PC-HELPER

N Series for USB
Isolated Digital I/O Unit
(8ch Relay, 8ch DI)

DIO-0808RN-USB
User’s Guide

CONTEC CO.,LTD.
Check Your Package

Thank you for purchasing the CONTEC product.
The product consists of the items listed below.
Check, with the following list, that your package is complete. If you discover damaged or missing items, contact your retailer.

Product Configuration List
- Unit [DIO-0808RN-USB] …1
- USB cable (1.8m) …1
- USB cable attachment on the main unit’s side (For Mini B connector side) …1
- First step guide … 1
- I/O connector…4
- Rubber feet …4
- Magnet …2
- CD-ROM *1 [API-USBP(WDM)] …1
- Warranty Certificate…1
- Serial number label …1

*1 The CD-ROM contains the driver software and User’s Guide (this guide)
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1. Before Using the Product

This chapter provides information you should know before using the product.

About the Unit

This product is an USB2.0-compliant digital I/O unit that extends the input function of digital signal from the USB port of PC and output signals to SPDT relay contacts. This product is compatible with input digital signals at 12 - 24VDC which features 8 channels of Optocoupler isolated inputs (compatible with current sink output/current source output) and 8 channels of SPDT relay outputs with independent common. Compact design not restricting installation location (188.0(W) x 78.0(D) x 30.5(H)) makes it easy to install the product within the panel or device using DIN rail mounting jigs, or on the floor or wall. Windows driver library is supplied. Possible to be used as a data recording device for LabVIEW, with dedicated libraries.

Features

- Optocoupler isolated input (compatible with current sink output/current source output)
  This product has 8 channels of Optocoupler isolated inputs (compatible with current sink output/current source output) whose response speed is 200μsec, supporting driver voltages of 12 - 24 VDC for input. 8 channels share one common.

- Relay outputs (Form C) with independent common
  This product has 8 channels of SPDT relay outputs (Form C) with independent common. Independent common terminal provided per channel, capable of supporting a different external power supply. High-capacity output rating is designed to be a maximum of 6A 240V (AC), 5A 28V (DC) per channel.

- Opto-coupler isolation and relay isolation
  As the USB (PC) is isolated from the input interfaces by opto-couplers and output interfaces by relays, this product has excellent noise performance.

- Compact design not restricting installation location (188.0(W) x 78.0(D) x 30.5(H))
  Compact design of 188.0(W) x 78.0(D) x 30.5(H) does not require special installation location.

- Easy-to-wire terminal connector adopted
  Adoption of terminal connector (with screws) enables to achieve easy wiring.

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

- Diverse installations such as screw fastening, magnet, DIN rail are possible
Installation on the floor / wall / ceiling is possible by screw fastening, magnet, rubber feet, etc.
In addition, DIN rail mounting mechanism is equipped as standard with the product, making it easy to install the product within the panel or the device.

- 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.
# Support Software

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

**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, and 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, Server 2008, Vista, XP, Server 2003 .etc

**Adaptation language**  
Visual Basic, Visual C++, Visual C# .etc

You can download the updated version from the CONTEC’s Web site (http://www.contec.com/product/device/apiusbp/). For more details on the supported OS, applicable language and new information, please visit the CONTEC’s Web site.

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.
1. Before Using the Product

Customer Support

CONTEC provides the following support services for you to use CONTEC products more efficiently and comfortably.

Web Site

Japanese  http://www.contec.co.jp/
English  http://www.contec.com/
Chinese  http://www.contec.com.cn/

Latest product information
CONTEC provides up-to-date information on products.
CONTEC also provides product manuals and various technical documents in the PDF.

Free download
You can download updated driver software and differential files as well as sample programs available in several languages.

Note!  For product information
Contact your retailer if you have any technical question about a CONTEC product or need its price, delivery time, or estimate information.

Limited One-Year Warranty

CONTEC products are warranted by CONTEC CO., LTD. to be free from defects in material and workmanship for up to one year from the date of purchase by the original purchaser.

Repair will be free of charge only when this device is returned freight prepaid with a copy of the original invoice and a Return Merchandise Authorization to the distributor or the CONTEC group office, from which it was purchased.

