

# **PCI-1736UP**

**32-channel Isolated Digital  
Input/Output Card**

**User Manual**

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Advantech warrants to you, the original purchaser, that each of its products will be free from defects in materials and workmanship for two years from the date of purchase.

This warranty does not apply to any products which have been repaired or altered by persons other than repair personnel authorized by Advantech, or which have been subject to misuse, abuse, accident or improper installation. Advantech assumes no liability under the terms of this warranty as a consequence of such events.

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2. Call your dealer and describe the problem. Please have your manual, product, and any helpful information readily available.
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4. Carefully pack the defective product, a fully-completed Repair and Replacement Order Card and a photocopy proof of purchase date (such as your sales receipt) in a shippable container. A product returned without proof of the purchase date is not eligible for warranty service.
5. Write the RMA number visibly on the outside of the package and ship it prepaid to your dealer.

## **CE**

This product has passed the CE test for environmental specifications when shielded cables are used for external wiring. We recommend the use of shielded cables. This kind of cable is available from Advantech. Please contact your local supplier for ordering information.

## **Technical Support and Assistance**

- Step 1. Visit the Advantech web site at **[www.advantech.com/support](http://www.advantech.com/support)** where you can find the latest information about the product.
- Step 2. Contact your distributor, sales representative, or Advantech's customer service center for technical support if you need additional assistance. Please have the following information ready before you call:
  - Product name and serial number
  - Description of your peripheral attachments
  - Description of your software (operating system, version, application software, etc.)
  - A complete description of the problem
  - The exact wording of any error messages

## **Packing List**

Before setting up the system, check that the items listed below are included and in good condition. If any item does not accord with the table, please contact your dealer immediately.

1. PCI-1736UP card
2. Companion CD-ROM (Device Drivers included)
3. User Manual

## **Safety Precaution - Static Electricity**

Follow these simple precautions to protect yourself from harm and the products from damage.

1. To avoid electrical shock, always disconnect the power from your PC chassis before you work on it. Don't touch any components on the CPU card or other cards while the PC is on.
2. Disconnect power before making any configuration changes. The sudden rush of power as you connect a jumper or install a card may damage sensitive electronic components.

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## Introduction

The following sections of this chapter will provide further information about features, installation guide, together with some brief information on software and accessories for the PCI-1736UP card.

Sections include:

- Features
- Applications
- Installation Guide
- Software Overview
- Device Drivers Programming Roadmap
- Accessories

# Chapter 1 Introduction

Thank you for buying the Advantech PCI-1736UP. The Advantech PCI-1736UP is a 32-channel isolated digital input/output card for the PCI bus.

## 1.1 Features

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The Advantech PCI-1736UP offers the following main features:

- 32 isolated DIO channels (16 inputs and 16 outputs)
- High output driving capacity
- High-voltage isolation on isolated I/O channels (2,500 V DC)
- Interrupt handling capability
- D-type connector for isolated input and output channels
- Output status read-back
- Keep digital output values when hot system reset
- Wide input range (5 ~ 30 V DC)
- BoardID switch
- Low profile
- Universal PCI card, accepts both 3.3 and 5 V

### 1.1.1 Robust Protection

The PCI-1736UP digital input channels feature a robust isolation protection for industrial, lab and machinery automation applications. It durably withstands voltage up to 2,500 VDC, preventing your host system from any incidental harms. If connected to an external input source with surge-protection, the PCI-1736UP can offer up to a maximum of 2,000 VDC ESD (Electrostatic Discharge) protection. Even with an input voltage rising up to 70 VDC, the PCI-1736UP can still manage to work properly albeit only for short period of time.



### **1.1.2 Wide Input Range**

PCI-1736UP has a wide range of input voltage from 5 to 30 V DC, and it is suitable for most industrial applications with 12 to 24 V DC input voltage.

### **1.1.3 Reset Protection for Industrial Applications**

When the system has undergone a hot reset (i.e. without turning off the system power), PCI-1736UP can either retain outputs values of each channel, or return to its default configuration as open status, depending on its onboard jumper setting. This function protects the system from wrong operations during unexpected system resets.

### **1.1.4 Plug & Play Function**

PCI-1736UP is a Plug & Play device, which fully complies with PCI Specifications Revision 2.2. During card installation, there is no need to set jumpers or DIP switches. Instead, all bus-related configurations such as base I/O address and interrupt are automatically done by the Plug & Play function.

### **1.1.5 BoardID Switch**

PCI-1736UP has a built-in DIP Switch that helps define each card's ID when multiple PCI-1736UP cards have been installed on the same PC chassis. The BoardID switch setting function is very useful when users build their system with multiple PCI-1736UP cards. With correct BoardID settings, you can easily identify and access each card during hardware configuration and software programming.

*Note*                      *For detailed specifications of the PCI-1736UP, please refer to Appendix A, Specifications.*

## 1.2 Applications

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- Industrial ON/OFF control
- Switch status sensing
- BCD interfacing
- Digital I/O control
- Industrial and lab automation
- Laboratories & Education

## 1.3 Installation Guide

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Before you install your PCI-1736UP card, please make sure you have the following necessary components:

- PCI-1736UP card
- PCI-1736UP User Manual
- Driver software Advantech DLL drivers (included in the companion CD-ROM)
- Wiring cable PCL-10144 (optional)
- Wiring board ADAM-3944 (optional)
- Computer Personal computer or workstation with a PCI-bus slot (running Windows 98/2000/XP)

Some other optional components are also available for enhanced operation:

- Application software ActiveDAQ, ADAQ-View or other third-party software packages

After you get the necessary components and maybe some of the accessories for enhanced operation of your Multifunction card, you can begin the installation procedures.

## 1.4 Software Overview

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Advantech offers a rich set of DLL drivers, third-party driver support and application software to help fully exploit the functions of your PCI-1736UP card:

- Device Drivers (on the companion CD-ROM)
- LabVIEW driver
- Advantech ActiveDAQ
- ADAQ-View

### 1.4.1 Programming Choices for DA&C Cards

You may use Advantech application software such as Advantech Device Drivers. On the other hand, advanced users are allowed another option for register-level programming, although it is not recommended due to its laborious and timeconsuming nature.

