Bi-Directional
Digital I/O Unit for USB

DIO-48DX-USB

This product is an USB2.0-compliant digital I/O unit that extends the input/output function of bi-directional digital signal.

This product has up to 48 unisolated TTL-level input/output channels that is powered by the equivalence to the mode 0 of i8255 chips, and you can use up to 48 channels of the input signals as interrupt inputs. You can select the input/output by the application software in eight signals units (in four signals unit for some inputs/outputs).

As there is compatible with PCI bus-compatible board DIO-48D2-PCI and PCI Express bus-compatible board DIO-48D-PE in terms of connector shape and pin assignments, it is easy to migrate from the existing system.

Windows/Linux drivers are available.
Using the dedicated library VI-DAQ makes it possible to create each application for LabVIEW.

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

Features

This product can be used to TTL-level input/output 48 points bi-directional digital corresponding to the equivalence to the i8255 mode 0.
This product has up to 48 unisolated TTL-level input/output channels whose response speed is 200nsec that is powered by to the equivalence to the mode 0 of i8255 device for general-purpose. You can select the input/output by the application software in eight signals units (in four signals unit for some inputs/outputs).

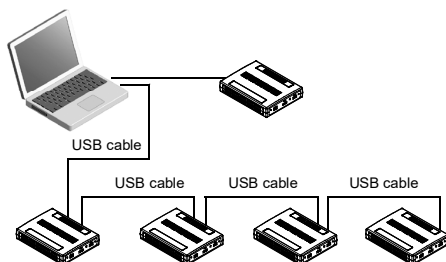**You can use up to 48channels of the input signals as interrupt events.**
You can use up to 48channels of the input signals as interrupt events and also disable or enable the interrupt in bit units and select the edge of signals, at which to generate an interrupt.

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.

USB HUB function
This product has the USB HUB function. Max. 4 DIO-48DX-USB can be used in 1 USB port of PC. *1
When you use 4 or more DIO-48DX-USB, you can do by connecting DIO-48DX-USB to another USB port of PC side.
Also, you can connect the CONTEC's USB device other than DIO-48DX-USB to the USB port of DIO-48DX-USB. *2*3

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

Connectors are compatible with PCI/PCI Express bus-compatible board
As there is compatible with DIO-48D2-PCI and DIO-48D-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/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.

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.

*1   This product cannot be stacked up for installation.
*2   Do not connect the device other than that of CONTEC's USB to the USB port included on the DIO-48DX-USB.   Otherwise, this may cause a failure or malfunction.
*3   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.

USB cable
USB cable   USB cable   USB cable

Specification

Item	Specification
I/O	
I/O format	Unisolated TTL-level I/O (Positive logic) *1
Number of I/O channels	48 channels (all available for interrupts)
Pull-up registance	10kΩ
Interrupt	48 interrupt input signals are arranged into a single output of interrupt signal INTA. An interrupt is generated at the rising edge (LOW-to-HIGH transition).
Response time	Within 200nsec
Rated output current	I_{OL}=24mA (Max.) I_{OH}=−15mA (Max.)
USB section	
Bus specification	USB Specification 2.0/1.1 standard
USB transfer rate	12Mbps (Full-speed), 480Mbps (High-speed) *2
Power supply	Self-power
Common section	
Number of terminals used at the same time	127 terminals (Max.) *3
Dielectric strength	250Vrms
Current consumption (Max.)	5VDC 550mA
Operating conditions*4	0 - 50ºC, 10 - 90%RH (No condensation)
Allowable distance of signal extension	Approx. 50m (depending on wiring environment)
Physical dimensions (mm)	180(W) x 140(D) x 34(H) (No protrusions)
Weight	400g (Not including the USB cable, attachment)
Connector	96 pin half pitch connector [F (female) type] PCR-E96LMD+ [mfd. by HONDA TSUSHIN KOGYO CO., LTD.] or equivalent to it
Attached cable	USB cable 1.8m
Standard	VCCI Class A, FCC Class A, CE Marking (EMC Directive Class A, RoHS Directive), UKCA

*1 Data "1" and "0" correspond to the High and Low levels, respectively.
*2 This depends on the PC environment used (OS and USB host controller).
*3 As a USB hub is also counted as one device, you cannot just connect 127 USB unit.
*4 To suppress the heating, ensure that there are spaces for ventilation (about 5cm) around this product.

Support Software

You should use CONTEC support software according to your purpose and development environment.

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)

* Download the software from the CONTEC website.

Option

Item	Model	Description
Cable	PCB96PS-0.5P (0.5m) PCB96PS-1.5P (1.5m)	Shield Cable with 96-Pin Half-Pitch Connectors at Both Ends
	PCB96P-1.5 (1.5m)	Flat Cable with 96-Pin Half-Pitch Connectors at Both Ends
	PCA96PS-0.5P (0.5m) PCA96PS-1.5P (1.5m)	Shield Cable with 96-Pin Half-Pitch Connectors at One End
	PCA96P-1.5 (1.5m)	Flat Cable with 96-Pin Half-Pitch Connectors at One End
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)
	POA200-20-2 *3	AC adaptor (input : 90 - 264VAC, output : 5VDC 2.0A)
	BRK-USB-X	USB I/O Unit Bracket for X Series
	POW-DD10GY	DC-DC power supply unit (input: 10 - 30VDC, output: 5VDC 3.0A)

*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.

