

**Isolated Digital I/O Board for PCI  
(Internal power supply)  
PIO-32/32B(PCI)V**



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

**Features**

- Opto-coupler isolated input (compatible with current sink output) and opto-coupler isolated open-collector output (current sink type)  
This product has the opto-coupler isolated input 32channels (compatible with current sink output) whose response speed is 200μsec and opto-coupler isolated open-collector output 32channels (current sink type). 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.
- Power for opto-coupler operation (12VDC 240mA) supplied internally  
As the power to run the opto-couplers is supplied internally, no external power supply is required. The use of jumpers allows you to decide whether you want to use the internal or external power supply for every 16 points.
- 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.
- 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.

This board is a PCI bus-compliant interface board for input/output of digital signals.  
It can be inputted by switch and relay.  
This product can input and output up to 32 channels.  
And this board is the equivalent of PIO-32/32B(PCI)H.  
For the detail, please refer to the page 5 Differences between PIO32/32B(PCI)H and this product.  
Using the bundled driver library package [API-PAC(W32)], you can create Windows application software for this board in your favorite programming language supporting Win32 API functions, such as Visual Basic or Visual C/C++.

- \* 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, 2018.

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

**Cable & Connector (Option)**

- Shield Cable with 96-Pin Half-Pitch Connector at Both Ends (Mold Type)
  - : 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)
- Shield Cable with 96-Pin Half-Pitch Connector at One End (Mold Type)
  - : PCA96PS-0.5P (0.5m)
  - : PCA96PS-1.5P (1.5m)
  - : PCA96PS-3P (3m)
  - : PCA96PS-5P (5m)
- Flat Cable with 96-Pin Half-Pitch Connector at One End
  - : PCA96P-1.5 (1.5m)
  - : PCA96P-3 (3m)
- Distribution Shield Cable with 96-Pin Half-Pitch Connector (96Pin→37Pin x 2)
  - : PCB96WS-1.5P (1.5m)
  - : PCB96WS-3P (3m)
  - : PCB96WS-5P (5m)

**Accessories (Option)**

- Screw Terminal : EPD-96A \*1
- Screw Terminal : EPD-96 \*1
- Digital I/O 64CH Series Terminal Panel : DTP-64A \*1
- Signal Monitor for Digital I/O(64Bits) : CM-64L \*1
- Screw Terminal : EPD-37A \*2
- Screw Terminal : EPD-37 \*2
- Signal Monitor for Digital I/O : CM-32L \*2
- Connection Conversion Board (96-Pin → 37-Pin x 2) : CCB-96 \*3

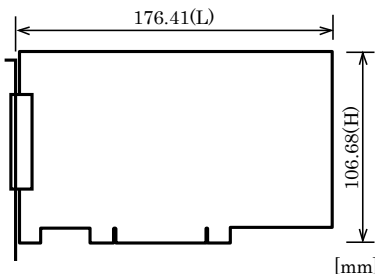
\*1 A PCB96P or PCB96PS optional cable is required separately.  
\*2 A PCB96W or PCB96WS optional cable is required separately.  
\*3 Option cable PCB96P or PCB96PS, and the cable for 37-pin D-SUB are required separately.  
\* Check the CONTEC's Web site for more information on these options.

## Specification

Item	Specification
<b>Input</b>	
Input format	Optocoupler 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
<b>Output</b>	
Output format	Optocoupler 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	35VDC (Max.)
Output voltage	100mA (par channel) (Max.)
Output current	
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
<b>Common</b>	
I/O address	Any 32-byte boundary
Interruption level	1 level use
Max. board count for connection	16 boards
Dielectric strength	500Vrms
External circuit power supply	12 - 24VDC(±10%)
Internal power	12VDC 250mA *2
Power consumption	5VDC 300mA(Max.) (Using the external power) 5VDC 1050mA(Max.)(Using the internal power)
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 *3
Dimension (mm)	176.41(L) x 106.68(H) *4
Weight	215g
Standard	VCCI Class A, CE Marking (EMC Directive Class A, RoHS Directive)

- \*1 Data "0" and "1" correspond to the High and Low levels, respectively.  
 \*2 When the internal power supply is used, the input section consumes a maximum of 80 mA and the output channel switching section consumes a maximum of 60 mA. In this case, therefore, the output current to be supplied from the board is 110 mA.  
 \*3 This board requires +5V power supply from expansion slots (it does not operate in the environment of only +3.3V power supply).  
 \*4 The size of board No.7283, No.7283A, and No.7283B is 176.41 (L) x 105.68 (H) mm.

