

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) × 78.0(D) × 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/Linux compatible driver libraries are supported.**

Using the digital I/O driver 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.

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) × 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/Linux 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 April, 2023.

**Specification**

Item	Specification	
<b>Input</b>		
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	
<b>Output</b>		
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	
<b>USB section</b>		
Bus specification	USB Specification 2.0/1.1 standard	
USB transfer rate	12Mbps (Full-speed), 480Mbps (High-speed) *3	
Power supply	Bus power	
<b>Common section</b>		
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)

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 \*1useful for checking operation is provided.

For more details on the supported OS, applicable language and new information, please visit the CONTEC's Web site.

### Linux version of digital I/O driver API-DIO(LNX)

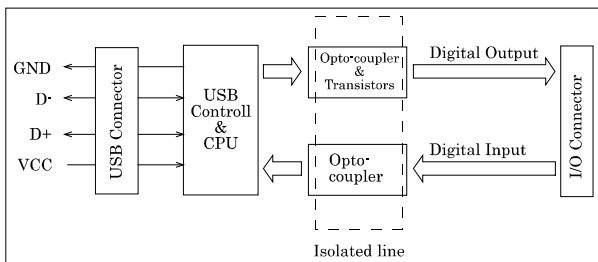
The API-DIO(LNX) is the Linux version driver software which provides device drivers (modules) by shared library and kernel version. Various sample programs of gcc are provided.

For more details on the supported OS, applicable language and new information, please visit the CONTEC's Web site.

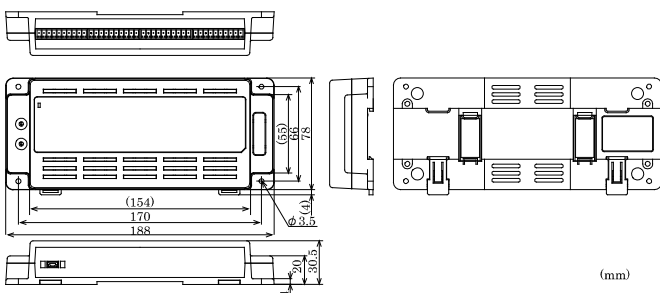
## Included Items

- 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
- Please read the following ... 1
- I/O connector...4
- Rubber feet ...4
- Magnet ...2

## Block Diagram



## Physical Dimensions

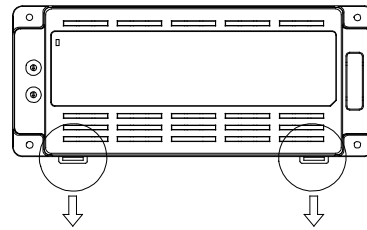


## Installing Method

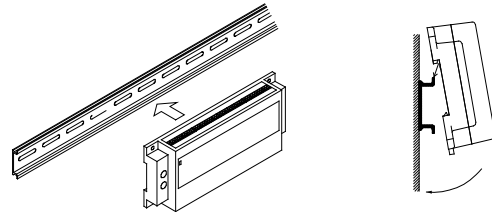
### Mounting on a DIN Rail

#### Mounting procedure

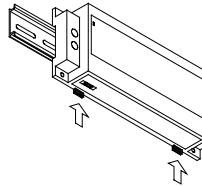
- (1) Push the fixing hook up using a slotted screwdriver to make it unlockable.



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

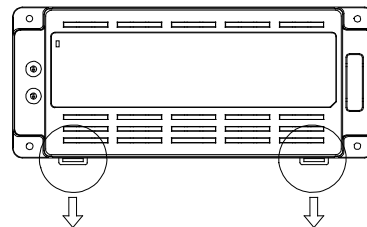


- (3) Push the fixing hook up using a slotted screwdriver to make it lockable.

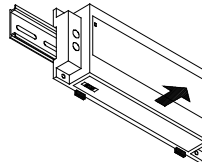


#### Removal procedure

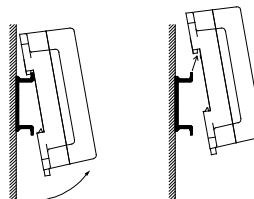
- (1) Pull down the fixing hook of the unit to unlock it.



- (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.

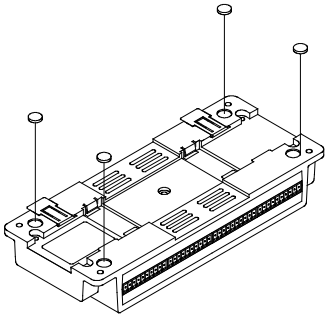


## Desktop Installation

### Using the rubber feet

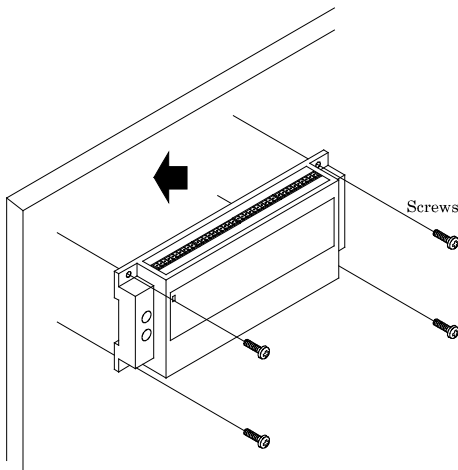
When required to mount the product on the desktop, mount it on a horizontal platform.

