Negative-Common Opto-Isolated Digital I/O
for PCI Express 16ch type

DIO-1616RL-PE

This product is a PCI Express bus-compliant interface board for input/output of digital signals. This product is a negative-common type isolated digital input/output board and supports input/output of 12 - 24VDC digital signals.

DIO-1616RL-PE features 16 opto-coupler isolated inputs (compatible with current source output signals) and 16 opto-coupler isolated outputs (current source type). You can use all 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 device driver is supported with this product.

* 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 March 2024.

Features

Opto-coupler isolated input (compatible with current source output signals) and opto-coupler isolated open-collector output (current source type)
DIO-1616RL-PE has the 16ch of opto-coupler isolated input (compatible with current source output signals) and 16ch of opto-coupler isolated open-collector output (current source 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.

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.

Functions and connectors are compatible with PCI compatible board PIO-16/16RL(PCI)H.
DIO-1616RL-PE : The functions same with PCI compatible board PIO-16/16RL(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.

Specification

Function Specifications

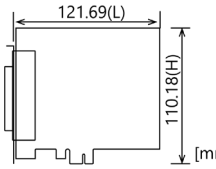
Item		Specifications
Input	Type	Opto-Isolated Input (Compatible with current source output) (Positive logic *1)
	Number of Channels	16ch (all available for interrupts) (One common)
	Input resistance	4.7kΩ
	Current required to turn ON	2.0mA or more
	Current required to turn OFF	0.16mA or less
	Interrupts	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	Opto-Isolated Output (Current source type) (Positive logic *1)
	Number of Channels	16ch (One common)
	Output rated voltage	12 - 24VDC(±10%)
	Output rated current	100mA/channel (Max.)
	Maximum voltage drop at ON	1.5V or less
	Surge protector	Zener diode RD47FM(Renesas) or equivalent
	Response time	200µsec 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
	External circuit power supply	12 - 24VDC(±10%)
	Power consumption	3.3VDC 350mA (Max.)
	Bus specification	PCI Express Base Specification Rev. 1.0a x1
	Dimension (mm)	121.69(L) x 110.18(H)
	Weight	90g

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

Installation Environment Requirements

Item	Specifications
Operating ambient temperature	0 - +50℃
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



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

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 two 37-pin D-type connectors	PCB37PS-0.5P	0.5m
	PCB37PS-1.5P	1.5m
	PCB37PS-3P	3m
	PCB37PS-5P	5m
Flat Cable with 37-Pin D-type Connectors on 2Ends	PCB37P-1.5	1.5m
Shield Cable with One 37pin D-type Connector	PCA37PS-0.5P	0.5m
	PCA37PS-1.5P	1.5m
	PCA37PS-3P	3m
	PCA37PS-5P	5m
Flat Cable with a 37Pin D-type Connectors	PCA37P-1.5	1.5m
	PCA37P-3	3m
Screw Terminal (M3 * 37P)	EPD-37A	*1 *2
Screw Terminal (M3.5 * 37)	EPD-37	*2
General Purpose Terminal	DTP-3C	*2
Screw Terminal	DTP-4C	*2

*1 "Spring-up" type terminal is used to prevent terminal screws from falling off.
*2 PCB37P or PCB37PS optional cable is required separately.

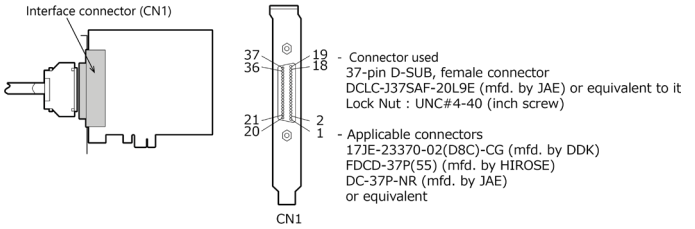
Visit the CONTEC website for the latest optional products.

Packing List

Product ...1

Please read the following ... 1

How to connect the connectors

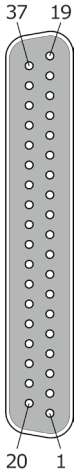


- Connector used
37-pin D-SUB, female connector
DCLC-J37SAF-20L9E (mfd. by JAE) or equivalent to it
Lock Nut : UNC#4-40 (inch screw)

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

Pin Assignments of Interface Connector (CN1)

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



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

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.
IN-0/1	Connect the negative side of the external power supply. This pin is common to 16 input signal pins.
OP-2/3	Connect the positive side of the external power supply. These pins are common to 16 output signal pins.
N.C.	This pin is left unconnected.