### 1.4.2 Device Drivers

The Advantech Device Drivers software is included on the companion CD-ROM at no extra charge. It also comes with all the Advantech DA&C cards. Advantech's DLL driver features a complete I/O function library to help boost your application performance. The Advantech Device Drivers for Windows 98/2000/XP works seamlessly with development tools such as Visual C++, Visual Basic, Inprise C++ Builder and Inprise Delphi.

### 1.4.3 Register-level Programming

Register-level programming is reserved for experienced programmers who find it necessary to write codes directly at the level of device registers. Since register-level programming requires much effort and time, we recommend that you use the Advantech Device Drivers instead. However, if register-level programming is indispensable, you should refer to the relevant information in Appendix C, Register Structure and Format, or to the example codes included on the companion CD-ROM.

## 1.5 Device Drivers Programming Roadmap

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This section will provide you a roadmap to demonstrate how to build an application from scratch using Advantech Device Drivers with your favorite development tools such as Visual C++, Visual Basic, Delphi and C++ Builder. The step-by-step instructions on how to build your own applications using each development tool will be given in the Device Drivers Manual. Moreover, a rich set of example source codes are also given for your reference.

### 1.5.1 Programming Tools

Programmers can develop application programs with several development tools:

- Visual C++
- Visual Basic
- Delphi
- C++ Builder

For instructions on how to begin programming works in each development tool, Advantech offers a Tutorial Chapter in the Device Drivers Manual for your reference. Please refer to the corresponding sections in this chapter on the Device Drivers Manual to begin your programming efforts. You can also take a look at the example source codes provided for each programming tool, since they can get you very well-oriented.

The Device Drivers Manual can be found on the companion CD-ROM. Or if you have already installed the Device Drivers on your system, The Device Drivers Manual can be readily accessed through the *Start* button:

***Start\Programs\Advantech Automation\Device Manager\Device Driver's Manual***

The example source codes could be found under the corresponding installation folder such as the default installation path:

***Program Files\Advantech\ADSAPI\Examples***

For information about using other function groups or other development tools, please refer to the *Creating Windows 98/2000/XP Application with Device Driver* chapter and the *Function Overview* chapter in the Device Driver's Manual.

## **1.5.2 Programming with Device Drivers Function Library**

Advantech Device Drivers offers a rich function library to be utilized in various application programs. This function library consists of numerous APIs that support many development tools, such as Visual C++, Visual Basic, Delphi and C++ Builder.

According to their specific functions or services, those APIs can be categorized into several function groups:

- Digital Input/Output Function Group
- Port Function Group (direct I/O)
- Event Function Group

For the usage and parameters of each function, please refer to the Function Overview chapter in the Device Drivers Manual.

## **1.5.3 Troubleshooting Device Driver Error**

Driver functions will return a status code when they are called to perform a certain task for the application. When a function returns a code that is not zero, it means the function has failed to perform its designated function. To troubleshoot the Device Drivers error, you can pass the error code to **DRV\_GetErrorMessage** function to return the error message. Or you can refer to the Device Drivers Error Codes Appendix in the Device Drivers Manual for a detailed listing of the Error Code, Error ID and the Error Message.

## 1.6 Accessories

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Advantech offers a complete set of accessory products to support the PCI-1736UP card. These accessories include:

### 1.6.1 Wiring Cables

#### **PCL-10144**

The PCL-10144 shielded cable is specially designed for PCI-1736UP cards to provide high resistance to noise. To achieve a better signal quality, the signal wires are twisted in such a way as to form a “twisted-pair cable”, reducing cross-talk and noise from other signal sources. Furthermore, its analog and digital lines are separately sheathed and shielded to neutralize EMI/EMC problems.

### 1.6.2 Wiring Boards

#### **ADAM-3944**

The ADAM-3944 is a 44-pin D-type wiring terminal module for DIN-rail mounting. This terminal module can be readily connected to a Advantech PC-LabCard product and allow easy yet reliable access to individual pin connections for the PCI-1736UP card.

## Installation

This chapter gives users a package item checklist, proper instructions about unpacking and step-by-step procedures for both driver and card installation.

Sections include:

- Unpacking
- Driver Installation
- Hardware Installation
- Device Setup and Configuration

# Chapter 2 Installation

## 2.1 Unpacking

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After receiving your PCI-1736UP package, please inspect its contents first. The package should contain the following items:

- PCI-1736UP card
- Companion CD-ROM (Device Drivers included)
- User Manual

The PCI-1736UP card harbors certain electronic components vulnerable to electrostatic discharge (ESD). ESD could easily damage the integrated circuits and certain components if preventive measures are not carefully paid attention to.

Before removing the card from the antistatic plastic bag, you should take following precautions to ward off possible ESD damage:

- Touch the metal part of your computer chassis with your hand to discharge static electricity accumulated on your body. Or one can also use a grounding strap.
- Touch the anti-static bag to a metal part of your computer chassis before opening the bag.
- Take hold of the card only by the metal bracket when removing it out of the bag.

After taking out the card, you should first:

- Inspect the card for any possible signs of external damage (loose or damaged components, etc.). If the card is visibly damaged, please notify our service department or our local sales representative immediately. Avoid installing a damaged card into your system.

Also pay extra caution to the following aspects to ensure proper installation:

- Avoid physical contact with materials that could hold static electricity such as plastic, vinyl and Styrofoam.
- Whenever you handle the card, grasp it only by its edges. **DO NOT TOUCH** the exposed metal pins of the connector or the electronic components.



