Opto-Isolated Digital I/O for PCI Express
32 ch type
DIO-3232H-PE

This product is a PCI Express bus-compliant interface board used to provide a digital signal I/O function on a PC.   The product can input and output digital signals at high voltages (24 - 48VDC).

DIO-3232H-PE features 32 opto-coupler isolated inputs and 32 opto-coupler isolated open-collector outputs. You can use 32 input signals as interrupt inputs. Equipped with the digital filter function to prevent wrong recognition of input signals is provided and output transistor protection circuit (surge voltage protection and over current protection).

Windows/Linux drivers are available.

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 July, 2022.

Features

Opto-coupler isolated input (supporting current sink output) and opto-coupler isolated open-collector output (current sink type)
DIO-3232H-PE has the opto-coupler isolated input 32channels (supporting current sink output) whose response speed is 200μsec and opto-coupler isolated open-collector output 16channels (current sink type). Common terminal provided per 16channels, capable of supporting a different external power supply.   Supporting driver voltages of high voltages (24 - 48 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 all of the input signals as interrupt request signals.
You can use all of the 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 drivers are available.
By using the digital I/O driver, each Windows/Linux application can be created. 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. 60VDC, 100mA per channel.

Functions and connectors are compatible with PCI compatible board PIO-32/32H(PCI)H.
DIO-3232H-PE : The functions same with PCI compatible board PIO-32/32H(PCI)H 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.

LabVIEW is supported by a plug-in of dedicated library.
Using the dedicated library makes it possible to make a LabVIEW application.

Specification

Item		Specifications
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) (1 common in 16channels)
Input resistance		15kΩ
Input ON current		1.36mA or more
Input OFF current		0.16mA or less
Interrupt		32 interrupt input signals are arranged into a single output of interrupt signal INTA. An interrupt is generated at the falling edge (HIGH-to-LOW transition) or rising edge (LOW-to-HIGH transition).
Response time		200μsec within
Output		
Output format		Opto-isolated open collector output (Compatible with current sink)(Negative logic *1)
Number of output signal channels		32 channels (1 common in 16channels)
Output rating	Output voltage	60VDC (Max.)
	Output current	100mA (par 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 RD68FM(NEC) or the equivalence for it
Response time		200μsec 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		500Vrms
External circuit power supply		24 - 48VDC (±10%)
Power consumption		3.3VDC 480mA (Max.)
Operating condition		0 - 50℃, 10 - 90%RH (No condensation)
Allowable distance of signal extension		Approx. 50m (depending on wiring environment)
Bus specification		PCI Express Base Specification Rev. 1.0a x1
Dimension (mm)		121.69(L) x 110.18(H)
Connector		96 pin half pitch connector [M (male) type] PCR-E96LMD+ [HONDA TSUSHIN KOGYO CO., LTD.] equivalent to it
Weight		120g
Standard		VCCI Class A, CE Marking (EMC Directive Class A, RoHS Directive), UKCA

*1   Data "0" and "1" correspond to the High and Low levels, respectively.
*2   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).

Board Dimensions

169.33(L)

110.18(H)

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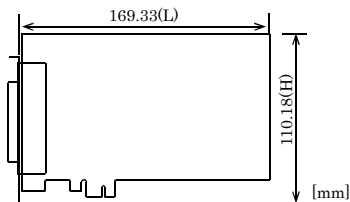
The standard outside dimension (L) is the distance from the end of the board to the outer surface of the slot cover.

Support Software

The name of the documents	Contents	How to get
Digital I/O Driver software API-DIO(WDM)	Driver software of digital input and output for Windows.	Download (ZIP)
Digital I/O Driver software API-DIO(LNX)	Driver software of digital input and output for Linux.	Download (tgz)
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 (ZIP)

Packing List

Board (DIO-3232H-PE) ...1
Setup Guide ... 1
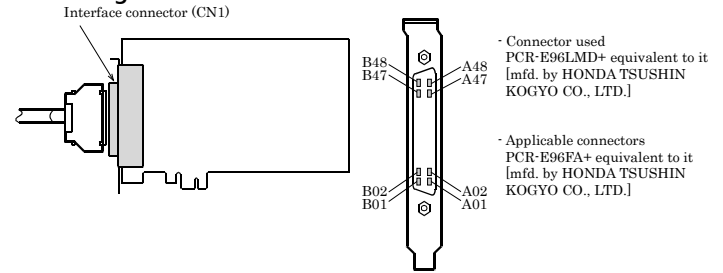Warranty Certificate ...1
Serial Number Label ...1