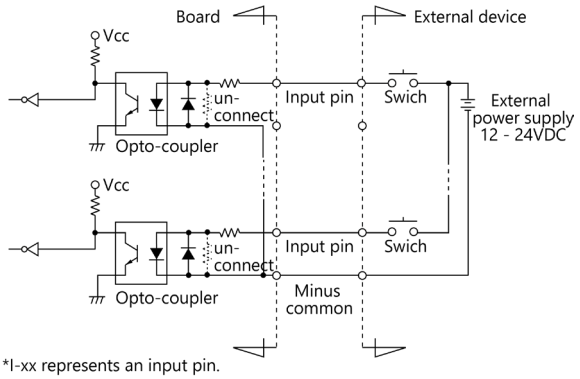
⚠ CAUTION

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 Signals

Input Circuit

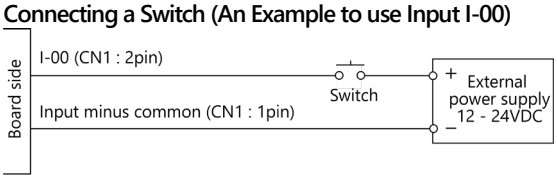
Connect the input signals to a device which can be current-driven, such as a switch or transistor output device.
The connection requires an external power supply to feed currents.
The product inputs the ON/OFF state of the current-driven device as a digital value.



*I-xx represents an input pin.

The signal inputs are isolated by opto-couplers (corresponding to the current source output). The product therefore requires an external power supply to drive the inputs. The power requirement for each input pin is about 5.1 mA at 24 VDC (about 2.6 mA at 12 VDC).

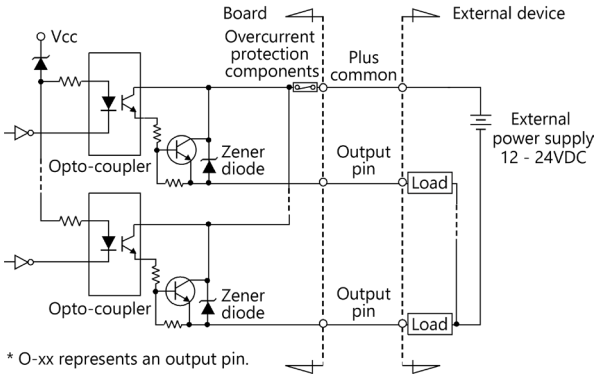
Connecting a Switch (An Example to use Input I-00)



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 connection requires an external power supply to feed currents.
The product controls turning on/off the current-driven controlled device using a digital value.



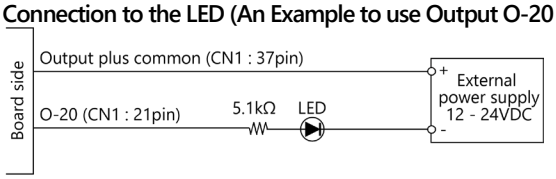
* O-xx represents an output pin.

The signal output section is an opto-coupler isolated output (current source type). Driving the output section requires an external power supply.
The rated output current per channel is 100mA at maximum.
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

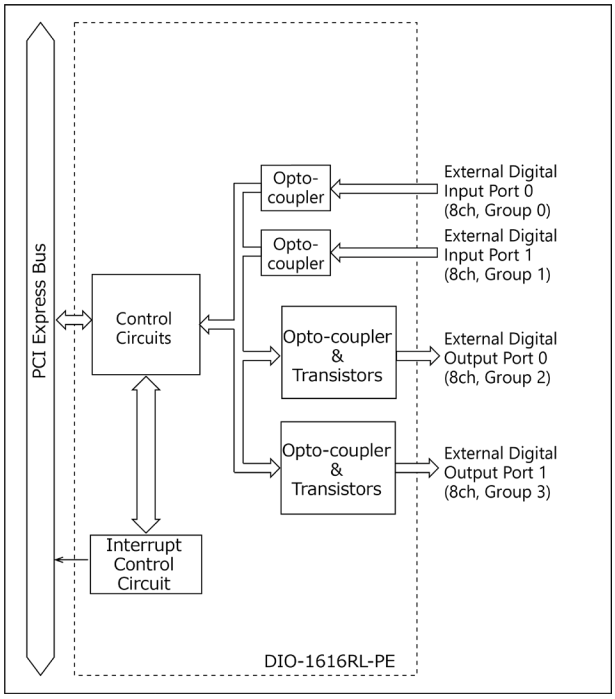
When the PC is turned on, all output are reset to OFF.

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

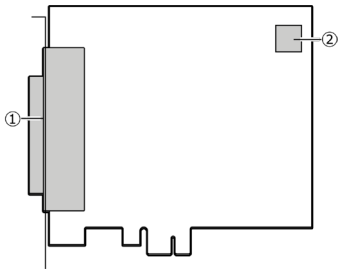


When outputting 1 to the corresponding bit, LED is ON.
When outputting 0 to the corresponding bit, by contrast, LED is off.

Block Diagram



Nomenclature of Product Components



No.	Name
1	Interface Connector
2	Board ID Setting Switch