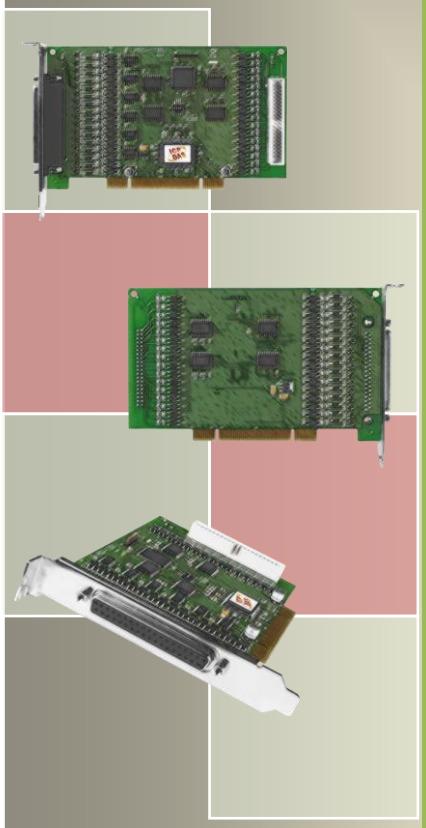

PISO-1730U Card User Manual

32-ch Optically Isolated DIO Board (Sink, NPN) Version 1.2, Jan. 2015

SUPPORTS

Board includes PISO-1730U.

WARRANTY

All products manufactured by ICP DAS are warranted against defective materials for a period of one year from the date of delivery to the original purchaser.

WARNING

ICP DAS assumes no liability for damages consequent to the use of this product. ICP DAS reserves the right to change this manual at any time without notice. The information furnished by ICP DAS is believed to be accurate and reliable. However, no responsibility is assumed by ICP DAS for its use, nor for any infringements of patents or other rights of third parties resulting from its use.

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CONTACT US

If you have any question, please feel to contact us. We will give you quick response within 2 workdays.

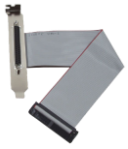
Email: service@icpdas.com, service.icpdas@gmail.com

TABLE OF CONTENTS

Packing List

The shipping package includes the following items:

- One PISO-1730U card hardware
- One printed Quick Start Guide
- One software utility CD
- One CA-4037B Cable
- Two CA-4002 D-Sub Connects



Note!!
If any of these items is missing or damaged, contact the dealer from whom you purchased the product. Save the shipping materials and carton in case you want to ship or store the product in the future.

Related Information

Hardware Manual

CD:\NAPDOS\PCI\PISO-DIO\Manual\
http://ftp.icpdas.com/pub/cd/iocard/pci/napdos/pci/piso-dio/manual/

Quick Start Guide:

CD:\NAPDOS\PCI\PISO-DIO\Manual\QuickStart\
http://ftp.icpdas.com/pub/cd/iocard/pci/napdos/pci/piso-dio/manual/quickstart/

Documentation and Software for UniDAQ SDK:

CD:\NAPDOS\PCI\UniDAQ\
http://ftp.icpdas.com/pub/cd/iocard/pci/napdos/pci/unidaq/

Product Page:

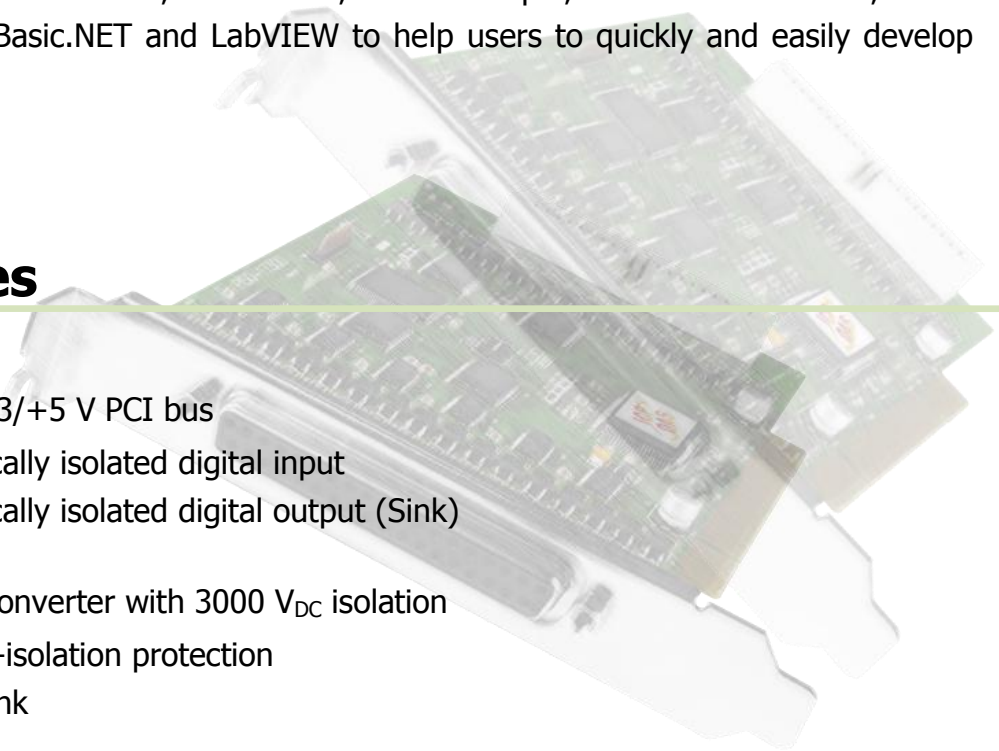
http://www.icpdas.com/root/product/solutions/pc_based_io_board/pci/piso-1730u.html

1. Introduction

The PISO-1730U has 32 channels of optically isolated digital inputs and 32 channels of optically isolated digital outputs, arranged into four isolated banks. Each input channel uses a photo-coupler input. Each digital output offers a Darlington transistor. The power supply of the output port and input port should use the external power. The board eliminates ground-loop problems and isolates the host computer from damaging voltages.

The PISO-1730U provides a Card ID switch. Users can set Card ID on a board and recognize the board by the ID via software when using two or more PIO-1730U cards in one computer.

The PISO-1730U software is fully compatible with the PISO-P32C32U software. Therefore, the new PISO-1730U card is totally compatible with PISO-P32C32U series card and requires no software modification. The PISO-1730U support various OS such as Linux, DOS, Windows 98, Windows 2000, Windows NT, 32-/64-bit Windows XP/2003/2008/Vista/7 and Windows 8. It also provides the DLL and Active X control, and various language sample programs in Turbo C++, Borland c++, Microsoft C++, Visual C++, Borland Delphi, Borland C++ Builder, Visual Basic, C#.NET, Visual Basic.NET and LabVIEW to help users to quickly and easily develop their applications.



1.1 Features

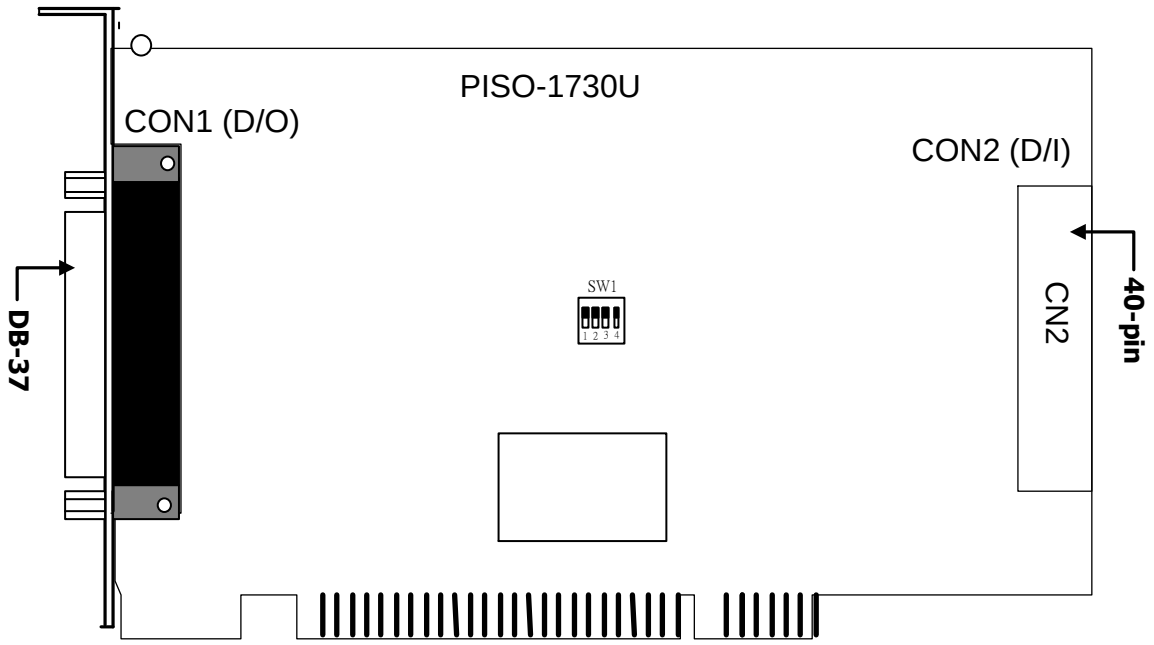
- Support the +3.3/+5 V PCI bus
- 32-channel optically isolated digital input
- 32-channel optically isolated digital output (Sink)
- Card ID function
- Built-in DC/DC converter with 3000 V_{DC} isolation
- 3750 V_{rms} photo-isolation protection
- Four isolated bank