*Note*      *Keep the anti-static bag for future use. You might need the original bag to store the card if you have to remove the card from PC or transport it elsewhere.*

## **2.2 Driver Installation**

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**We recommend you to install the driver before you install the PCI-1736UP card into your system, since this will guarantee a smooth installation process.**

The Advantech Device Driver Setup program for the PCI-1736UP card is included on the companion CD-ROM that is shipped with your DA&C card package. Please follow the steps below to install the driver software:

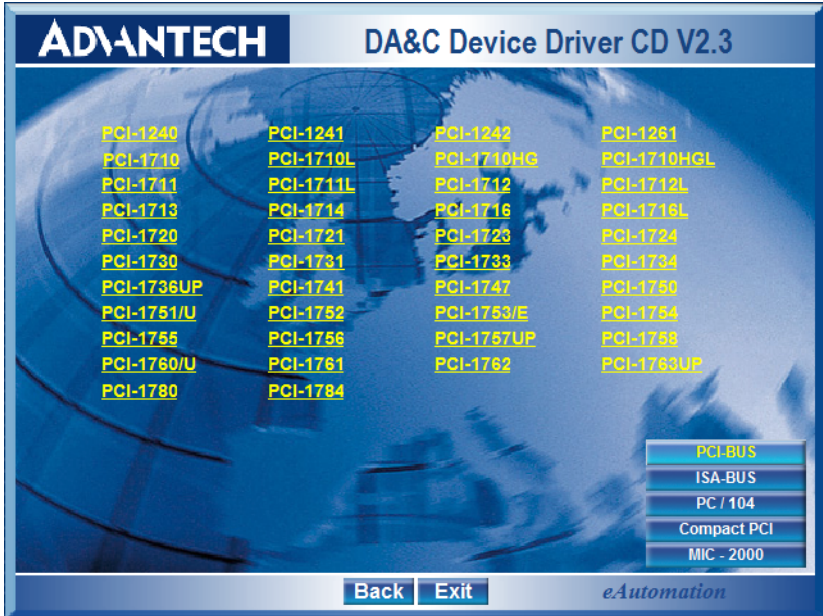
1.    Insert the companion CD-ROM into your CD-ROM drive.
2.    The Setup program will be launched automatically if you have the autoplay function enabled on your system. When the Setup Program is launched, you'll see the following Setup Screen.

*Note*      *If the autoplay function is not enabled on your computer, use Windows Explorer or Windows Run command to execute Autorun.exe on the companion CD-ROM.*



***Figure 2.1: The Setup Screen of Advantech Automation Software***

3. Select the Individual Drivers option.
4. Select the specific device then just follow the installation instructions step by step to complete your device driver installation and setup.



**Figure 2.2: Different Options for Driver Installation**

For further information on driver-related issues, an online version of the Device Drivers Manual is available by accessing the following path:

***Start\Programs\Advantech Automation\Device Manager\Device Driver's Manual***

## 2.3 Hardware Installation

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*Note*            *Make sure you have installed the driver before you install the card.*  
*(please refer to 2.2 Driver Installation)*

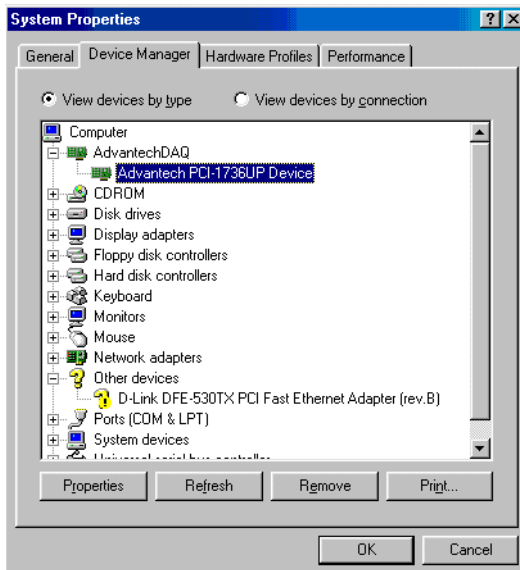
After the device driver installation is completed, you can now go on to install the PCI-1736UP card in any PCI slot on your computer. But it is suggested that you refer to the computer user manual or related documentation if you have any doubt. Please follow the steps below to install the card on your system.

1. Turn off your computer and unplug the power cord and cables. **TURN OFF** your computer before installing or removing any components on the computer.
2. Remove the cover of your computer.
3. Remove the slot cover on the back panel of your computer.
4. Touch the metal part on the surface of your computer to neutralize the static electricity that might be on your body.
5. Insert the PCI-1736UP card into a PCI slot. Hold the card only by its edges and carefully align it with the slot. Insert the card firmly into place. Use of excessive force must be avoided, otherwise the card might be damaged.
6. Fasten the bracket of the PCI card on the back panel rail of the computer with screws.
7. Connect appropriate accessories (44-pin cable, wiring terminals, etc. if necessary) to the PCI card.
8. Replace the cover of your computer chassis. Re-connect the cables you removed in step 2.
9. Plug in the power cord and turn on the computer .

**Note** *In case you installed the card without installing the Device Drivers first, Windows 98/2000/XP will recognize your card as an “unknown device” after rebooting, and will prompt you to provide the necessary driver. You should ignore the prompting messages (just click the Cancel button) and set up the driver according to the steps described in 2.4 Driver Installation.*

After the PCI-1736UP card is installed, you can verify whether it is properly installed on your system in the Device Manager:

1. Access the Device Manager through Control Panel/System/Device Manager.
2. The device name of the PCI-1736UP should be listed on the Device Manager tab on the System Property Page.



**Figure 2.3: The Device Name Listed on the Device Manager**

**Note**      *If your card is properly installed, you should see the device name of your card listed on the Device Manager tab. If you do see your device name listed on it but marked with an exclamation sign “!”, it means your card has not been correctly installed. In this case, remove the card device from the Device Manager by selecting its device name and press the Remove button. Then go through the driver installation process again.*

After your card is properly installed on your system, you can now configure your device using the Device Installation Program that has itself already been installed on your system during driver setup. A complete device installation procedure should include device setup, configuration and testing. The following sections will guide you through the Setup, Configuration and Testing of your device.

