

Opto-Isolated Digital I/O for PCI Express

DIO-1616H-PE



This product is a PCI Express bus-compliant interface board used to provide a digital signal I/O function on a PC. The product can input and output digital signals at high voltages (24 - 48VDC). DIO-1616H-PE features 16 opto-coupler isolated inputs and 16 opto-coupler isolated open-collector outputs. You can use 16 input signals as interrupt inputs. Equipped with the digital filter function to prevent wrong recognition of input signals is provided and output transistor protection circuit (surge voltage protection and over current protection). Windows/Linux driver is bundled with this product. Possible to be used as a data recording device for LabVIEW, with dedicated libraries.

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

Features

Opto-coupler isolated input (supporting current sink output) and opto-coupler isolated open-collector output (current sink type)

DIO-1616H-PE has the opto-coupler isolated input 16 channels (supporting current sink output) whose response speed is 200μsec and opto-coupler isolated open-collector output 16channels (current sink type). Common terminal provided per 16channels, capable of supporting a different external power supply. Supporting driver voltages of high voltages (24 - 48 VDC) for I/O

Opto-coupler bus isolation

As the PC is isolated from the input and output interfaces by opto-couplers, this product has excellent noise performance.

You can use all of the input signals as interrupt request signals.

You can use all of the 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.

Windows/Linux compatible driver libraries are attached.

Using the attached driver library API-PAC(W32) 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 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.

Output circuits include zener diodes for surge voltage protection and poly-switches for over current protection.

Zener diodes are connected to the output circuits to protect against surge voltages. Similarly, polyswitches are fitted to each group of 8channels outputs for over-current protection. The output rating is max. 60VDC, 100mA per channel.

Functions and connectors are compatible with PCI compatible board PIO-16/16H(PCI)H.

The functions same with PCI compatible board PIO-16/16H(PCI)H are provided.

In addition, as there is compatibility in terms of connector shape and pin assignments, it is easy to migrate from the existing system.

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.

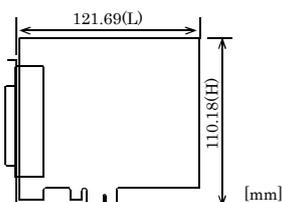
Specification

Item	Specification	
Input		
Input format	Opto-isolated input (Compatible with current sink output) (Negative logic *1)	
Number of input signal channels	16 channels (all available for interrupts) (1 common)	
Input resistance	15kΩ	
Input ON current	1.36mA or more	
Input OFF current	0.16mA or less	
Interrupt	16 interrupt input signals are arranged into a single output of interrupt signal INTA. An interrupt is generated at the falling edge (HIGH-to-LOW transition) or rising edge (LOW-to-HIGH transition).	
Response time	Within 200μsec	
Output		
Output format	Opto-isolated open collector output (Compatible with current sink) (Negative logic *1)	
Number of output signal channels	16 channels (1 common)	
Output rating	Output voltage	60VDC (Max.)
	Output current	100mA (per 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	
Item	Specification	
Common		
I/O address	Any 32-byte boundary	
Interruption level	1 level use	
Max. board count for connection	16 boards including the master board	
Dielectric strength	1000Vrms	
External circuit power supply	24 - 48VDC(±10%)	
Power consumption	3.3VDC 310mA(Max.)	
Operating condition	0 - 50°C, 10 - 90%RH (No condensation)	
Allowable distance of signal extension	Approx. 50m (depending on wiring environment)	
Bus specification	PCI Express Base Specification Rev. 1.0a x1	
Dimension (mm)	121.69(L) x 110.18(H)	
Connector	37 pin D-SUB connector [F (female) type] DCLC-J37SAF-20L9E [mfd by JAE] or equivalent to it	
Weight	80g	

*1 Data "0" and "1" correspond to the High and Low levels, respectively.

*2 This board requires power supply at +5V from an expansion slot (it does not work on a machine with a +3.3V power supply alone).