1.2 Specifications

Digital Input	
Isolation Voltage	3750 V_{rms} (Using external power)
Channels	32
Compatibility	Sink or Source, Photo coupler isolated channel with common power or ground
Input Voltage	Logic 0: 0 ~ 1 V Logic 1: 9 ~24 V (Logic 1: Min. 7 V; Max. 30 V)
Input Impedance	3 KΩ, 0.5 W
Response Speed	4 kHz (Typical)
Digital Output	
Isolation Voltage	3750 V_{rms}
Channels	32
Compatibility	Sink, Open Collector
Output Capability	100 mA/ +30 V for one channel @ 100% duty
Response Speed	4 kHz (Typical)
General	
Bus Type	3.3 V/5 V Universal PCI, 32-bit, 33 MHz
Data Bus	8-bit
Card ID	Yes (4-bit)
I/O Connector	Female DB37 x 1 40-pin box header x 1
Dimensions (L x W x D)	180 mm x 105 mm x 22mm
Power Consumption	600 mA @ +5 V
Operating Temperature	0 ~ 60 °C
Storage Temperature	-20 ~ 70 °C
Humidity	5 ~ 85% RH, non-condensing

2. Hardware Configuration

2.1 Board Layout

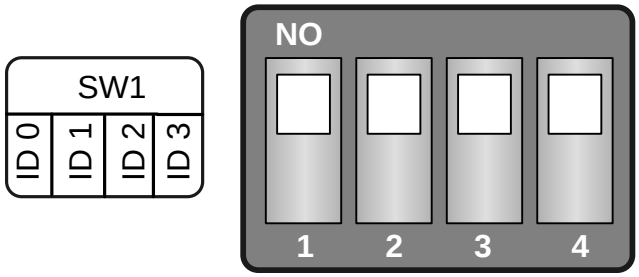


Isolation Bank	DO Channel	Power	Ground
Isolation Bank 0	DO_0~7	(CON1, Pin 05)	(CON1, Pin19)
Isolation Bank 1	DO_8~15	(CON1, Pin 28)	(CON1 Pin19)
Isolation Bank 2	DO_16~23	(CON1, Pin 14)	(CON1, Pin19)
Isolation Bank 3	DO_24~31	(CON1, Pin 37)	(CON1, Pin19)
Isolation Bank 4	DI_0~7	(CON2, Pin 05)	(CON2, Pin19)
Isolation Bank 5	DI_8~15	(CON2, Pin 28)	(CON2, Pin19)
Isolation Bank 6	DI_16~23	(CON2, Pin 14)	(CON2, Pin19)
Isolation Bank 7	DI_24~31	(CON2, Pin 37)	(CON2, Pin19)

All four banks are fully isolated from each other when using four isolated external power supplies.

2.2 Card ID Switch

The PISO-1730U has a Card ID switch (SW1) with which users can recognize the board by the ID via software when using two or more PISO-1730U cards in one computer. The default Card ID is 0x0. For detail SW1 Card ID settings, please refer to Table 2.1.



(Default Settings)

Table 2.1 (*) Default Settings; OFF → 1; ON → 0

Card ID (Hex)	1 ID0	2 ID1	3 ID2	4 ID3
(*) 0x0	ON	ON	ON	ON
0x1	**OFF**	ON	ON	ON
0x2	ON	**OFF**	ON	ON
0x3	**OFF**	**OFF**	ON	ON
0x4	ON	ON	**OFF**	ON
0x5	**OFF**	ON	**OFF**	ON
0x6	ON	**OFF**	**OFF**	ON
0x7	**OFF**	**OFF**	**OFF**	ON
0x8	ON	ON	ON	**OFF**
0x9	**OFF**	ON	ON	**OFF**
0xA	ON	**OFF**	ON	**OFF**
0xB	**OFF**	**OFF**	ON	**OFF**
0xC	ON	ON	**OFF**	**OFF**
0xD	**OFF**	ON	**OFF**	**OFF**
0xE	ON	**OFF**	**OFF**	**OFF**
0xF	**OFF**	**OFF**	**OFF**	**OFF**

2.3 Pin Assignments

- CON1: 37-pin D-type female connector (Digital Output Connector).
- CON2: 40-pin flat-cable connector (Digital Input Connector).

Pin Assignment CON2	Pin Assignment CON1	Terminal No.		Pin Assignment CON1	Pin Assignment CON2
IDI_0	IDO_0	01	20	IDO_1	IDI_1
IDI_2	IDO_2	02	21	IDO_3	IDI_3
IDI_4	IDO_4	03	22	IDO_5	IDI_5
IDI_6	IDO_6	04	23	IDO_7	IDI_7
PCOM	PCOM	05	24	IDO_8	IDI_8
IDI_9	IDO_9	06	25	IDO_10	IDI_10
IDI_11	IDO_11	07	26	IDO_12	IDI_12
IDI_13	IDO_13	08	27	IDO_14	IDI_14
IDI_15	IDO_15	09	28	PCOM	PCOM
IDI_16	IDO_16	10	29	IDO_17	IDI_17
IDI_18	IDO_18	11	30	IDO_19	IDI_19
IDI_20	IDO_20	12	31	IDO_21	IDI_21
IDI_22	IDO_22	13	32	IDO_23	IDI_23
PCOM	PCOM	14	33	IDO_24	IDI_24
IDI_25	IDO_25	15	34	IDO_26	IDI_26
IDI_27	IDO_27	16	35	IDO_28	IDI_28
IDI_29	IDO_29	17	36	IDO_30	IDI_30
IDI_31	IDO_31	18	37	PCOM	PCOM
EGND	EGND	19			

CON1/CON2 (Female DB-37)

Pin Assignment	Terminal No.		Pin Assignment
IDI_0	01	02	IDI_1
IDI_2	03	04	IDI_3
IDI_4	05	06	IDI_5
IDI_6	07	08	IDI_7
PCOM	09	10	IDI_8
IDI_9	11	12	IDI_10
IDI_11	13	14	IDI_12
IDI_13	15	16	IDI_14
IDI_15	17	18	PCOM
IDI_16	19	20	IDI_17
IDI_18	21	22	IDI_19
IDI_20	23	24	IDI_21
IDI_22	25	26	IDI_23
PCOM	27	28	IDI_24
IDI_25	29	30	IDI_26
IDI_27	31	32	IDI_28
IDI_29	33	34	IDI_30
IDI_31	35	36	PCOM
EGND	37	38	N/A
N/A	39	40	N/A

CON2 (40-pin box header)

