DIO-6464LX-USB

Digital I/O Unit with Opto-Isolation for USB

Features

Optocoupler isolated input (compatible with current sink)
64 channels of Optocoupler isolated inputs (compatible with current sink output) and 64 channels of Optocoupler isolated open-collector outputs (current sink type)
This product has the 64 channels of Optocoupler isolated inputs (compatible with current sink output) and the 64 channels of Optocoupler isolated open-collector outputs (current sink type) whose response speed is 200μsec.
Supporting driver voltages of 12 - 24 VDC for I/O.
(12 - 24VDC external circuit power supply is required separately.)

Compatible to USB1.1/USB2.0
Compatible to USB1.1/USB2.0 and capable to achieve high speed transfer at HighSpeed (480 Mbps).

USB HUB function
This product has the USB HUB function. Max. 4 DIO-6464LX-USB can be used in 1 USB port of PC. When you use 4 or more DIO-6464LX-USB, you can do by connecting DIO-6464LX-USB to the another USB port of PC side.
Also, you can connect the CONTEC’s USB device other than DIO-6464LX-USB to the USB port of DIO-6464LX-USB. *1*2

Common terminal provided per 16 channels
Common terminal provided per 16 channels, capable of supporting a different external power supply.

Optocoupler bus isolation
As the USB (PC) is isolated from the input and output interfaces by Optocouplers, this product has excellent noise performance.

This product is an USB2.0-compliant digital I/O unit used to provide a digital signal I/O function on a PC.
This product can input and output digital signals at 12 - 24VDC.
This product features 64 channels of Optocoupler isolated inputs (compatible with current sink output) and 64 channels of Optocoupler isolated open-collector outputs (current sink type).
You can use 16 input signals as interrupt inputs. Equipped with the digital filter function to prevent wrong recognition of input signals and output transistor protection circuit (surge voltage protection and over current protection).

As there is compatible with PCI bus-compatible board PIO-64/64L(PCI)H and PCI Express bus-compatible board DIO-6464L-PE in terms of connector shape and pin assignments, it is easy to migrate from the existing system.
Windows driver is bundled with this product. Possible to be used as a data recording device for LabVIEW, with dedicated libraries.

You can use 16 input signals as interrupt request signals.
You can use 16 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.

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.

Output circuits include zener diodes for surge voltage protection and poly-switches for overcurrent protection.
Zener diodes are connected to the output circuits to protect against surge voltages. Similarly, polyswitches are fitted to each group of 8channels outputs for over-current protection.
The output rating is max. 35VDC, 100mA per channel.

Connectors are compatible with PCI/PCI Express bus-compatible board
As there is compatible with PIO-64/64L(PCI)H and DIO-6464L-PE in terms of connector shape and pin assignments, it is easy to migrate from the existing system. If the system of this product is created by the digital I/O driver API-DIO(98/PC), it is required to replace it with API-DIO(WDM).

Windows compatible driver libraries are attached.
Using the attached digital I/O driver API-DIO(WDM) makes it possible to create applications of Windows. In addition, a diagnostic program by which the operations of hardware can be checked is provided.

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

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

*1 Do not connect the device other than that of CONTEC’s USB to the USB port included on the DIO-6464LX-USB. Otherwise, this may cause a failure or malfunction.

*2 When connecting multiple units with USB HUB function and set up them, do one at a time and complete setup for the previous unit before starting to do the next unit.
**Specification**

