Digital I/O Board with Opto-Isolation for PCI

PIO-32/32L(PCI)H

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

This product is a PCI 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.

PIO-32/32L(PCI)H features 32 opto-coupler isolated inputs and 32 opto-coupler isolated open-collector outputs. You can use 32 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 supported with this product.

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

*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 August, 2022.

Features

Opto-coupler isolated input (compatible with current sink output) and opto-coupler isolated open-collector output (current sink type)
PIO-32/32L(PCI)H has the 32ch of opto-coupler isolated input (compatible with current sink output) and 32ch of opto-coupler isolated open-collector output (current sink type) whose response speed is 200µsec. Common terminal provided per 16channels, capable of supporting a different external power supply. Supporting driver voltages of 12 - 24 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 32 input signals as interrupt request signals.
You can use 32 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.
Using the 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.

The output circuit, has a built-in Zener diode and the overcurrent protection circuit of the surge voltage protection.
Zener diodes are connected to the output circuits to protect against surge voltages. In addition, the output circuit, it attaches the overcurrent protection circuit at the output 8-channel unit. The output rating is max. 35VDC, 100mA per channel.

LabVIEW is supported by a plug-in of dedicated library.
Using the dedicated library makes it possible to make a LabVIEW application.

Packing List

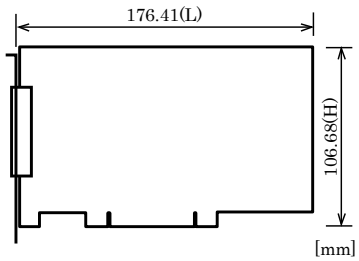
Product [PIO-32/32L(PCI)H] ...1
Please read the following ... 1

Hardware specifications

Item			Specifications
Input			
	Input format		Opto-coupler isolated input (Compatible with current sink output)(Negative logic *1)
	Number of input signal channels		32 channels (all available for interrupts) (One common power supply per 16 channels)
	Input resistance		4.7kΩ
	Input ON current		2.0mA or more
	Input OFF current		0.16mA or less
	Interrupt		32 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).
	Response time		200µsec within
Output			
	Output format		Opto-coupler isolated open-collector output (current sink type)(Negative logic *1)
	Number of output signal channels		32 channels (One common power supply per 16 channels)
	Output rating	Output voltage	35VDC (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 RD47FM(NEC) or equivalent
	Response time		200µsec within
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		500Vrms
	External circuit power supply		12 - 24VDC (±10%)
	Power consumption		5VDC 250mA (Max.)
	Operating condition		0 - 50°C, 10 - 90%RH(No condensation)
	Allowable distance of signal extension		Approx. 50m (depending on wiring environment)
	PCI bus specification		32bit, 33MHz, Universal key shapes supported *2
	Dimension (mm)		176.41(L) x 106.68(H) *3
	Weight		215g
	Standard		VCCI 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 This board requires power supply at +5 V from an expansion slot (it does not work on a machine with a +3.3-V power supply alone).
*3 The size of board No.7212, No.7212A, and No.7212B is 176.41 (L) x 105.68 (H) mm.

Physical 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

You can use CONTEC support software according to your purpose and development environment. For more details on the supported OS, applicable languages, or to download the latest version of software, visit the CONTEC Web site.

Name	Contents	How to get
Windows Version Digital I/O Driver software API-DIO(WDM)	The API-DIO(WDM) is the Windows version driver 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.	Download from the CONTEC website
Linux Version Digital I/O Driver software 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.	Download from the CONTEC website
LabVIEW-support data acquisition library DAQfast for LabVIEW	This is a data collection library to use in the LabVIEW by National Instruments. With Polymorphic VI, our design enables a LabVIEW user to operate seamlessly. Our aim is that the customers to perform easily, promptly what they wish to do.	Download from the CONTEC website

