

## Digital I/O Board with Opto-Isolation for PCI Express

### DIO-6464L-PE



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

#### Features

##### Optocoupler isolated inputs (compatible with current sink output), and Optocoupler isolated open-collector outputs (current sink type)

This product has the 64 channels of Optocoupler isolated input (compatible with current sink output) and 64 channels Optocoupler isolated open-collector output (current sink type) whose response speed is 200μsec. Common terminal provided per 16 channels, capable of supporting a different external power supply. Supporting driver voltages of 12 - 24 VDC for I/O.

##### Optocoupler bus isolation

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

##### You can use 16 input signals as interrupt request signals.

You can use 16 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 Window/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 overcurrent protection.

Zener diodes are connected to the output circuits to protect against surge voltages. Similarly, polyswitches are fitted to each group of 8 channels outputs for over-current protection. Output rating : max 35VDC, 100mA per pin.

##### Functions and connectors are compatible with PCI compatible board PIO-64/64L(PCI)H.

The functions same with PCI compatible board PIO-64/64L(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.

This product is a PCI Express bus-compliant interface board used to provide a digital signal I/O function on a PC. This product can input and output digital signals at 12 - 24VDC.

This product features 64 Optocoupler isolated inputs and 64 Optocoupler isolated open-collector outputs. You can use 16 input signals as interrupt inputs. In addition, the digital filter function to prevent wrong recognition of input signals is provided and output transistor protection circuit (surge voltage protection and overcurrent protection).

Windows/Linux driver is bundled with this product.

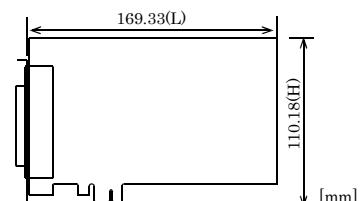
Possible to be used as a data recording device for LabVIEW, with dedicated libraries.

#### Specification

Item	Specification
<b>Input</b>	
Input format	Optocoupler isolated input (Compatible with current sink output)(Negative logic *1)
Number of input signal channels	64 channels (16 channels available for interrupts) (1 common per 16 channels unit)
Input resistance	4.7kΩ
Input ON current	2.0mA 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 rising edge (HIGH-to-LOW transition) or falling edge (LOW-to-HIGH transition) (set by software).
Response time	Within 200μsec
<b>Output</b>	
Output format	Optocoupler isolated open-collector output (current sink type)(Negative logic *1)
Number of output signal channels	64 channels (1 common per 16 channels unit)
Output rating	35VDC (Max.)
Output voltage	100mA (par 1 channel) (Max.)
Output current	0.5V or less (Output current≤50mA), 1.0V or less (Output current≤100mA)
Residual voltage with output on	Surge protector Zener diode RD47FM(NEC)
Response time	Within 200μsec
<b>Common</b>	
Allowable distance of signal extension	Approx. 50m (depending on wiring environment)
I/O address	Any 32-byte boundary
Interruption level	1 level use
Max. board count for connection	16 boards including the master board
Isolated power	250Vrms
External circuit power supply	12 - 24VDC(±10%)
Power consumption (Max.)	3.3VDC 600mA
Operating condition	0 - 50°C, 10 - 90%RH (No condensation)
Bus specification	PCI Express Base Specification Rev. 1.0a x1
Dimension (mm)	169.33(L) x 110.18(H)
Connector	100 pin 0.8mm pitch connector [F (female) type] x 2 HDRA-E100W1LFD11EC-SL+[HONDA TSUSHIN KOGYO CO., LTD.] or equivalent to it
Weight	215g

\*1 Data "0" corresponds at the High level and data "1" correspond at the Low level.

#### 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 (Option)

Shielded Cable With Two 100pin Connector

: PCB100PS-0.5 (0.5m)  
: PCB100PS-1.5 (1.5m)  
: PCB100PS-3 (3m)  
: PCB100PS-5 (5m)

Connection Conversion Shield Cable (100P→96P)

: PCB100/96PS-1.5 (1.5m)  
: PCB100/96PS-3 (3m)  
: PCB100/96PS-5 (5m)

Flat Cable with One 100-Pin Connector

: PCA100P-1.5 (1.5m)  
: PCA100P-3 (3m)  
: PCA100P-5 (5m)

Connection Conversion Shield Cable (100P→37P D-SUB x 2)

: PCB100WS-1.5 (1.5m)  
: PCB100WS-3 (3m)  
: PCB100WS-5 (5m)

\*1 If using both the CNA and CNB connectors, two cable sets are required.