<table>
<thead>
<tr>
<th>Item</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input section</td>
<td></td>
</tr>
<tr>
<td>Number of input signal channels</td>
<td>64 channels (16 channels available for interrupts) (1 common in 16 channels unit)</td>
</tr>
<tr>
<td>Input format</td>
<td>Optocoupler isolated input (Compatible with current sink output) (Negative logic*1)</td>
</tr>
<tr>
<td>Input resistance</td>
<td>4.7kΩ</td>
</tr>
<tr>
<td>Input OFF current</td>
<td>2.0mA or more</td>
</tr>
<tr>
<td>Input OFF current</td>
<td>0.16mA or less</td>
</tr>
<tr>
<td>Interrupt</td>
<td>16 interrupt input signals are arranged into a single output of interrupt request signal INTA. An interrupt is generated at the rising edge (HIGH-to-LOW transition) or falling edge (LOW-to-HIGH transition) (set by software).</td>
</tr>
<tr>
<td>Response time</td>
<td>20μsec between *2</td>
</tr>
<tr>
<td>Output section</td>
<td></td>
</tr>
<tr>
<td>Number of output signal channels</td>
<td>64 channels (1 common in 16 channels unit)</td>
</tr>
<tr>
<td>Output format</td>
<td>Optocoupler isolated open collector output (current sink type) (Negative logic*1)</td>
</tr>
<tr>
<td>Output voltage</td>
<td>35VDC (Max.)</td>
</tr>
<tr>
<td>Output current</td>
<td>100mA (pair channel) (Max.)</td>
</tr>
<tr>
<td>Residual voltage with output on</td>
<td>0.5V or less (Output current: 50mA), 1.5V or less (Output current: 100mA)</td>
</tr>
<tr>
<td>Surge protector</td>
<td>Zener diode RD47FM(NEC) or equivalent</td>
</tr>
<tr>
<td>Response time</td>
<td>20μsec between *2</td>
</tr>
<tr>
<td>USB section</td>
<td></td>
</tr>
<tr>
<td>Bus specification</td>
<td>USB Specification 2.0/1.1 standard</td>
</tr>
<tr>
<td>USB transfer rate</td>
<td>12Mbps (Full-speed), 48Mbps (High-speed) *3</td>
</tr>
<tr>
<td>Power supply</td>
<td>Self-power</td>
</tr>
<tr>
<td>Common section</td>
<td></td>
</tr>
<tr>
<td>Number of terminals used at the same time</td>
<td>127 terminals (Max.)*4</td>
</tr>
<tr>
<td>Dielectric strength</td>
<td>250Vrms</td>
</tr>
<tr>
<td>External circuit power supply*5</td>
<td>12 - 24VDC (±10%)</td>
</tr>
<tr>
<td>Current consumption</td>
<td>5VDC 550mA</td>
</tr>
<tr>
<td>Operating conditions</td>
<td>0 - 50°C, 10 - 90%RH (No condensation)</td>
</tr>
<tr>
<td>Allowable distance of signal extension</td>
<td>Approx. 50m (depending on wiring environment)</td>
</tr>
<tr>
<td>Physical dimensions</td>
<td>180(W) x 140(D) x 34(H) (No protrusions)</td>
</tr>
<tr>
<td>Weight</td>
<td>300g (Not including the USB cable, attachment)</td>
</tr>
<tr>
<td>Connector</td>
<td>10pin 0.8mm pitch connector (F (female) type) x 2</td>
</tr>
<tr>
<td>Connector conversion board</td>
<td>HDRA-E100W1LFDT1EC-SL+ [HONDA TSUSHIN]</td>
</tr>
<tr>
<td>Connector conversion board</td>
<td>POA200-20 *7</td>
</tr>
<tr>
<td>Accessories</td>
<td></td>
</tr>
</tbody>
</table>

**Support Software**

Windows version of digital I/O driver  API-DIO(WDM)
[Stored on the bundled CD-ROM driver library API-USBP(WDM)]

It is the library software, which supplies command of hardware produced by our company in the form of standard Win32 API function (DLL). Using programming languages supporting Win32API functions, such as Visual Basic and Visual C++, etc., you can develop high-speed application software with feature of hardware produced by our company. In addition, you can verify the operation of hardware using Diagnostic programs.

< Operating environment >

- **OS**
  - Windows 7, Vista, XP, Server 2003, 2000, Me, 98

- **Adaptation language**
  - Visual Basic, Visual C++, Visual C#, Delphi, C++ Builder

For more details on the supported OS, applicable language and how to download the updated version, please visit the CONTEC’s Web site (http://www.contec.com/apiusbp/).

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.

**Cable & Connector**

**Cable (Option)**

- **Shielded Cable With Two 100pin Connector**
  - PCB100PS-0.5 (0.5m), PCB100PS-1.5 (1.5m), PCB100PS-3 (3m), PCB100PS-5 (5m)

- **Connection Conversion Shield Cable (100P→96P)**
  - PCB100/96PS-1.5 (1.5m), PCB100/96PS-3 (3m), PCB100/96PS-5 (5m)

- **Flat Cable with One 100-Pin Connector**
  - PCA100P-1.5 (1.5m), PCA100P-3 (3m), PCA100P-5 (5m)

- **Connection Conversion Shield Cable (100P→37P D-SUB x 2)**
  - PCB100WS-1.5 (1.5m), PCB100WS-3 (3m), PCB100WS-5 (5m)

* If using both the CNA and CNB connectors, two cable sets are required.

