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# Digital I/O Board with Opto-Isolation for PCI Express DIO-3232B-PE



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

**Features** 

Opto-coupler isolated input (supporting current sink output) and opto-coupler isolated open-collector output (current sink type)

This product has the 32ch of opto-coupler isolated input (supporting current sink output) and 32ch of opto-coupler isolated open-collector output (current sink type) whose response time 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 PCI Express bus (PC) is isolated from the input and output interfaces by opto-couplers, this product has excellent noise performance.

Power for opto-coupler operation (12VDC 240mA) supplied internally As the power to run the opto-couplers is supplied internally, no external power supply is required. The use of imports allows you to decide

power supply is required. The use of jumpers allows you to decide whether you want to use the internal or external power supply for every 16 points.

#### 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.

# Zener diode for surge voltage protection and the circuit for overcurrent 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.

This product is a PCI Express bus-compliant interface board for input/output of digital signals. This product can input and output digital signals at 12 - 24VDC.

This product features 32 opto-coupler isolated inputs (supporting current sink output) and 32 opto-coupler isolated open-collector outputs (current sink type). You can use all of input signals as interrupt inputs. In addition, this product is equipped with a power supply for driving opto-couplers (12 VDC), 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 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 February 2024.

# Functions and connectors are compatible with PCI compatible board PIO-32/32B(PCI)V

The functions same with PCI compatible board PIO-32/32B(PCI)V are provided. In addition, as there is compatibility in terms of connector shape and pin assignments, it is easy to migrate from the existing system.

# **Packing List**

Product ...1

Please read the following ... 1

# **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

<sup>\*1</sup> Download the files from the following URL.

https://www.contec.com/download/

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

# **Specification**

#### **Function specification**

	Item	Specifications							
Input	Туре	Opto-Isolated Input (for current sinking output) (Negative logic *1)							
	Number of Channels	$32 \mbox{ch}$ (all available for interrupts) (One common power supply per $16$ channels)							
	Input resistance	4.7kΩ							
	Current required to turn ON	2.0mA or more							
	Current required to turn OFF	0.16mA or less							
	Interrupts	Combine 32 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	Туре	Opto-Isolated Open Collector Output (current sinking type) (Negative logic *1)							
	Number of Channels	32ch (One common power supply per 16 channels)							
	Output rated voltage	35VDC (Max)							
	Output rated 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(Renesas) or equivalent							
	Response time	200µsec within							
Common	Internal power	12VDC 240mA *2							
	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	500Vrms							
	External circuit power supply	12 - 24VDC(±10%)							
	Power consumption	When using the internal power supply: 3.3VDC 500mA (Max), 12VDC 350mA (Max) When using the external power supply: 3.3VDC 500mA (Max)							
	Bus specification	PCI Express Base Specification Rev. 1.0a x1							
	Dimension (mm)	169.33(L) x 110.18(H)							
	Weight	160g							

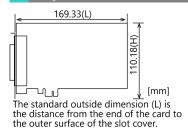
- Data "0" and "1" correspond to the High and Low levels, respectively.

  When using the internal power supply, the input section consumes up to 80mA and the SW section of output channel consumes up to 60mA, so the output current that can be supplied to the external device is 100mA.

#### **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

# **Physical Dimensions**



# **Optional Products**

Product Name	Model type	Description
Shielded Cable with Two 96-Pin Half-Pitch Connectors	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
Shielded Cable with One 96-pin Half-Pitch Connector	PCA96PS-0.5P	0.5m
	PCA96PS-1.5P	1.5m
	PCA96PS-3P	3m
	PCA96PS-5P	5m
Flat Cable with One 96-pin Half-Pitch Connector	PCA96P-1.5	1.5m
·	PCA96P-3	3m
Connection Conversion Shield Cable (96P→37P x 2)	PCB96WS-1.5P	1.5m
, ,	PCB96WS-3P	3m
	PCB96WS-5P	5m
Screw Terminal (M3 * 96)	EPD-96A	*1 *2
Terminal Unit for Relay Terminal Banks	EPD-96	*2
Screw Terminal (M3 * 37P)	EPD-37A	*1 *3
Screw Terminal (M3.5 * 37)	EPD-37	*3
Screw Terminal	DTP-64A	*2
General Purpose Terminal	DTP-3C	*3
Screw Terminal	DTP-4C	*3
Signal monitor Accessory for Digital I/O (64bits)	CM-64L	*2
Signal monitor Accessory for Digital I/O (32bits)	CM-32L	*3
Connector Conversion Board (96pin→37pinx2)	CCB-96	*4

