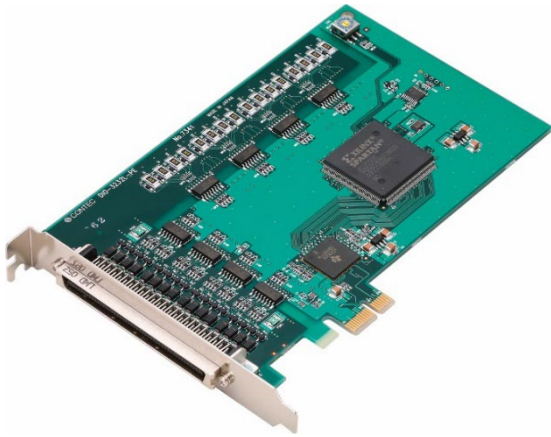


Digital I/O Board with Opto-Isolation for PCI Express DIO-3232L-PE



* 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)
DIO-3232L-PE 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.

32 input signals can be used as interrupt request signals

You can use 32 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.

Functions and connectors are compatible with PCI compatible board PIO-32/32L(PCI)H series.

DIO-3232L-PE : The functions same with PCI compatible board PIO-32/32L(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.

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.

DIO-3232L-PE 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 the 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.

*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 2024.

Specification

Function Specifications

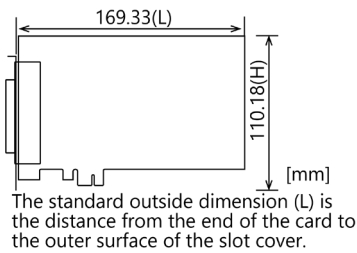
| Item | | Specifications |
|--------|---------------------------------|--|
| Input | Type | Opto-Isolated Input (for current sinking output) (Negative logic *1) |
| | Number of Channels | 32ch (all available for interrupts) (One common power supply per 16 channels) |
| | Input resistance | 4.7kΩ |
| | 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. |
| Output | Response time | 200μsec within |
| | Type | 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) |
| Common | Surge protector | Zener diode RD47FM(Renesas) or equivalent |
| | Response time | 200μsec within |
| | Connecting distance | 50m(Typ.)(depending on wiring environment) |
| | 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 | 1000Vrms |
| | External circuit power supply | 12 - 24VDC(±10%) |
| | Power consumption | 3.3VDC 400mA (Max.) |
| | Bus specification | PCI Express Base Specification Rev. 1.0a x1 |
| | Dimension (mm) | 169.33(L) x 110.18(H) |
| | Weight | 215g |

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

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



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#, 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 |
|---|--------------|-------------|
| 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 |

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

*2 PCB96P or PCB96PS optional cable is required separately.

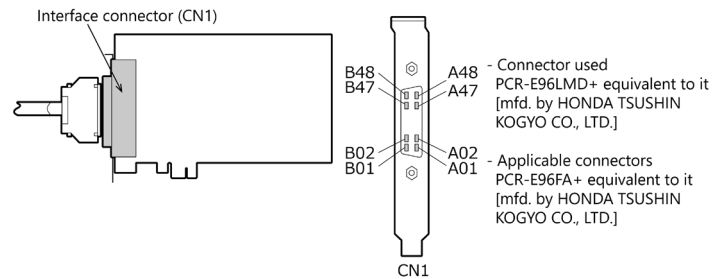
*3 PCB96WS optional cable is required separately.

*4 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.

Connecting an Interface Connector

To connect an external device to this product, plug the cable from the device into the interface connector (CN1) shown below.



Layout on the Interface Connector(CN1)

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

* 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.

Packing List

Product ...1

Please read the following ... 1

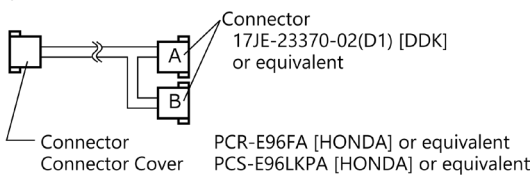
| Signal name | Description |
|-------------|---|
| I-00 - I-37 | 32 input signal pins. Connect output signals from the external device to these pins. |
| O-40 - O-77 | 32 output signal pins. Connect these pins to the input signal pins of the external device. |
| IP-0/1 | Connect the positive side of the external power supply. These pins are common to 16 input signal pins. |
| IP-2/3 | Connect the positive side of the external power supply. These pins are common to 16 input signal pins. |
| OP-4/5 | Connect the positive side of the external power supply. These pins are common to 16 output signal pins. |
| OP-6/7 | Connect the positive side of the external power supply. These pins are common to 16 output signal pins. |
| ON-4/5 | Connect the negative side of the external power supply. 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 | Connect the negative side of the external power supply. 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