Option

Item	Model	Description
Cable	PCB96PS-0.5P (0.5m) PCB96PS-1.5P (1.5m) PCB96PS-3P (3m) PCB96PS-5P (5m)	Shield Cable with 96-Pin Half-Pitch Connector at Both Ends (Mold Type)
	PCB96P-1.5 (1.5m) PCB96P-3 (3m)	Flat Cable with 96-Pin Half-Pitch Connectors at Both Ends
	PCA96PS-0.5P (0.5m) PCA96PS-1.5P (1.5m) PCA96PS-3P (3m) PCA96PS-5P (5m)	Shield Cable with 96-Pin Half-Pitch Connector at One End (Mold Type)
	PCA96P-1.5 (1.5m) PCA96P-3 (3m)	Flat Cable with 96-Pin Half-Pitch Connector at One End
	PCB96WS-1.5P (1.5m) PCB96WS-3P (3m) PCB96WS-5P (5m)	Distribution Shield Cable with 96-Pin Half-Pitch Connector (96Pin⇔37Pin x 2)
Accessories	EPD-96A *1*2	Screw Terminal Unit (M3 x 96P)
	EPD-96 *1	Screw Terminal Unit (M3.5 x 96P)
	DTP-64A *1	Terminal Unit for Cables (M3 x 96P)
	EPD-37A *2 *3	Screw Terminal (M3 x 37P)
	EPD-37 *3	Screw Terminal (M3.5 x 37P)
	DTP-3C*3	General Purpose Terminal
	DTP-4C *3	Screw Terminal
	CCB-96 *4	Connection Conversion Board (96-Pin → 37-Pin x 2)

*1   A PCB96P or PCB96PS optional cable is required separately.
*2   "Spring-up" type terminal is used to prevent terminal screws from falling off.
*3   A PCB96WS optional cable is required separately.
*4   Option cable PCB96P or PCB96PS, and the cable for 37-pin D-SUB are required separately.

Using the On-board Connectors

Connecting a Device to a Connector

Interface connector (CN1)

B48
B47
A48
A47

B02
B01
A02
A01

· Connector used PCR-E96LMD+ equivalent to it [mfd. by HONDA TSUSHIN KOGYO CO., LTD.]

· Applicable connectors PCR-E96FA+ equivalent to it [mfd. by HONDA TSUSHIN KOGYO CO., LTD.]

Connector Pin Assignment

[1] A48   A01 [48]

[49] B48   B01 [96]

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

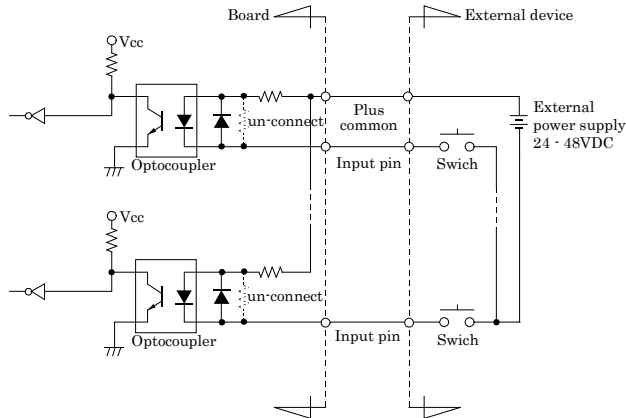| Function	Signal name	Pin No.	Pin No.	Signal name	Function
Common plus pin for +6/+7 output ports	OP 6/7	B48	A48	IP 2/3	Common plus pin for +2/+3 input ports
	OP 6/7	B47	A47	IP 2/3	
+7 port (output)	O-77	B46	A46	I-37*	+3 port (input)
	O-76	B45	A45	I-36*	
	O-75	B44	A44	I-35*	
	O-74	B43	A43	I-34*	
	O-73	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 used as interrupt signal.

Signal name	Description
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	Connect the positive side of the external power supply. These pins are common to 16 input signal pins.
OP 4/5 - OP 6/7	Connect the positive side of the external power supply. These pins are common to 16 output signal pins.
ON 4/5 - ON 6/7	Connect the negative 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

Board ⌐   ⌐ External device

Vcc
un-connect
Plus common
Optocoupler   Input pin   Swich
External power supply 24 - 48VDC

Vcc
un-connect
Optocoupler   Input pin   Swich

* Input pin represent input signals.