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

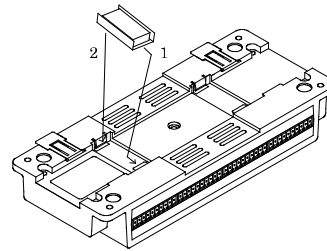
Do not let the magnet go near objects that can be affected by magnetic fields, such as monitors and floppy disks.

If the product is shifted while mounted on the steel surface, the surface paint may be scratched.

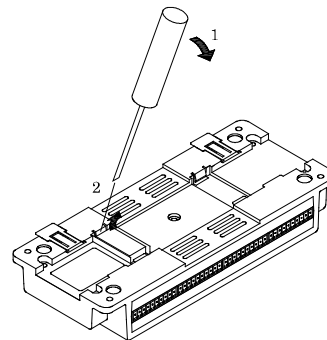
When using the magnet, stack connection is not possible.

## 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.

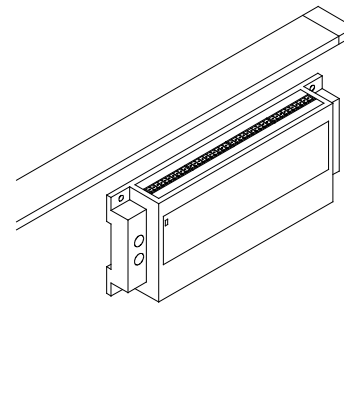


To remove the magnet, slide the magnet in the direction of arrow 1 as shown in the following figure, and then lift it out in the direction of arrow 2.



## 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.

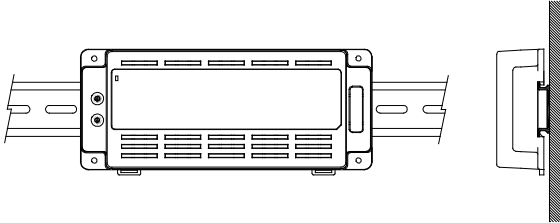


## Installation Conditions

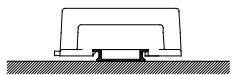
It is possible to mount it in the orientations shown in the following figure. Other orientations would cause problems in usage, such as inadequate heat dissipation.

### DIN rail fixation

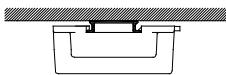
Vertical installation



Horizontal installation

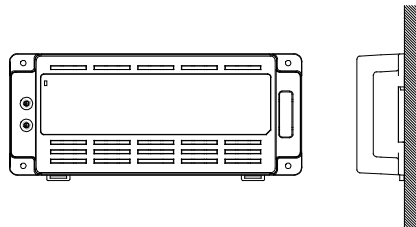


Installation on a ceiling

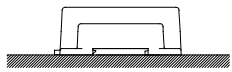


### Screws / magnet fixation

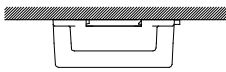
Vertical installation



Horizontal installation



Installation on a ceiling



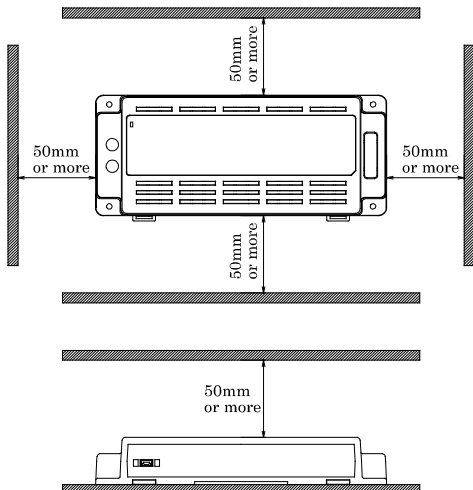
### CAUTION

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.

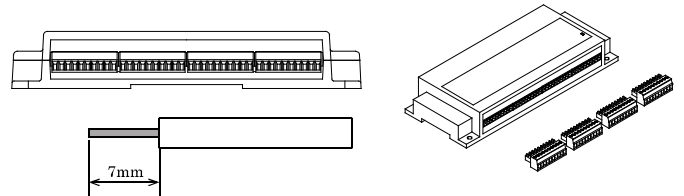
Do not locate the unit in a fully enclosed housing.



## 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

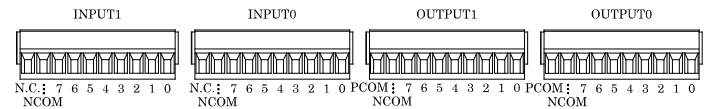
### CAUTION

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.