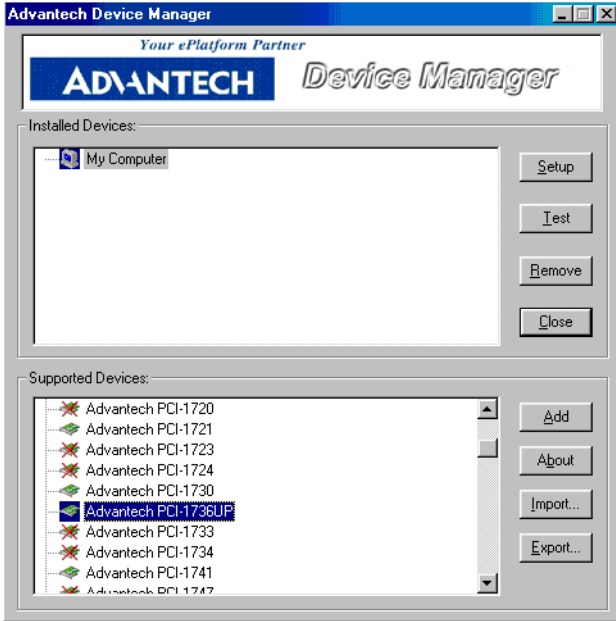
## **2.4 Device Setup & Configuration**

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The Advantech Device Manager program is a utility that allows you to set up, configure and test your device, and later stores your settings on the system registry. These settings will be used when you call the APIs of Advantech Device Drivers.

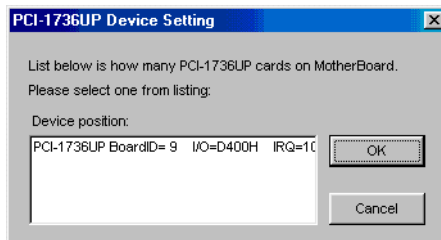
### **2.4.1 Setting Up the Device**

1. To install the I/O device for your card, you must first run the Device Manager program (by accessing Start/Program/Advantech Automation/Device Manager).
2. You can then view the device(s) already installed on your system (if any) on the Installed Devices list box. Since you haven't installed any device yet, you might see a blank list such as the one below (Fig. 2-4).



**Figure 2.4: The Device Manager Dialog Box**

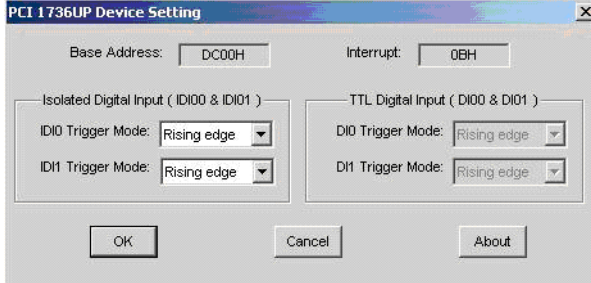
3. Scroll down the *Supported Devices* box to find the device that you wish to install, then click the *Add* button to evoke the existing unconfigured PCI-1736UP dialog box such as one shown in Figure 2.5. The Existing unconfigured PCI-1736UP dialog box. lists all the installed devices on your system. Select the device you want to configure from the list box and press the OK button. After you have clicked OK, you will see a PCI-1736UP Device Setting dialog box such as the one in Fig. 2-6.



**Figure 2.5: The “Device(s) Found” Dialog Box**

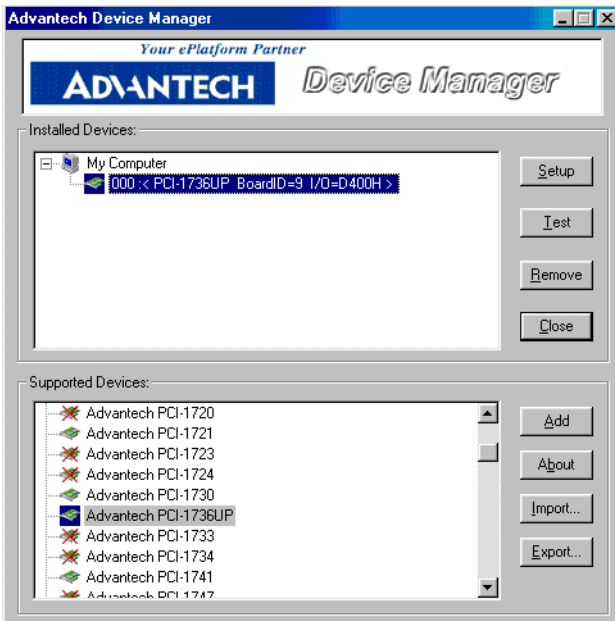
## 2.4.2 Configuring the Device

4. On the PCI-1736UP Device Setting dialog box (Fig. 2-6), you can configure the IDI00, IDI01 and DI00, DI01 Interrupt trigger mode either as Rising Edge or Falling Edge, and Enable or Disable the IDI00, IDI01 and DI00, DI01.



**Figure 2.6: The Device Setting Dialog Box**

5. After you have finished configuring the device, click OK and the device name will appear in the Installed Devices box as seen below:

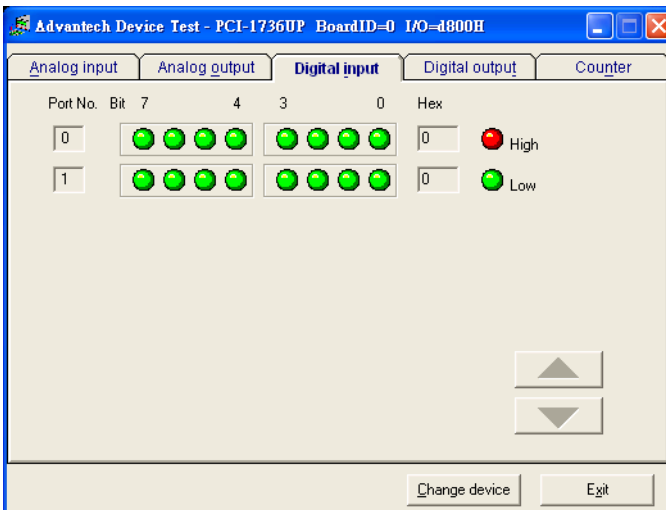


**Figure 2.7: The Device Name Appearing on the List of Devices Box**

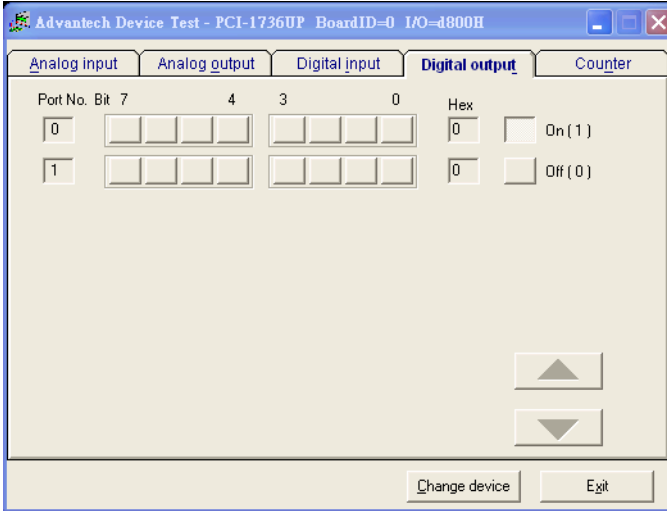


**Note:** As we have noted, the device name “**000:<PCI-1736UP BoardID=0 I/O=1000H>**” begins with a device number “000”, which is specifically assigned to each card. The device number is passed to the driver to specify which device you wish to control.

After your card is properly installed and configured, you can click the [Test...] button to test your hardware by using the testing utility we supplied. For more detailed information, please refer to Chapter 2 of the Device Drivers Manual.



**Figure 2.8: The Test Diagram Box for Digital Input**



**Figure 2.9: The Test Diagram Box for Digital Output**

You can also find examples on the CD-ROM to speed up your programming.

## Signal Connections

This chapter provides useful information about how to connect input and output signals to the PCI-1736UP via the I/O connector.

Sections include:

- Overview
- Switch and Jumper Settings
- Signal Connections

# Chapter 3 Signal Connections

## 3.1 Overview

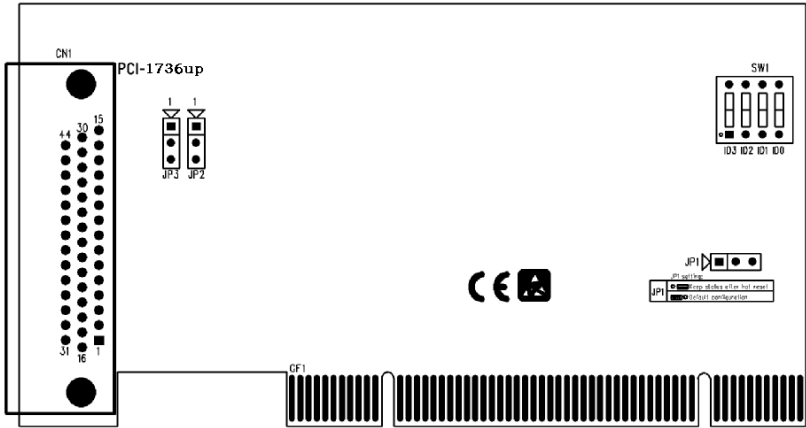
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Maintaining signal connections is one of the most important factors in ensuring that your application system is sending and receiving data correctly. A good signal connection can avoid unnecessary and costly damage to your PC and other hardware devices. This chapter provides useful information about how to connect input and output signals to the PCI-1736UP via the I/O connector.

## 3.2 Switch and Jumper Locations

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The PCI-1736UP card has three jumpers and one switch..



*Figure 3.1: Card Connector, Jumper and Switch Locations*



### 3.2.1 Setting the time to Reset the Digital Outputs

Some users will want the capability of clearing each digital output when the system (or PC) issues a reset signal on the PCI bus. Other users will want to clear their digital outputs only as part of system power-on.

PCI-1736UP satisfies both these needs with jumper JP1. Depending on the application, this capability may allow digital outputs to be "OFF" without requiring a complete shutdown of processes controlled by the card.

Complete loss of power to the chip clears the chip memory. Thus, no matter how JP1 is set, if the power to PCI-1736UP is disconnected, the digital output channel's initial power-on state will be "OFF"





**Table 3.1: Jumper Settings**

Jumper Label	Function Description
JP1	 Keep last status after hot reset
	 Default configuration

### 3.2.2 BoardID Switch Setting

BD3	BD2	BD1	BD0	BoardID
ON	ON	ON	ON	0
ON	ON	ON	OFF	1
ON	ON	OFF	ON	2
ON	ON	OFF	OFF	3
ON	OFF	ON	ON	4
ON	OFF	ON	OFF	5
ON	OFF	OFF	ON	6
ON	OFF	OFF	OFF	7
OFF	ON	ON	ON	8
OFF	ON	ON	OFF	9
OFF	ON	OFF	ON	10
OFF	ON	OFF	OFF	11
OFF	OFF	ON	ON	12
OFF	OFF	ON	OFF	13
OFF	OFF	OFF	ON	14
OFF	OFF	OFF	OFF	15

### 3.2.3 Wet/Dry Contact Setting.

Number	Function Description	
<b>JP2</b>		Set IDI0~IDI7 to Wet Contact mode
		Set IDI0~IDI7 to Dry Contact mode
<b>JP3</b>		Set IDI8~IDI15 to Wet Contact mode
		Set IDI8~IDI15 to Dry Contact mode