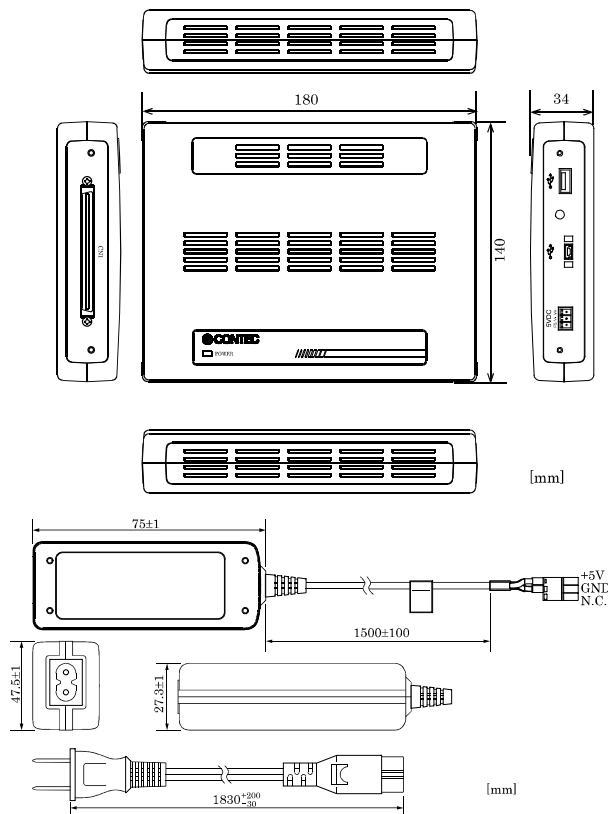*   Check the CONTEC's Web site for more information on these options.

Packing List

- Unit [DIO-48DX-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 …1
- Setup Guide … 1
- Power connector MC1,5/3-ST-3,5 …1
- Ferrite core …1
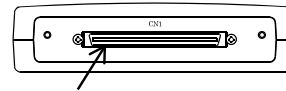
Block Diagram
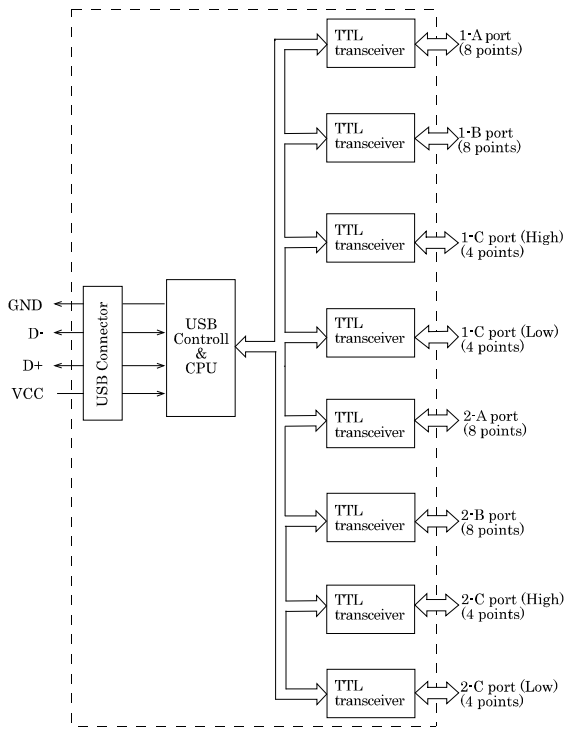
Physical Dimensions

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.

- Connector used
  PCR-E96LMD+ equivalence to it
  [mfd. by HONDA TSUSHIN KOGYO CO., LTD.]
- Compatible connectors
  PCR-E96FA+ equivalence to it
  [mfd. by HONDA TSUSHIN KOGYO CO., LTD.]

Interface connector (CN1)

* Please refer to the 2 page for more information on the supported cable and accessories.

Connector Pin Assignment

Pin Assignments of Interface Connector (CN1)