This warranty is not applicable for scratches or normal wear, but only for the electronic circuitry and original products. The warranty is not applicable if the device has been tampered with or damaged through abuse, mistreatment, neglect, or unreasonable use, or if the original invoice is not included, in which case repairs will be considered beyond the warranty policy.

How to Obtain Service

For replacement or repair, return the device freight prepaid, with a copy of the original invoice. Please obtain a Return Merchandise Authorization number (RMA) from the CONTEC group office where you purchased before returning any product.

*  No product will be accepted by CONTEC group without the RMA number.

Liability

The obligation of the warrantor is solely to repair or replace the product. In no event will the warrantor be liable for any incidental or consequential damages due to such defect or consequences that arise from inexperienced usage, misuse, or malfunction of this device.
1. Before Using the Product

Safety Precautions
Understand the following definitions and precautions to use the product safely.

Safety Information
This document provides safety information using the following symbols to prevent accidents resulting in injury or death and the destruction of equipment and resources. Understand the meanings of these labels to operate the equipment safely.

| ▲ DANGER | DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. |
| ▲ WARNING | WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury. |
| ▲ CAUTION | CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or in property damage. |

Handling Precautions

▲ DANGER
Do not use the product where it is exposed to flammable or corrosive gas. Doing so may result in an explosion, fire, electric shock, or failure.

▲ CAUTION
- Do not strike or bend this product.
  Otherwise, this may malfunction, overheat, cause a failure or breakage.
- Do not touch this product's terminals (edge connector) with your hands.
  Otherwise, this may malfunction, overheat, or cause a failure.
  If the terminals are touched by someone's hands, clean the terminals with industrial alcohol.
- Do not close the ventilation hole(s) of this product by, for example, placing an object. This may cause overheating, malfunction, and/or failure of the product.
- Do not touch the external connector when the power is on.
  Otherwise this may malfunction, overheat, cause a failure due to static electricity.
- Make sure that your PC can supply ample power to all this product installed.
  Insufficiently energized products could malfunction, overheat, or cause a failure.
- When connecting multiple units, do one at a time and complete setup for the previous unit before starting to do the next unit.
- The specifications of this product are subject to change without notice for enhancement and quality improvement.
  Even when using this product continuously, be sure to read the manual and understand the contents.
- Do not modify this product. CONTEC will bear no responsibility for any problems, etc., resulting from modifying this product.
1. Before Using the Product

- Regardless of the foregoing statements, CONTEC is not liable for any damages whatsoever (including damages for loss of business profits) arising out of the use or inability to use this CONTEC product or the information contained herein.

- If you use this product in a noisy environment, attach two ferrite core to stabilize the operation.

FCC PART 15 Class A Notice

**NOTE**
This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.
This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection again harmful interference when the equipment is operated in a commercial environment.
This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

**WARNING TO USER**
Change or modifications not expressly approved the manufacturer can void the user's authority to operate this equipment.
Environment

Use this product in the following environment. If used in an unauthorized environment, this product may overheat, malfunction, or cause a failure.

Operating temperature
0 - 50°C

Humidity
10 - 90%RH (No condensation)

Corrosive gases
None

Floating dust particles
Not to be excessive

Inspection

Inspect the product periodically as follows to use it safely.

⚠️ CAUTION

Check that the ventilation slit has no obstruction and has no dust or foreign matter adhering.
Moreover, if there is the slit on the case side, please confirm it to the slit similarly.
1. Before Using the Product

Storage
When storing this product, keep it in its original packing form.
(1) Put this product in the storage bag.
(2) Wrap it in the packing material, and then put it in the box.
(3) Store the package at room temperature at a place free from direct sunlight, moisture, shock, vibration, magnetism, and static electricity.

Disposal
When disposing of the product, follow the disposal procedures stipulated under the relevant laws and municipal ordinances.
2. Setup
This chapter explains how to set up this product.

What is Setup?
Setup means a series of steps to take before the product can be used.
Different steps are required for software and hardware.