### 3.3 Signal Connections

**Table 3.2: Description of CNI Pin Use**

IDIn (n=0 ~ 15)	Isolated digital input
IDOn (n=0 ~ 15)	Isolated digital output
EI.WCOM1	External common Vcc/GND of IDIn (n=0 ~ 7) in Wet Contact mode
EI.WCOM2	External common Vcc/GND of IDIn(n=8 ~15) in Wet Contact mode
EI.DCOM1	External common GND of IDIn (n=0 ~7) in Dry Contact mode
EI.DCOM2	External common GND of IDIn (n=8 ~15) in Dry Contact mode
PCOM1	Free wheeling common diode for IDOn(n=0 ~7)
PCOM2	Free wheeling common diode for IDOn(n=8 ~15)
E.GND1	External ground for IDOn(n=0 ~7)
E.GND2	External ground for IDOn(n=8 ~15)

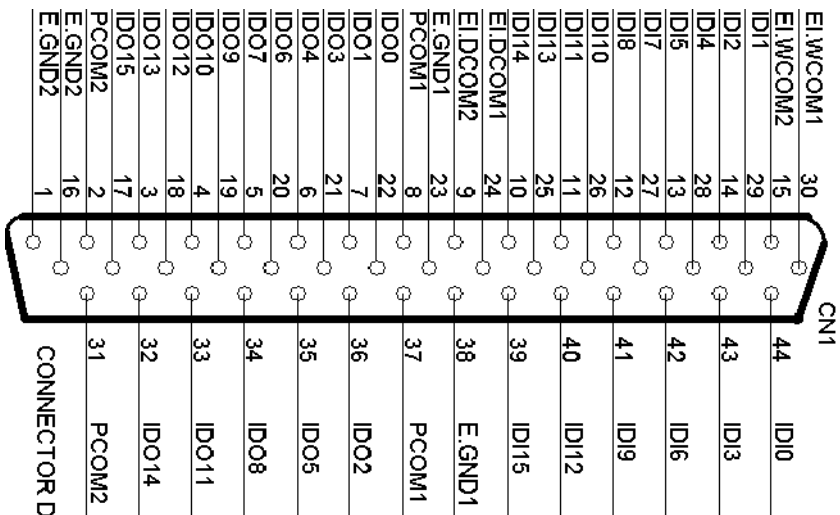


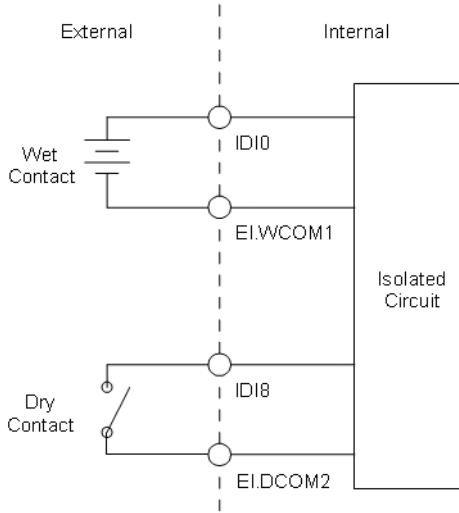
Figure 3.2: I/O Connector Pin Assignments for CNI

**Warning!** EI.WCOM, EI.DCOM and PCOM are totally different. Please be careful to ensure correct connections.

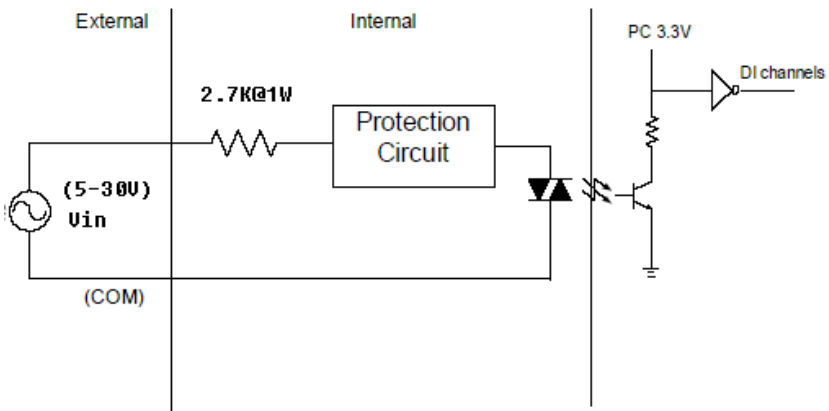
### 3.3.1 Isolated Digital Inputs

Each of the 16 isolated digital input channels accept voltages from 5 to 30 V. Every eight input channels share one external ground.

(Channels 0~7 use EI.WCOM1 (Wet Contact) and EI.DCOM1 (Dry Contact). Channels 8~15 use EI.WCOM2 (Wet Contact) and EI.DCOM2 (Dry Contact).) The following figure shows how to connect an external input source to the card's isolated inputs.



**Figure 3.3: Isolated Digital Input Connection**



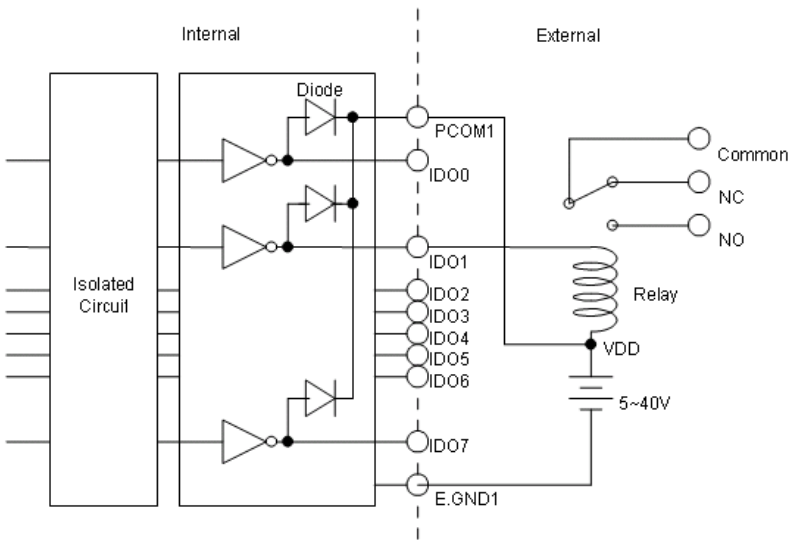
**Figure 3.4: Bi-directional Isolated Digital Input Connection**



### 3.3.2 Isolated Digital Outputs

Each of the 16 isolated digital output channels comes equipped with a darlington transistor. Every eight output channels share common emitters and integral suppression diodes for inductive load, acted by connecting PCOM to VDD. (Channels 0~7 use PCOM1. Channels 8~15 use PCOM2)

If the external voltage (5~40 V) is connected to each isolated output channel (IDO) and its isolated digital output turns on (90 mA per channel maximum), the card's current will sink from the external voltage.



