Digital I/O Board with Optocoupler Isolation for PCI
PIO-64/64L(PCI)H

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-64/64L(PCI)H features 64 opto-coupler isolated inputs and 64 opto-coupler isolated open-collector outputs.   You can use 16 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.

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

*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 October, 2022.

Features

Opto-coupler isolated input (compatible with current sink output) and opto-coupler isolated open-collector output (current sink type)
PIO-64/64L(PCI)H has the 64ch of opto-coupler isolated input (compatible with current sink output) and 64ch 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 16 input signals as interrupt request signals.
You can use 16 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 supported.
Using the digital I/O driver 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-64/64L(PCI)H] ...1

Please read the following ... 1

Hardware specifications

Item		Specification
Input		
Type		Optocoupler Isolated Input (for current sinking output) (Negative logic *1)
Number of Channels		64 channels (16 of these 64 can be used as interrupt signal) (16 channels share a positive common)
Resister		4.7kΩ
Current required to turn ON		2.0mA(Min.)
Current required to turn OFF		0.16mA(Max.)
Interrupts		Combine four 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(Max.)
Output		
Type		Optocoupler Isolated Open Collector Output (current sinking type) (Negative logic *1)
Number of Channels		64 channels (16 channels share a negative common)
Rate	Voltage	35VDC(Max.)
	Current	100mA/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(Max.)
Common		
I/O address		Any 32-byte boundary
Interrupt level		1 level use
Boards in one system		Maximum of 16 boards can be install in a same system.
Isolated voltage (I/O-to-system) *2		250Vrms
External power supply		12 - 24VDC (±10%)
Power consumption		5VDC 500mA(Max.)
Operating condition		0 - 50°C, 10 - 90%RH (No condensation)
Connecting distance		50m(Typ.)(depending on wiring environment)
PCI bus specification		32bit, 33MHz, Universal key shapes supported *3
Dimension (mm)		176.41(L) x 105.68(H) *4
Weight		215g
Standard		VCCI Class A, CE Marking (EMC Directive Class A, RoHS Directive), UKCA, KC

*1   Data "0" and "1" correspond to the High and Low levels, respectively.
*2   There was no electrical breakdown after having impressed the specification voltage with AC50/60Hz and DC for one minute to the insulation part.
*3   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).
*4   The size of board No.7299 is 176.41 (L) x 106.68 (H) mm.

Physical Dimensions

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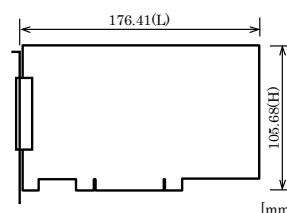
The standard outside dimension (L) is the distance from the end of the board to the outer surface of the slot cover.

Support Software

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

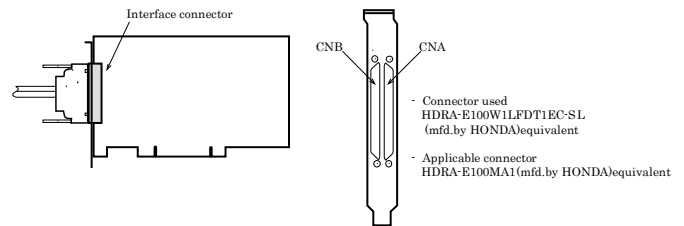| Product Name	Model type	Description
Shielded Cable With Two 100pin Connector *1	PCB100PS-0.5	0.5m
	PCB100PS-1.5	1.5m
	PCB100PS-3	3m
	PCB100PS-5	5m
Connection Conversion Shield Cable (100P→96P) *1	PCB100/96PS-1.5	1.5m
	PCB100/96PS-3	3m
	PCB100/96PS-5	5m
Flat Cable with One 100-Pin Connector *1	PCA100P-1.5	1.5m
	PCA100P-3	3m
	PCA100P-5	5m
Connection Conversion Shield Cable (100P→37P D-SUB x 2) *1	PCB100WS-1.5	1.5m
	PCB100WS-3	3m
	PCB100WS-5	5m
Screw Terminal Unit (M3 x 100P)	EPD-100A	*2*4*7
Screw Terminal Unit (M3 x 96P)	EPD-96A	*2*5*7
Screw Terminal Unit (M3.5 x 96P)	EPD-96	*2*5
Terminal Unit for Cables (M3 x 96P)	DTP-64A	*2*5
Connection Conversion Card (96-Pin → 37-Pin x 2)	CCB-96	*2*5
Screw Terminal (M3 x 37P)	EPD-37A	*3*6*7
Screw Terminal (M3.5 x 37P)	EPD-37	*3*6
General Purpose Terminal (M3 x 37P)	DTP-3C	*3*6
Screw Terminal (M2.5 x 37P)	DTP-4C	*3*6
Signal Monitor / Output Accessory for Digital I/O (64P)	CM-64L	*2*5