Extension Cable (CA-4037B):
DB-40-Pin conversion DB-37-Pin

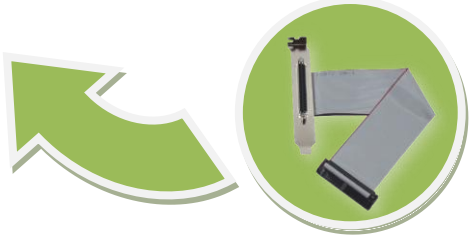


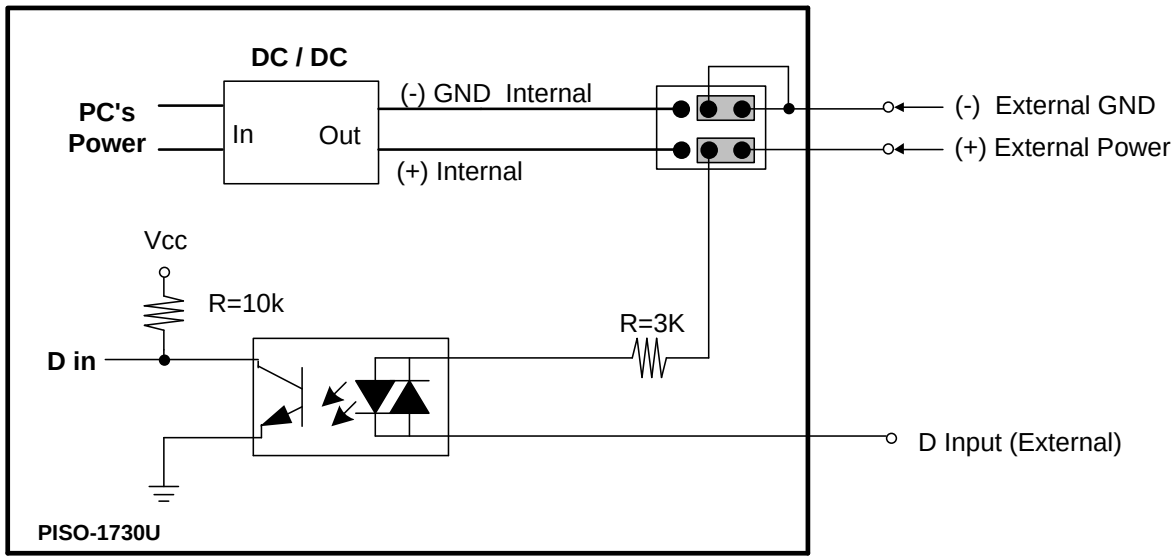
Figure 2-1

2.4 Isolated DIO Architecture

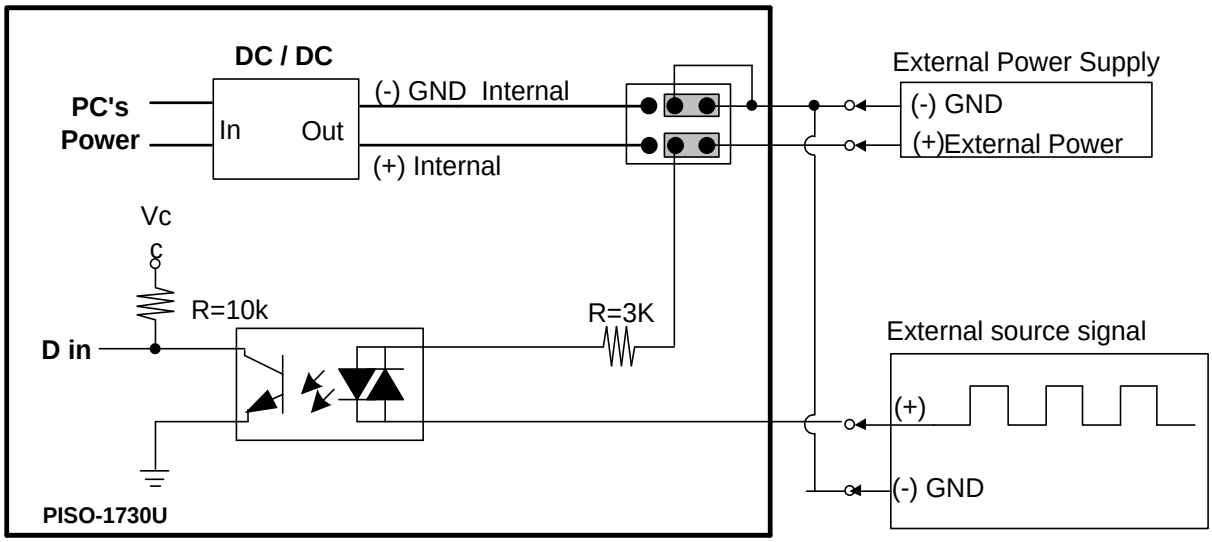
The digital output and digital input (DIO) function supports external power mode. The DIO various configurations and wiring note is illustrated in the figure below.

2.4.1 Isolated D/I Architecture

- Isolated D/I Architecture with external power supply.

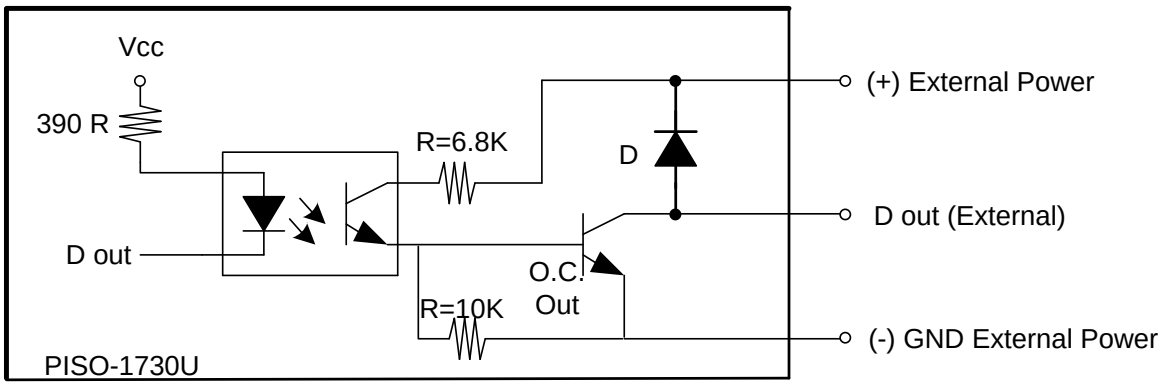


- Typical Application of D/I with external power supply.

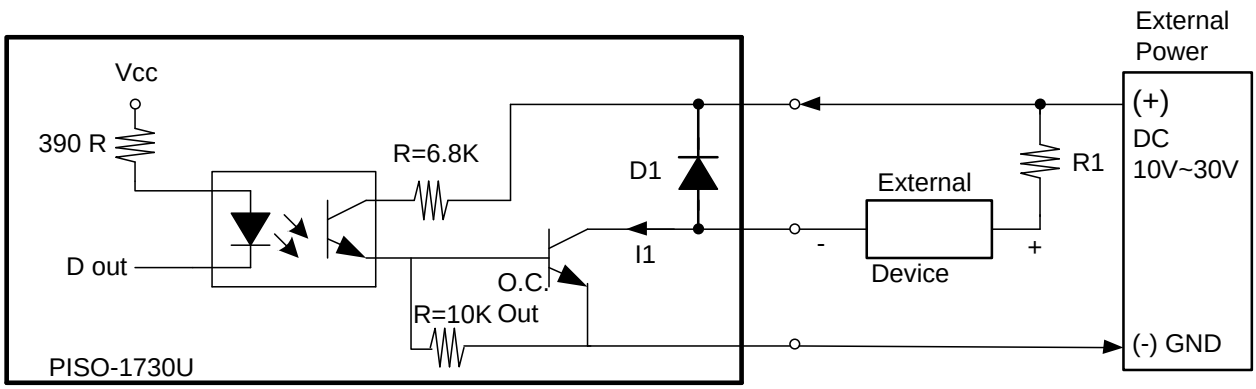


2.4.2 Isolated D/O Architecture

- Isolated D/O Architecture. (Current Sinking)



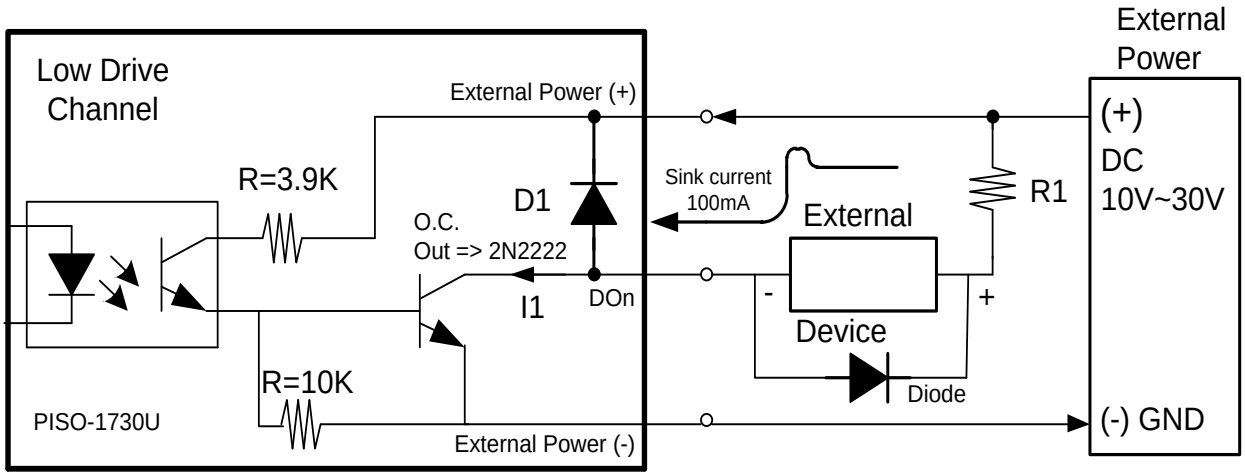
- Typical Application of D/O. (Current Sinking)



Note!!

1. ***The I1~I32 must be < 100 mA.***
2. ***The R1, R2, … R32 are current-limit resistors. They must be designed to let I1, I2, …I32 < 100 mA.***
3. ***If the internal resistance of the external device is large enough, the R can be omitted.***
4. ***D1, D2, … D31 are common-cathode diodes for switching inductive loads. They can be used as relay drivers, hammer drivers, lamp drivers, display drivers, line drivers & logic buffers.***

2.4.3 Open Collector Wiring Notice



Open Collector Output Type and Notice!!

- **High Drive Channel:**
  Open Collector N-channel Power FET (BPS75N). Max. Sink Current is 500 mA for Each Channel.

- **Low Drive Channel:**
  Open Collector NPN/PNP Transistor. Max. Sink Current is 100 mA for Each Channel.

(Recommend: It is necessary to connect a diode in the external device end as means of preventing damage form the counter emf . If your external device is inductive Load , Ex. Relay ...)

3. Hardware Installation

Note!!

It's recommended to install driver first, since some operating system (such as Windows 2000) may ask you to restart the computer again after driver installation. This reduces the times to restart the computer.

To install your PISO-1730U card, complete the following steps:

Step 1: Installing PISO-1730U card driver on your computer first.