### Board Dimensions



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

## Packing List

- PIO-32/32B(PCI)V ...1
- First step guide ...1
- Disk \*1 [API-PAC(W32)] ...1
- Warranty Certificate...1
- Serial Number Label...1

\*1 The Disk contains the driver software and User's Guide.

## Support Software

### Windows version of digital I/O driver

#### API-DIO(WDM)/API-DIO(98/PC)

#### [Stored on the bundled disk driver library API-PAC(W32)]

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 \*1 useful 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)

#### [Stored on the bundled disk 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.

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

### LabVIEW-support data acquisition library DAQfast for LabVIEW

#### (Available for downloading (free of charge) from the CONTEC web site.)

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.

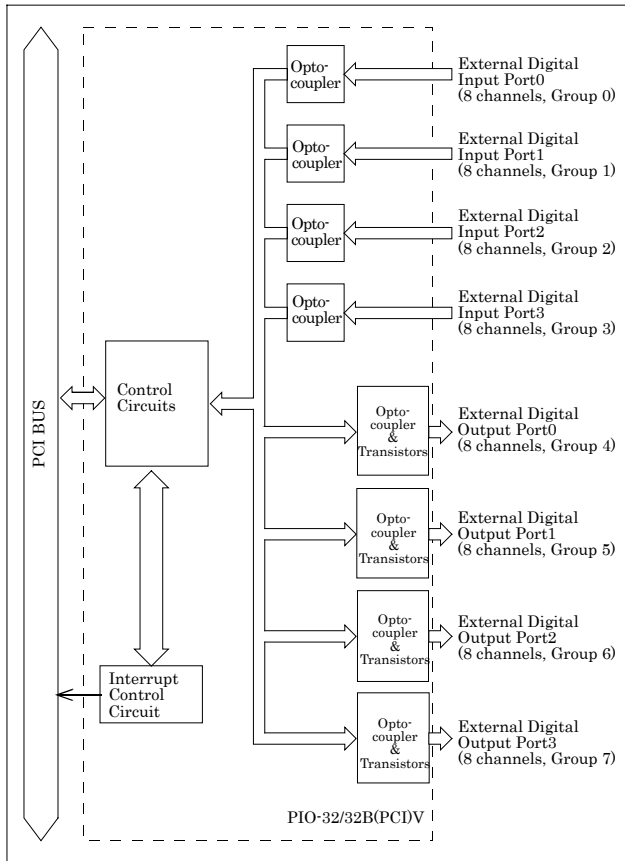
For more details on the library and download of DAQfast for LabVIEW, please visit the CONTEC's Web site.

### Data acquisition 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.

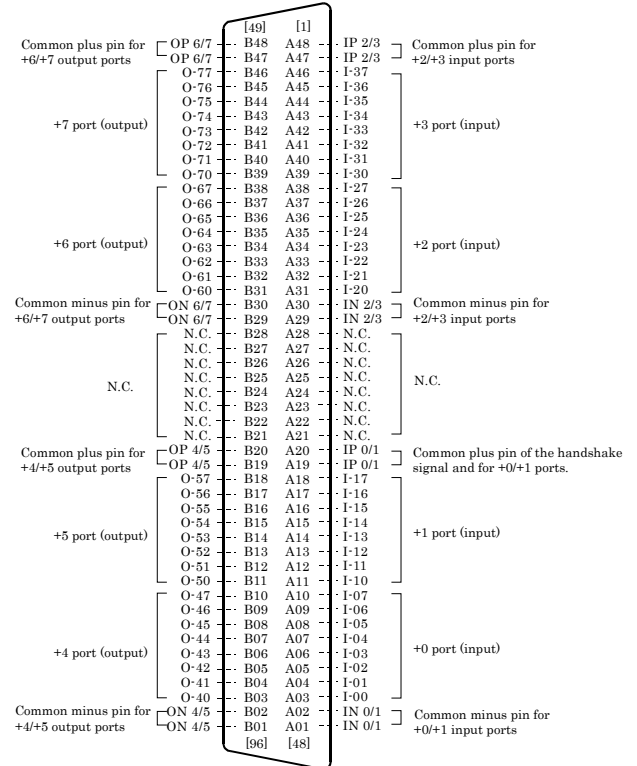
For more details on the library and download of VI-DAQ, please visit the CONTEC's Web site.

