High-voltage,Non-polarity Isolated
Digital I/O Board for PCI

PIO-16/16RY(PCI)

This board is a PCI-compliant interface board for input/output of digital signals.
The board provides 16 Optocoupler isolated input channels and 16 semiconductor-relay output channels.
Using the bundled Driver library [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

Input Interface
Capable of receiving digital signals at 12 to 24 VDC or at 24 to 48 VDC through 16 input channels.
Supports both of current sink and current source outputs.
Capable of selecting a voltage range of 12 to 24 VDC or 24 to 48 VDC for each channel.
Directly accepts the output device of a leakage current (OFF current) of up to 1 mA.
Provided with a digital filter feature to prevent noise or chatter from causing erroneous input.
You can use all of the input signals as interrupt inputs.   You can also select the interrupt trigger edge of the input signal.

Output Interface
The board can output digital signals of up to 120 VAC/VDC through 16 channels.
A load of up to 100 mA can be driven per channel.
The PCI bus (personal computer) and the I/O interface are isolated from each other by an Optocoupler or semiconductor relay, offering good noise immunity.

Specification

Item		Specification
Input		
Input format		Optocoupler isolated input (Both of current sink and source outputs supported)
Number of input signal points		16 points (all available for interrupts) (1 common pin)
Input resistance		3 kΩ (with 12 to 24 V selected) or 6 kΩ (with 24 to 48 V selected)
Input ON current		3.1mA or more
Input OFF current		1.0mA or less
External circuit power supply		12 - 24 VDC (±10%) or 24 - 48 VDC (±10%) (selected by jumper switch)
Interrupt		16 interrupt input signals are arranged into a single output of interrupt signal INTA. An interrupt occurs at the OFF-to-ON or ON-to-OFF edge (software-selected)
Response time		200μsec within
Output		
Output format		Semiconductor relay output
Number of output signal points		16 points (1 common)
Output rating	Output voltage	120VAC/DC(Max.)
	Output current	100mA (par channel) (Max.)
Device used		PS7221A-2A (NEC) *2
ON resistance		10.0Ω or less *2
OFF leakage current		1.0μA or less
Response time		1.0msec 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
Power consumption		5VDC 400mA(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 *1
Dimension (mm)		176.41(L) x 105.68(H)
Weight		130g
Certification		RoHS,CE,VCCI

*1   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).
*2   If the board No is 7228, "Device used" is "PS7221-2A (NEC)" and "ON resistance" is 8.0Ω or less.

Board Dimensions

176.41(L)

105.68(H)

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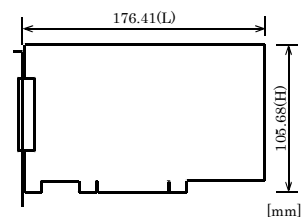
The standard outside dimension (L) is the distance from the end of the board to the outer surface of the slot cover.

Support Software

Driver Library API-PAC(W32)   (Bundled)

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 or 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)

Flat Cable with a 37-Pin D-SUB Connectors at 2 Ends
: PCB37P-1.5 (1.5m)
: PCB37P-3 (3m)
: PCB37P-5 (5m)

Shielded cable with two 37-pin D-Type connectors
: PCB37PS-0.5P (0.5m)
: PCB37PS-1.5P (1.5m)
: PCB37PS-3P (3m)
: PCB37PS-5P (5m)

Flat Cable with a 37-pin D-type Connector
: PCA37P-1.5 (1.5m)
: PCA37P-3 (3m)
: PCA37P-5 (5m)

Shielded Cable with Two 37-pin D-Type Connectors
: PCA37PS-0.5P (0.5m)
: PCA37PS-1.5P (1.5m)
: PCA37PS-3P (3m)
: PCA37PS-5P (5m)

Connector (Option)

D-SUB37P Male Connector Set (5 Pieces)
: CN5-D37M

Accessories

Accessories (Option)

Screw Terminal	: EPD-37A *1
Screw Terminal	: EPD-37 *1
Termination Panel (M3)	: DTP-3(PC)
Termination Panel	: DTP-4(PC)
Signal Monitor for Digital I/O	: CM-32(PC)E *1