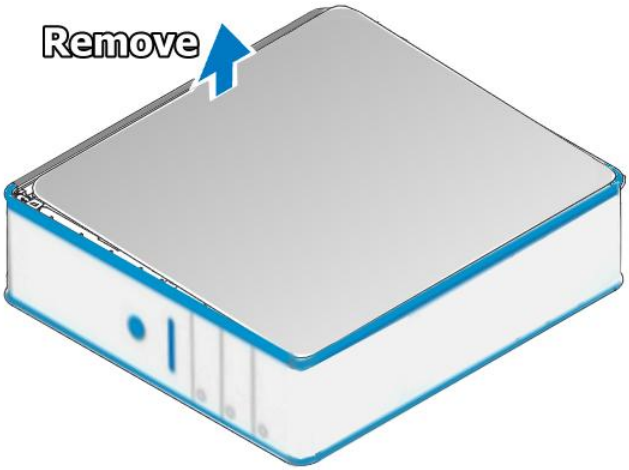
For detailed information about the driver installation, please refer to Chapter 4 Software Installation.

Step 2: Configuring Card ID by the SW1 DIP-Switch.

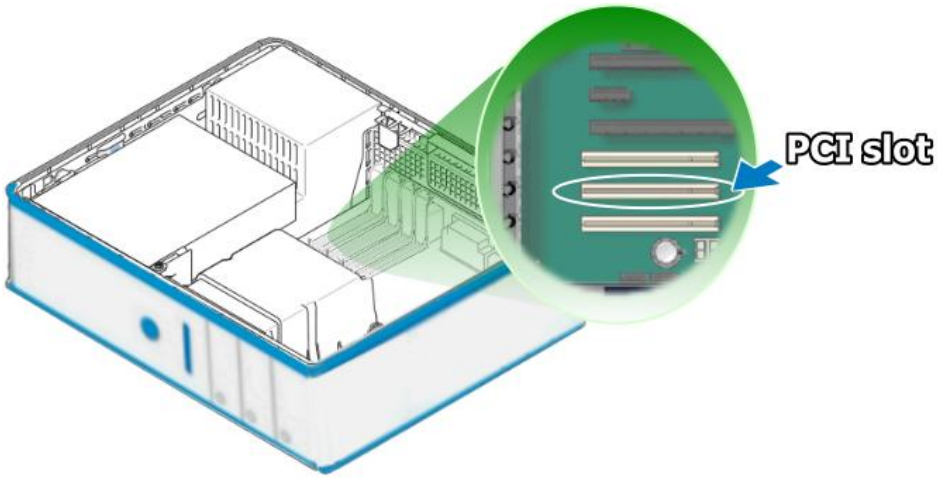
For detailed information about the card ID (SW1), please refer to Sec. 2.2 Car ID Switch .

Step 3: Shut down and power off your computer.

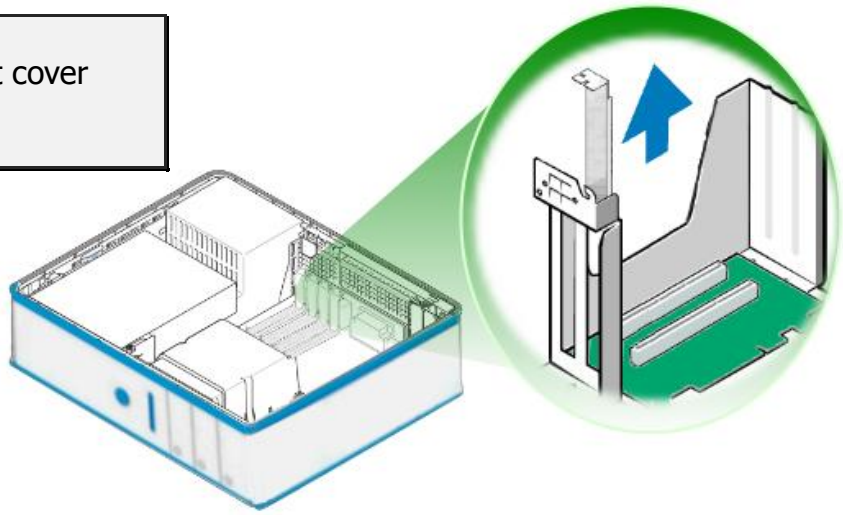
Step 4: Remove all covers from the computer.

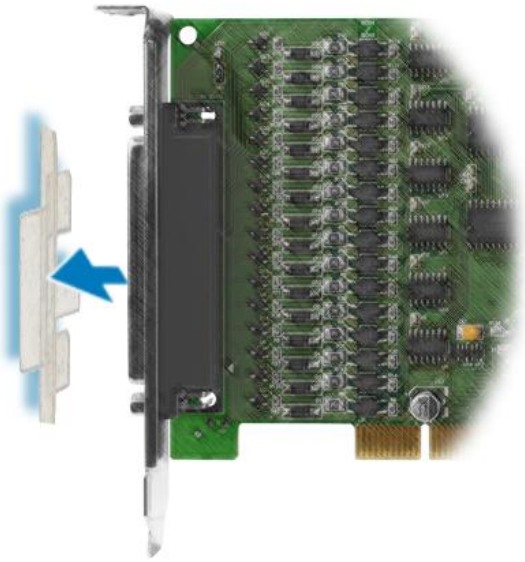


Step 5: Select an empty PCI slot.



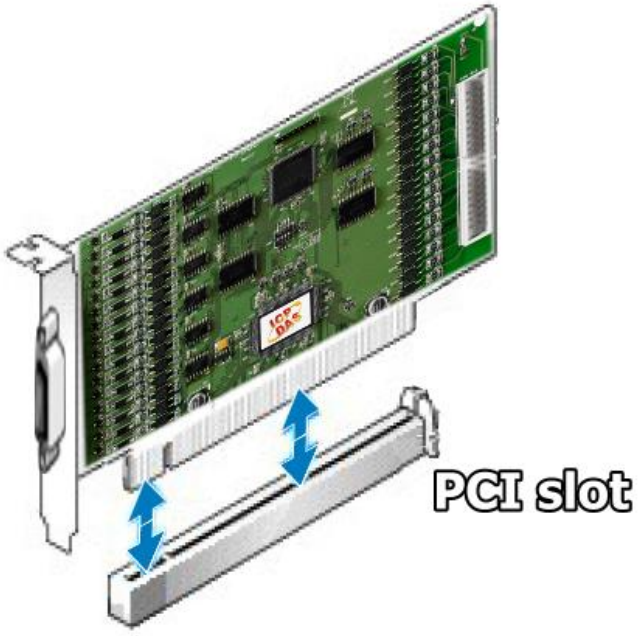
Step 6: Remove the PCI slot cover form the PC.

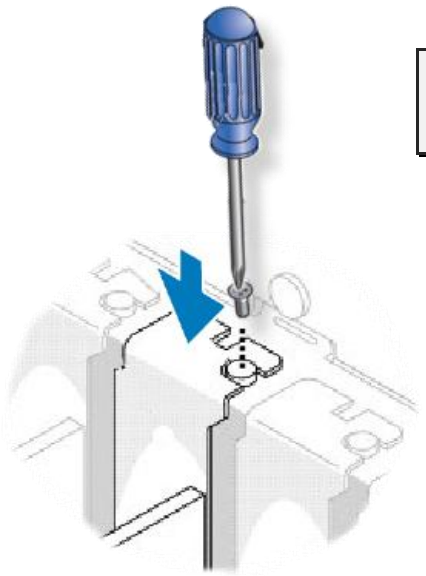




Step 7: Remove the connector cover form the PISO-1730U card.

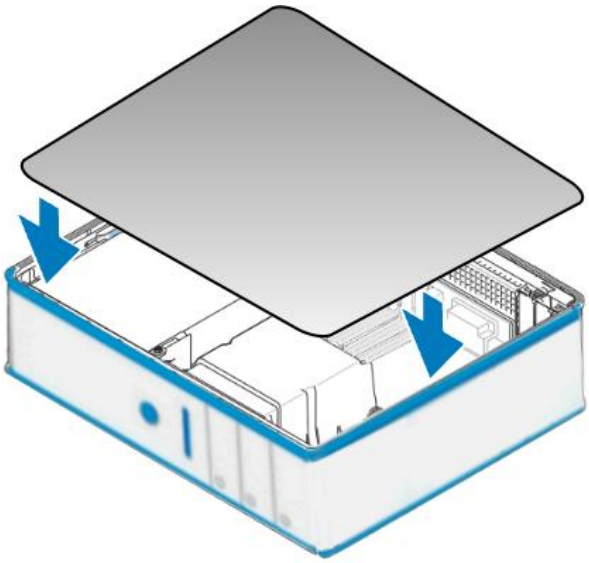
Step 8: Carefully insert your PISO-1730U card into the PCI slot.





Step 9: Tighten the captive Phillips screw.

Confirm the PISO-1730U card is mounted on the motherboard.



Step 10: Replace the computer cover.

Step 11: Power on the computer.

Follow the prompt message to finish the Plug&Play steps, please refer to Chapter 4 Software Installation.

