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High Speed Isolated Digital I/O Board for PCI

PIO-32/32F(PCI)H

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

This product is a PCI-compliant interface board for isolated high-speed input/output of digital signals.
The PIO-32/32F(PCI)H installs the high-speed opto-coupler within 5μsec of response time, and can input up to 32 signals and output up to 32 signals.
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++.
This product has the difference point in the specification though past PIO-32/32F(PCI) and the connector shape and the signal arrangement are compatible.   The difference point is shown in "Differences between the PIO-32/32F(PCI)H and PIO-32/32F(PCI)".

Features

The opto-coupler isolated input 32 points and the opto-coupler isolated open-collector output 32 points are installed.
Moreover, it is possible to correspond to a different external power supply by a common composition in every 16 points.

The high-speed opto-coupler within 5μ□sec of response time is installed.

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

The connector shape and the signal arrangement is compatible with the PIO-32/32F(PCI).

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

The board has a digital filter to prevent wrong recognition of input signals from carrying noise or a chattering.

The protection circuit (surge voltage and overcurrent) is built into the output transistor.

Up to 35VDC, 50mA per output signal, max.

Specification

Encoder Input Section

Item		Specification
Input		
	Input format	Opto-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	2.2kΩ
	Input ON current	4.9mA or more
	Input OFF current	0.68mA 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	5μ sec within
Output		
	Output format	Opto-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	Output voltage	35VDC (Max.)
	Output current	50mA (par channel) (Max.)
	Response time	5μ sec within
Common		
	I/O address	Any 32-byte boundary
	Max. board count for connection	16 boards
	Dielectric strength	500Vrms
	External circuit power supply	12 - 24VDC(±10%)
	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 *2
	Dimension (mm)	176.41(L) x 105.68(H)
	Weight	215g
Certification		RoHS,CE,VCCI

*1   Data "0" and "1" correspond to the High and Low levels, respectively.
*2   This board requires +5V power supply from expansion slots (it does not operate in the environment of only +3.3V power supply).

Board Dimensions

176.41(L)

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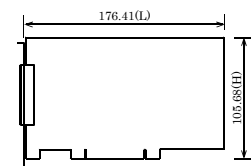
The standard outside dimension (L) is [mm]
the distance from the end of the board
to the outer surface of the slot cover.

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(98/PC) 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 useful for checking operation is provided.
You can download the updated version from the CONTEC's Web site (http://www.contec.com/apipac/).   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.
You can download the updated version from the CONTEC's Web site (http://www.contec.com/apipac/).   For more details on the supported OS, applicable language and new information, please visit the CONTEC's Web site.

Data acquisition VI 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.
See http://www.contec.com/vidaq/ for details and download of VI-DAQ.

Packing List

Board [PIO-32/32F(PCI)H] …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.

Accessories

Accessories (Option)

Screw Terminal Unit (M3 x 96P)   : EPD-96A *1*4
Screw Terminal Unit (M3.5 x 96P)   : EPD-96 *1
Terminal Unit for Cables (M2.5 x 96P)   : DTP-64(PC) *1
Signal monitor Accessory for Digital I/O (64Bits)
                                        : CM-64L *1
Screw Terminal Unit (M3 x 37P)   : EPD-37A *2
Screw Terminal Unit (M3.5 x 37P)   : EPD-37 *2
General Purpose Terminal (M3 x 37P)   : DTP-3A *2
Screw Terminal (M2.6 x 37P)   : DTP-4A *2
Signal monitor Accessory for Digital I/O (32Bits)
                                        : CM-32L *2
Connection Conversion Board (96-Pin → 37-Pin x 2)
                                        : CCB-96 *3

*1   A PCB96P-1.5 or PCB96PS-1.5P optional cable is required separately.
*2   A PCB96WS-1.5P optional cable is required separately.
*3   Option cable PCB96P-1.5 or PCB96PS-1.5P, and the cable for 37-pin D-SUB are
       required separately.
*4   "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.