Pin No.	Signal name	Meaning	Pin No.	Signal name	Meaning
B48	2-PC7		A48	1-PC7	
B47	GND		A47	GND	
B46	2-PC6		A46	1-PC6	
B45	GND	2-C port (High)	A45	GND	1-C port (High)
B44	2-PC5		A44	1-PC5	
B43	GND		A43	GND	
B42	2-PC4		A42	1-PC4	
B41	GND		A41	GND	
B40	2-PC3		A40	1-PC3	
B39	GND		A39	GND	
B38	2-PC2		A38	1-PC2	
B37	GND	2-C port (Low)	A37	GND	1-C port (Low)
B36	2-PC1		A36	1-PC1	
B35	GND		A35	GND	
B34	2-PC0		A34	1-PC0	
B33	GND		A33	GND	
B32	2-PB7		A32	1-PB7	
B31	GND		A31	GND	
B30	2-PB6		A30	1-PB6	
B29	GND		A29	GND	
B28	2-PB5		A28	1-PB5	
B27	GND		A27	GND	
B26	2-PB4	2-B port	A26	1-PB4	1-B port
B25	GND		A25	GND	
B24	2-PB3		A24	1-PB3	
B23	GND		A23	GND	
B22	2-PB2		A22	1-PB2	
B21	GND		A21	GND	
B20	2-PB1		A20	1-PB1	
B19	GND		A19	GND	
B18	2-PB0		A18	1-PB0	
B17	GND		A17	GND	
B16	2-PA7		A16	1-PA7	
B15	GND		A15	GND	
B14	2-PA6		A14	1-PA6	
B13	GND		A13	GND	
B12	2-PA5		A12	1-PA5	
B11	GND		A11	GND	
B10	2-PA4		A10	1-PA4	
B09	GND	2-A port	A09	GND	1-A port
B08	2-PA3		A08	1-PA3	
B07	GND		A07	GND	
B06	2-PA2		A06	1-PA2	
B05	GND		A05	GND	
B04	2-PA1		A04	1-PA1	
B03	GND		A03	GND	
B02	2-PA0		A02	1-PA0	
B01	GND		A01	GND	

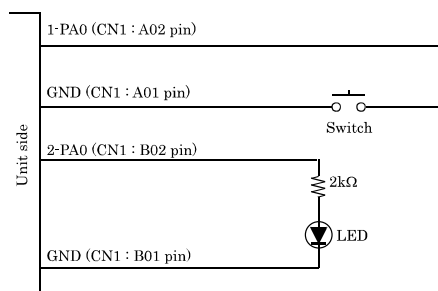* The numbers in square brackets [ ] are pin numbers designated by HONDA TSUSHIN KOGYO CO., LTD.

Connecting I/O Signals

The I/O circuits of interface blocks of this board are illustrated in Figure 3.3. Signals are TTL levels and positive logic.

I/O Circuit
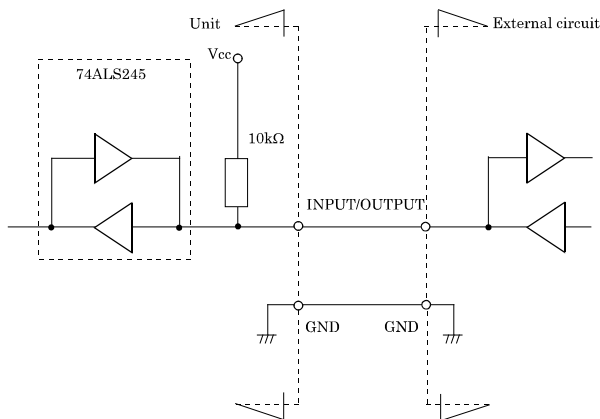

Example of Connection

When switch is "ON", the corresponding bit is "0".   When switch is "OFF" in contrast, the corresponding bit is "1".

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.

Connection with 5VDC Power Supply for Self-power

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

5VDC

FG Vi- Vi+

Vi+ Power supply (5V)

Vi- Power supply (GND)

FG Frame ground
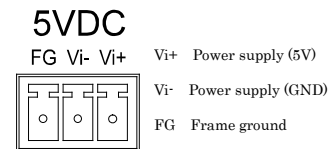
When using the attached AC adapter [POA200-20-2], please connect directly to the input terminals. When the accompanying power connector (MC1,5/3-ST-3,5, suitable cable: AWG28 - 16) is used to supply power to this unit, strip the end of the suitable cable and insert it to the power connector before firmly securing it using a screw.
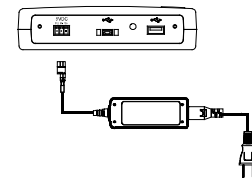
⚠ CAUTION
- Connect 5VDC power supply to the main unit.   Next, connect the USB cable to the PC.   Do not turn it on or off when using.   If you remove, USB cable is first and then 5VDC power supply.
- When the USB module is not used, leave the AC adapter unplugged.
- Continuously using the AC adapter heated affects its life.
- Use the AC adapter not in a closed place but in a well-ventilated place not to be heated.
- Do not remove the power connector [MC1,5/3-ST-3,5] attached to the AC adapter.

Difference from DIO-48D-PE and DIO-48D2-PCI

Item	DIO-48DX-USB	DIO-48D-PE	DIO-48D2-PCI
Current consumption (Max.)	5VDC 550mA	3.3VDC 1000mA	5VDC 600mA
Bus specification	USB Specification 2.0/1.1 standard	PCI Express Base Specification Rev. 1.0a x1	PCI(32bit, 33MHz, Universal key shapes supported)
Physical dimensions (mm)	180(L) x 140(D) x 34(H) (No protrusions)	169.33(L) x 110.18(H)	176.41(L) x 106.68(H)
Weight	400g (Not including the USB cable, attachment)	140g	