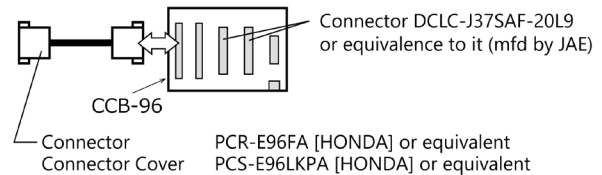
- Option cable PCB96WS-**



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

Pin Assignments of Optional Connector CCB-96

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



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

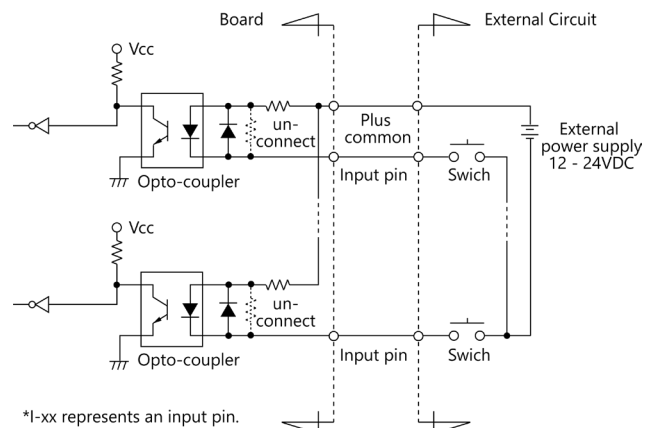
Connecting Input and Output Signals

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.

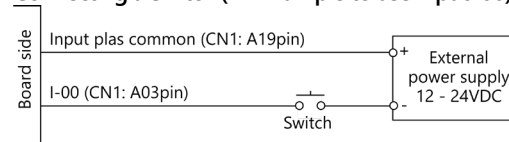
The product inputs the ON/OFF state of the current-driven device as a digital value.



*I-xx represents an input pin.

The signal inputs are isolated by opto-couplers (ready to accept current sinking output signals). 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 I00)

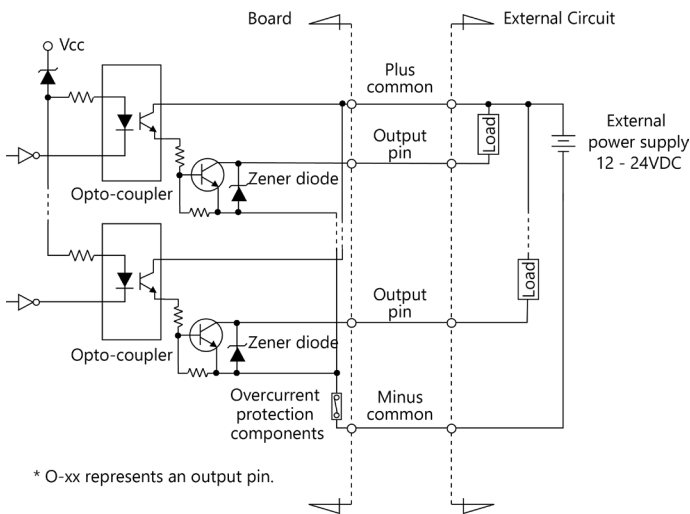


When the switch is ON, the corresponding bit contains 1.
When the switch is OFF, by contrast, the bit contains 0.

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.

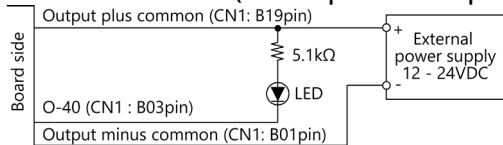


The signal output section is an opto-coupler isolated, open-collector output (current sink type). Driving the output section requires an external power supply. The rated output current per channel is 100mA at maximum. The output section can also be connected to a TTL level input as it uses a low-saturated 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. A zener diode is connected to the output transistor for protection from surge voltages. An overcurrent protection components is provided for every 8 output transistors.