Option

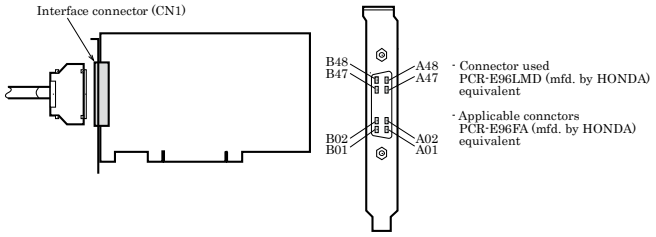
Product Name	Model type	Description
96-Pin Shield Cable with a Half-Pitch Connector	PCB96PS-0.5P	0.5m
	PCB96PS-1.5P	1.5m
	PCB96PS-3P	3m
	PCB96PS-5P	5m
Flat Cable with 96-Pin Half-Pitch Connectors at Both Ends	PCB96P-1.5	1.5m
	PCB96P-3	3m
96-Pin Shield Cable with 2Sided Half-Pitch Connector	PCA96PS-0.5P	0.5m
	PCA96PS-1.5P	1.5m
	PCA96PS-3P	3m
	PCA96PS-5P	5m
Flat Cable with One 96-Pin Half-Pitch Connector	PCA96P-1.5	1.5m
	PCA96P-3	3m
Connection Conversion Shield Cable(96P → 37P x 2)	PCB96WS-1.5P	1.5m
	PCB96WS-3P	3m
	PCB96WS-5P	5m
Screw Terminal (M3 x 96P)	EPD-96A	*1 *4
Screw Terminal (M3.5 x 96P)	EPD-96	*1
Digital I/O 64CH Series Terminal Panel (M3 x 96P)	DTP-64A	*1
Signal Monitor for Digital I/O (64Bits)	CM-64 L	*1
Screw Terminal (M3 x 37P)	EPD-37A	*2 *4
Screw Terminal (M3.5 x 37P)	EPD-37	*2
General Purpose Terminal (M3 x 37P)	DTP-3C	*2
Screw Terminal (M2.5 x 37P)	DTP-4C	*2
Signal Monitor for Digital I/O (32Bits)	CM-32L	*2
Connection Conversion Board (96-P→37-P x 2)	CCB-96	*3

*1 PCB96P or PCB96PS optional cable is required separately.
*2 PCB96WS optional cable is required separately.
*3 Option cable PCB96P or PCB96PS, and the cable for 37-pin D-SUB are required separately.
*4 "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.

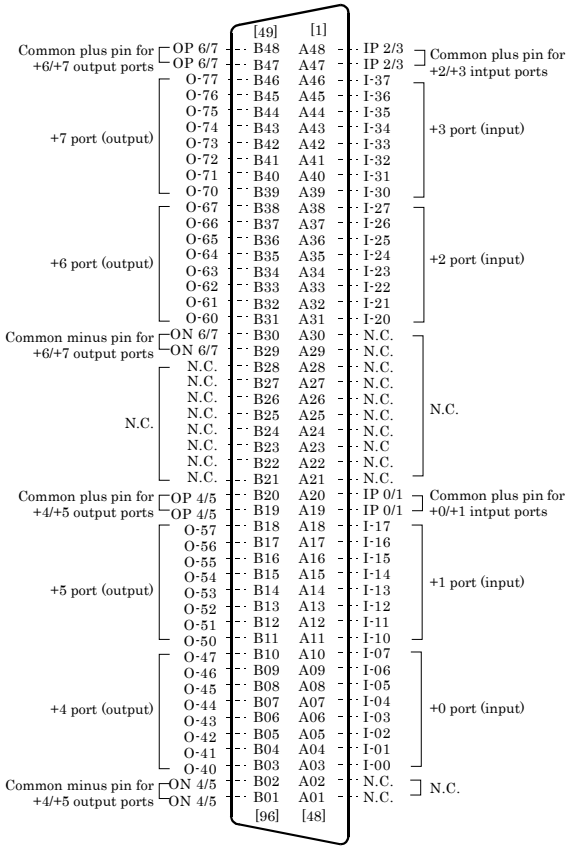
How to connect the connectors

Connector shape

The on-board interface connector (CN1) is used when connecting this product and the external devices.



Connector Pin Assignment



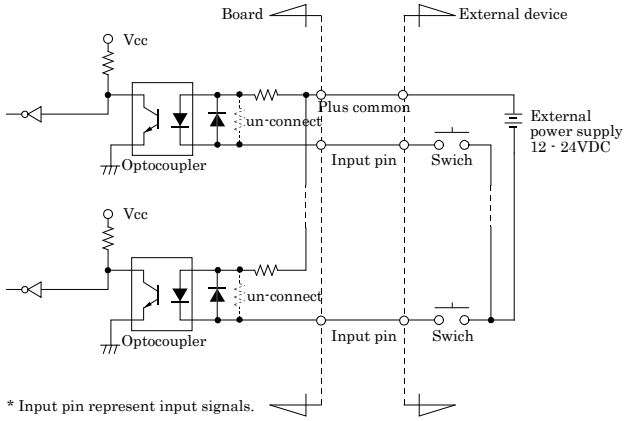
* I-00 - I-37 can be used as interrupt signal.
The numbers in square brackets [ ] are pin numbers designated by HONDA TSUSHIN KOGYO CO., LTD.