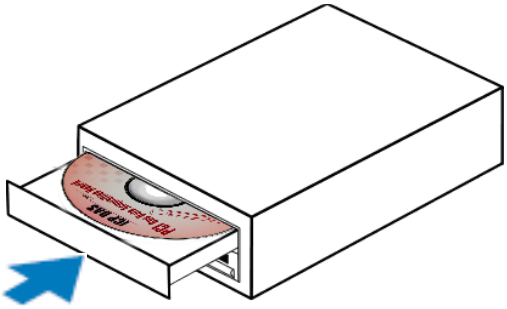
4. Software Installation

The PISO-1730U can be used in DOS, Linux and Windows 98/NT/2K and 32-bit/64-bit Windows XP/2003/Vista/7/8. This chapter shows you the detail steps to install these drivers. The recommended installation procedure for **Windows** is given in Sec. 4.1 ~ 4.3.
Note: The PISO-1730U software is fully compatible with the PISO-P32C32 series card software. Therefore, the PISO-1730U card is totally compatible with PISO-P32C32 series card and requires no software modification.

4.1 Driver Installing Procedure

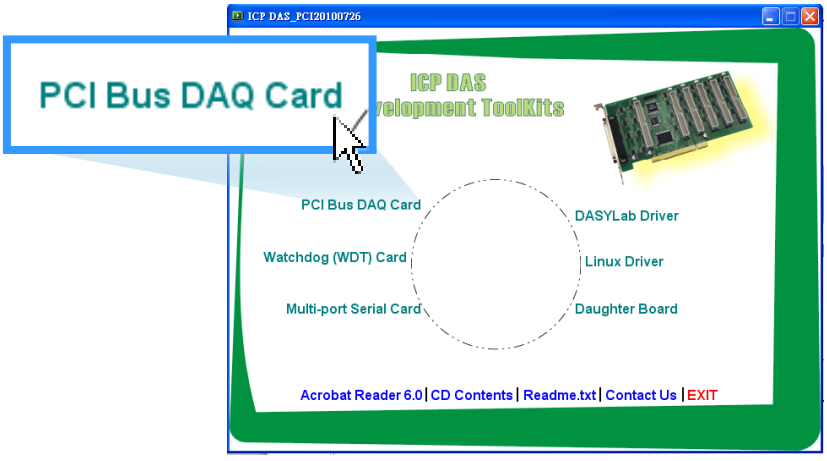
Follow these steps:

Step 1: Run the companion CD.



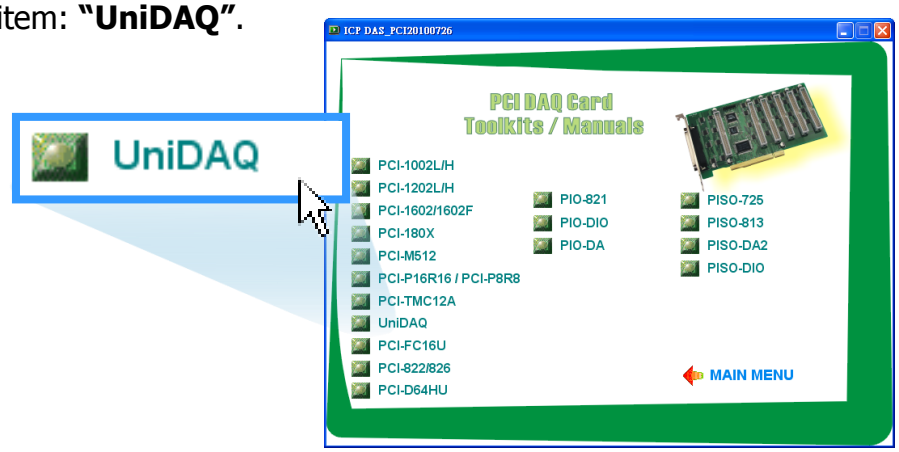
Insert the companion CD into the CD-ROM driver and wait a few seconds until the installation program starts automatically. If it does not start automatically for some reason, then please double-click the file **\NAPDOS\AUTO32.EXE** on the CD.

Step 2: Click the item:
PCI Bus DAQ Card.

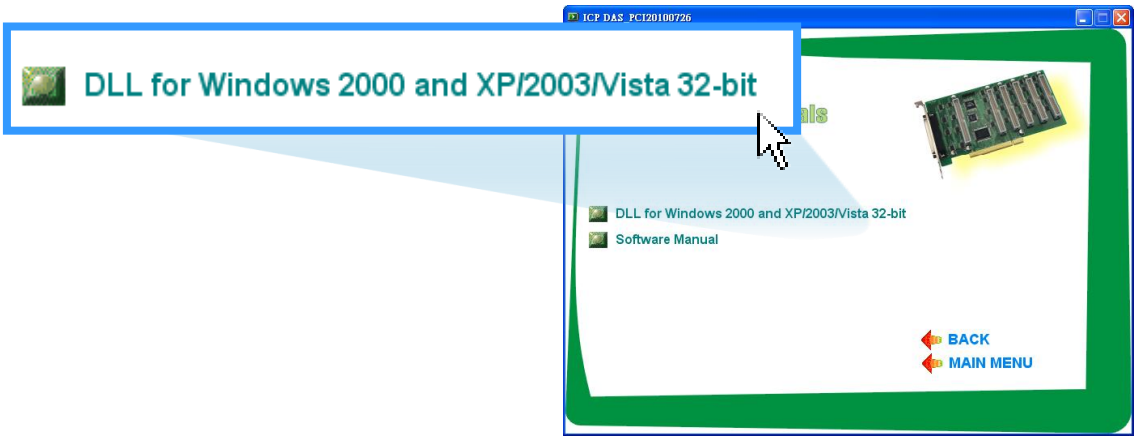


Step 3: Please install the appropriate driver for your OS.

1. Click the item: **"UniDAQ"**.



2. Click the item: **"DLL for Windows 2000 and XP/2003/Vista 32-bit"**.



3. Double-Click **"UniDAQ_Win_Setup_x.x.x.x_xxxx.exe"** file in the **"Driver"** folder.

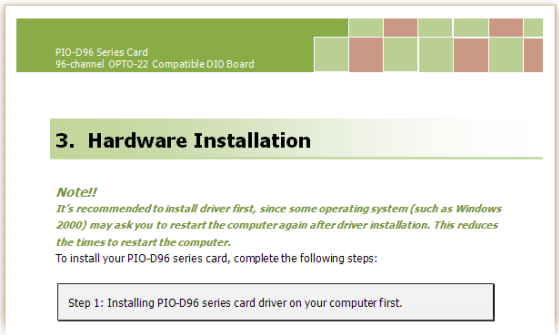
4. Click the **"Next>"** button to start the installation.
5. Check your DAQ Card is or not on supported list, Click the **"Next>"** button.
6. Select the installed folder, the default path is C:\ICPDAS\UniDAQ, confirm and click the **"Next>"** button.
7. Check your DAQ card on list, then click the **"Next>"** button.
8. Click the **"Next>"** button on the **Select Additional Tasks** window.
9. The demo program can be obtained from the following link and then click the **"Next>"** button.
10. Select **"No, I will restart my computer later"** and then click the **"Finish"** button.

For detailed information about the UniDAQ driver installation, please refer to UniDAQ DLL Software Manual. The user manual is contained in: CD:\NAPDOS\PCI\UniDAQ\Manual\
http://ftp.icpdas.com/pub/cd/iocard/pci/napdos/pci/unidaq/manual/

4.2 PnP Driver Installation

Step 1: Turn off the computer and install the PISO-1730U card into the computer.

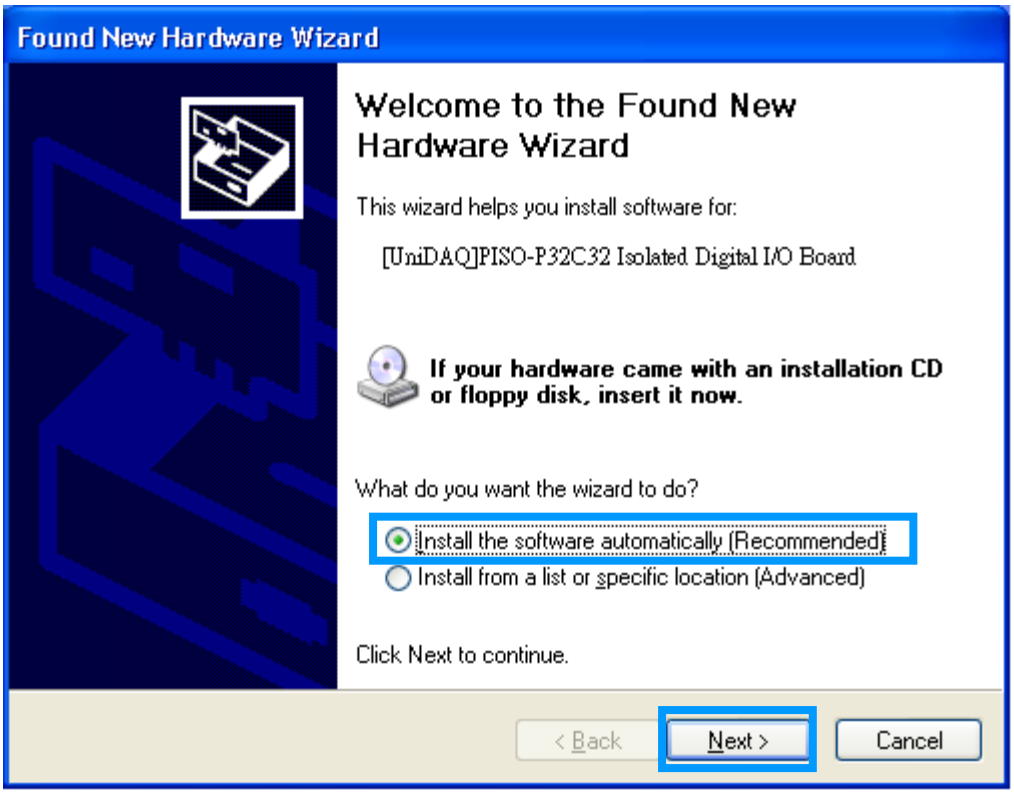
For detailed information about the hardware installation of PISO-1730U card, please refer to Chapter 3 Hardware Installation.