Board Dimensions



The standard outside dimension (L) is the distance from the end of the board to the outer surface of the slot cover.

Support Software

Windows version of digital I/O driver API-DIO(WDM) / API-DIO(98/PC) [Stored on the bundled CD-ROM driver library API-PAC(W32)]

The API-DIO(WDM) / API-DIO(98/PC) 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.

< Operating environment >

OS Windows Vista, XP, Server 2003, 2000
Adaptation language Visual Basic, Visual C++, Visual C#, Delphi, C++ Builder

You can download the updated version from the CONTEC's Web site (<http://www.contec.com/apipac/>). 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)

[Stored on the bundled CD-ROM driver library API-PAC(W32)]

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.

< Operating environment >

OS RedHatLinux, TurboLinux
(For details on supported distributions, refer to Help available after installation.)

Adaptation language gcc

You can download the updated version from the CONTEC's Web site (<http://www.contec.com/apipac/>). 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 <http://www.contec.com/vidaq/> for details and download of VI-DAQ.

Cable & Connector

Cable(Optional)

Flat Cable with Two 37-pin D- SUB Connectors

: PCB37P-1.5 (1.5m)
: PCB37P-3 (3m)
: PCB37P-5 (5m)

Shielded Cable with Two 37-pin D- SUB Connectors

: PCB37PS-0.5P (0.5m)
: PCB37PS-1.5P (1.5m)
: PCB37PS-3P (3m)
: PCB37PS-5P (5m)

Flat Cable with One 37-pin D- SUB Connector

: PCA37P-1.5 (1.5m)
: PCA37P-3 (3m)
: PCA37P-5 (5m)

Shielded Cable with One 37-pin D- SUB Connector

: PCA37PS-0.5P (0.5m)
: PCA37PS-1.5P (1.5m)
: PCA37PS-3P (3m)
: PCA37PS-5P (5m)

Connector (Option)

37-pin D-SUB Male Connector Set (5 Pieces) : CN5-D37M

Accessories

Accessories (Option)

Screw Terminal (M3 x 37P) : EPD-37A *1 *2
Screw Terminal (M3.5 x 37P) : EPD-37 *1
General Purpose Terminal : DTP-3A *1
Screw Terminal : DTP-4A *1

*1 A PCB37P or PCB37PS optional cable is required separately.

*2 "Spring-up" type terminal is used to prevent terminal screws from falling off.

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

Packing List

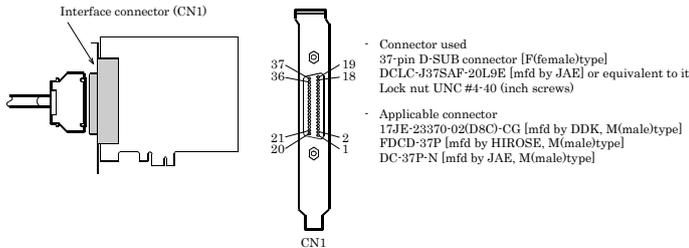
- Board [DIO-1616H-PE] ... 1
- First step guide ... 1
- CD-ROM *1 [API-PAC(W32)] ... 1

*1 The CD-ROM contains the driver software and User's Guide.

Using the On-board Connectors

Connector Shape

To connect an external device to this board, plug the cable from the device into the interface connector shown below.