I-00 - I-37	32 input signal pins. Connect output signals from the external device to these pins.
O-40 - O-77	32 output signal pins. Connect these pins to the input signal pins of the external device.
IP 0/1 - IP 2/3	Connect the positive side of the external power supply. These pins are common to 16 input signal pins.
OP 4/5 - OP 6/7	Connect the positive side of the external power supply. These pins are common to 16 output signal pins.
ON 4/5 - ON 6/7	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

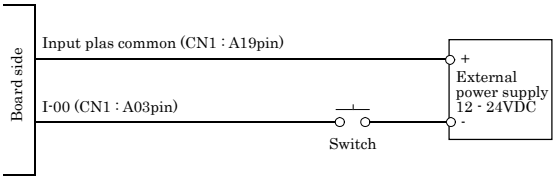
Connect the input signals to a device which can be current-driven, such as a switch or transistor output device.
The connection requires an external power supply to feed currents.
The board inputs the ON/OFF state of the current-driven device as a digital value.

Input Circuit



The input circuits of interface blocks of the PIO-32/32L(PCI)H is illustrated in Figure. 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 5.1 mA at 24 VDC (about 2.6 mA at 12 VDC).

Connecting a Switch

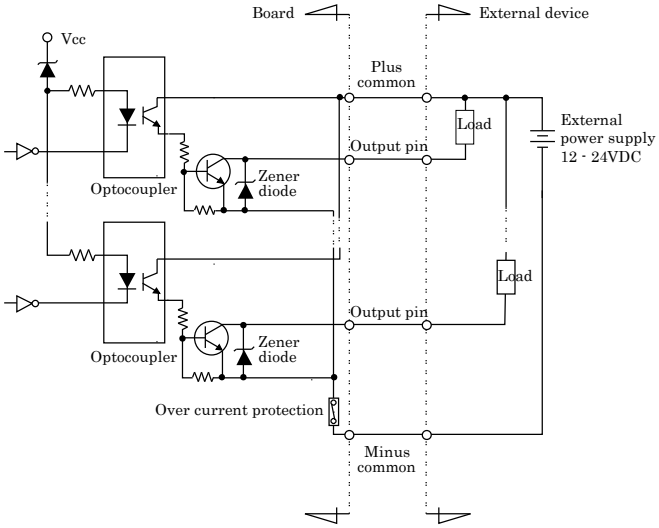


When the switch is ON, the corresponding bit contains 1.
When the switch is OFF, by contrast, the bit contains 0.

Output Circuit

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.

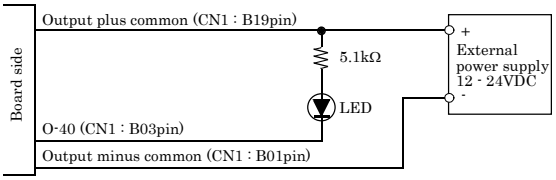
Output Circuit



The output circuits of interface blocks of the PIO-32/32L(PCI)H is illustrated in 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 100 mA 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 0.5 V or less at an output current within 50 mA or at most 1.0 V at an output current within 100 mA.
To protect against surge voltage, a Zener diode is connected to the output transistor. Also, an overcurrent protection circuit is attached to a unit of eight output channels.

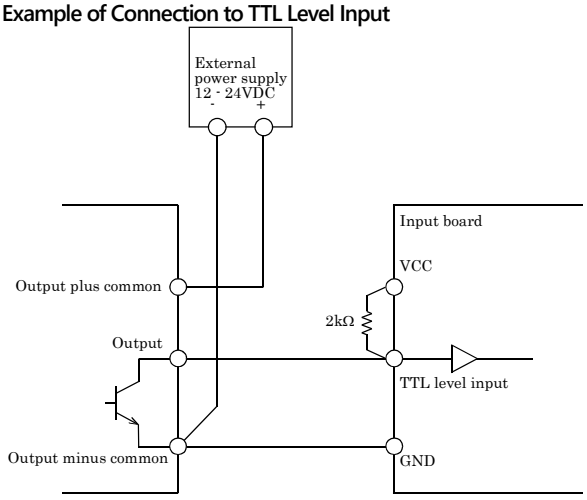
⚠ CAUTION
When the PC is turned on, all output are reset to OFF.