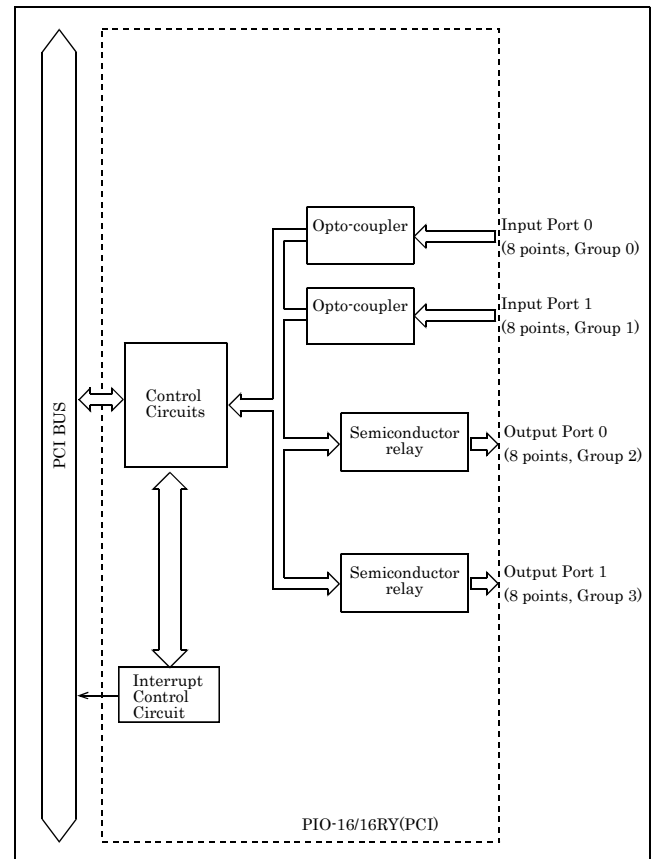*1   PCB37P or PCB37PS optional cable is required separately.

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

Packing List

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

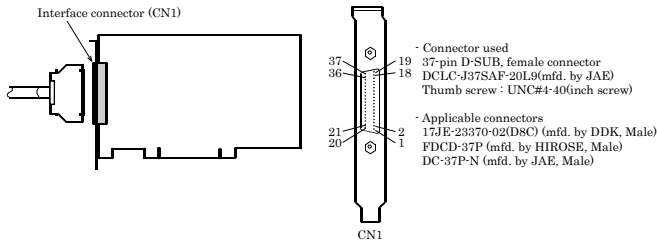*1   The Disk contains the driver software and User's Guide.

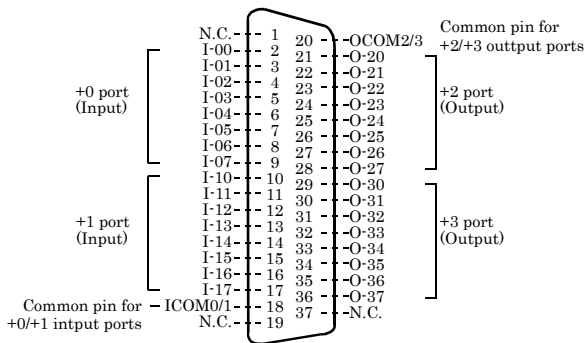## Block Diagram

PIO-16/16RY(PCI)

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 shown below.

Interface connector (CN1)

CN1

- Connector used
  37-pin D-SUB, female connector
  DCLC-J37SAF-20L9(mfd. by JAE)
  Thumb screw : UNC#4-40(inch screw)

- Applicable connectors
  17JE-23370-02(D8C) (mfd. by DDK, Male)
  FDCD-37P (mfd. by HIROSE, Male)
  DC-37P-N (mfd. by JAE, Male)

Pin Assignments of Interface Connector

Left	Pin	Pin	Right	
N.C.	1	20	OCOM2/3	Common pin for +2/+3 outtput ports
I-00	2	21	O-20	
I-01	3	22	O-21	
I-02	4	23	O-22	
I-03	5	24	O-23	+2 port (Output)
I-04	6	25	O-24	
I-05	7	26	O-25	
I-06	8	27	O-26	
I-07	9	28	O-27	
I-10	10	29	O-30	
I-11	11	30	O-31	
I-12	12	31	O-32	
I-13	13	32	O-33	+3 port (Output)
I-14	14	33	O-34	
I-15	15	34	O-35	
I-16	16	35	O-36	
I-17	17	36	O-37	
ICOM0/1	18	37	N.C.	
N.C.	19			

+0 port (Input): I-00 - I-07
+1 port (Input): I-10 - I-17
Common pin for +0/+1 intput ports: ICOM0/1

I-00 - I-17	32 input signal pins. Connect output signals from the external device to these pins.
O20 - O37	32 output signal pins. Connect these pins to the input signal pins of the external device.
ICOM 0/1	Common pin for input signals. These pins are common to 16 input signal pins.
OCOM 2/3	Connect the positive 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.
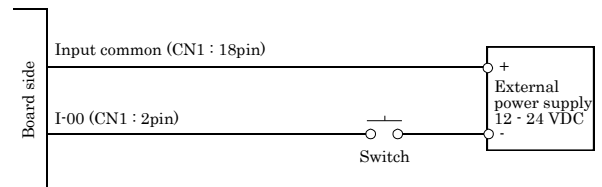The board inputs the ON/OFF state of the current-driven device as a digital value.

