Digital I/O Board with High Voltage Isolation for PCI

PIO-16/16RY(PCI)

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

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

This product is compatible with the digital signal I/O with high voltage (input 12 - 48VDC, output 120VAC/DC) and features 16 opto-coupler isolated inputs (compatible with current sink output/current source output) and 16 solid-state relay outputs. You can use all of input signals as interrupt inputs.

In addition, the digital filter function to prevent wrong recognition of input signals is provided.

Windows/Linux device driver is supported with this product.

* 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, 2023.

Features

Opto-coupler isolated input (compatible with current sink output/current source output) and solid-state relay output

This product has the 16 of opto-coupler isolated input (compatible with current sink output/current source output) whose response speed is 200µsec and 16 of solid-state relay output whose response speed is 1.0msec.

Supporting driver voltages of 12 - 48VDC for input and 120VAC/DC for output with high voltage.

Opto-coupler and solid-state relay bus isolation

As the PCI bus (PC) is isolated from the input and output interfaces by opto-coupler and solid-state relay, this product has excellent noise performance.

All input signals can be used as interrupt request signals

You can use all 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 support device driver

Using the device driver API-TOOL 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.

Equipped with 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.

Specifications

Function specification

Item		Specifications
Input	Type	Opto-Isolated Input (Both of current sink and source outputs supported)
	Number of Channels	16ch (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)
	Current required to turn ON	3.1mA or more
	Current required to turn OFF	1.0mA or less
	External circuit power supply	12 - 24 VDC (±10%) or 24 - 48 VDC (±10%) (selected by jumper switch)
	Interrupt	Combine 16 interrupt signals to one interrupt request signal as the INTA. Either rising edge or falling edge of input signal can generate interrupt.
	Response time	200µsec within
Output	Type	Solid-state relay output
	Number of Channels	16ch (1 common)
	Output rated voltage	120VAC/DC (Max.)
	Output rated current	100mA (par channel) (Max.)
	Device used	PS7221A-2A (Renesas) *1
	ON resistance	10.0Ω or less *1
	OFF leakage current	1.0µA or less
	Response time	1.0msec within
Common	Connecting distance	50m(Typ.) (depending on wiring environment)
	I/O address	Any 32-byte boundary
	Interruption level	1 level use
	Boards in one system	Maximum of 16 boards can be install in a same system.
	Isolated voltage	1000Vrms
	Power consumption	5VDC 400mA (Max.)
	PCI bus specification	32bit, 33MHz, Universal key shapes supported *2
	Dimension (mm)	176.41(L) x 105.68(H)
	Weight	130g

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

*2 This product requires power supply at +5V from an expansion slot (it does not work on a machine with a +3.3V power supply alone).

Installation Environment Requirements

Item	Specifications
Operating ambient temperature	0 - 50°C
Operating ambient humidity	10 - 90%RH (No condensation)
Floating dust particles	Not to be excessive
Corrosive gases	None
Standard	VCCI Class A, CE Marking (EMC Directive Class A, RoHS Directive), UKCA

Support Software

Name	Contents	How to get
Windows Version Digital I/O Driver software API-DIO(WDM)	The Windows device driver is provided as a form of Windows API functions. Various sample programs such as C# and Visual Basic .NET, Visual C++, Python etc. and diagnostic program useful for checking operation is provided.	Download from the CONTEC website *1
Linux Version Digital I/O Driver software API-DIO(LNX)	The Linux device driver is provided as a shared library. The software includes various sample programs such as gcc (C, C++) and Python programs, as well as a configuration tool to configure the device settings.	Download from the CONTEC website *1
Software Development Tool Kits (SDK) and Support Software	In addition to the device drivers, we offer many software programs for using CONTEC devices in an easier manner.	Download from the CONTEC website *2

*1 Download the files from the following URL.
https://www.contec.com/download/

*2 For supported software, search the CONTEC website for this product and view the product page.
https://www.contec.com/

Optional Products

Product Name	Model type	Description
Shield Cable with 37-pin D-Type Connector at Both Ends (Mold Type)	PCB37PS-0.5P	0.5m
	PCB37PS-1.5P	1.5m
	PCB37PS-3P	3m
	PCB37PS-5P	5m
Flat Cable with 37-Pin D-Type Connector at Both Ends	PCB37P-1.5	1.5m
	PCB37P-3	3m
	PCB37P-5	5m
Shield Cable with 37-pin D-Type Connector at One End (Mold Type)	PCA37PS-0.5P	0.5m
	PCA37PS-1.5P	1.5m
	PCA37PS-3P	3m
	PCA37PS-5P	5m
Flat Cable with 37-pin D-Type Connector at One End	PCA37P-1.5	1.5m
	PCA37P-3	3m
	PCA37P-5	5m
Screw Terminal Unit (M3 x 37P)	EPD-37A	*1 *2
Screw Terminal Unit (M3.5 x 37P)	EPD-37	*1
Termination Panel (M3 x 37P)	DTP-3C	*1
Termination Panel (M2.5 x 37P)	DTP-4C	*1
Signal Monitor for Digital I/O (32bit)	CM-32L	*1

*1 PCB37P or PCB37PS optional cable is required separately.