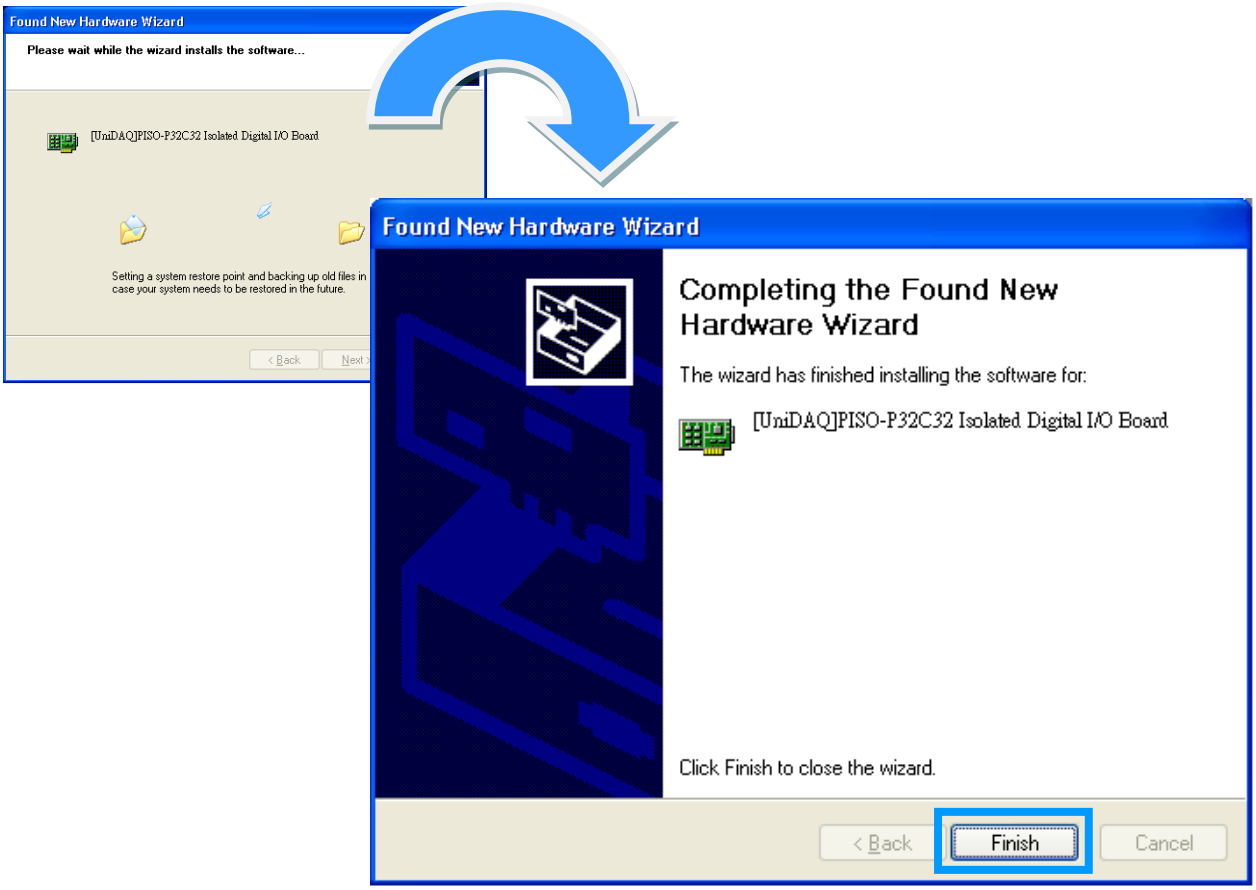
Step 2: Power on the computer and system should find the new card and then continue to finish the Plug&Play steps.

Note: Some Windows OS will load the driver automatically to complete the installation at boot.

Step 3: Select **"Install the software automatically [Recommended]"** and click the **"Next>"** button.



Step 4: Click the **"Finish"** button.



Step 5: Windows pops up **"Found New Hardware"** dialog box again.

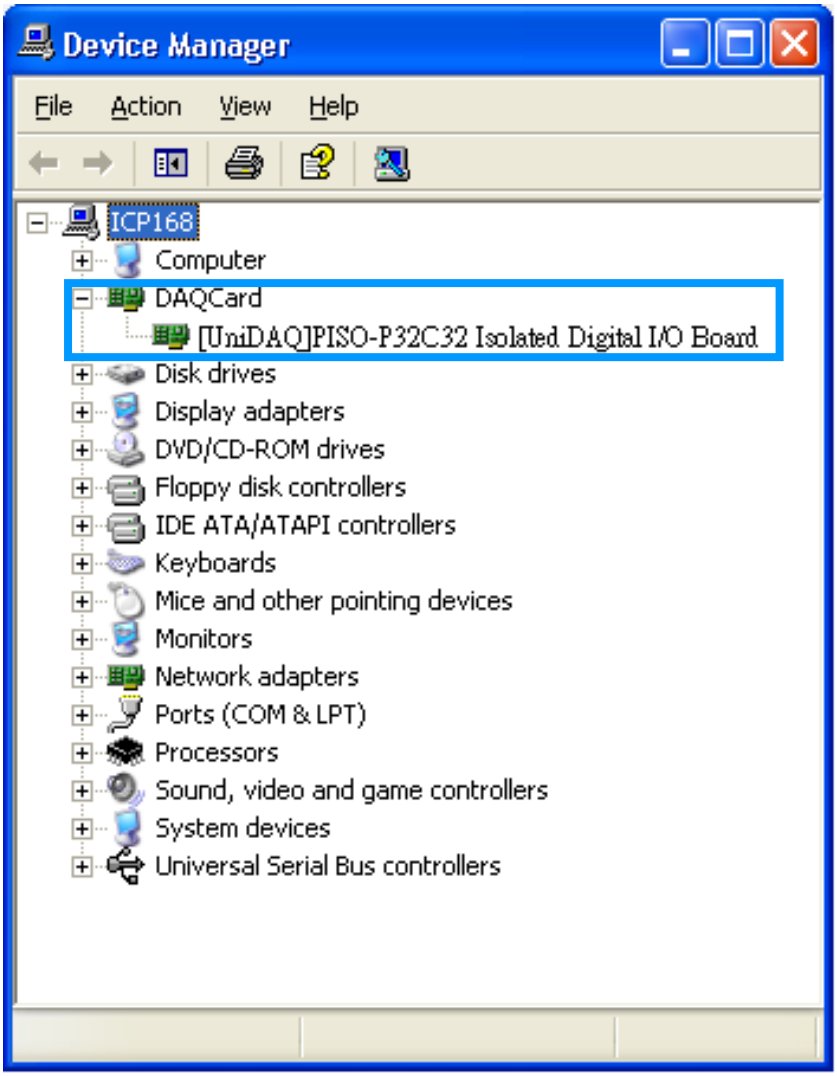
4.3 Confirm the Successful Installation

Make sure the PISO-1730U card installed is correct on the computer as follows:

Step 1: Select the **"Start" → "Control Panel"** and then double click the **"System"** icon on Windows.

Step 2: Click the **"Hardware"** tab and then click the **"Device Manager"** button.

Step 3: Check the PISO-1730U card which listed correctly or not, as illustrated below.