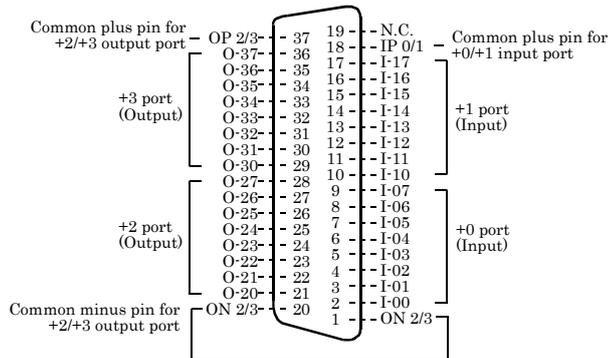


- Connector used
37-pin D-SUB connector [F(female)type]
DCLC-J37SAF-20L9E [mfd by JAE] or equivalent to it
Lock nut UNC #4-40 (finch screws)
- Applicable connector
17JE-23370-02(D8C)-CG [mfd by DDK, M(male)type]
FDCD-37P [mfd by HIROSE, M(male)type]
DC-37P-N [mfd by JAE, M(male)type]

* Please refer to page 2 for more information on the supported cable and accessories.

Connector Pin Assignment

< Pin Assignments of Interface Connector (CN1) >

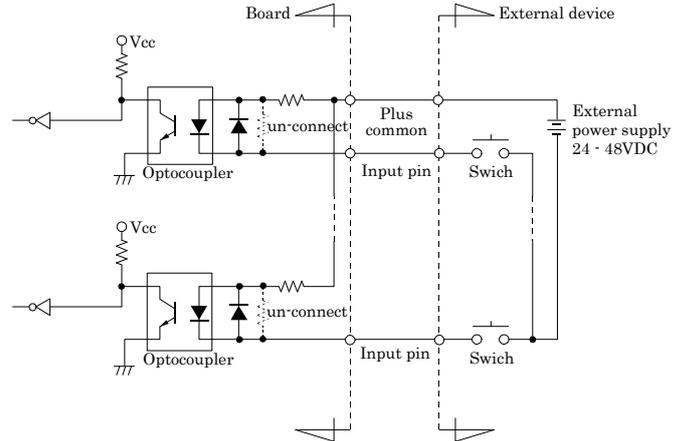


I-00 - I-17	16 input signal pins. Connect output signals from the external device to these pins.
O20 - O37	16 output signal pins. Connect these pins to the input signal pins of the external device.
IP 0/1	Connect the positive side of the external power supply. These pins are common to 16 input signal pins.
OP 2/3	Connect the positive side of the external power supply. These pins are common to 16 output signal pins.
ON 2/3	Connect the negative side of the external power supply. These pins are common to 16 output signal pins.
N.C.	This pin is left unconnected.

Connecting Input Signals

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

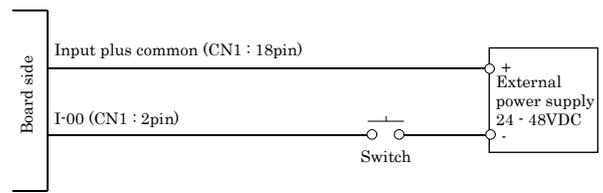
Input Circuit



* Input pin represent input signals.

The input circuits of interface blocks of the DIO-1616H-PE are illustrated above. The signal inputs are isolated by opto-couplers (ready to accept current sinking output signals). The board therefore requires an external power supply to drive the inputs. The power requirement for each input pin is about 3.2mA at 48VDC (about 1.6mA at 24VDC).

Connecting a Switch

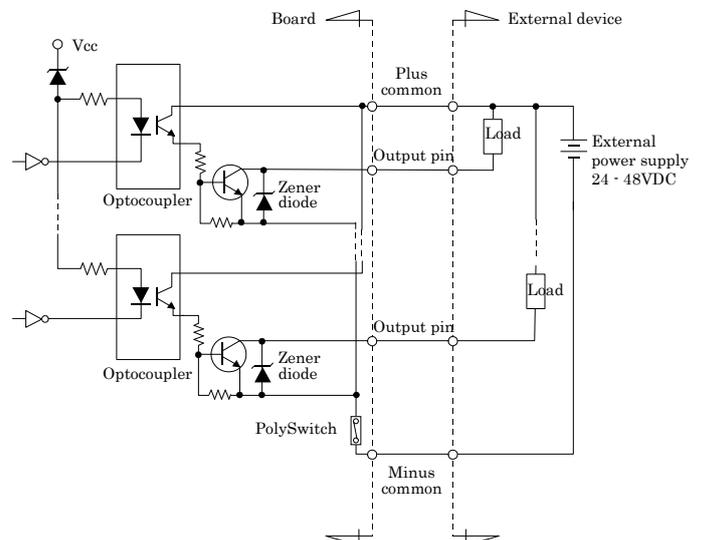


When the switch is ON, the corresponding bit contains 1. When the switch is OFF, by contrast, the bit contains 0.

