Digital I/O Board with Opto-Isolation
for Low Profile PCI

PIO-16/16L(LPCI)H

This board is a PCI-compliant interface board for input/output of digital signals.

The board can input and output digital signals at 12 - 24 VDC. The board supports a low-profile PCI slot and, if replaced with the supplied bracket, supports a PCI slot, too.

PIO-16/16L(LPCI)H can input and output up to 16 channels. Using the bundled API function 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++.

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

Features

A different external power supply can be used for each common pin as it is shared by 16 channels.

The PCI bus (personal computer) and the I/O interface are isolated from each other by an opto-coupler, offering good noise immunity.

You can use all of the input signals as interrupt inputs. You can also select the interrupt trigger edge of the input signal.

The board has a digital filter feature to prevent noise or chatter from causing erroneous inputs.

Up to 35VDC, 100mA per signal, max. output.

Zener diode connected to output transistors for protection from surge voltage. Overcurrent protective device provided for every eight channels of output transistors.

Support for both of low-profile and standard PCI slots (interchangeable with a bundled bracket).

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		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).
Response time		200μsec within
Output		
Output format		Opto-isolated open collector output (current sink type) (Negative logic*1)
Number of output signal channels		16 channels (1 common)
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		1000Vrms
External circuit power supply		12 - 24VDC(±10%)
Power consumption		5VDC 100mA(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		33bit, 33MHz, Universal key shapes supported *2
Dimension (mm)		121.69(L) x 63.41(H)
Weight		60g
Certification		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).

Board Dimensions

121.69(L)
63.41(H)
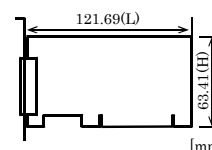
[mm]
The standard outside dimension (L) is the distance from the end of the board to the outer surface of the slot cover.

Support Software

Driver Software Package API-PAC(W32) (Available for downloading (free of charge) from the CONTEC web site.)

API-PAC(W32) is the library software that provides the commands for CONTEC hardware products in the form of Windows standard Win32 API functions (DLL).   It makes it easy to create high-speed application software taking advantage of the CONTEC hardware using various programming languages that support Win32 API functions, such as Visual Basic and Visual C/C++.

It can also be used by the installed diagnosis program to check hardware operations.

CONTEC provides download services to supply the updated drivers and differential files.

For details, read Help on the bundled Disk visit the CONTEC's Web site.

Linux version of digital I/O driver API-DIO(LNX) (Supplied: Stored on the API-PAC(W32) Disk)

This driver is used to control CONTEC digital I/O boards (cards) from within Linux.

You can control CONTEC I/O boards easily using the shared library used by gcc and Kylix, the device driver (module) for each kernel version, and the board (card) configuration program (config).

CONTEC provides download services to supply the updated drivers and differential files.

For details, read Help on the bundled Disk or visit the CONTEC's Web site.

Data acquisition VI library for LabVIEW VI-DAQ (Free download)

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)

Shield Cable with Two 50-Pin Mini-Ribbon Connector
: PCB50PS-0.5P(0.5m)
: PCB50PS-1.5P(1.5m)
: PCB50PS-3P(3m)
: PCB50PS-5P(5m)

Shield Cable with One 50-Pin Mini-Ribbon Connector
: PCA50PS-0.5P(0.5m)
: PCA50PS-1.5P(1.5m)
: PCA50PS-3P(3m)
: PCA50PS-5P(5m)

Connection Conversion 0.5m Shield Cable
(50-Pin Ribbon->37-Pin D-SUB)   : PCE50/37PS-0.5P(0.5m)

Packing List

Board [PIO-16/16L(LPCI)H] …1
First step guide … 1
Disk *1 [API-PAC(W32)] …1
Bracket for PCI…1
Serial number label…1
Product Registration Card & Warranty Certificate…1

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

Accessories

Accessories (Option)

Screw Terminal Unit(M3 terminal block, 50 points)
: EPD-50A *1
Screw Terminal Unit(M3 terminal block, 37 points)
: EPD-37A *2
Screw Terminal Unit(M3.5 terminal block, 37 points)
: EPD-37 *2
Termination Panel (M3) : DTP-3C *3
Termination Panel : DTP-4C *3
Signal Monitor for Digital I/O : CM-32L *2

*1   PCB50PS-*P optional cable is required separately.
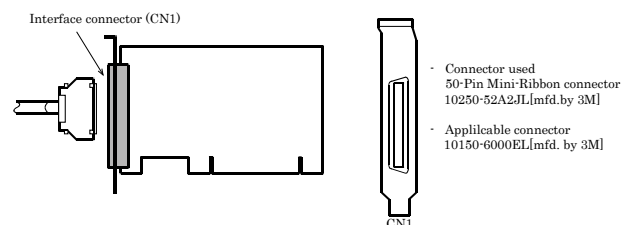*2   PCE50/37PS-0.5P and PCB37P or PCB37PS optional cable is required separately.
*3   PCE50/37PS-0.5P optional cable is required separately.