**Figure 3.5: Isolated Digital Output Connection**



APPENDIX  
**A**

**Specifications**

# Appendix A Specifications

## A.1 Isolated Digital Inputs

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<b>Number of Channels</b>	16 (bi-directional)	
<b>Optical Isolation</b>	2,500 V <sub>DC</sub>	
<b>Opto-isolator Response Time</b>	25 μs	
<b>Input Voltage</b>	V <sub>IH</sub> (max.)	30 V <sub>DC</sub>
	V <sub>IH</sub> (min.)	5 V <sub>DC</sub>
	V <sub>IL</sub> (max.)	2 V <sub>DC</sub>
<b>Input Current</b>	5 V <sub>DC</sub>	1.4 mA (typical)
	12 V <sub>DC</sub>	3.9 mA (typical)
	24 V <sub>DC</sub>	8.2 mA (typical)
	30 V <sub>DC</sub>	10.3 mA (typical)

## A.2 Isolated Digital Outputs

---

<b>Number of Channels</b>	16
<b>Optical Isolation</b>	2,500 V <sub>DC</sub>
<b>Output Voltage</b>	Open collector 5 to 40 V <sub>DC</sub>
<b>Sink/Source Current</b>	200 mA max./channel

## A.3 General

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<b>I/O Connector Type</b>	44-pin D-Sub female	
<b>Dimensions</b>	119.91 x 64.41 mm (4.7" x 2.5")	
<b>Power Consumption</b>	Typical	+5 V @ 150 mA
	Max.	+5 V @ 200 mA
<b>Temperature</b>	Operating	0~+60°C (32~140°F) (refer to IEC 68-2-1,2)
	Storage	-20~+85°C (-4~185°F)
<b>Relative Humidity</b>	5~95%RH non-condensing (refer to IEC 68-2-3)	
<b>Certification</b>	CE certified	

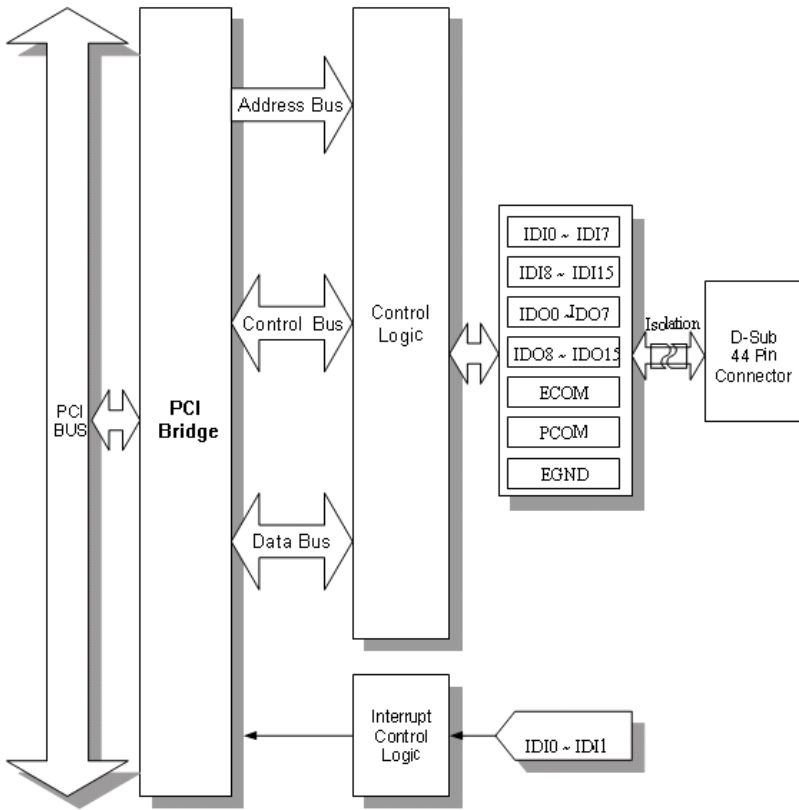


APPENDIX

# B

## Block Diagram

# Appendix B Block Diagram



**Figure B.1: PCI-1736UP Block Diagram**



APPENDIX

C

## **Register Structure and Format**

# Appendix C Register Structure & Format

## C.1 Overview

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The PCI-1736UP is delivered with easy-to-use Advantech Device Drivers for user programming under Windows 98/2000/XP operating systems. We advise users to program the PCI-1736UP by using the Advantech Device Drivers provided by Advantech to avoid the complexity of low-level programming by register.

The most important consideration in programming the PCI-1736UP at the register level is to understand the function of the card's registers. The information in the following sections is provided only for users who would like to do their own low-level programming.

## C.2 I/O Port Address Map

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The PCI-1736UP requires 16 consecutive addresses in the PC's I/O space. The address of each register is specified as an offset from the card's base address. For example, BASE+0 is the card's base address and BASE+6 is the base address plus six bytes.

Table C.1 shows the function of each register of the PCI-1736UP or driver and its address relative to the card's base address.