## Block Diagram



## Connector Pin Assignment

### Pin Assignments of Interface Connector

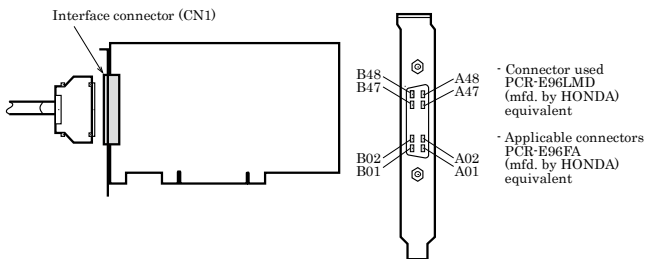


\* The number in square brackets [] are pin numbers designated by HONDA TSUSHIN KOGYO CO., LTD.

## Using the On-board Connectors

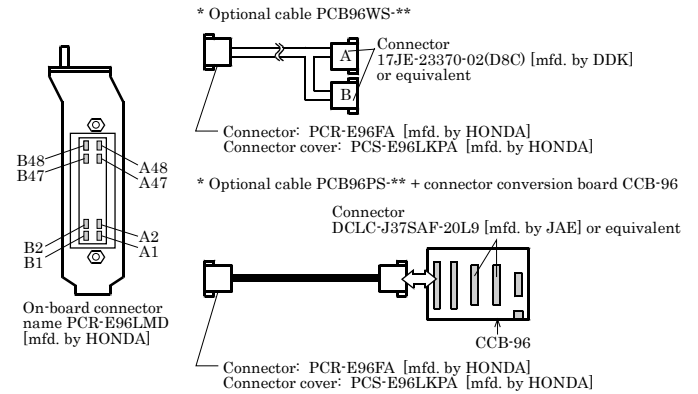
### Connecting a Device to a Connector

To connect an external device to this board, plug the cable from the device into the interface connector (CN1).



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	When the external power supply is selected, its positive side is connected to these pins. When the internal power supply is used, these pins output power at +12 V. These pins are common to 16 input signal pins.
IN 0/1, IN 2/3	When the external power supply is selected, its negative side is connected to this pin. When the internal power supply is selected, this pin serves as the ground. These pins are common to 16 input signal pins.
OP 4/5, OP 6/7	When the external power supply is selected, its positive side is connected to these pins. When the internal power supply is used, these pins output power at +12 V. These pins are common to 16 input signal pins.
ON 4/5, ON 6/7	When the external power supply is selected, its negative side is connected to this pin. When the internal power supply is selected, this pin serves as the ground. These pins are common to 16 input signal pins.
N.C.	This pin is left unconnected.

### Pin Assignments of Optional Connector PCB96WS and CCB-96



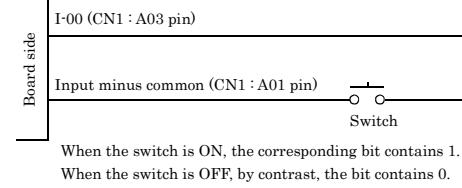
\*\* represents the cable length (1.5, 3, or 5m).

PCB96WS

CNA				CNB									
Common minus pin for +2/+3 input ports	IN 2/3	20	1	IN 0/1	Common minus pin for +0/+1 input ports	Common minus pin for +6/+7 output ports	ON 6/7	20	1	ON 4/5	Common minus pin for +4/+5 output ports		
+2 port (input)	I-20	21	20	2	I-00	30	O-60	22	30	2	O-40	40	
	I-21	22		3	I-01		O-61	23		3	O-41		
	I-22	23		4	I-02		O-62	24		4	O-42		
	I-23	24		5	I-03		O-63	25		5	O-43		
	I-24	25		6	I-04		O-64	26		6	O-44		
	I-25	26		7	I-05		O-65	27		7	O-45		
+3 port (input)	I-26	27	37	8	I-06	19	O-66	27	37	8	O-46	47	
	I-27	28		9	I-07		O-67	28		9	O-47		
	I-30	29		10	I-10		O-70	29		10	O-50		
	I-31	30		11	I-11		O-71	30		11	O-51		
	I-32	31		12	I-12		O-72	31		12	O-52		
	I-33	32		13	I-13		O-73	32		13	O-53		
Common plus pin for +2/+3 input ports	IP 2/3	37	18	14	I-14	37	O-74	33	37	14	O-54	47	
	Common plus pin for +0/+1 input ports	I-34		33	15		I-15	O-75		34	15		O-55
		I-35		34	16		I-16	O-76		35	16		O-56
		I-36		35	17		I-17	O-77		36	17		O-57
		I-37		36	18		IP 0/1	18		OP 4/5	45		
		19		N.C.	19		N.C.						