Installing the driver
This section enables you to prepare the software and hardware by operating in accordance with each step in this chapter using the bundled CD-ROM. Taking the following steps sets up the software and hardware. You can use the diagnosis program later to check whether the software and hardware function normally.

Step 1 Setting the Hardware
Step 2 Installing the Software
Step 3 Installing the Hardware
Step 4 Checking Operations with the Diagnosis Program

Uninstall the driver and then set it up again if it cannot be set up properly.

The following shows the basic flow for installing product.
2. Setup

Step 1 Setting the Hardware

This section describes how to set up the product and how to connect it to a PC.

Name of each parts

LED indicator

The above figure has installed the USB cable attachment.

Figure 2.1. Name of each parts (Front side)
Step 2 Initializing the Software

Install software.
The following description assumes the operating system as Windows XP. Although some user interfaces are different depending on the OS used, the basic procedure is the same.

Points
- If you are using Windows XP, please log on as Administrator (authorized account) before proceeding to the following steps.

Illustration of Menu Screen

![Menu Screen Illustration]

- Install Development Environment such as sample programs and online help
- Install utility.
- Refer to the user's guide.
- Refer to the content of CD-ROM.
- Install C-LOGGER.
* Cannot be used for this product.

Points
- Please set up the supplied CD-ROM if it has not been set up. The menu starts automatically.
- If the menu do not start, launch X: AUTORUN.EXE(X:CD-ROM drive) from [Run...] in Start menu.
- The screen design may be different.
Installation of API-USBP (WDM) Development Environment

Installation of development environment is namely installing supplied online help and sample program in all language in order to use API function.

1) Clicking on “Install Development or Execution Environment”.
   [API-USBP(WDM) Installer] dialog box displays.

2) Selecting “Advanced Digital I/O driver”.

3) Clicking on “Continue” Button.
   Please perform installation following the directions on the screen. And thus the installation is completed.
   * The screen design may be different.
Step 3 Installing the Hardware

Under Windows, information about the converter needs to be detected by the OS. This is called hardware installation.

To use more than one of this product, make sure to install them one by one, setting each unit after completing the previous one.

Connecting the Product

(1) Turn on the power to the PC before connecting this product.

(2) When the PC has been up and running, plug the USB interface connector to a USB port in the PC. The converter can also be connected to the PC via a USB hub of this product.

(3) USB cable can be attached firmly to the main unit by using a USB cable attachment.

CAUTION
- The USB cable attachment cannot be used excluding an attached cable.
- When the USB cable attachment is being used, do not perform removing and connecting the USB cable on the unit side repeatedly. This may damage the USB cable attachment or yourself.
2. Setup

**Setting with the Found New Hardware Wizard**

(1) The “Found New Hardware Wizard” will be started.

* In Windows Vista, Because the driver’s installation is completed by "Installing the Software", it is not necessary to operate it about the Hardware Wizard.

(2) Select “Install from a list or specific location”, then click on the [Next] button. Detect setup information from supplied CD automatically for installing USB driver.

Point

Please specify the path for supplied CD as follows in the case of failure in detecting automatically.

X:\INF\WDM\DIO  (X: CD-ROM drive)

(3) Click on [Finish] button to complete the installation of USB driver.
Setting Properties Using Device Manager

After connecting product with a PC and completing driver installation, open Device Manager and set properties.

(1) Starting Device Manager.

From [Start] menu, click on [Settings]-[Control Panel]-[System] and then click on [Device Manager] button in [Hardware] tab.

- In the case of Windows 98/Me

Right-click on [My Computer] and select [Properties] to start device manager.
2. Setup

(2) Setting the Device Name.
   Right-clicking on the product name and selecting [Properties] displays [Product Properties].
   Open [Common Settings] tab and enter arbitrary name in the editing box for device name. (Default name also can be used.)

   * The product-specific number will be displayed as the serial number.

   ![Screenshot of DIO DIO-240Y-USB Properties window]
   * The name of the connected product will be displayed. DIO-0808RN-USB

   CAUTION
   USB driver can not be used without settings. Settings must be performed.

(3) Clicking on [OK] button.
   Device name is set by clicking [OK] button.