Connection to the LED



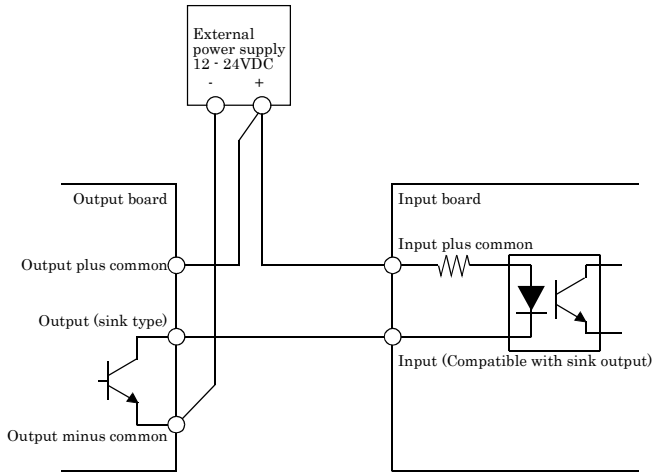
When "1" is output to a relevant bit, the corresponding LED comes on.
When "0" is output to the bit, in contrast, the LED goes out.

Example of Connection to TTL Level Input

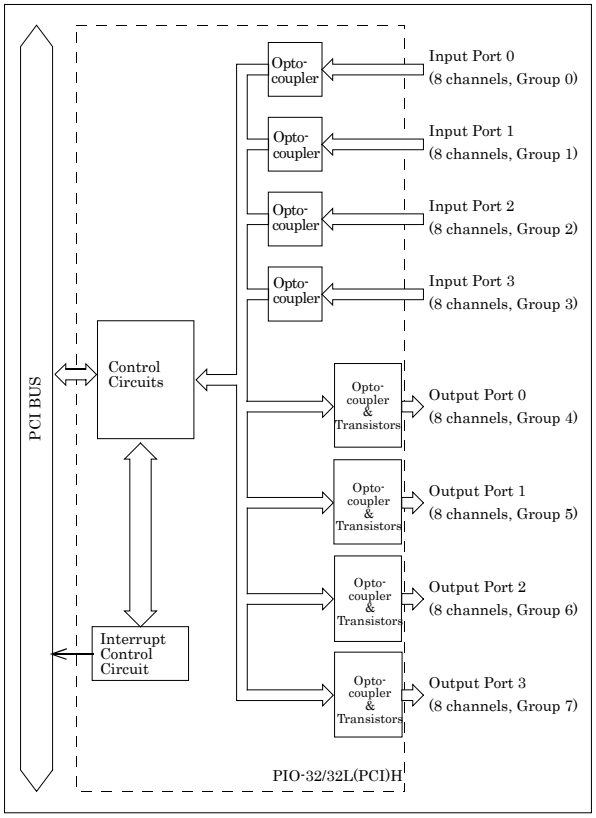


Connecting the Sink Type Output and Sink Output Support Input

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



Differences between the PIO-32/32L(PCI)H and PIO-32/32L(PCI)

The PIO-32/32L(PCI)H is connector-pin compatible with the conventional PIO-32/32L(PCI) but has the following differences from it :

(1) Different in the number of input signals available to interrupt requests
- PIO-32/32L(PCI)H : All of 32 channels
- PIO-32/32L(PCI) : 4 channels

(2) Different in the expression to calculate the digital filter time (n: setting value)
- PIO-32/32L(PCI)H : $2^n / (8 \times 10^6)$
- PIO-32/32L(PCI) : $2^n / (16 \times 10^6)$

(3) Protective elements provided for outputs
- PIO-32/32L(PCI)H : Surge protector: Zener diode
- PIO-32/32L(PCI) : Nothing

(4) Different in interrupt level resource allocation
- PIO-32/32L(PCI)H : Automatically allocates on interrupt level.
- PIO-32/32L(PCI) : Uses a jumper switch to select whether to allocate interrupt levels.