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

How to connect the 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 shown below.


- Connector used
  50-Pin Mini-Ribbon connector
  10250-52A2JL[mfd.by 3M]

- Applilcable connector
  10150-6000EL[mfd. by 3M]

Connector Pin Assignment

Common minus pin for +2/+3 output ports	ON 2/3	50		25	ON 2/3	Common minus pin for +2/+3 output ports
	ON 2/3	49		24	ON 2/3	
+2 port (output)	O-20	48		23	O-30	+3 port (output)
	O-21	47		22	O-31	
	O-22	46		21	O-32	
	O-23	45		20	O-33	
	O-24	44		19	O-34	
	O-25	43		18	O-35	
	O-26	42		17	O-36	
	O-27	41		16	O-37	
Common plus pin for +2/+3 output ports	OP 2/3	40		15	OP 2/3	Common plus pin for +2/+3 output ports
	OP 2/3	39		14	OP 2/3	
	N.C.	38		13	N.C.	
	N.C.	37		12	N.C.	
	N.C.	36		11	N.C.	
+0 port (input)	I-00	35		10	I-10	+1 port (input)
	I-01	34		9	I-11	
	I-02	33		8	I-12	
	I-03	32		7	I-13	
	I-04	31		6	I-14	
	I-05	30		5	I-15	
	I-06	29		4	I-16	
	I-07	28		3	I-17	
Common plus pin for +0/+1 input ports	IP 0/1	27		2	IP 0/1	Common plus pin for +0/+1 input ports
	IP 0/1	26		1	IP 0/1	

| 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.

Input Circuit

Input Circuit

* Input pin represent I-xx.
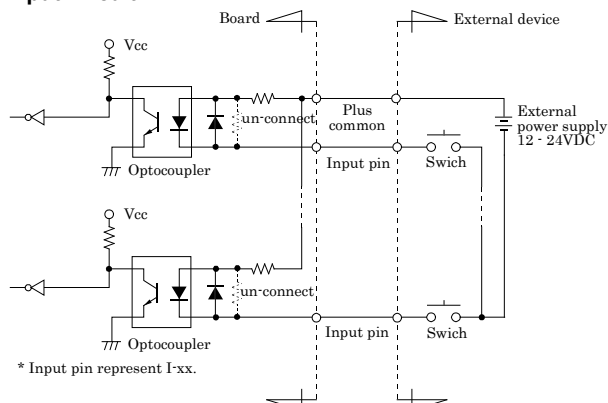
The input circuit of interface is illustrated in the above Figure.
The circuit is connected to a device that can be current-driven, such as a switch or transistor output device.
The circuit inputs the ON/OFF state of the current-driven device as a digital value.
The signal inputs are isolated by opto-couplers (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
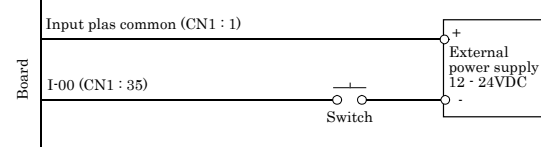
When the switch is ON, the corresponding bit contains 1.
When the switch is OFF, by contrast, the bit contains 0.