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

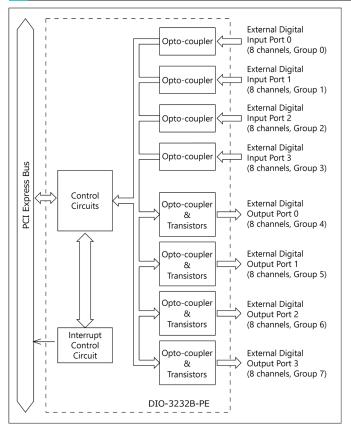
- PCB96P or PCB96PS optional cable is required separately.

  PCB96WS optional cable is required separately.

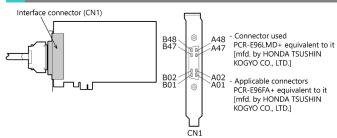
  Option cable PCB96P or PCB96PS, and the cable for 37-pin D-SUB are required separately.

Visit the CONTEC website for the latest optional products.

# **Block Diagram**



# **Connecting an Interface Connector**



Lavout on the Interface Connector(CN1)

Layout on the In	tertace	Con	nector(CN1)	1		
Common plus pin for	OP-6/7	B48		A48	IP-2/3	Common plus pin for
+6/+7 output ports	OP-6/7	B47		A47	IP-2/3	+2/+3 input ports
	0-77	B46		A46	I-37	
	O-76	B45		A45	I-36	
	O-75	B44		A44	I-35	
+7 port	0-74	B43		A43	I-34	+3 port
(Output)	O-73	B42		A42	I-33	(Input)
	O-72	B41		A41	I-32	
	O-71	B40		A40	I-31	
	O-70	B39		A39	I-30	
	O-67	B38		A38	1-27	
	O-66	B37		A37	1-26	
	O-65	B36		A36	1-25	
16 port	0-64	B35	[49] [1]	A35	1-24	+2 port
+6 port (Output)	0-63	B34	B48 A48	A34	1-23	(Input)
	0-62	B33		A33	1-23	
	O-61	B32		A32	I-21	
	0-60	B31		A31	1-20	
		B30		A30	IN-2/3	
Common minus pin for +6/+7 output ports	ON-6/7	B29		A30 A29	IN-2/3	Common minus pin for +2/+3 input ports
roy r r output ports	N.C.	B29 B28		A29	N.C.	12/ 13 input ports
		B27		A27	N.C.	
	N.C.					
	N.C.	B26		A26	N.C.	
N.C.	N.C.	B25		A25	N.C.	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
+4/+3 output ports	OP-4/5	B19		A19	IP-0/1	+o/ + i input ports
	O-57	B18		A18	I-17	
	O-56	B17	<del>                                      </del>	A17	I-16	
	O-55	B16		A16	I-15	
+5 port	0-54	B15	B01 A01	A15	I-14	+1 port
(Output)	O-53	B14	[96] [48]	A14	I-13	(Input)
	O-52	B13		A13	I-12	
	O-51	B12		A12	I-11	
	O-50	B11		A11	I-10	
	O-47	B10		A10	I-07	
	0-46	B09		A09	1-06	
	O-45	B08		A08	I-05	
+4 port	0-44	B07		A07	I-04	+0 port
(Output)	O-43	B06		A06	I-03	(Input)
	0-42	B05		A05	I-02	
	O-41	B04		A04	I-01	
	O-40	B03		A03	1-00	
Common minus pin for	ON-4/5	B02		A02	IN-0/1	Common minus pin for
common minas pirmor						

<sup>\*</sup> I-00 - I-37 can be used as interrupt signal.

The numbers in square brackets [] are pin numbers designated by HONDA TSUSHIN KOGYO CO., LTD.

