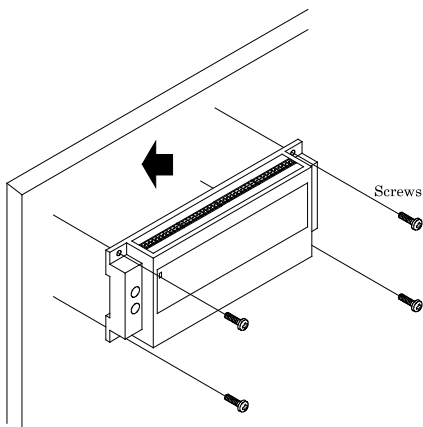
Desktop Installation Using the rubber feet

When required to mount the product on the desktop, mount it on a horizontal platform.
The rubber feet can be mounted in their mounting holes as shown in the following figure.



Wall Installation

To mount the product on the wall, purchase the commercially available screw (fitting for $\phi 3.5$) separately.



Installation Using the Magnet

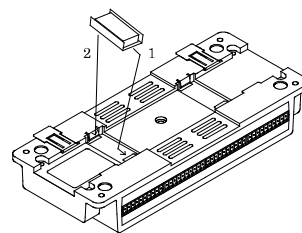
Attaching the magnet supplied with the product makes it easy to mount or remove the product on or from a metal surface such as steel desk or partition.

⚠ CAUTION

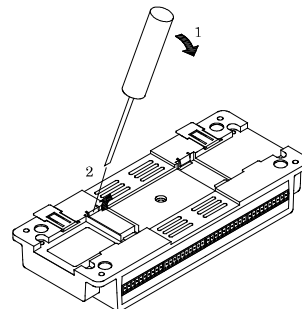
Do not let the magnet go near objects that can be affected by magnetic fields, such as monitors and floppy disks.
If the product is shifted while mounted on the steel surface, the surface paint may be scratched.
When using the magnet, stack connection is not possible.

Mounting/ removing the magnet

To mount the magnet, press down the entire length of the magnet into its mounting hole while pushing the magnet in the direction of arrow 1. Next, slide the magnet in the direction of arrow 2 to fix it in position.

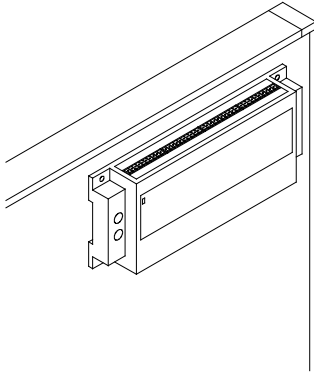


To remove the magnet, slide the magnet in the direction of arrow 1 as shown in the following figure, and then lift it out in the direction of arrow 2.



Mounting onto the steel wall

Mount the product directly onto the steel wall. Pull it gently after mounting to confirm that it will not drop off from the body.



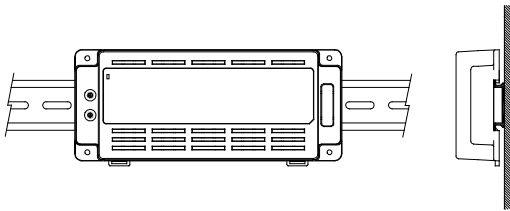
Installation Conditions

Installation orientation

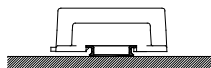
It is possible to mount it in the orientations shown in the following figure. Other orientations would cause problems in usage, such as inadequate heat dissipation.