Points
- When the application developed by users is running on another PC, please perform foregoing operation on the target computer. (No need to install software introduced on next page)
- Please use the device name specified in last step for initialization function when initialization is performed using API function. When running on other PC, it can run without changing the application for the same device name being specified.
Step 4 Checking Operations with the Diagnosis Program

Use the diagnosis program to check that the product and driver software work normally, thereby you can confirm that they have been set up correctly.

What is the Diagnosis Program?

The diagnosis program diagnoses the states of the product and driver software. It can also be used as a simple checker when an external device is actually connected. Using the “Diagnosis Report” feature reports the driver settings, the presence or absence of the product, I/O status, and interrupt status.

Using the Diagnosis Program

Starting the Diagnosis Program
Click [Diagnosis] on the Properties page to start the diagnosis program.

* The name of the connected product will be displayed. DIO-0808RN-USB
2. Setup

Checking Digital Inputs and Outputs

The main panel of the Diagnosis Program appears.

You can check the current operation states of the product in the following boxes:

“Input Port”: Displays input values bit by bit at fixed time intervals.
“Output Port”: Mouse operation allows the data to output or display.

To use the function execution time measurement feature, click on the [Measurement Time] button. Enter the I/O start port and the number of ports, then press the measurement button. The time for each execution of a function will be measured.

* The name of the connected product will be displayed. DIO-0808RN-USB

Input Port: 8Bit
Output Port: 8Bit will be displayed.
2. Setup

DIO-0808RN-USB

(1) Clicking on the [Show Diagnosis Report] button displays detailed data such as product settings and the diagnosis results while saving them in text format.

The Diagnosis Program performs “product presence/absence check”, “driver file test”, “board setting test”, and so on.

⚠️ CAUTION

Before executing diagnosis report output, unplug the cable from the product.

(2) A diagnosis report is displayed as shown below.
3. Connection and Installation

Installation Method

Mounting on a DIN Rail

Mounting procedure

1. Push the fixing hook up using a slotted screwdriver to make it unlockable.

2. Hook the product from the upper part of the DIN rail, and press the lower part on to the DIN rail.

3. Push the fixing hook up using a slotted screwdriver to make it lockable.
3. Connection and Installation

Removal procedure

(1) Pull down the fixing hook of the unit to unlock it.

![Image of unit with fixing hook pulled down]

Figure 3.2. Removing the unit from the DIN rail  <1/3>

(2) With the fixing hook unlocked, pull the lower part of this unit toward you.

![Image of unit being pulled toward you]

Figure 3.2. Removing the unit from the DIN rail  <2/3>

(3) By lifting this unit, you can easily remove it from the DIN rail.

![Image of unit being lifted from DIN rail]

Figure 3.2. Removing the unit from the DIN rail  <3/3>
Desktop Installation

Using the rubber feet

When required to mount the product on the desktop, mount it on a horizontal platform. The rubber feet can be mounted in their mounting holes as shown in the following figure.

Figure 3.3. Mounting the rubber feet

Wall Installation

To mount the product on the wall, purchase the commercially available screw (fitting for Ø3.5) separately.

Figure 3.4. Wall Installation
Installation Using the Magnet

Attaching the magnet supplied with the product makes it easy to mount or remove the product on or from a metal surface such as steel desk or partition.

⚠️ CAUTION
- Do not let the magnet go near objects that can be affected by magnetic fields, such as monitors and floppy disks.
- If the product is shifted while mounted on the steel surface, the surface paint may be scratched.
- When using the magnet, stack connection is not possible.

Mounting/ removing the magnet

To mount the magnet, press down the entire length of the magnet into its mounting hole while pushing the magnet in the direction of arrow 1. Next, slide the magnet in the direction of arrow 2 to fix it in position.

![Figure 3.5. Mounting the magnet](image)

To remove the magnet, slide the magnet in the direction of arrow 1 as shown in the following figure, and then lift it out in the direction of arrow 2.

![Figure 3.6. Removing the magnet](image)
Mounting onto the steel wall

Mount the product directly onto the steel wall. Pull it gently after mounting to confirm that it will not drop off from the body.