*1 If using both the CNA and CNB connectors, two cable sets are required.
*2 If using both the CNA and CNB connectors, two each of the accessories and cable sets are required.
*3 If using both the CNA and CNB connectors, two cable sets are required. You will also require sufficient terminal blocks for the number of I/O points you are using.
*4 PCB100PS optional cable is required separately.
*5 PCB100/96PS optional cable is required separately.
*6 PCB100WS optional cable is required separately.
*7 "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

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

Interface connector

CNB   CNA

- Connector used
  HDRA-E100W1LFDT1EC-SL
  (mfd. by HONDA)equivalent
- Applicable connector
  HDRA-E100MA1(mfd. by HONDA)equivalent

Connector Pin Assignment
Pin Assignments Interface Connector (CNA, CNB)

CNB

Port	Signal	Pin		Pin	Signal	Port
Common plus pin for +E/+F output ports	P-E/F	100		50	P-A/B	Common plus pin for +A/+B output ports
	P-E/F	99		49	P-A/B	
+F port (Output)	O-F7	98		48	O-B7	+B port (Output)
	O-F6	97		47	O-B6	
	O-F5	96		46	O-B5	
	O-F4	95		45	O-B4	
	O-F3	94		44	O-B3	
	O-F2	93		43	O-B2	
	O-F1	92		42	O-B1	
	O-F0	91		41	O-B0	
+E port (Output)	O-E7	90		40	O-A7	+A port (Output)
	O-E6	89		39	O-A6	
	O-E5	88		38	O-A5	
	O-E4	87		37	O-A4	
	O-E3	86		36	O-A3	
	O-E2	85		35	O-A2	
	O-E1	84		34	O-A1	
	O-E0	83		33	O-A0	
Common minus pin for +E/+F output ports	N-E/F	82		32	N-A/B	Common minus pin for +A/+B output ports
	N-E/F	81		31	N-A/B	
	N-E/F	80		30	N-A/B	
	N-E/F	79		29	N-A/B	
	N-E/F	78		28	N-A/B	
	N-E/F	77		27	N-A/B	
	N.C.	76		26	N.C.	
	N.C.	75		25	N.C.	
Common plus pin for +C/+D output ports	P-C/D	74		24	P-8/9	Common plus pin for +8/+9 output ports
	P-C/D	73		23	P-8/9	
+D port (Output)	O-D7	72		22	O-97	+9 port (Output)
	O-D6	71		21	O-96	
	O-D5	70		20	O-95	
	O-D4	69		19	O-94	
	O-D3	68		18	O-93	
	O-D2	67		17	O-92	
	O-D1	66		16	O-91	
	O-D0	65		15	O-90	
+C port (Output)	O-C7	64		14	O-87	+8 port (Output)
	O-C6	63		13	O-86	
	O-C5	62		12	O-85	
	O-C4	61		11	O-84	
	O-C3	60		10	O-83	
	O-C2	59		9	O-82	
	O-C1	58		8	O-81	
	O-C0	57		7	O-80	
Common minus pin for +C/+D output ports	N-C/D	56		6	N-8/9	Common minus pin for +8/+9 output ports
	N-C/D	55		5	N-8/9	
	N-C/D	54		4	N-8/9	
	N-C/D	53		3	N-8/9	
	N-C/D	52		2	N-8/9	
	N-C/D	51		1	N-8/9	