DIN rail fixation

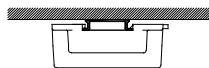
Vertical installation



Horizontal installation

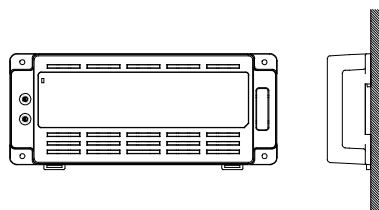


Installation on a ceiling

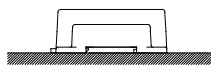


Screws / magnet fixation

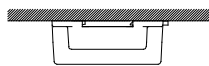
Vertical installation



Horizontal installation



Installation on a ceiling



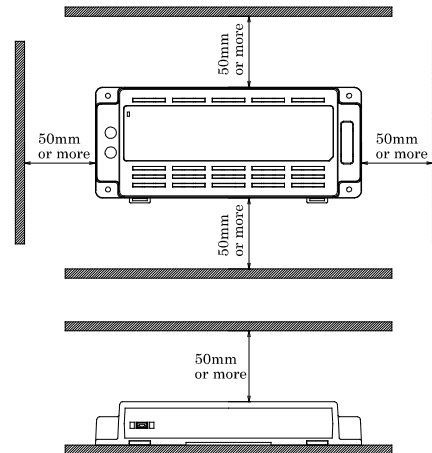
⚠ CAUTION

When using the product in a high temperature environment, cool it by blowing air even when the temperature is within the specified range.

Spacing between the system unit and any surrounding objects

Secure a distance of at least 50mm between the top of the main unit (single use) and any surrounding objects.

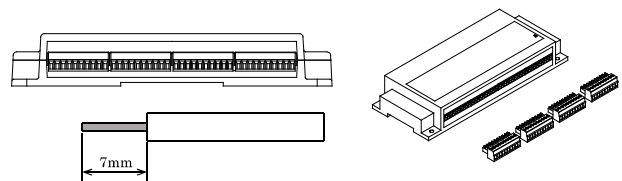
Do not locate the unit in a fully enclosed housing.



Connection Method

Connecting an Interface Connector

When connecting the unit to an external device, you can use the supplied connector plug. For wiring, strip off approximately 7 mm of the covered part of a wire rod and then insert it to the opening. After the insertion, secure the wire rod with screws. Compatible wires are AWG 28 - 16.



- Connector used :
3.5mm pitch, 10 pin type of rated current 9.0A
STL1550/10G-3.5-H-GREEN [mfd. by PTR]
- Compatible plug (supplied) :
AK1550/10-3.5-GREEN [mfd. by PTR]
- Compatible wires : AWG28-16

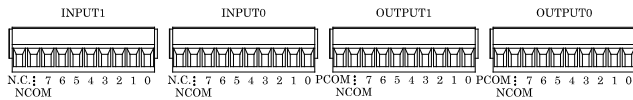
⚠ CAUTION

Removing the connector plug by grasping the cable can break the wire.

Signal Layout

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.