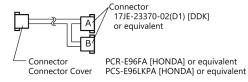
Signal name	Description
I-00 - I-37	32 input signal pins. Connect output signals from the external device to these pins.
0-40 - 0-77	32 output signal pins. Connect these pins to the input signal pins of the external device.
IP-0/1	When the external power supply is selected, its positive side is connected to these pins. When the internal power supply is used, this pin output power at +12 V. These pins are common to 16 input signal pins.
IP-2/3	When the external power supply is selected, its positive side is connected to these pins. When the internal power supply is used, this pin output power at +12 V. These pins are common to 16 input signal pins.
OP-4/5	When the external power supply is selected, its positive side is connected to these pins. When the internal power supply is used, this pin output power at +12 V. These pins are common to 16 output signal pins.
OP-6/7	When the external power supply is selected, its positive side is connected to these pins. When the internal power supply is used, this pin output power at +12 V. These pins are common to 16 output signal pins.
IN-0/1	When the external power supply is selected, its negative side is connected to these pins. When the internal power supply is used, this pin serves as the ground. These pins are common to 16 input signal pins.
IN-2/3	When the external power supply is selected, its negative side is connected to these pins. When the internal power supply is used, this pin serves as the ground. These pins are common to 16 input signal pins.
ON-4/5	When the external power supply is selected, its negative side is connected to these pins. When the internal power supply is selected, this pin serves as the ground. These pins are common to 16 output signal pins. One pin permissible current of the connector is 1A Please connect necessary number of pins for the corresponding total current of the output 16 channels. When 16 channels are used by the output full ratings (100mA per 1 channel), it is necessary to connect all.
ON-6/7	When the external power supply is selected, its negative side is connected to these pins. When the internal power supply is selected, this pin serves as the ground. These pins are common to 16 output signal pins. One pin permissible current of the connector is 1A Please connect necessary number of pins for the corresponding total current of the output 16 channels. When 16 channels are used by the output full ratings (100mA per 1 channel), it is necessary to connect all.
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.

### Pin Assignments of Optional Connector PCB96WS

- Option cable PCB96WS-\*\*



	CNA		CNB										
	N.C.	19						N.C.	19				
Common plus pin for +0/+1 input ports	IP- 0/1	18		37	IP- 2/3	Common plus pin for +2/+3 input ports	Common plus pin for +4/+5 output ports	OP- 4/5	18		37	OP- 6/7	Common plus pin for +6/+7 output port
+1 port (Input)	I-17 I-16 I-15 I-14 I-13 I-12 I-11 I-10	17 16 15 14 13 12 11	19 37	35 34 33 32 31	I-34 I-33 I-32 I-31	+3 port (Input)	+5 port (Output)	O-57 O-56 O-55 O-54 O-53 O-52 O-51 O-50	16 15 14 13 12 11	19 37	35 34 33 32 31 30	0-72	+7 port (Output)
+0 port (Input)	I-07 I-06 I-05 I-04 I-03 I-02 I-01 I-00	9 8 7 6 5 4 3	1 20	28 27 26 25 24 23 22 21	I-27 I-26 I-25 I-24 I-23 I-22 I-21	+2 port (Input)	+4 port (Output)	O-47 O-46 O-45 O-44 O-43 O-42 O-41 O-40	9 8 7	1 20	28 27 26 25 24 23 22 21	O-67 O-66 O-65 O-64 O-63 O-62	+6 port (Output)
Common minus pin for +0/+1 input ports	IN- 0/1	1		20	IN- 2/3	Common minus pin for +2/+3 input ports	Common minus pin for +4/+5 output ports	4/5	1		20	ON- 6/7	Common minus pin fo +6/+7 output por

Connector Cover

# Pin Assignments of Optional Connector CCB-96

"Optional cable PCB96PS" + "Connector conversion board CCB-96"

Connector DCLC-J37SAF-20L9
or equivalent (mfd by JAE)