The signal inputs are isolated by opto-couplers (ready to accept current sinking output signals).   The board therefore requires an external power supply to drive the inputs.   The power requirement for each input pin is about 3.2mA at 48VDC (about 1.6mA at 24VDC).

Connecting a Switch

Board side

Input plus common (CN1 : A19pin)

I-00 (CN1 : A03pin)

Switch

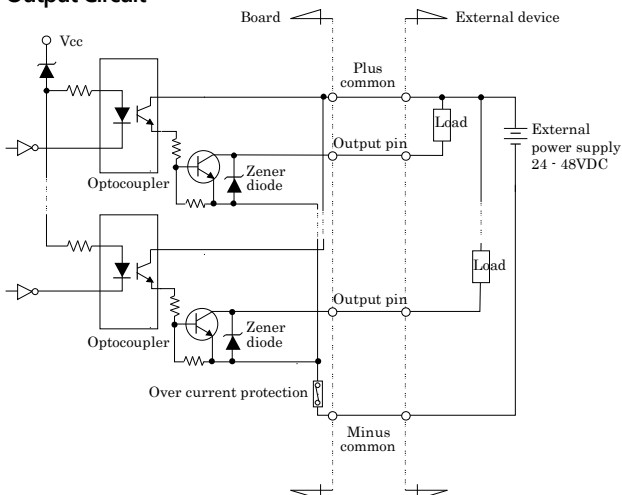+ External power supply 24 - 48VDC -
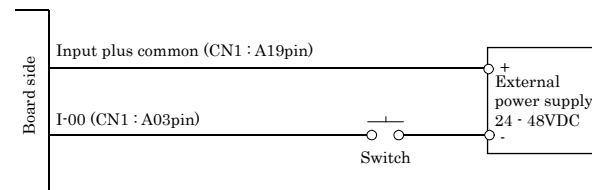
When the switch is ON, the corresponding bit contains 1.
When the switch is OFF, by contrast, the bit contains 0.

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

Board ⌐   ⌐ External device

Vcc
Plus common
Optocoupler   Zener diode   Output pin   Load
External power supply 24 - 48VDC

Optocoupler   Zener diode   Output pin   Load

Over current protection

Minus common
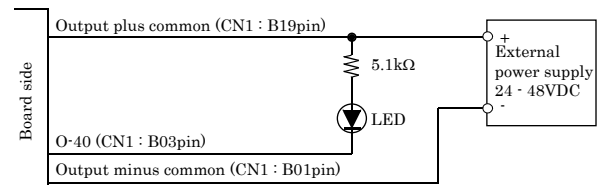
* Output pin represent output signals.

The signal output section is an opto-coupler isolated, open-collector output (current sink type).   Driving the output section requires an external power supply. 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.
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.
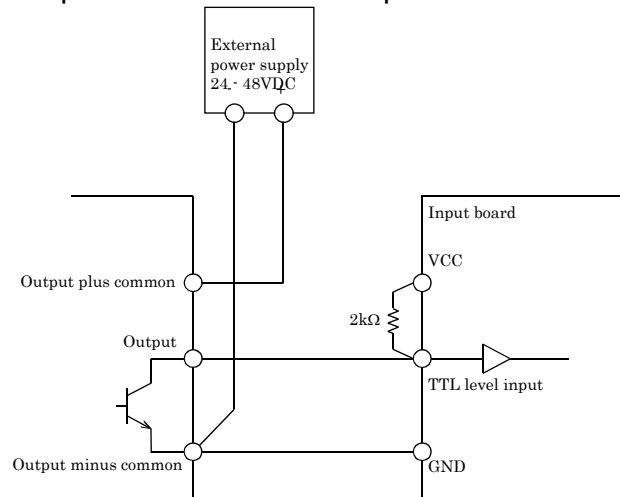
CAUTION

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

Connection to the LED

Board side

Output plus common (CN1 : B19pin)

5.1kΩ

O-40 (CN1 : B03pin)

LED

Output minus common (CN1 : B01pin)

+ External power supply 24 - 48VDC -

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

External power supply 24 - 48VDC

Output plus common

Output

Output minus common

Input board
VCC
2kΩ
TTL level input
GND

Connecting the Sink Type Output and Sink Output Support Input

External power supply 24 - 48VDC - +

Output board

Output plus common

Output (sink type)

Output minus common

Input board
Input plus common
Input (Compatible with sink output)