CAUTION

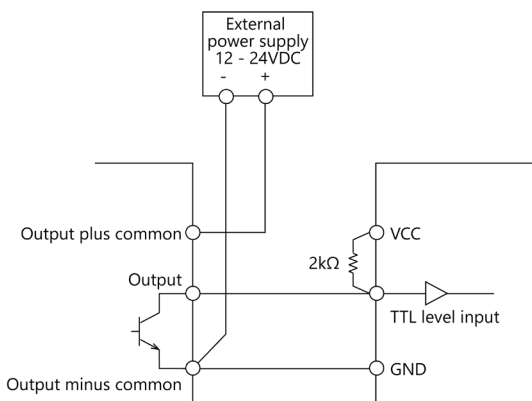
When the PC is turned on, all output are reset to OFF.

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



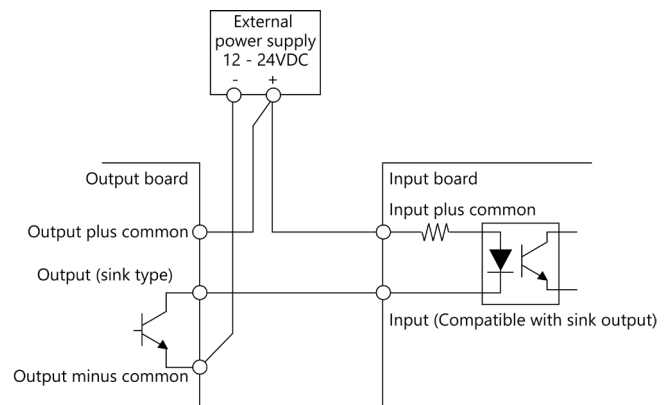
When "1" is output to a relevant bit, the corresponding LED comes on. When "0" is output to the bit, in contrast, the LED goes out.

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

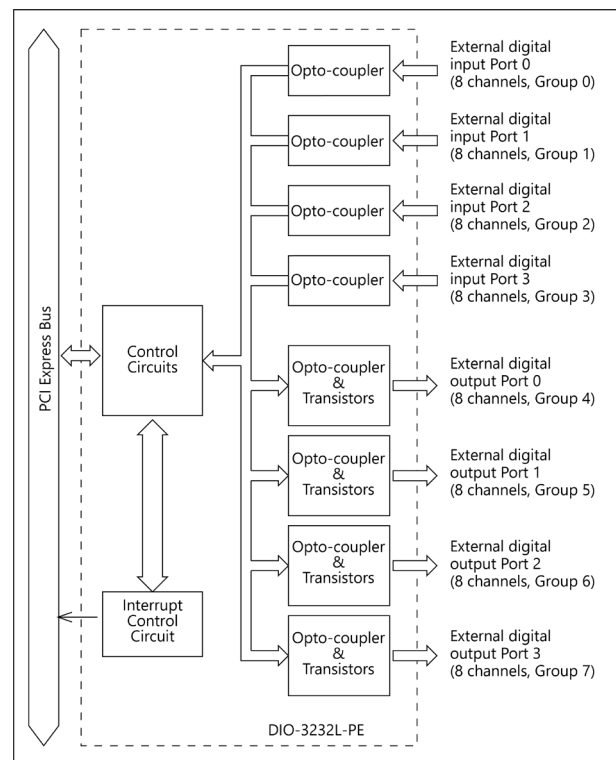


Connecting the Sink Type Output and Sink Output Support Input

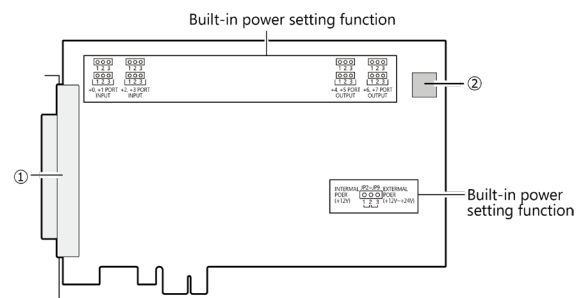
The following example shows a connection between a sink type output (output board) and a sink output support input (input board). Refer to this connection example when you connect such boards to each other.



Block Diagram



Nomenclature of Product Components



| No. | Name |
|-----|-------------------------|
| 1 | Interface Connector |
| 2 | Board ID Setting Switch |

CAUTION

The product doesn't have the built-in power setting function.