Cable & Connector

Cable (Option)

Shield Cable with 96-Pin Half-Pitch Connectors at Both Ends
                                        : 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)
                                        : PCB96P-5 (5m)

Shield Cable with 96-Pin Half-Pitch Connectors at One End
                                        : PCA96PS-0.5P (0.5m)
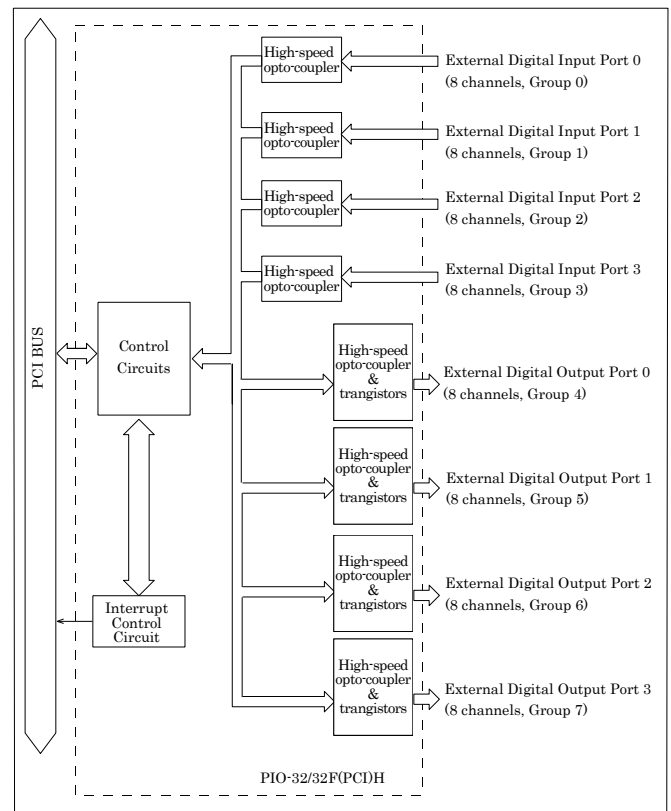   : PCA96PS-1.5P (1.5m)
                                        : PCA96PS-3P (3m)
                                        : PCA96PS-5P (5m)

Flat Cable with 96-Pin Half-Pitch Connectors at One End
                                        : PCA96P-1.5 (1.5m)
                                        : PCA96P-3 (3m)
                                        : PCA96P-5 (5m)

Distribution Shield Cable with 96-Pin Half-Pitch Connectors
(96Pin→37Pin x 2)   : PCB96WS-1.5P (1.5m)
                                        : PCB96WS-3P (3m)
                                        : PCB96WS-5P (5m)

Connector (Option)

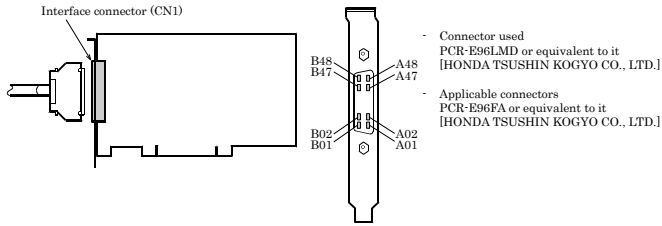Half Pitch 96P Female Connector Set(5 Pieces)   : CN5-H96F

Block Diagram

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 (CN1).

Interface connector (CN1)

- Connector used
  PCR-E96LMD or equivalent to it
  [HONDA TSUSHIN KOGYO CO., LTD.]

- Applicable connectors
  PCR-E96FA or equivalent to it
  [HONDA TSUSHIN KOGYO CO., LTD.]