## Accessories

### Accessories (Option)

Screw Terminal Unit (M3 x 100P)	: EPD-100A *1*4*6
Screw Terminal Unit (M3 x 96P)	: EPD-96A *2*4*6
Screw Terminal Unit (M3.5 x 96P)	: EPD-96 *2*4
Terminal Unit for Cables (M2.5 x 96P)	: DTP-64(PC) *2*4
Connector Conversion Board (96-Pin→37-Pin x 2)	: CCB-96 *2*4
Signal Monitor / Output Accessory for Digital I/O (64P)	: CM-64(PC)E *2*4
Screw Terminal Unit (M3 x 37P)	: EPD-37A *3*5*6
Screw Terminal Unit (M3.5 x 37P)	: EPD-37 *3*5
General Purpose Terminal (M3 x 37P)	: DTP-3A *3*5
Screw Terminal (M2.6 x 37P)	: DTP-4A *3*5

\*1 PCB100PS optional cable is required separately.

\*2 PCB100/96PS optional cable is required separately.

\*3 PCB100WS optional cable is required separately.

\*4 If using both the CNA and CNB connectors, two each of the terminal block and cable sets are required.

\*5 If using both the CNA and CNB connectors, two cable sets are required. You will also require sufficient terminal blocks for the number of I/O points you are using.

\*6 "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

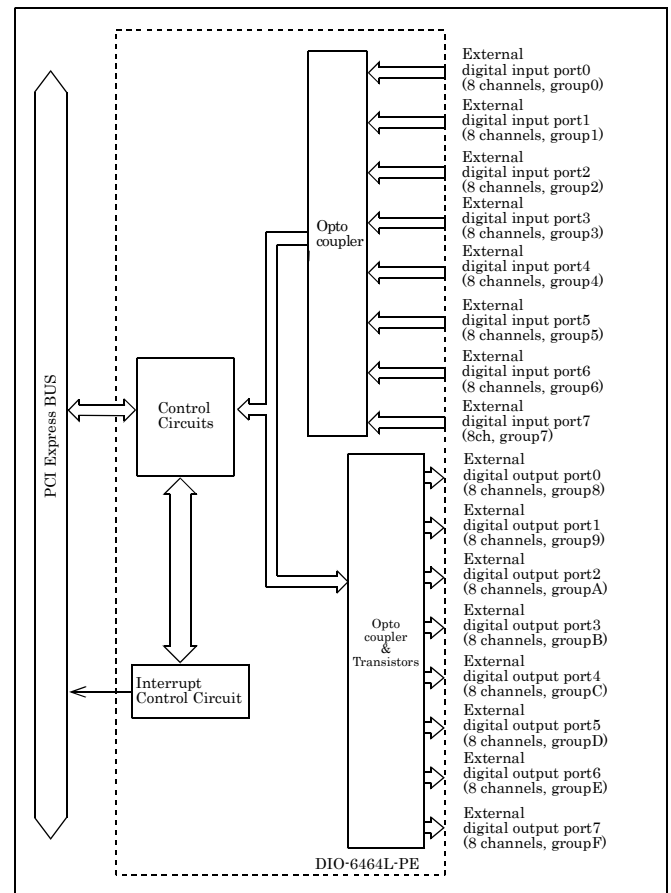
Board [DIO-6464L-PE] ... 1

First step guide ... 1

CD-ROM \*1 [API-PAC(W32)] ... 1

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

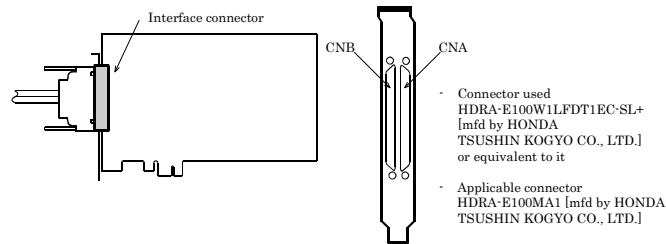
## Block Diagram



## How to connect the connectors

### Connector shape

The on-board interface connector (CNA, CNB) is used when connecting this product and the external devices.