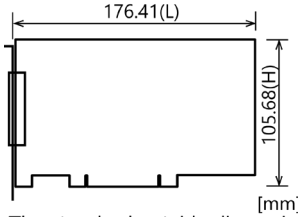
*2 "Spring-up" type terminal is used to prevent terminal screws from falling off.

Visit the CONTEC website for the latest optional products.

Included Items

Product [PIO-16/16RY(PCI)] ...1
Please read the following ... 1

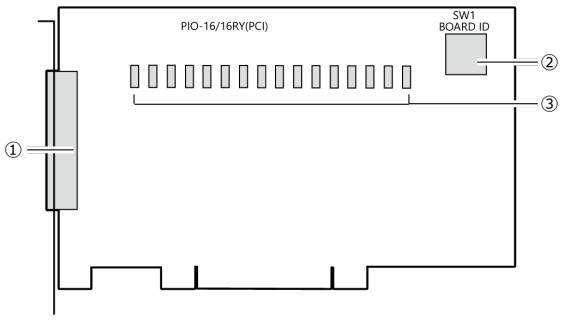
External Dimensions



[mm]

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

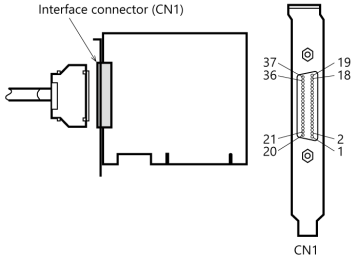
Component Name



No.	Name	No.	Name
1	Interface Connector	3	Jumper for selecting the input voltage range (JP1 - JP16)
2	Board ID Setting Switch		

Connecting an Interface Connector

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

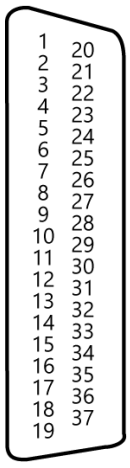


-Connector used
37-pin D-SUB, female connector
DCLC-J37SAF-20L9E (mfd. by JAE) equivalent
Thumb screw: UNC#4-40 (inch screw)

-Applicable connector
17JE-23370-02(D8C) (mfd. by DDK) equivalent,
FDCD-37P(55) (mfd. by HIROSE) equivalent,
DC-37P-NR (mfd. by JAE) equivalent

Layout on the Interface Connector(CN1)

Unconnected	N.C.	1	20	OCOM-2/3	Common pin for +2/+3 output ports
+0 port (Input)	I-00	2	21	O-20	+2 port (Output)
	I-01	3	22	O-21	
	I-02	4	23	O-22	
	I-03	5	24	O-23	
	I-04	6	25	O-24	
	I-05	7	26	O-25	
	I-06	8	27	O-26	
	I-07	9	28	O-27	
+1 port (Input)	I-10	10	29	O-30	+3 port (Output)
	I-11	11	30	O-31	
	I-12	12	31	O-32	
	I-13	13	32	O-33	
	I-14	14	33	O-34	
	I-15	15	34	O-35	
	I-16	16	35	O-36	
	I-17	17	36	O-37	
Common pin for +0/+1 input ports	ICOM-0/1	18	37	N.C.	Unconnected
	N.C.	19			



Signal name	Description
I-00 - I-17	16 input signal pins. Connect output signals from the external device to these pins.
O-20 - O-37	16 output signal pins. Connect these pins to the input signal pins of the external device.
ICOM-0/1	Common pin for input signals. This pin is common to 16 input signal pins.
OCOM-2/3	Common pin for output signals. This pin is common to 16 output signal pins.
N.C.	This pin is left unconnected.

⚠ CAUTION

To perform input/output using this product with the CONTEC device driver, specify logical ports and logical bits when calling each function. For details, refer to the "Relationships between API-TOOL Logical Ports/Bits and Connector Signal Pins" of Reference Manual.

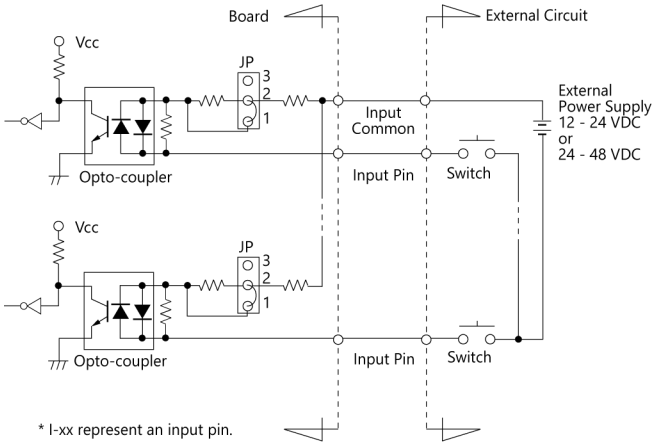
Connecting Input and Output Signal

Input Circuit

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.