**CAUTION**  
Please refer to Selecting Power Supply, and choose the proper supply by jumps.

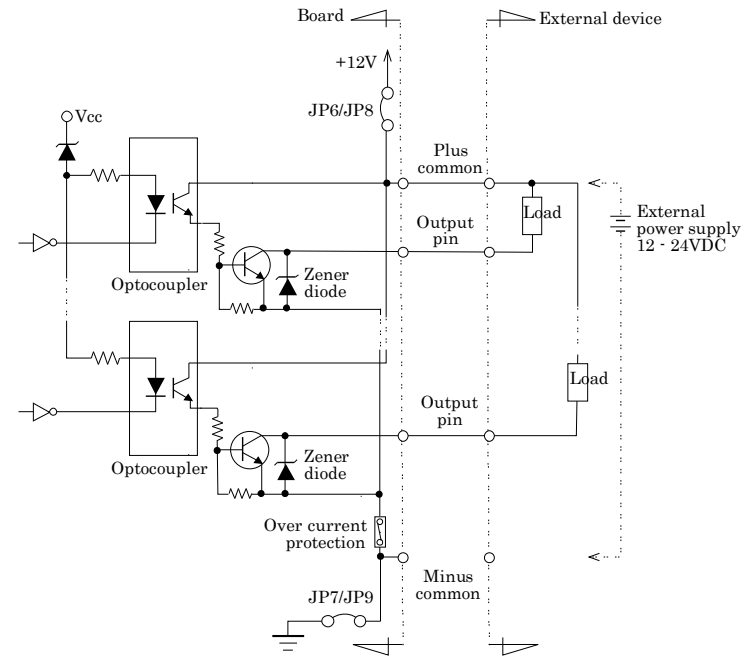
Connection to the LED



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 this board are 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 additional power supply isolated from the PC system. The board offers you an on-board isolated 12VDC power supply in option. 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.

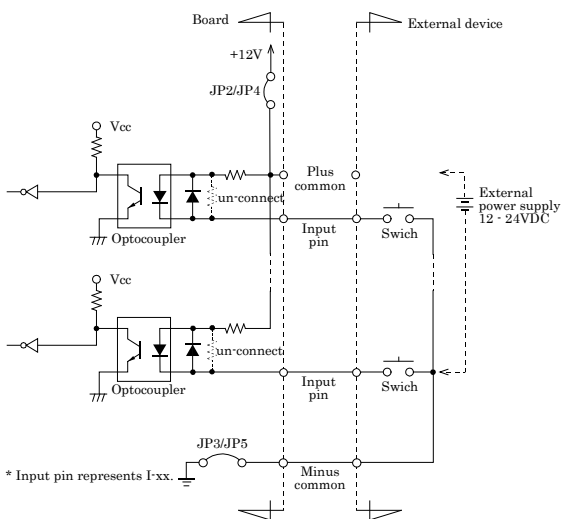
CCB-96

CN3(CNA)				CN4(CNB)									
Common minus pin for +0/+1 input ports	IN 0/1	1	20	IN 2/3	Common minus pin for +2/+3 input ports	Common minus pin for +4/+5 output ports	ON 4/5	1	20	ON 6/7	Common minus pin for +6/+7 output ports		
+0port (input)	I-00	2	30	21	I-20	30	O-40	2	30	21	O-60	40	
	I-01	3		22	I-21		O-41	3		22	O-61		
	I-02	4		23	I-22		O-42	4		23	O-62		
	I-03	5		24	I-23		O-43	5		24	O-63		
	I-04	6		25	I-24		O-44	6		25	O-64		
	I-05	7		26	I-25		O-45	7		26	O-65		
+1 port (input)	I-06	8	37	27	I-26	19	O-46	8	37	27	O-66	47	
	I-07	9		28	I-27		O-47	9		28	O-67		
	I-10	10		29	I-30		O-50	10		29	O-70		
	I-11	11		30	I-31		O-51	11		30	O-71		
	I-12	12		31	I-32		O-52	12		31	O-72		
	I-13	13		32	I-33		O-53	13		32	O-73		
Common plus pin for +0/+1 input ports	IP 0/1	18	37	33	I-34	37	O-54	14	37	33	O-74	47	
	Common plus pin for +2/+3 input ports	I-14		14	34		I-35	O-55		15	34		O-75
		I-15		15	35		I-36	O-56		16	35		O-76
		I-16		16	36		I-37	O-57		17	36		O-77
		I-17		17	37		IP 2/3	18		OP 4/5	45		
		19		N.C.	19		N.C.						