**Table C.1: PCI-1736UP Register Format**

Base Addr. +HEX		7	6	5	4	3	2	1	0
0H	R	Isolated Digital Input							
		IDI7	IDI6	IDI5	IDI4	IDI3	IDI2	IDI1	IDI0
	W	Isolated Digital Output							
		IDO7	IDO6	IDO5	IDO4	IDO3	IDO2	IDO1	IDO0
01H	R	Isolated Digital Input							
		IDI15	IDI14	IDI13	IDI12	IDI11	IDI10	IDI9	IDI8
	W	Isolated Digital Output							
		IDO15	IDO14	IDO13	IDO12	IDO11	IDO10	IDO9	IDO8
08H	R	Interrupt Enable Status							
						DI1EN	DI0EN	IDI1EN	IDI0EN
	W	Interrupt Enable Register							
						DI1EN	DI0EN	IDI1EN	IDI0EN
0CH	R	Interrupt Triggering Status							
						DI1RF	DI0RF	IDI1RF	IDI0RF
	W	Interrupt Triggering Register							
						DI1RF	DI0RF	IDI1RF	IDI0RF
10H	R	Interrupt Flag							
						DI1F	DI0F	IDI1F	IDI0F
	W	Interrupt Clear Register							
						DI1CLR	DI0CLR	IDI1CLR	IDI0CLR

### **C.3 Isolated Digital Input Reg. -- BASE+0H/1H (/2H/3H)**

The PCI-1736UP offers 16-ch isolated digital input channels. These channels use the input ports at addresses BASE+0H/1H.

**Table C.2: Register for Isolated Digital Input**

<b>Read</b>	<b>Isolated Digital Input</b>							
Bit #	7	6	5	4	3	2	1	0
BASE + 0H	IDI7	IDI6	IDI5	IDI4	IDI3	IDI2	IDI1	IDI0
BASE + 1H	IDI15	IDI14	IDI13	IDI12	IDI11	IDI10	IDI9	IDI8

### **C.4 Isolated Digital Output Reg.- BASE+0H/1H (/2H/3H)**

The PCI-1736UP offers 16-ch isolated digital output channels. These channels use the registries at addresses BASE+0H/1H.

**Table C.3: Register for Isolated Digital Output**

<b>Write</b>	<b>Isolated Digital Output</b>							
Bit #	7	6	5	4	3	2	1	0
BASE + 0H	IDO7	IDO6	IDO5	IDO4	IDO3	IDO2	IDO1	IDO0
BASE + 1H	IDO15	IDO14	IDO13	IDO12	IDO11	IDO10	IDO9	IDO8

## C.5 Board ID — BASE+4H

The PCI-1736UP offers BoardID register BASE+4H. With correct BoardID settings, user can easily identify and access each card during hardware configuration and software programming.

**Table C.4: Register for BoardID**

Read	Board ID							
Bit #	7	6	5	4	3	2	1	0
BASE + 4H					BD3	BD2	BD1	BD0

### BD3 ~ DB0 Board ID

**BD0** LSB of the Board ID

**BD3** MSB of the Board ID

BD3	BD2	BD1	BD0	BoardID
ON	ON	ON	ON	15
ON	ON	ON	OFF	14
ON	ON	OFF	ON	13
ON	ON	OFF	OFF	12
ON	OFF	ON	ON	11
ON	OFF	ON	OFF	10
ON	OFF	OFF	ON	9
ON	OFF	OFF	OFF	8
OFF	ON	ON	ON	7
OFF	ON	ON	OFF	6
OFF	ON	OFF	ON	5
OFF	ON	OFF	OFF	4
OFF	OFF	ON	ON	3
OFF	OFF	ON	OFF	2
OFF	OFF	OFF	ON	1
OFF	OFF	OFF	OFF	0

## C.6 Interrupt Status Register — BASE+8H/CH/10H

The PCI-1736UP *Interrupt Status Register* control the status of two interrupt signal sources (IDI0, IDI1).

**Table C.5: Register for Interrupt Status**

Read	Interrupt Status Register							
Bit #	7	6	5	4	3	2	1	0
BASE + 8H							IDI1EN	IDI0EN
BASE + CH							IDI1RF	IDI0RF
BASE + 10H							IDI1F	IDI0F

### **IDInF**      **Interrupt flag bits ( $n = 0 \sim 1$ )**

This bit is a flag indicating the status of an interrupt. User can read this bit to get the status of the interrupt

- 0**    No interrupt
- 1**    Interrupt occurred

### **IDInEN**      **Interrupt enable control bits ( $n = 0 \sim 1$ )**

Read this bit to Enable/Disable the interrupt.

- 0**    Disable
- 1**    Enable

### **IDInRF**      **Interrupt triggering control bits ( $n = 0 \sim 1$ )**

The interrupt can be triggered by a rising edge or falling edge of the interrupt signal, as determined by the value in this bit.

- 0**    Rising edge trigger
- 1**    Falling edge trigger

## C.7 Interrupt Control Register — BASE+8H/CH/10H

The PCI-1736UP *Interrupt Control Register* controls the status of two interrupt signal sources (IDI0, IDI1). The user can clear the interrupt by writing its corresponding value to the *Interrupt Control Register*, as shown in below table.

**Table C.6: Register for Interrupt Control**

Write	Interrupt Control Register							
	7	6	5	4	3	2	1	0
BASE + 8H							IDI1EN	IDI0EN
BASE + CH							IDI1RF	IDI0RF
BASE + 10H							IDI1CLR	IDI0CLR

### IDI/nCLR Interrupt clear control bits ( $n = 0 \sim 1$ )

This bit must first be cleared to service the next interrupt.

- 0 Don't care
- 1 Clear the interrupt

### IDI/nEN Interrupt enable control bits ( $n = 0 \sim 1$ )

Read this bit to Enable/Disable the interrupt.

- 0 Disable
- 1 Enable

### IDI/nRF Interrupt triggering control bits ( $n = 0 \sim 1$ )

The interrupt can be triggered by a rising edge or falling edge of the interrupt signal, as determined by the value in this bit.

- 0 Rising edge trigger
- 1 Falling edge trigger