**Accessories (Option)**

| Screw Terminal (M3 x 100P)       | EPD-100A *1*4*6 |
| Screw Terminal (M3 x 96P)        | EPD-96A *2*4*6 |
| Screw Terminal (M3.5 x 96P)      | EPD-96 *2*4 |
| Terminal Unit for Cables (M2.5 x 96P) | DTP-64(PC) *2*4 |
| Connector Conversion Board (96-Pin→37-Pin x 2) | CCB-96 *2*4 |
| Terminal Unit for Diagnostic I/O (64P) | CM-64(PC) *2*4 |
| Screw Terminal (M3 x 37P)        | EPD-37A *3*5*6 |
| Screw Terminal (M3.5 x 37P)      | EPD-37 *3*5 |
| General Purpose Terminal (M3 x 37P) | DTP-3A *3*5 |
| Screw Terminal (M2.6 x 37P)      | DTP-4A *3*5 |
| AC adapter (input : 90 - 264VAC, output : 5VDC 2.0A) | POA200-20 *7 |

**USB I/O Unit Bracket for X Series**

- **BRK-USB-X**

1. Data “0” and “1” correspond to the High and Low levels, respectively.
2. The Optocoupler's response time comes.
3. This depends on the PC environment used (OS and USB host controller).
4. As a USB hub is also counted as one device, you cannot just connect 127 USB unit.
5. External circuit power supply is required separately.
6. If using both the CNA and CNB connectors, two cable sets are required.
7. It is the same as the one appended to the product. Please buy it necessary for maintenance.

* Check the CONTEC’s Web site for more information on these options.
Packing List

- Unit [DIO-6464LX-USB] ...1
- AC adapter ...1
- AC Cable (for 125VAC) ...1
- USB cable (1.8m) ...1
- USB cable attachment on the main unit's side
- (For Mini B connector side) ...1
- Clamps for prevention of cable on the main unit's side
- Power connector MC1,5/3-ST-3,5 ...1
- Ferrite core ...1
- First step guide ...1
- CD-ROM *1 [API-USBP(WDM)] ...1

*1 The CD-ROM contains the driver software and User’s Guide.

Block Diagram

![Diagram of DIO-6464LX-USB interface connector CN1 and CNB.]  

Physical Dimensions

![Physical dimensions of the DIO-6464LX-USB unit.]  

Using the Connectors

Connecting to a Connector

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

**[Diagram showing interface connector (CNA, CNB)]**

- Connector used
  - HDRA-E100WLLFDT1EC-SL+  
  - [mfd by HONDA TSUSHIN KOGYO CO., LTD.]
  - or equivalent to it
- Applicable connector
  - HDRA-E100MA1  
  - [mfd by HONDA TSUSHIN KOGYO CO., LTD.]

* Please refer to page 2 for more information on the supported cable and accessories.
### Pin assignments for connecting to the PCB100/96PS or PCB100WS

The figure below shows the correspondence between the option cable pins and signals.

< Pin assignments for connecting a PCB100/96PS or PCB100WS to the DIO-6464LX-USB >

![Diagram of PCB100/96PS connections](image)

<table>
<thead>
<tr>
<th>Common minus pin for +C/+D output ports</th>
<th>N-C/D</th>
<th>B01</th>
<th>A01</th>
<th>N-905</th>
<th>Common minus pin for +8/+9 output ports</th>
<th>N-C/D</th>
<th>B02</th>
<th>A02</th>
<th>N-906</th>
</tr>
</thead>
<tbody>
<tr>
<td>+C port (Output)</td>
<td>N-C/D</td>
<td>B03</td>
<td>A10</td>
<td>N-C/D</td>
<td>B01</td>
<td>A01</td>
<td>N-C/D</td>
<td>B04</td>
<td>A11</td>
</tr>
<tr>
<td>+D port (Output)</td>
<td>N-C/D</td>
<td>B05</td>
<td>A12</td>
<td>N-C/D</td>
<td>B06</td>
<td>A07</td>
<td>N-C/D</td>
<td>B07</td>
<td>A13</td>
</tr>
<tr>
<td>+E port (Output)</td>
<td>N-E/F</td>
<td>B31</td>
<td>A41</td>
<td>N-C/D</td>
<td>B32</td>
<td>A42</td>
<td>N-C/D</td>
<td>B33</td>
<td>A43</td>
</tr>
</tbody>
</table>