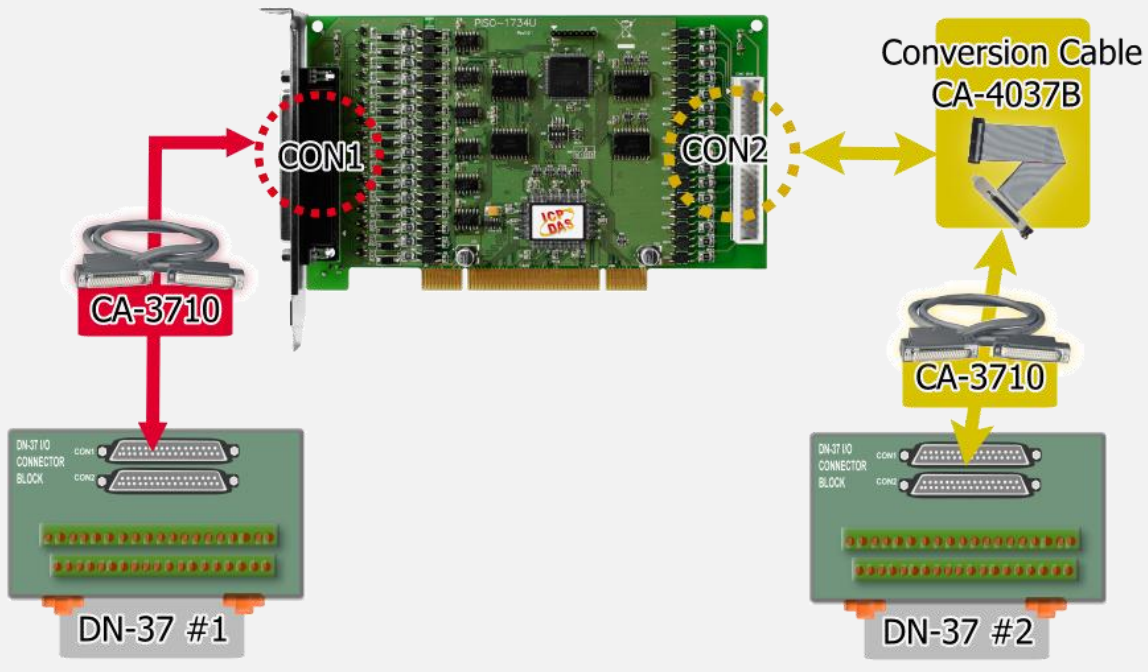
5. Testing PISO-1730U Card

This chapter can give you the detail steps about self-test. In this way, user can confirm that PISO-1730 card well or not. Before the self-test, you must complete the hardware and driver installation. For detailed information about the hardware and driver installation, please refer to Chapter 3 Hardware Installation and Chapter 4 Software Installation.

5.1 Self-Test Wiring

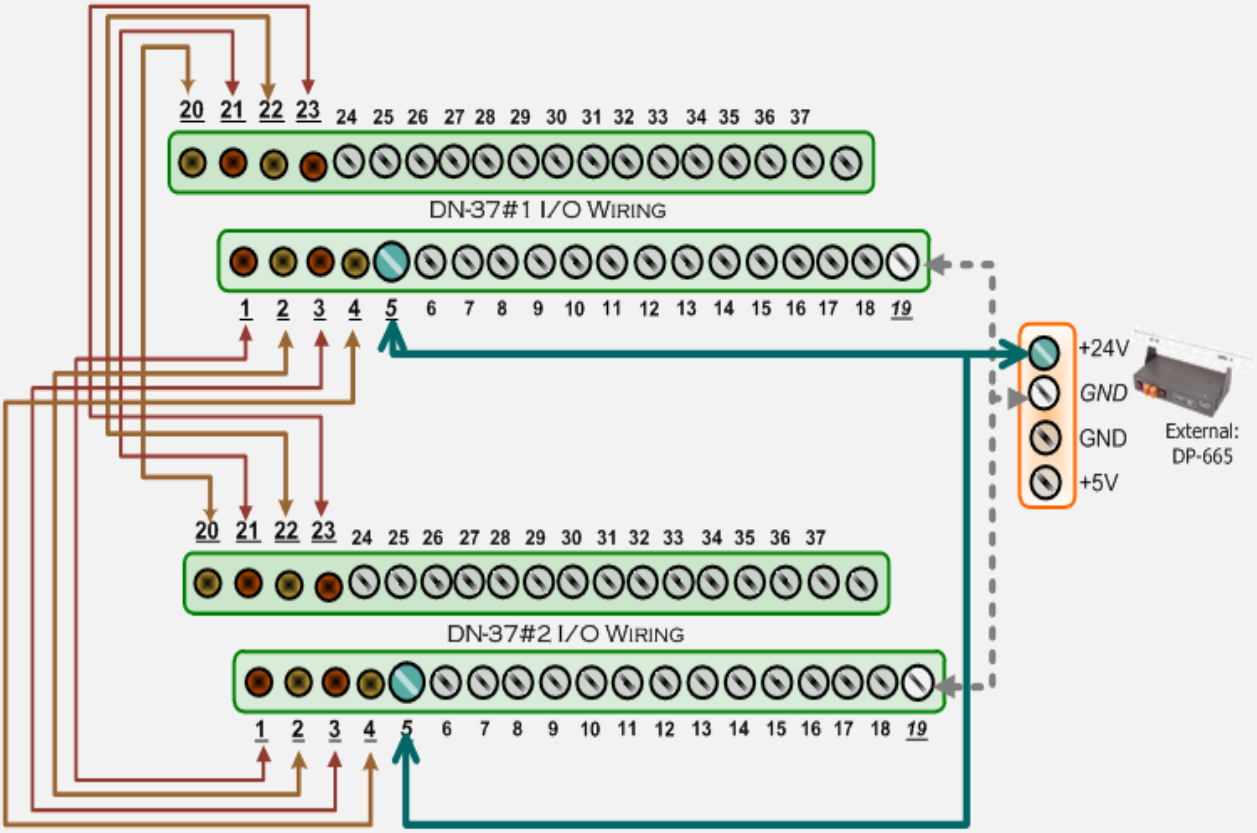
1. Prepare for device:
   - ☑ Two DN-37 (optional) wiring terminal boards.
   - ☑ Two CA-3710 (optional) cables.
   - ☑ One CA-4037B conversion cable.
   - ☑ Exterior power supply device. For example: DP-665 (optional)

2. Use the DN-37#1 to connect the CON1 on board.
3. Use the DN-37#2 to connect the CON2 on board.



4. Connect the DI(0-7) with DO(0-7). (DI0 with DO0 … DI7 with DO7)
5. Power Supply (+24 V) connect to PCOM (Pin05) of the CON1/CON2.
   Power Supply GND connect to EGND (Pin19) of the CON1/CON2.

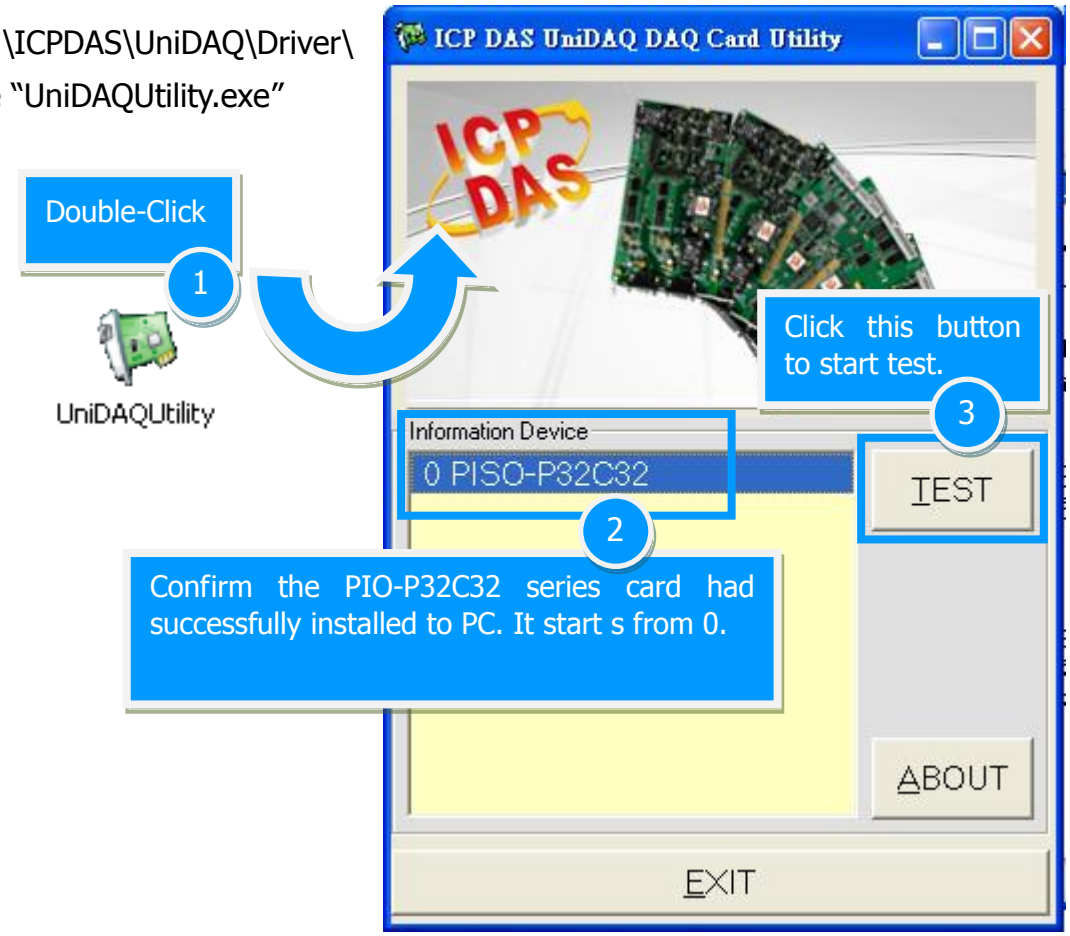
Note: The PISO-1730U suggests input voltage range as follow:
Logic high: +9 ~ +24 V; Logic Low: 0 ~ 1V.
(Higher voltage over the limitation will cause the hardware damage.)