Figure 3.7 Mounting onto the steel wall
3. Connection and Installation

Installation Conditions

Installation orientation

It is possible to mount it in the orientations shown in the following figure. Other orientations would cause problems in usage, such as inadequate heat dissipation.

DIN rail fixation

Vertical installation

![Figure 3.8. DIN rail fixation](image)

Horizontal installation  
Installation on a ceiling

Screws / magnet fixation

Vertical installation

![Figure 3.9. Screws / magnet fixation](image)

Horizontal installation  
Installation on a ceiling

⚠️ CAUTION

When using the product in a high temperature environment, cool it by blowing air even when the temperature is within the specified range.
Spacing between the system unit and any surrounding objects

Secure a distance of at least 50mm between the top of the main unit (single use) and any surrounding objects.
Do not locate the unit in a fully enclosed housing.

![Diagram of spacing between the unit and any surrounding objects]

Figure 3.10. Spacing between the unit and any surrounding objects
3. Connection and Installation

Connection Method

Connecting an Interface Connector

When connecting the unit to an external device, you can use the supplied connector plug. When wiring the unit, strip off approximately 7 mm of the covering for the cable, and insert the bare wire by pressing the orange button on the connector plug. Releasing the orange button after the wire is inserted fixes the cable. Compatible wires are AWG 28 - 16.

\[ \text{\textbullet Connector used:} \\
\quad \text{3.5mm pitch, 10 pin type of rated current 9.0A} \\
\quad \text{STL1550/10G-3.5-H-GREEN [mfd. by PTR]} \\
\text{\textbullet Compatible plug (supplied):} \\
\quad \text{AK1550/10-3.5-GREEN [mfd. by PTR]} \\
\quad \text{Compatible wires: AWG28-16} \]

Figure 3.11. Connecting an Interface Connector and Connectors That Can Be Used

⚠️ CAUTION

Removing the connector plug by grasping the cable can break the wire.
### Signal Layout on the Interface Connector

The unit can be connected to an external device using 10-pin connectors that is provided on the unit face.

**DIO-0808RN-USB**

#### Pin Assignments of Interface Connector <DIO-0808RN-USB>

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Signal Name</th>
<th>Logical Bits</th>
<th>Logical Ports</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>IN00</td>
<td>0</td>
<td></td>
<td>Input</td>
</tr>
<tr>
<td>1</td>
<td>IN01</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>IN02</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>IN03</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>IN04</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>IN05</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>IN06</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>IN07</td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>X</td>
<td>N.C.</td>
<td>None</td>
<td>None</td>
<td>Not Connected</td>
</tr>
<tr>
<td>COM</td>
<td>COM</td>
<td>None</td>
<td>None</td>
<td>Float Minus Common for INPUT0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Signal Name</th>
<th>Logical Bits</th>
<th>Logical Ports</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>OUTPUT2</td>
<td>0</td>
<td></td>
<td>Output</td>
</tr>
<tr>
<td>2</td>
<td>NO-2</td>
<td></td>
<td></td>
<td>None</td>
</tr>
<tr>
<td>3</td>
<td>NO-3</td>
<td></td>
<td></td>
<td>None</td>
</tr>
<tr>
<td>4</td>
<td>NO-4</td>
<td></td>
<td></td>
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<td>7</td>
<td>NO-7</td>
<td></td>
<td></td>
<td>None</td>
</tr>
<tr>
<td>X</td>
<td>N.C.</td>
<td>None</td>
<td>None</td>
<td>Not Connected</td>
</tr>
</tbody>
</table>

**IN00 · 07** 8 input signal pins. Connect output signals from the external device to these pins.

**NO-0 · 07** 8 output signal pins (Normally Open [NO]). Connect these pins to the input signal pins of the external device.

**NC-0 · 07** 8 output signal pins (Normally Close [NC]). Connect these pins to the input signal pins of the external device.

**C-0 · 07** Common pins for 8 output signals (Common for Normally Open [NO] and Normally Close [NC]).

**N.C.** This pin is left unconnected.

**COM** Common pins for 8 input signals. These pins are common to either positive side or negative side of external signals.