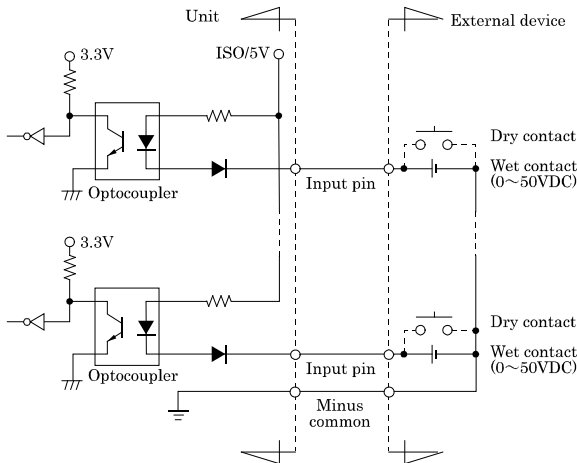


Pin No.	Signal Name	Logics 1 Bits	Logics 1 Ports	Meaning	Pin No.	Signal Name	Logics 1 Bits	Logics 1 Ports	Meaning		
INPUT 0	0	IN0	0	Input	OUTPUT 0	0	OUT0	0	Output		
	1	IN01	1			1	OUT01	1			
	2	IN02	2			2	OUT02	2			
	3	IN03	3			3	OUT03	3			
	4	IN04	4			4	OUT04	4			
	5	IN05	5			5	OUT05	5			
	6	IN06	6			6	OUT06	6			
7	IN07	7	7	OUT07	7						
	N.C.	7 6 5 4 3 2 1 0		Minus Common for INPUT0/1		N.COM	COM0(-)	None	None	Minus Common for OUTPUT	
	N.C.	N.C.	None	Not Connected		PCOM	COM0(+)	None	None	Plus Common for OUTPUT	
INPUT 1	0	IN10	8	Input	OUTPUT 1	0	OUT10	8	Output		
	1	IN11	9			1	OUT11	9			
	2	IN12	10			2	OUT12	10			
	3	IN13	11			3	OUT13	11			
	4	IN14	12			4	OUT14	12			
	5	IN15	13			5	OUT15	13			
	6	IN16	14			6	OUT16	14			
7	IN17	15	7	OUT17	15						
	N.C.	COM1(-)	None	None	Plus Common for INPUT0/1		N.COM	COM1(-)	None	None	Minus Common for OUTPUT
	N.C.	N.C.	None	Not Connected		PCOM 1	COM1(+)	None	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

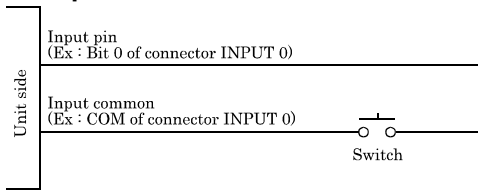


The input circuit of interface blocks of this product is illustrated in the above figure. Each input channel accepts either dry contact or 0 - 50 VDC wet contact inputs.

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

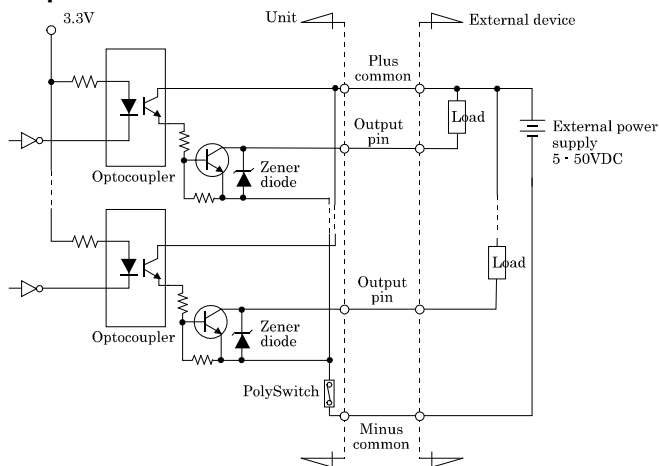
As the power to run the opto-couplers for input section is supplied internally (5VDC), no external power supply is required.

### 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

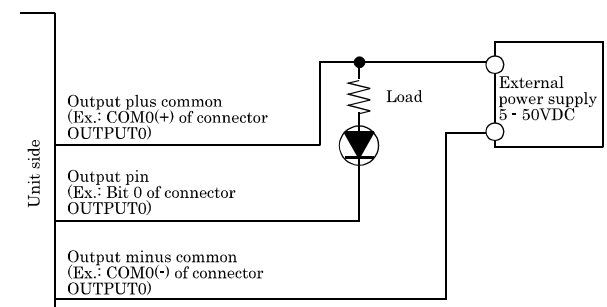
as it uses a low-saturated transistor for output. The residual voltage (low-level voltage) between the collector and emitter with the output on is 0.5V or less at an output current within 50mA or at most 1.0V at an output current within 100mA.

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 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 power is turned on, all output will be OFF.

### Connection to the LED



### Example of Connection to TTL Level Input