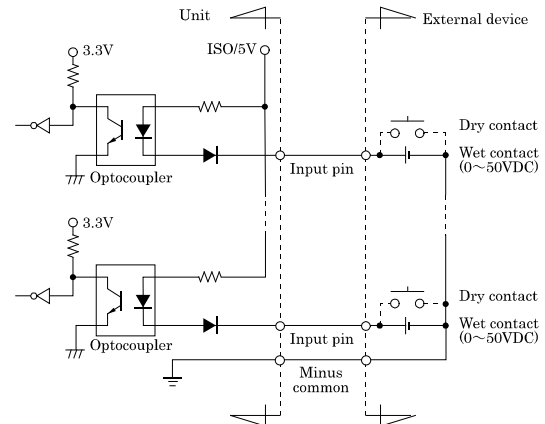


Pin No.	Signal Name	Logic I Bits	Logic I Ports	Meaning	Pin No.	Signal Name	Logic I Bits	Logic I Ports	Meaning
INPUT 0	0	IN00	0	Input	0	OUT00	0	Output	Output
	1	IN01	1		1	OUT01	1		
	2	IN02	2		2	OUT02	2		
	3	IN03	3		3	OUT03	3		
	4	IN04	4		4	OUT04	4		
	5	IN05	5		5	OUT05	5		
	6	IN06	6		6	OUT06	6		
	7	IN07	7		7	OUT07	7		
INPUT 0	N.C.	COM(-)	None	Minus Common for INPUT0/1	OUTPUT 0	N.C.	COM0(-)	None	Minus Common for OUTPUT
	N.C.	N.C.	None	Not Connected		PCOM	COM0(+)	None	Plus Common for OUTPUT
	N.C.	N.C.	None	Not Connected		PCOM	COM1(+)	None	Plus Common for OUTPUT
INPUT 1	8	IN10	8	Input	8	OUT10	8	Output	Output
	9	IN11	9		9	OUT11	9		
	10	IN12	10		10	OUT12	10		
	11	IN13	11		11	OUT13	11		
	12	IN14	12		12	OUT14	12		
	13	IN15	13		13	OUT15	13		
	14	IN16	14		14	OUT16	14		
	15	IN17	15		15	OUT17	15		
INPUT 1	N.C.	COM(-)	None	Plus Common for INPUT0/1	OUTPUT 1	N.C.	COM1(-)	None	Minus Common for OUTPUT
	N.C.	N.C.	None	Not Connected		PCOM	COM1(+)	None	Plus Common for OUTPUT
	N.C.	N.C.	None	Not Connected		PCOM	COM1(+)	None	Plus Common for OUTPUT

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 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.

Connecting Input Signals

Input Circuit

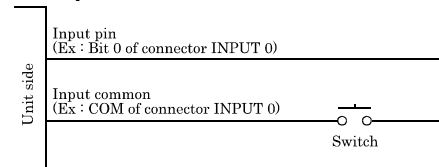


The input circuit of interface blocks of this product is illustrated in the above figure. Each input channel accepts either dry contact or 0 - 50 VDC wet contact inputs.

The signal inputs are isolated by Optocouplers (compatible with current sink output).

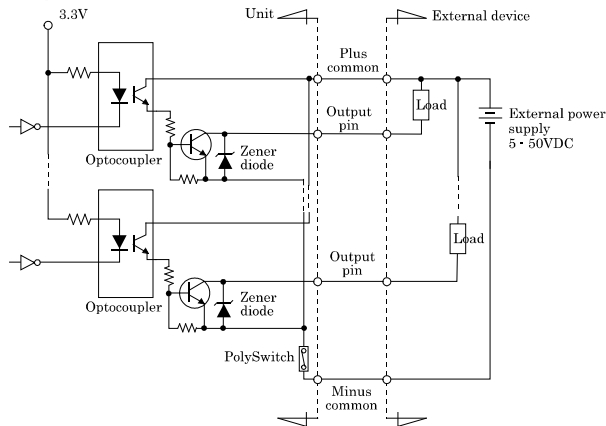
As the power to run the opto-couplers for input section is supplied internally (5VDC), no external power supply is required.

Example of Connection



Connecting Output Signals

Output Circuit



The output circuits of interface blocks of this product are illustrated in the above figure.

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.

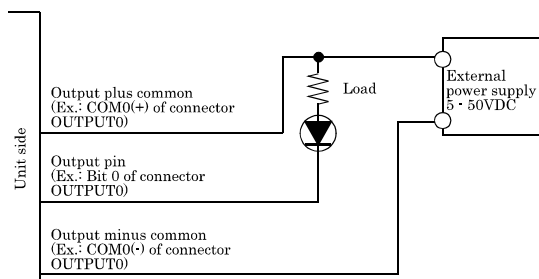
The output section can also be connected to a TTL level input as it uses a low-saturated transistor for output. The residual voltage (low-level voltage) between the collector and emitter with the output on is 0.5V or less at an output current within 50mA or at most 1.0V at an output current within 100mA.

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 polyswitch 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 off the power to the PC and the external power supply and wait for a few minutes, then turn them on back.

CAUTION

When the power is turned on, all output will be OFF.

Connection to the LED



Example of Connection to TTL Level Input