Connector Pin Assignment
Pin Assignments of Interface Connector (CN1)

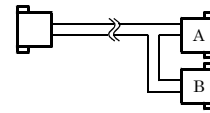| Common plus pin for +6/+7 output ports | OP 6/7 | B48 | | A48 | IP 2/3 | Common plus pin for +2/+3 input ports |
	OP 6/7	B47		A47	IP 2/3	
+7 port (Output)	O-77	B46		A46	I-37	+3 port (Input)
	O-76	B45		A45	I-36	
	O-75	B44		A44	I-35	
	O-74	B43		A43	I-34	
	O-73	B42		A42	I-33	
	O-72	B41		A41	I-32	
	O-71	B40		A40	I-31	
	O-70	B39		A39	I-30	
+6 port (Output)	O-67	B38		A38	I-27	+2 port (Input)
	O-66	B37		A37	I-26	
	O-65	B36		A36	I-25	
	O-64	B35		A35	I-24	
	O-63	B34		A34	I-23	
	O-62	B33		A33	I-22	
	O-61	B32		A32	I-21	
	O-60	B31		A31	I-20	
Common minus pin for +6/+7 output ports	ON 6/7	B30		A30	N.C.	
	ON 6/7	B29		A29	N.C.	
N.C.	N.C.	B28		A28	N.C.	N.C.
	N.C.	B27		A27	N.C.	
	N.C.	B26		A26	N.C.	
	N.C.	B25		A25	N.C.	
	N.C.	B24		A24	N.C.	
	N.C.	B23		A23	N.C.	
	N.C.	B22		A22	N.C.	
	N.C.	B21		A21	N.C.	
Common plus pin for +4/+5 output ports	OP 4/5	B20		A20	IP 0/1	Common plus pin for +0/+1 input ports
	OP 4/5	B19		A19	IP 0/1	
+5 port (Output)	O-57	B18		A18	I-17	+1 port (Input)
	O-56	B17		A17	I-16	
	O-55	B16		A16	I-15	
	O-54	B15		A15	I-14	
	O-53	B14		A14	I-13	
	O-52	B13		A13	I-12	
	O-51	B12		A12	I-11	
	O-50	B11		A11	I-10	
+4 port (Output)	O-47	B10		A10	I-07	+0 port (Input)
	O-46	B09		A09	I-06	
	O-45	B08		A08	I-05	
	O-44	B07		A07	I-04	
	O-43	B06		A06	I-03	
	O-42	B05		A05	I-02	
	O-41	B04		A04	I-01	
	O-40	B03		A03	I-00	
Common minus pin for +4/+5 output ports	ON 4/5	B02		A02	N.C.	N.C.
	ON 4/5	B01		A01	N.C.	

I-00 - I-37 can be all used as interrupt input.
* [ ] shows the pin No. specified by the HONDA TSUSHIN KOGYO CO., LTD.

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	The positive side of the external power supply is connected to these pins. These pins are common to 16 input signal pins.
OP 4/5, OP 6/7	The positive side of the external power supply is connected to these pins. These pins are common to 16 output signal pins.
ON 4/5, ON 6/7	The negative side of the external power supply is connected to this pin. These pins are common to 16 output signal pins.
N.C.	This pin is left unconnected.

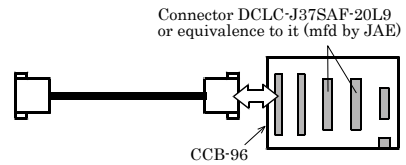### Pin Assignments of Optional Connector PCB96WS
- Optional cable PCB96WS

CNA

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

CNB

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

Pin Assignments of Optional Connector CCB-96
- "Optional cable PCB96PS"
  + "Connector conversion board CCB-96"

Connector DCLC-J37SAF-20L9 or equivalence to it (mfd by JAE)

CCB-96

CN3(CNA)

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

CN4(CNB)

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

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 represents the I-xx.
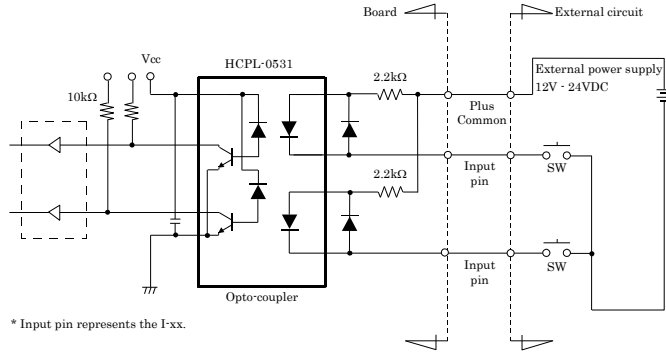
The input circuits of interface blocks of the PIO-32/32F(PCI)H are illustrated in above Figure. The signal inputs are isolated by opto-couplers (ready to accept current sinking output signals). The board therefore requires an additional power supply isolated from the PC system to drive the photo-isolated circuits. When a 12 VDC external power supply is used each channel will consume about 5.5 mA; when a 24 VDC external power supply is selected, each channel will consume about 11 mA.