Connecting Output Signals

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

Output Circuit

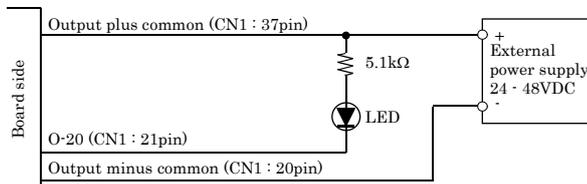


* Output pin represent output signals.

The output circuits of interface blocks of the DIO-1616H-PE are illustrated above. 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. A zener diode is connected to the output transistor for protection from surge voltages. 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. If this is the case, turn off the power to the PC and the external power supply and wait for a few minutes, then turn them on back.

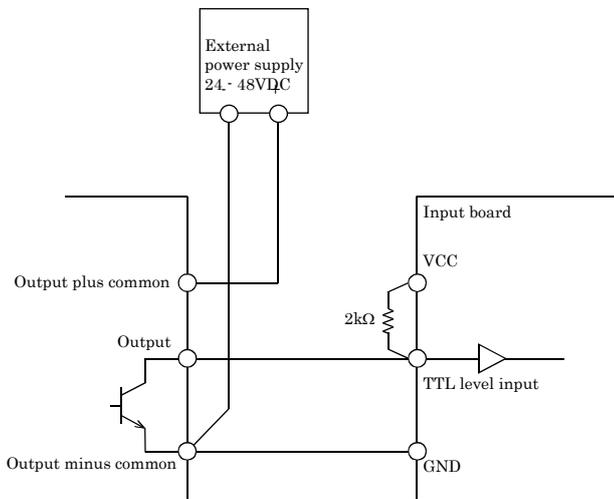
CAUTION
When the PC is turned on, all output are reset to OFF.

Connection to the LED



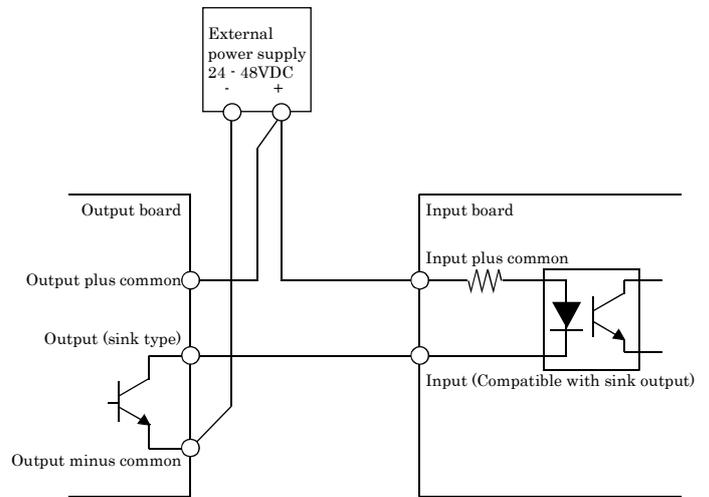
When "1" is output to a relevant bit, the corresponding LED comes on. When "0" is output to the bit, in contrast, the LED goes out.

Example of Connection to TTL Level Input



Connecting the Sink Type Output and Sink Output Support Input

The following example shows a connection between a sink type output (output board) and a sink output support input (input board). Refer to this connection example when you connect such boards to each other.



Block Diagram