CCB-96

Connector PCR-E96FA [HONDA] or equivalent

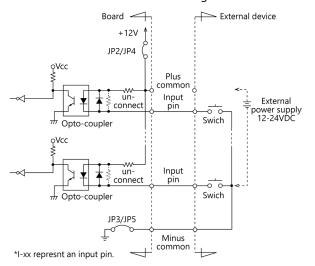
CN3(CNA)								CN4(CNB)						
	N.C.	19							N.C.	19				
Common plus pin for +0/+1 input ports	IP- 0/1	18		37	IP- 2/3	Common plus pin for +2/+3 input ports		Common plus pin for +4/+5 output ports	OP 4/5	18		37	OP 6/7	Common plus pin for +6/+7 output ports
	I-17	17		36	I-37				0-57	17		36	0-77	
	I-16	16	19 37	35	I-36				0-56	16	19 37	35	0-76	
	I-15	15	6	34	I-35				O-55	15	66	34	0-75	
+1 port	I-14	14	000	33	I-34	+3 port		+5 port	0-54	14	00	33	0-74	+7 port
(Input)	I-13	13	000	32	I-33	(Input)		(Output)	O-53	13	000	32	0-73	(Output)
	I-12	12	0 0	31	I-32				0-52	12	0 0	31	0-72	
	I-11	11	000	30	I-31				0-51	11	000	30	0-71	
	I-10	10	000	29	I-30				O-50	10	000	29	0-70	
	I-07	9	000	28	I-27				0-47	9	00	28	0-67	
	I-06	8	000	27	I-26				0-46	8	000	27	0-66	
	I-05	7	0 0	26	I-25				0-45	7	0 0	26	0-65	
+0 port	I-04	6	000	25	I-24	+2 port		+4 port	0-44	6	000	25	0-64	. o porc
(Input)	I-03	5	ا ۾ ۾	24	I-23	(Input)		(Output)	0-43	5	٥٩	24	0-63	(Output)
	I-02	4	4	23	I-22				0-42	4	4	23	0-62	
	I-01	3	1 20	22	I-21				0-41	3	1 20	22	0-61	
	I-00	2		21	I-20				0-40	2		21	0-60	
Common						Common		Common					<b>.</b>	Common
minus pin for +0/+1 input	IN- 0/1	1		20	IN- 2/3	minus pin for +2/+3 input		minus pin for +4/+5 output	ON 4/5	1		20	ON 6/7	minus pin for +6/+7 output
ports	0/1				2/3	port		ports	4/3				0//	ports

PCS-E96LKPA [HONDA] or equivalent

### **Connecting Input and Output Signals**

#### Input Circuit

Connect the input signals to a device which can be current-driven, such as a switch or transistor output device. The product inputs the ON/OFF state of the current-driven device as a digital value.

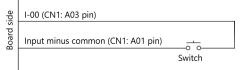


This product inputs the ON/OFF state of the current-driven device as a digital value. The signal inputs are isolated by opto-couplers (ready to accept current sinking output signals). This product therefore requires the on-board internal power supply or the external power supply to drive the input section of this product. The power requirement for each input pin is about 5.1 mA at 24 VDC (about 2.6 mA at 12 VDC).



Please refer to "Supply power setting jumper" of Reference Manual and choose the proper supply by jumpers.

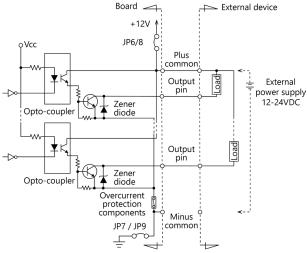
#### Connecting a Switch (An Example to use Input I-00)



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

#### **Output Circuit**

Connect the output signals to a current-driven controlled device such as a relay or LED. The product controls turning on/off the current-driven controlled device using a digital value.



\*O-xx represent an output pin.

The signal output section is an opto-coupler isolated, open-collector output (current sink type).

This product therefore requires the on-board internal power supply or the external power supply to drive the output section of this product.

The rated output current per channel is 100mA 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 0.5V or less at an output current within 50mA or at most 1.0V at an output current within 100mA.

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

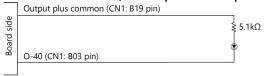
An overcurrent protection component is provided for every 8 output transistors.

**⚠** CAUTION

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

Please refer to "Supply power setting jumper" of Reference Manual and choose the proper supply by jumpers.

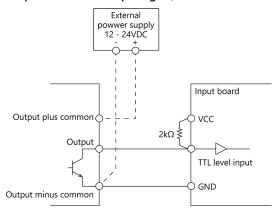
### Connection to the LED (An Example to use Output O-40)



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.

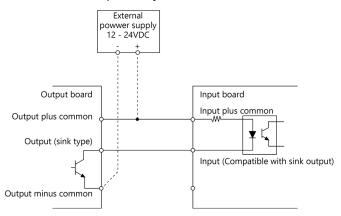


# Example of Connection to TTL Level Input (Connection Example of Output and TTL level Input Signal)

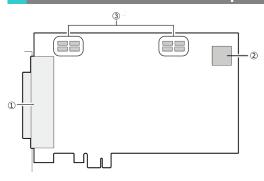


### Connecting the Sink Type Output and Sink Output Support Input

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.



# **Nomenclature of Product Components**



No.	Name	No.	Name
1	Interface Connector	3	Supply power setting jumper
2	Board ID Setting Switch		