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

### Connector Pin Assignment

#### Pin Assignments Interface Connector (CNA, CNB)

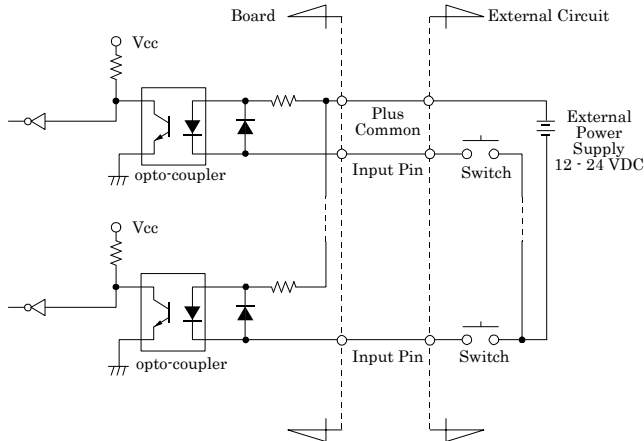
Common plus pin for +E/+F output ports	P-E/F	100		50	P-A/B	Common plus pin for +A/+B output ports		N.C.	1	51	N.C.	Common plus pin for +4/+5 input ports	
	P-E/F	99		49	P-A/B			N.C.	2		52		N.C.
	O-F7	98		48	O-B7			N.C.	3		53		N.C.
	O-F6	97		47	O-B6			N.C.	4		54		N.C.
	O-F5	96		46	O-B5			N.C.	5		55		N.C.
	O-F4	95		45	O-B4			N.C.	6		56		N.C.
	O-F3	94		44	O-B3			N.C.	7		57		140
	O-F2	93		43	O-B2			N.C.	8		58		141
	O-F1	92		42	O-B1			N.C.	9		59		142
	O-F0	91		41	O-B0			N.C.	10		60		143
+F port (Output)	O-E7	90	40	O-A7	+04 (Input)	11	61	144	+4 port (Input)				
	O-E6	89	39	O-A6	*105 12	62	145						
	O-E5	88	38	O-A5	*106 13	63	146						
	O-E4	87	37	O-A4	*107 14	64	147						
	O-E3	86	36	O-A3	*110 15	65	150						
	O-E2	85	35	O-A2	68	151							
	O-E1	84	34	O-A1	67	152							
	O-E0	83	33	O-A0	*113 18	68	153						
	N-E/F	82	32	N-A/B	+114 19	69	154						
	Common minus pin for +E/+F output ports	N-E/F	81	31	N-A/B	+115 20	70	155		+5 port (Input)			
N-E/F		80	30	N-A/B	+116 21	71	156						
N-E/F		79	29	N-A/B	*117 22	72	157						
N-E/F		78	28	N-A/B	P-Q/1 23	73	P-4/5						
N-E/F		77	27	N-A/B	P-Q/1 24	74	P-4/5						
N-E/F		76	26	N.C.	N.C.	25	75	N.C.					
N-E/F		75	25	N.C.	N.C.	26	76	N.C.					
N-E/F		74	24	P-8/9	N.C.	27	77	N.C.					
Common minus pin for +C/+D output ports		P-C/D	74	23	P-8/9	N.C.	28	78	N.C.				
		P-C/D	73	22	O-9/7	N.C.	29	79	N.C.				
	O-D7	72	21	O-96	N.C.	30	80	N.C.					
	O-D6	71	20	O-95	N.C.	31	81	N.C.					
	O-D5	70	19	O-94	N.C.	32	82	N.C.					
	O-D4	69	18	O-93	N.C.	33	83	160					
	O-D3	68	17	O-92	121 34	84	161						
	O-D2	67	16	O-91	122 35	85	162						
	O-D1	66	15	O-90	123 36	86	163						
	O-D0	65	14	O-87	124 37	87	164						
+D port (Output)	O-C7	64	13	O-86	125 38	88	165	+6 port (Input)					
	O-C6	63	12	O-85	126 39	89	166						
	O-C5	62	11	O-84	127 40	90	167						
	O-C4	61	10	O-83	130 41	91	170						
	O-C3	60	9	O-82	131 42	92	171						
	O-C2	59	8	O-81	132 43	93	172						
	O-C1	58	7	O-80	133 44	94	173						
	O-C0	57	6	N-8/9	134 45	95	174						
	N-C/D	56	5	N-8/9	135 46	96	175						
	Common minus pin for +C/+D output ports	N-C/D	55	4	N-8/9	136 47	97		176	+7 port (Input)			
N-C/D		54	3	N-8/9	137 48	98	177						
N-C/D		53	2	N-8/9	P-2/3 49	99	P-6/7						
N-C/D		52	1	N-8/9	P-2/3 50	100	P-6/7						
N-C/D		51											