---

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DIO-0808RN-USB 29
Connecting Input Signals

Input Circuit

Figure 3.13 I/O Circuit

The input circuit of interface blocks of DIO-0808RN-USB is illustrated in Figure 3.13. The signal inputs are isolated by Optocouplers (compatible with both current sink type and current source type output).

The board therefore requires an external power supply to drive the inputs. The power capacity required for driving each input channel is about 5.1mA when the signal voltage is 24 VDC or about 2.6mA when the signal voltage is 12 VDC.

Example of Connection

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

Figure 3.14 an Example to use Input IN00
Connecting Output Signals

Output Circuit

![Output Circuit Diagram]

The output circuits of interface blocks of the DIO-0808RN-USB are illustrated in Figure 3.22. The signal outputs are independent common relay outputs (Form C) using a rated output current of up to 6A 240V (AC), 5A 28V (DC) per channel.

⚠️ CAUTION

When power on, normally open (NO) outputs are OFF status (break status) and normally close (NC) outputs are ON status (make status).
Connection to the LED

- When the output logic bit0 is 1

As a result, setting output NC-0 to “ON” state (make status), LED1 goes out and LED2 comes on.

Figure 3.23 An Example to use Output NO-0, NC-0 (bit0 is 1)

- When the output logic bit0 is 0

As a result, setting output NO-0 to "ON" state (make status), LED1 comes on and LED2 goes out.

Figure 3.24 An Example to use Output NO-0, NC-0 (bit0 is 0)
4. Application Development

Please reference to online help and sample program when developing applications.

Reference to Online Help

Click on [Programs]-[CONTEC API-USBP(WDM)]-[API-USBP(WDM) Help] from [Start] menu.

The information for application development, such as function reference is provided in [API-USBP(WDM) Help].

Detailed introduction to search method for help should be found from [How to navigate Help] in the help.

Printing Function Reference

Clicking on Print button from online help prints the page being displayed. It can be printed entirely as follows in the case of referencing to printing function.

As figure shown on the right, selecting mark and clicking on Print button prints all the topics under the mark selected at a time.
Sample Program

To run a sample program, click on [Programs] - [CONTEC API-USBP(WDM)] - [DIO] - [Sample Name] from [Start] menu.

Distributing Developed Application

Please distribute the developed application with USB driver in supplied CD-ROM.
Created application (including driver) can be freely distributed.
4. Application Development

Returning to Initial State

This is the method of returning to initial state. It is suggested that you should return to initial state and perform installation again when the operation is losing stabilization.

(1) Deleting Device form Device Manager.

(2) Drawing 5VDC power supply (the attached AC adapter) from unit

(3) Drawing USB cable from a PC

(4) Uninstalling Driver
   Select [CONTEC API-DIO(WDM) driver] from [My Computer]-[Control Panel]-[Add/Remove Programs].

(5) Restarting
5. Function
This section describes the features of this product.

Data I/O Function

Data Input
When input data is “ON”, “1” is input to the relevant bit.
When the input data is “OFF”, in contrast, “0” is input to the relevant bit

Data Output
Normally Open (NO) Output:
Providing “0” output to the corresponding bit makes the relay contact turned ON (make state).
Providing, in turn, “1” output to the corresponding bit makes the relay contact turned OFF (break state).

Normally Close (NC) Output:
Providing “0” output to the corresponding bit makes the relay contact turned OFF (break state).
Providing, in turn, “1” output to the corresponding bit makes the relay contact turned ON (make state).

The state of the output data is kept intact until the output instruction is executed again.

⚠️ CAUTION
When the PC is turned on, all bits reset to “1” (normally open (NO) outputs are OFF status and normally close (NC) outputs are ON status).