* [] shows pin numbers specified by HONDA TSUSHIN KOGYO CO., LTD.
|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|

**Notes:**
- N.C. indicates a common plus pin for the indicated ports.
- N.C. 19 indicates a common plus pin for +8/+9 output ports.
- N.C. 18 indicates a common plus pin for +A/+B output ports.
- N.C. 17 indicates a common plus pin for +C/+D output ports.
- N.C. 16 indicates a common plus pin for +E/+F output ports.
- N.C. 15 indicates a common plus pin for +0/+1 input ports.
- N.C. 14 indicates a common plus pin for +2/+3 input ports.

**Port Descriptions:**
- **+9 Port (Output):** O-97
  - Pin 17: Common
  - Pin 36: N.C.
- **+B Port (Output):** O-B7
  - Pin 17: Common
  - Pin 36: N.C.
- **-9 Port (Input):** I-17
  - Pin 17: Common
  - Pin 36: N.C.
- **-B Port (Input):** I-37
  - Pin 17: Common
  - Pin 36: N.C.
**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. This product inputs the ON/OFF state of the current-driven device as a digital value.

**Input Circuit**

![Input Circuit Diagram]

* I-xx represents the input pin.

The input circuits of interface blocks of this product is illustrated in the image above.

The signal inputs are isolated by Optocouplers (compatible with current sink output). This product therefore requires an external power supply to drive the inputs. The power requirement for each input pin is about 5.1mA at 24VDC (about 2.6mA at 12VDC).

**Connecting a Switch**

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. This product controls turning on/off the current-driven controlled device using a digital value.

**Output Circuit**

![Output Circuit Diagram]

* O-xx represents the output pin.

The output circuits of interface blocks of this product is illustrated in the image above. The signal output section is an Optocoupler 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. A PolySwitch-based overcurrent protector is provided for every 8 output transistors. When the overcurrent protector works, the output section of this product is temporarily disabled. If this is the case, turn off the power to the PC and the external power supply and wait for a few minutes, then turn them on back.

**CAUTION**

When the PC is turned on, all output 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.
Example of Connection to TTL Level Input

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

This product must be connected with 5VDC power supply (in a self-powered state).
Connect with 5VDC power supply by using +5VDC input pin.

When using the attached AC adapter [POA200-20], please connect directly to the input terminals.

CAUTION
Connect 5VDC power supply to the main unit. Next, connect the USB cable to the PC. Do not turn it on or off when using. If you remove, USB cable is first and then 5VDC power supply.
When the USB module is not used, leave the AC adapter unplugged.
Continuously using the AC adapter heated affects its life. Use the AC adapter not in a closed place but in a well-ventilated place not to be heated.

Difference from DIO-6464L-PE and PIO-64/64L(PCI)H

<table>
<thead>
<tr>
<th>Item</th>
<th>DIO-6464LX-USB</th>
<th>DIO-6464L-PE</th>
<th>PIO-6464L/PCIH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current consumption (Max.)</td>
<td>5VDC 350mA</td>
<td>5VDC 350mA</td>
<td>5VDC 350mA</td>
</tr>
<tr>
<td>Bus specification</td>
<td>USB Specification 2.0/1.1 standard</td>
<td>PCI Express Base Specification Rev 1.0a x1</td>
<td>PCIe 2.0 x16, 3.0GHz, Universal key shapes supportedx1</td>
</tr>
<tr>
<td>Physical dimensions (mm)</td>
<td>180(L) x 140(D) x 34(H)</td>
<td>180(L) x 110.18(D)</td>
<td>176.43(L) x 106.68(D)</td>
</tr>
<tr>
<td>Weight</td>
<td>300g (Not including the USB cable, attachment)</td>
<td>215g</td>
<td>215g</td>
</tr>
</tbody>
</table>