Connecting Input Signals

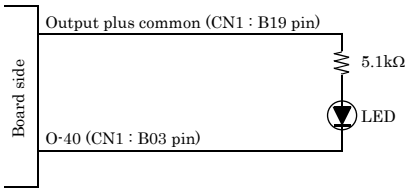
Connect the input signals to a device which can be current-driven, such as a switch or transistor output device. The connection requires an external power supply to feed currents. The board inputs the ON/OFF state of the current-driven device as a digital value.

Input Circuit



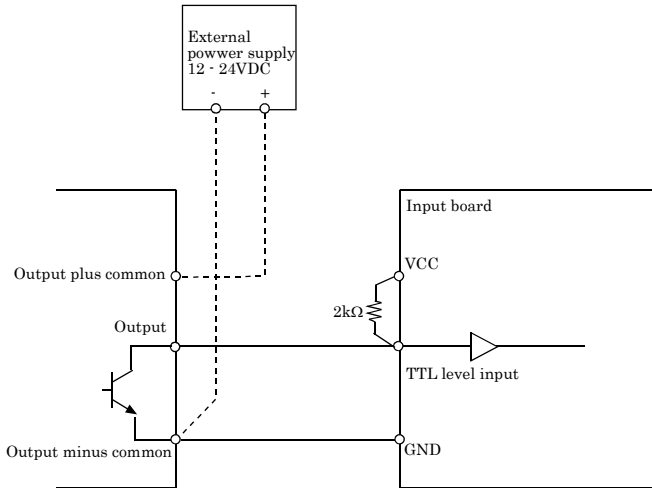
The input circuits of interface blocks of this board are illustrated in the image above. The signal inputs are isolated by the Optocoupler (ready to accept current sinking output signals). The board therefore requires an additional power supply isolated from the PC system to drive the photo-isolated circuits. The board offers you an on-board isolated 12VDC power supply in option. In this case (using external supply), 5.1mA current is requested each channel on 24VDC (2.6mA on 12VDC).

### Connecting a Switch



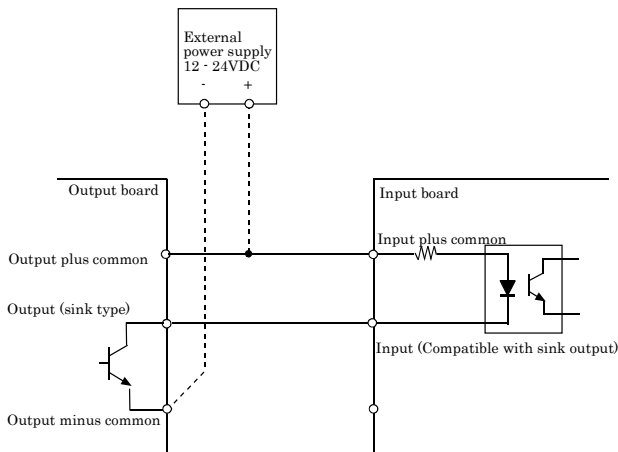
When "1" is output to a relevant bit, the corresponding LED comes on.  
 When "0" is output to the bit, in contrast, the LED goes out.

### 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.



### Differences between the PIO-32/32B(PCI)V And PIO-32/32B(PCI)H

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

- (1) Different in the number of input signals available to interrupt requests
  - PIO-32/32B(PCI)V : All of 32 channels
  - PIO-32/32B(PCI)H : 4 channels
- (2) Different in the expression to calculate the digital filter time (n: setting value)
  - PIO-32/32B(PCI)V :  $2^n / (8 \times 10^6)$
  - PIO-32/32B(PCI)H :  $2^n / (16 \times 10^6)$
- (3) Protective elements provided for outputs
  - PIO-32/32B(PCI)V : Surge protector: Zener diode
  - PIO-32/32B(PCI)H : Nothing
- (4) Different in interrupt level resource allocation
  - PIO-32/32B(PCI)V : Automatically allocates on interrupt level.
  - PIO-32/32B(PCI)H : Uses a jumper switch to select whether to allocate interrupt levels.
- (5) Different in whether ASIC or not
  - PIO-32/32B(PCI)V : Nothing
  - PIO-32/32B(PCI)H : ASIC
- (6) Different in Power Consumption
  - PIO-32/32B(PCI)V : 5VDC 200mA(Max.) (Using the external power)  
5VDC 1050mA(Max.) (Using the internal power)
  - PIO-32/32B(PCI)H : 5VDC 300mA(Max.) (Using the external power)  
5VDC 1300mA(Max.) (Using the internal power)