CNA

| Port	Signal	Pin		Pin	Signal	Port
	N.C.	1		51	N.C.	
	N.C.	2		52	N.C.	
	N.C.	3		53	N.C.	
	N.C.	4		54	N.C.	
	N.C.	5		55	N.C.	
	N.C.	6		56	N.C.	
+0 port (Input)	*I-00	7		57	I-40	+4 port (Input)
	*I-01	8		58	I-41	
	*I-02	9		59	I-42	
	*I-03	10		60	I-43	
	*I-04	11		61	I-44	
	*I-05	12		62	I-45	
	*I-06	13		63	I-46	
	*I-07	14		64	I-47	
+1 port (Input)	*I-10	15		65	I-50	+5 port (Input)
	*I-11	16		66	I-51	
	*I-12	17		67	I-52	
	*I-13	18		68	I-53	
	*I-14	19		69	I-54	
	*I-15	20		70	I-55	
	*I-16	21		71	I-56	
	*I-17	22		72	I-57	
Common plus pin for +0/+1 input ports	P-0/1	23		73	P-4/5	Common plus pin for +4/+5 input ports
	P-0/1	24		74	P-4/5	
	N.C.	25		75	N.C.	
	N.C.	26		76	N.C.	
	N.C.	27		77	N.C.	
	N.C.	28		78	N.C.	
	N.C.	29		79	N.C.	
	N.C.	30		80	N.C.	
	N.C.	31		81	N.C.	
	N.C.	32		82	N.C.	
+2 Port (Input)	I-20	33		83	I-60	+6 port (Input)
	I-21	34		84	I-61	
	I-22	35		85	I-62	
	I-23	36		86	I-63	
	I-24	37		87	I-64	
	I-25	38		88	I-65	
	I-26	39		89	I-66	
	I-27	40		90	I-67	
+3 Port (Input)	I-30	41		91	I-70	+7 Port (Input)
	I-31	42		92	I-71	
	I-32	43		93	I-72	
	I-33	44		94	I-73	
	I-34	45		95	I-74	
	I-35	46		96	I-75	
	I-36	47		97	I-76	
	I-37	48		98	I-77	
Common plus pin for +2/+3 input ports	P-2/3	49		99	P-6/7	Common plus pin for +6/+7 input ports
	P-2/3	50		100	P-6/7	

I-00 - I-17 can be used as interrupt signal.

I-00 - I-77	64 channels input signal. Connect output signals from the external device to these pins.
O-80 - O-F7	64 channels output signal. Connect input signals from the external device to these pins.
P-0/1 - P-6/7	Connect the positive side of the external power supply. These pins are common to 16 input signal pins.
P-8/9 - P-E/F	Connect the positive side of the external power supply. These pins are common to 16 output signal pins.
N-8/9 - N-E/F	Connect the negative side of the external power supply. These pins are common to 16 output signal pins. A current of 0.3 A is allowable per connector pin. Connect the required number of pins for the total current for the corresponding 16 output signals.
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
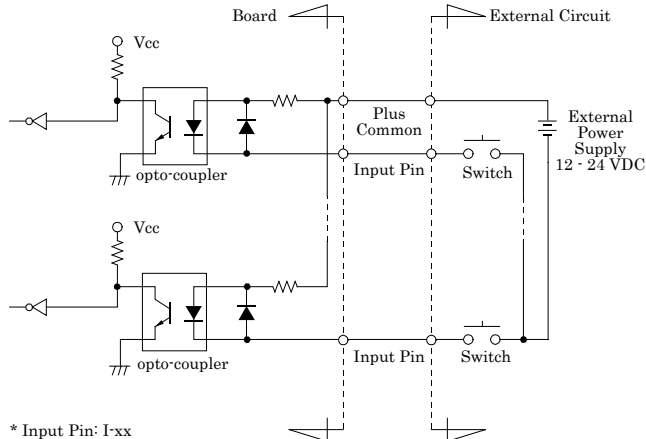
* Input Pin: I-xx

The input circuits of interface blocks of this product is illustrated in the image above.
The input circuit of this board is illustrated in the image above.
The on-board Optocoupler isolated internal input circuits from outside devices.   The input channels are to be connected with current sinking output signals.   Driving these Optocoupler isolated circuits require an additional power supply isolated from the PC system.   When a 12VDC external power is used, each input channel will consume about 2.6mA current; when a 24VDC external power supply is selected, each input channel will consume about 5.1mA current.
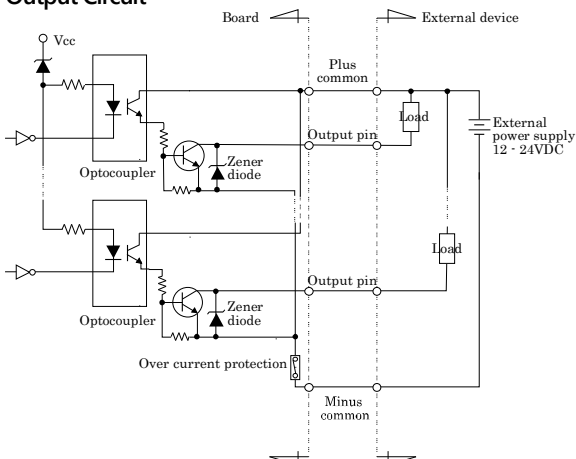
Connecting a Switch
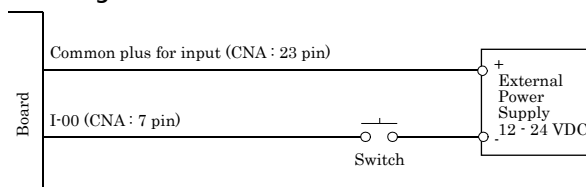
Connecting Output Signals

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


* O-xx shows output pins.