Monitoring Output Data
This product can read the state of the data currently being output without affecting the output data.
## 6. About Hardware

### Hardware specification

<table>
<thead>
<tr>
<th>Table 6.1 Specification</th>
<th></th>
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<tr>
<td><strong>Item</strong></td>
<td><strong>Specification</strong></td>
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<tr>
<td><strong>Input</strong></td>
<td></td>
</tr>
<tr>
<td>Number of input signal channels</td>
<td>8 channels (1 common)</td>
</tr>
<tr>
<td>Input format</td>
<td>Opto-isolated input (Compatible with current sink / current source output) (Negative logic *1)</td>
</tr>
<tr>
<td>Input resistance</td>
<td>4.7kΩ</td>
</tr>
<tr>
<td>Input ON current</td>
<td>2.0mA or more</td>
</tr>
<tr>
<td>Input OFF current</td>
<td>0.16mA or less</td>
</tr>
<tr>
<td>Response time</td>
<td>Within 200µsec *2</td>
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<tr>
<td>Dielectric strength</td>
<td>500Vrms</td>
</tr>
<tr>
<td>Dielectric strength *5</td>
<td>12 · 24VDC (±10%)</td>
</tr>
<tr>
<td><strong>Output</strong></td>
<td></td>
</tr>
<tr>
<td>Number of output signal channels</td>
<td>8 channels (independent common)</td>
</tr>
<tr>
<td>Output format</td>
<td>SPDT Relay Output (Form C)</td>
</tr>
<tr>
<td>Relay Contact Spec.</td>
<td></td>
</tr>
<tr>
<td>Max. rating capacity</td>
<td>6A 240VAC, 5A 28VDC (load resister)</td>
</tr>
<tr>
<td>Max. permitted voltage</td>
<td>240V (Max.) *7, *8</td>
</tr>
<tr>
<td>Max. Carry Current</td>
<td>5A (Max.)</td>
</tr>
<tr>
<td>Contact resistance (Initial state)</td>
<td>100mΩ max.</td>
</tr>
<tr>
<td>Operate time</td>
<td>Within 10ms</td>
</tr>
<tr>
<td>Release time</td>
<td>Within 5ms</td>
</tr>
<tr>
<td>Mechanical Life</td>
<td>10,000,000 operations min or more</td>
</tr>
<tr>
<td>Expectancy</td>
<td>Switching times : 300 operations/min</td>
</tr>
<tr>
<td>Electrical Lifetime</td>
<td>50,000 operations min.</td>
</tr>
<tr>
<td></td>
<td>Switching times : 30 operations/min</td>
</tr>
<tr>
<td>Relay Type</td>
<td>G6RL-1</td>
</tr>
<tr>
<td><strong>USB section</strong></td>
<td></td>
</tr>
<tr>
<td>Bus specification</td>
<td>USB Specification 2.0/1.1standard</td>
</tr>
<tr>
<td>USB transfer rate</td>
<td>12Mbps (Full-speed), 480Mbps (High-speed) *3</td>
</tr>
<tr>
<td>Power supply</td>
<td>Bus Power</td>
</tr>
<tr>
<td><strong>Common section</strong></td>
<td></td>
</tr>
<tr>
<td>Number of terminals used at the same time</td>
<td>127 terminals (Max.) *4</td>
</tr>
<tr>
<td>Current consumption (Max.)</td>
<td>5VDC  430mA</td>
</tr>
<tr>
<td>Operating conditions *6</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 (mm)</td>
<td>188.0(W)×78.0(D)×30.5(H) (No protrusions)</td>
</tr>
<tr>
<td>Weight</td>
<td>300g (Not including the USB cable, attachment)</td>
</tr>
<tr>
<td>Connector</td>
<td>10 pin (screw-terminal) plug header x4</td>
</tr>
<tr>
<td>Attached cable</td>
<td>USB Cable 1.8m</td>
</tr>
</tbody>
</table>
6. About Hardware

*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 units.

*5 External circuit power supply is required.

*6 To suppress the heating, ensure that there are spaces for ventilation (about 5cm) around this product.

*7 Please don’t exceed either max. permitted voltage or max. rating capacity of the use relay when using it by the voltage that exceeds 28VDC. Doing so can cause a malfunction.

*8 The potential difference between channels must not exceed 240V in the maximum. Doing so can cause a malfunction.
Physical dimensions

![Physical dimensions](image1)

Figure 6.1. Physical dimensions

Block Diagram

![Block Diagram](image2)

Figure 6.2. Block Diagram