Connecting a Switch
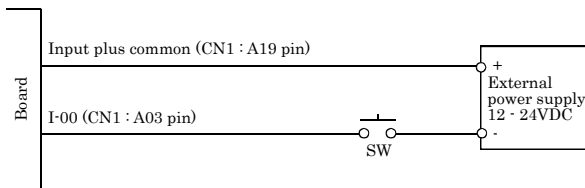
When the SW is ON, the corresponding bit contains 1.
When the SW is OFF, by contrast, the bit contains 0.

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 represents the O-xx.
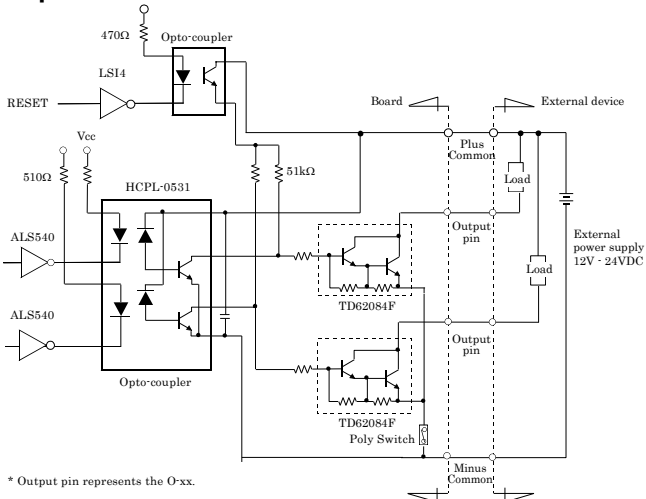
The output circuits of interface blocks of the PIO-32/32F(PCI)H are illustrated in above Figure. The signal output section is an opto-coupler isolated, open-collector output (current sink type). Driving the output section requires an external power supply isolated from the PC system. The rated output current per channel is 50 mA at maximum.

A zener diode is connected to the output transistor for protection from surge voltages.

For every eight output-lines, a self-recovery Ployswitch is equipped on board for over-current protection. Should this Polyswitch be acting, the related output lines will not function correctly.

You must release the load from these output lines or you have to turn off the external power supply off for at least several minutes. You should also check your application to find what is wrong and recover it before you connect the application to these output lines again or turn on the external power supply again.

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

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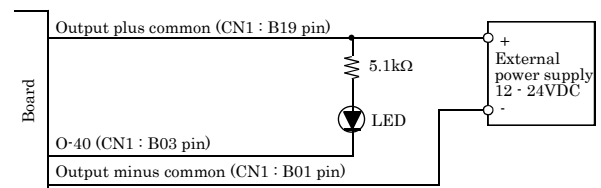
When 1 is output to a relevant bit, the corresponding LED comes on.
When 0 is output to the bit, in contrast, the LED goes out.

Differences between the PIO-32/32F(PCI)H and PIO-32/32F(PCI)

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

	PIO-32/32F(PCI)	PIO-32/32F(PCI)H
Number of input signals available to interrupt requests	4 channels	All of 32 channels
Interrupt level resource allocation	Uses a jumper switch to select whether to allocate interrupt levels.	Automatically allocates on interrupt level.
Digital filter time (Calculation type) *1	$2^n / (16 \times 10^6)$ (n: setting value)	$2^n / (8 \times 10^6)$ (n: setting value)
Current consumption	5VDC 500mA(Max.)	5VDC 400mA(Max.)
Dimensions (mm)	176.41(L) x 106.68(H)	176.41(L) x 105.68(H)
Handshake function	Have	None