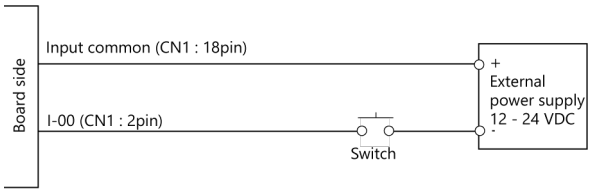
The product inputs the ON/OFF state of the current-driven device as a digital value.



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.

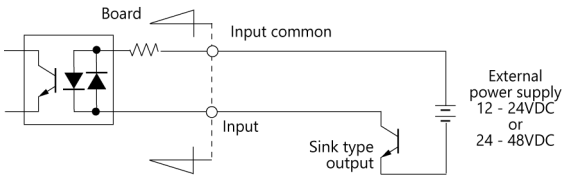
The signal inputs are isolated by opto-couplers (Both of current sink and source outputs supported). The product therefore requires an external power supply to drive the inputs. The power capacity required for driving each input channel is about 8 mA when the signal voltage is 48 VDC (with the 24 - 48 VDC setting) or about 4 mA when the signal voltage is 12 VDC (with the 12 - 24 VDC setting).

Connecting a Switch (An Example to use Input I-00)

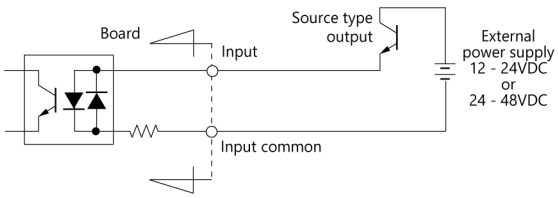


When the switch is ON, the corresponding bit contains 1.
When the switch is OFF, by contrast, the bit contains 0.

Examples of Connecting the Product to an External Device
Connecting the input to the sink type output



Connecting the input to the source type output

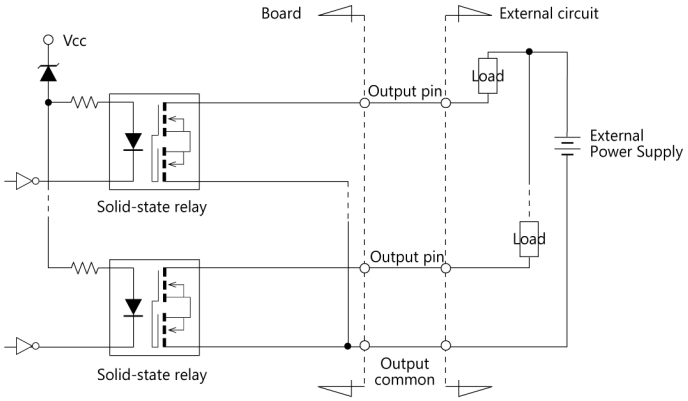


Output Circuit

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 product controls turning on/off the current-driven controlled device using a digital value.

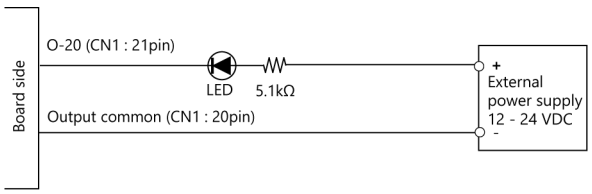


The signal outputs are solid-state relay outputs using a rated output current of up to 100 mA per channel.

⚠ CAUTION

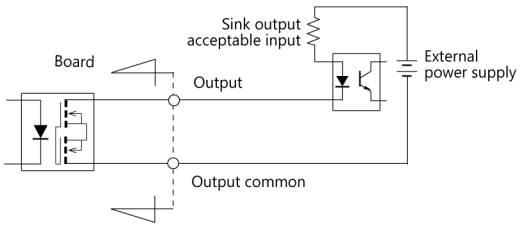
When the PC is turned on, all outputs are reset to OFF.

Connection to the LED (An Example to use Output O-20)

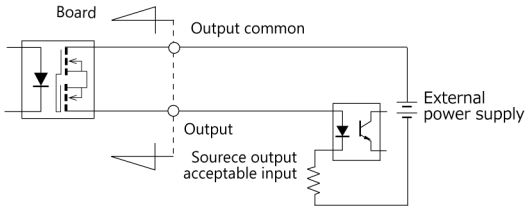


When "1" is output to a relevant bit, the corresponding LED comes on.
When "0" is output to the bit, in contrast, the LED goes out.

Examples of Connecting the Product to an External Device
Connecting the Output to the Sink Output Acceptable Input



Connecting the Output to the Source Output Acceptable Input



Block Diagram