The output circuit of this board is 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 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.
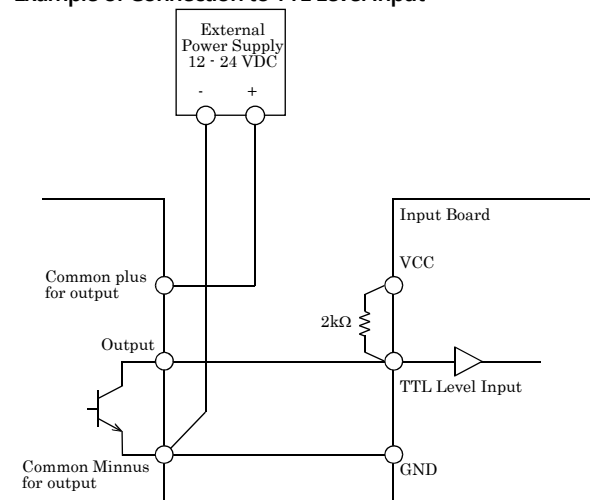
⚠ CAUTION

- When the PC is turned on, all output are reset to OFF.
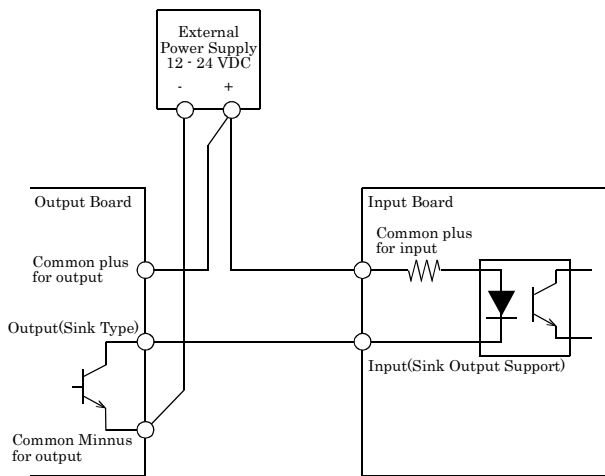
Connection to the LED
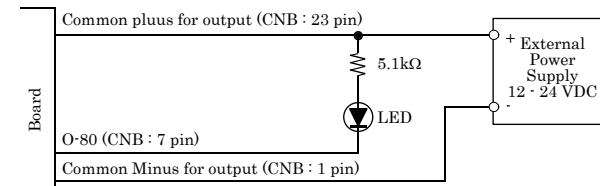
When "1" is output to a relevant bit, the corresponding LED comes on.
When "0" is output to the bit, in contrast, the LED goes out.

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.

External
Power Supply
12 - 24 VDC
- +

Output Board

Common plus
for output

Output(Sink Type)

Common Minnus
for output

Input Board

Common plus
for input

Input(Sink Output Support)

Block Diagram

PCI BUS*

Control Circuit

Interrupt Control

Opto-
coupler

Opto-
coupler
&
Transistor

External
Digital Input Port0
(8ch, Group0)
External
Digital Input Port1
(8ch, Group1)
External
Digital Input Port2
(8ch, Group2)
External
Digital Input Port3
(8ch, Group3)
External
Digital Input Port4
(8ch, Group4)
External
Digital Input Port5
(8ch, Group5)
External
Digital Input Port6
(8ch, Group6)
External
Digital Input Port7
(8ch, Group7)
External
Digital Output Port8
(8ch, Group8)
External
Digital Output Port9
(8ch, Group9)
External
Digital Output PortA
(8ch, GroupA)
External
Digital Output PortB
(8ch, GroupB)
External
Digital Output PortC
(8ch, GroupC)
External
Digital Output PortD
(8ch, GroupD)
External
Digital Output PortE
(8ch, GroupE)
External
Digital Output PortF
(8ch, GroupF)

PIO-64/64L(PCI)H