Input Circuit

* Input Pin: I-xx
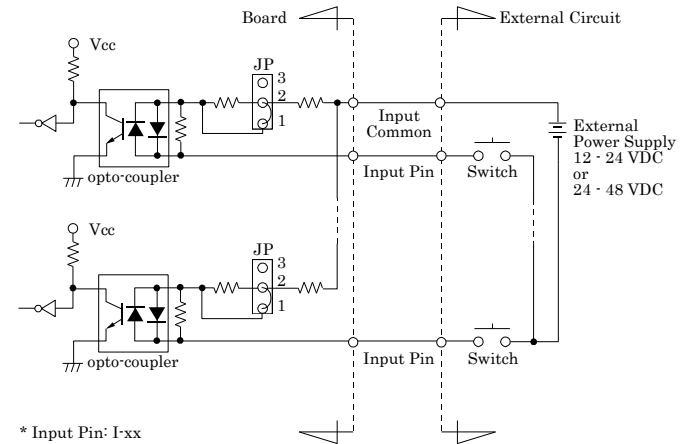
The input circuits of interface blocks of the board are illustrated in the image above. For each input channel, use the corresponding jumper to select a voltage range of 12 - 24 or 24 - 48 VDC depending on the voltage of the input signal.
The signal inputs are isolated by the Optocoupler (Both of current sink and source outputs supported). The board therefore requires an external power supply to drive the inputs. The power capacity required for driving each input channel is about 8 mA when the signal voltage is 48 VDC (with the 24 - 48 VDC setting) or about 4 mA when the signal voltage is 12 VDC (with the 12 - 24 VDC setting).
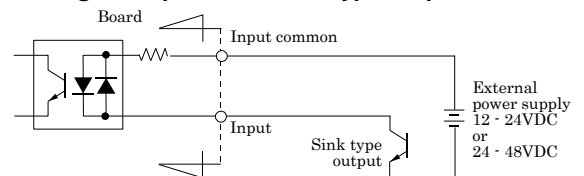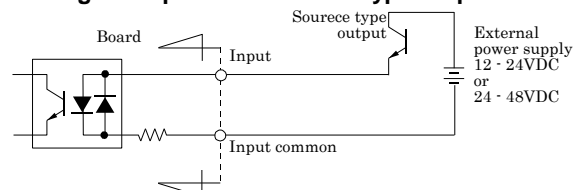
Connecting a Switch

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

Examples of Connecting the Board to an External Device

Connecting the input to the sink type output

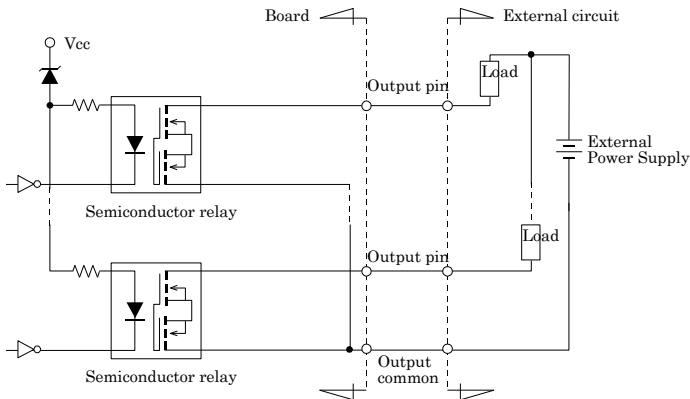#### Connecting the input to the source type output

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.
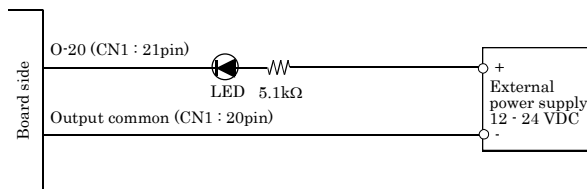
Output Circuit

* Output Pin: O-xx

The output circuits of interface blocks of the board are illustrated in the image above.
The signal outputs are semiconductor relay outputs using a rated output current of up to 100 mA per channel.

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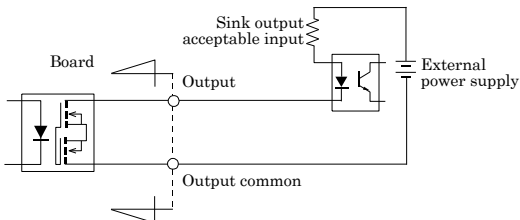
Connection to the LED

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.

Examples of Connecting the Board to an External Device

Connecting the Output to the Sink Output Acceptable Input

Connecting the Output to the Source Output Acceptable Input