Output Circuit

Output Circuit


* Output pin: O-xx
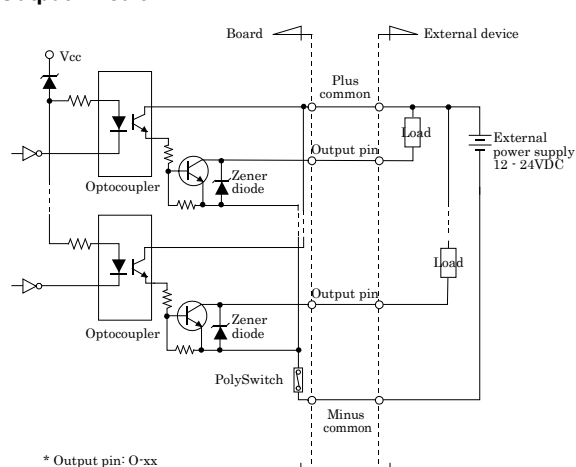
The output circuit of interface is illustrated in the above Figure.
The signal output section is an opto-coupler isolated, open-collector output (current sink type). Driving the output section requires an external power supply.The rated output current per channel is 100 mA at maximum.
The output section 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.
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.
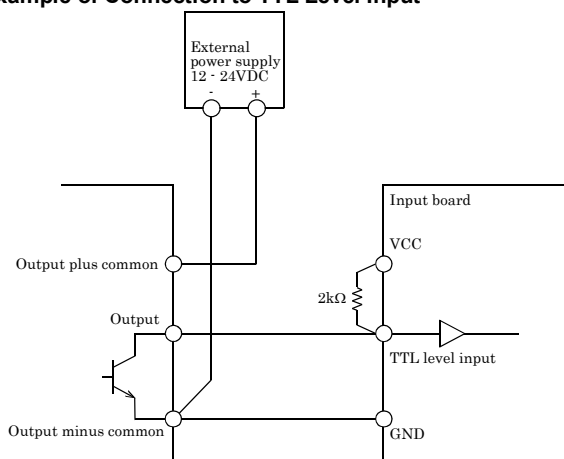
⚠ CAUTION
When the PC is turned on, all output are reset to OFF.

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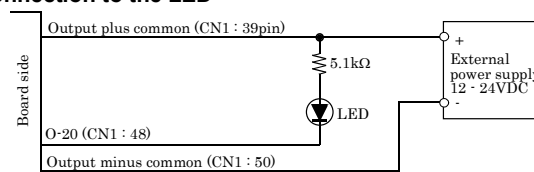
When "1" is output to a relevant bit, the corresponding LED comes on.
When "0" is output to the bit, in contrast, the LED goes out.

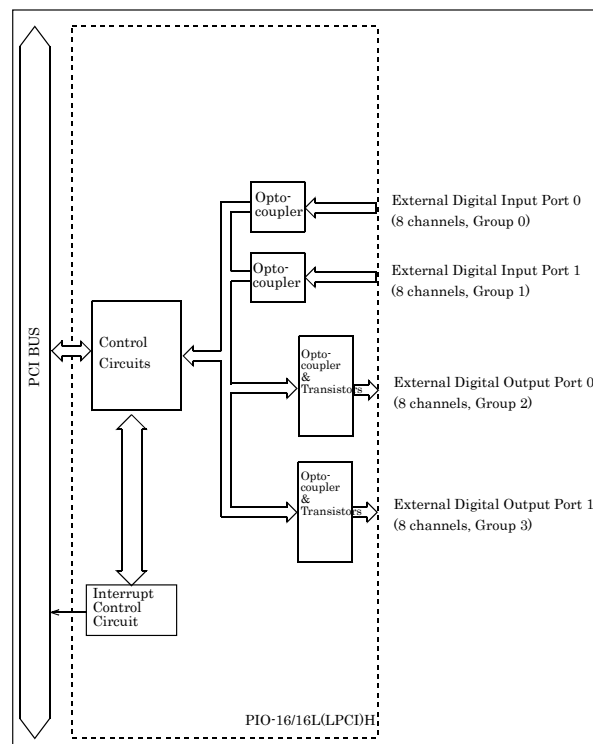## Example of Connection to TTL Level Input

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.
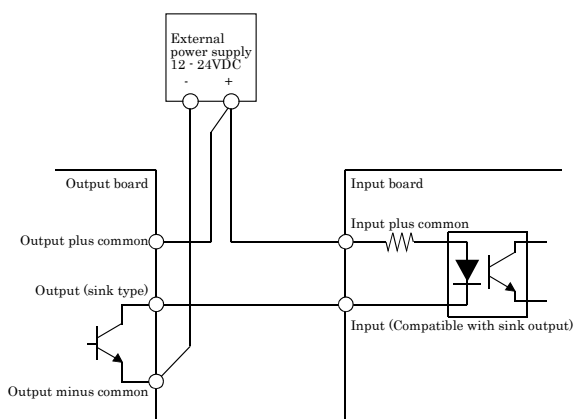
Block Diagram

Differences between the PIO-16/16L(LPCI)H and PIO-16/16L(PCI)H

The PIO-16/16L(LPCI)H is connector-pin compatible with the conventional PIO-16/16L(PCI)H but has the following differences from it:

(1) Different in connector shape and pin assignment
    PIO-16/16L(LPCI)H : 50-Pin Mini-Ribbon connector
    PIO-16/16L(PCI)H   : 37-Pin D-SUB

(2) Different in board dimensions
    PIO-16/16L(LPCI)H : 121.69(L) x 63.41(H) mm
    PIO-16/16L(PCI)H   : 121.69(L) x 105.68(H) mm