## 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

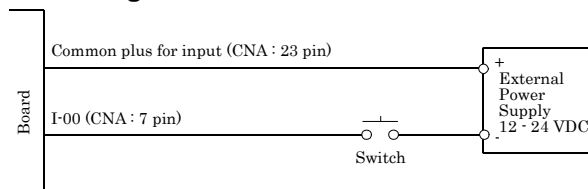


\* I-xx shows input pins.

This product input circuit of interface is illustrated in the image above.

The signal inputs are isolated by Optocoupler (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 5.1mA at 24VDC (about 2.6mA at 12VDC).

### Connecting to the Switch



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

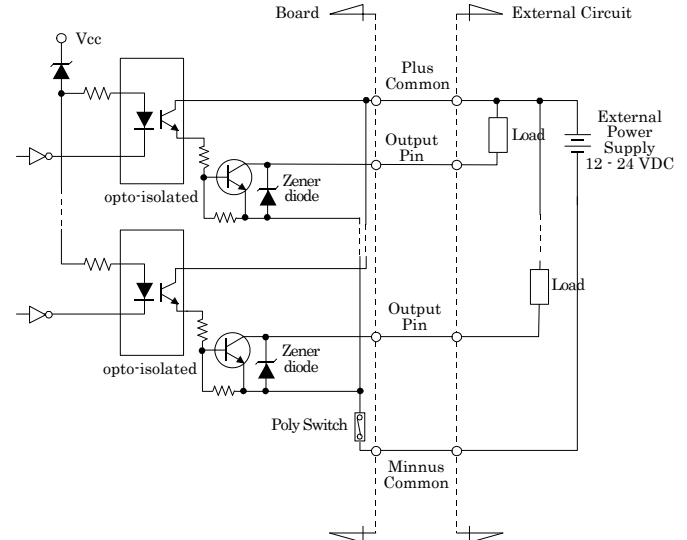
## Connecting Output Signals

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



\* O-xx shows output pins.

This product output circuit of interface is illustrated in the image above.

The signal output section is an Optocoupler 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.

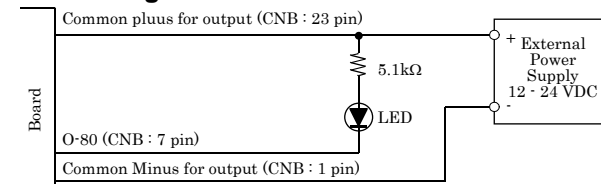
The output section can also be connected to a TTL level input as it uses a low-saturated transistor for output. The residual voltage (low-level voltage) between the collector and emitter with the output on is 0.5V or less at an output current within 50mA or at most 1.0V at an output current within 100mA.

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

### CAUTION

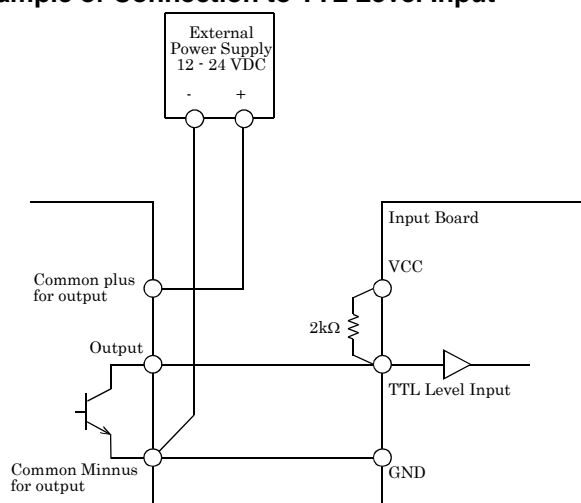
When the PC is turned on, all output are reset to OFF.

### Connecting 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.