5.2 Execute the Test Program

1. Execute the UniDAQ Utility Program. The UniDAQ Utility.exe will be placed in the default path after completing installation.

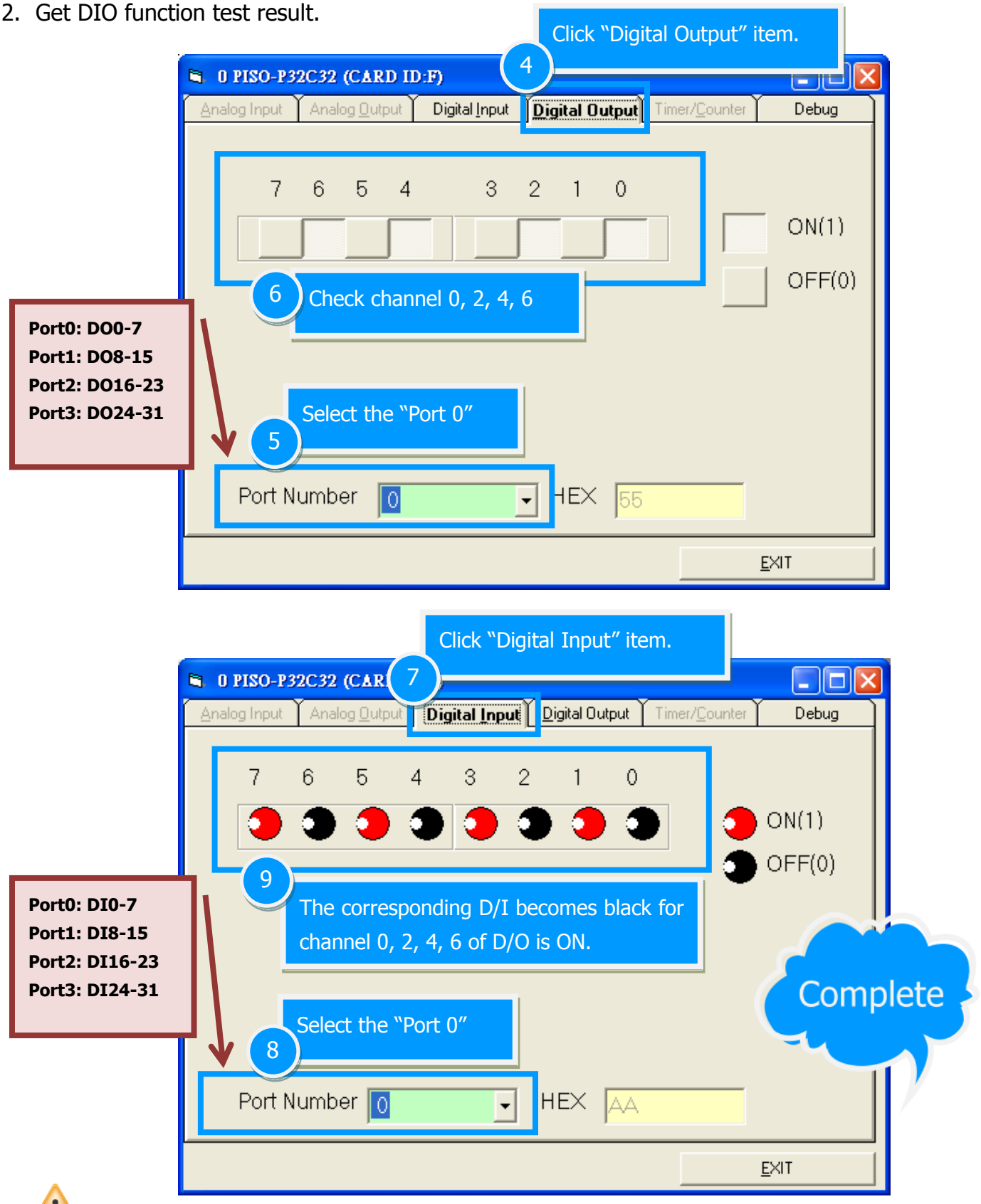
   Default Path: C:\ICPDAS\UniDAQ\Driver\
   Double click the "UniDAQUtility.exe"



Note!!

The PISO-1730U software is fully compatible with the PISO-P32C32 series software.

2. Get DIO function test result.



All the D/I should become red because all the D/O is OFF (uncheck).

6. I/O Control Register

6.1 How to Find the I/O Address

The plug&play BIOS will assign a proper I/O address to every PIO/PISO series card in the power-on stage. The fixed IDs for the PISO-1730U card are given as follows:

Table 6-1:

PISO-1730U (Rev 1.0)			
Vendor ID	0xE159	Sub-Vendor ID	0x4280
Device ID	0x0001	Sub-Device ID	0x0000
		Sub-Aux ID	0x0020

The PIO_PISO.EXE utility program will detect and present all information for PIO/PISO cards installed in the PC, as shown in the following Figure6-1. Details of how to identify the PISO-1730U card of ICPDAS data acquisition boards based on the **Sub-vendor**, **Sub-device** and **Sub-Aux ID** are given in Table 6-1.

The PIO_PISO.exe utility is located on the CD as below and is useful for all PIO/PISO series cards. (CD:\NAPDOS\PCI\Utility\Win32\PIO_PISO\)
http://ftp.icpdas.com/pub/cd/iocard/pci/napdos/pci/utility/win32/pio_piso/

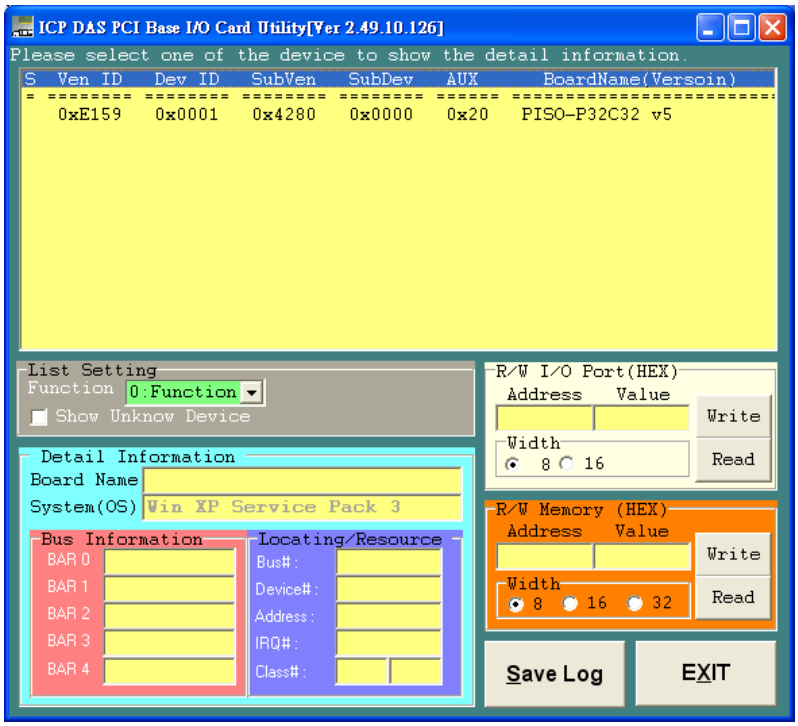


Figure 6-1

6.2 The Assignment of I/O Address

The Plug&Play BIOS will assign the proper I/O address to a PIO/PISO series card. If there is only one PIO/PISO board, the user can identify the board as card_0. If there are two PIO/PISO boards in the system, it is very difficult to identify which board is card_0. The software driver can support a maximum of 16 boards. Therefore, the user can install 16 PIO/PSIO series cards onto one PC system. The methods used to find and identify card_0 and card_1 is demonstrated below.

The simplest way to identify which card is card_0 is to use wSlotBus and wSlotDevice in the following manner:

Step 1: Remove all PISO-1730U cards from the PC.

Step 2: Install one PISO-1730U card onto the PC's PCI_slot1, run PIO_PISO.EXE. Then record the wSlotBus1 and wSlotDevice1 information.

Step 3: Remove all PISO-1730U cards from the PC.

Step 4: Install one PISO-1730U card into the PC's PCI_slot2 and run PIO_PISO.EXE. Then record the wSlotBus2 and wSlotDevice2 information.

Step 5: Repeat Steps(3) and (4) for every PCI_slot and record all information from wSlotBus and wSlotDevice.

The records may look similar to the table follows:

Table 6-2:

PC's PCI Slot	WslotBus	WslotDevice
Slot_1	0	0x07
Slot_2	0	0x08
Slot_3	0	0x09
Slot_4	0	0x0A
PCI-BRIDGE		
Slot_5	1	0x0A
Slot_6	1	0x08
Slot_7	1	0x09
Slot_8	1	0x07

The above procedure will record all the wSlotBus and wSlotDevice information on a PC. These values will be mapped to this PC's physical slot and this mapping will not be changed for any PIO/PISO cards. Therefore, this information can be used to identify the specified PIO/PISO card by following steps:

Step1: Using the wSlotBus and wSlotDevice information from Table 6-2.

Step2: Enter the board number into PIO_GetConfigAddressSpace(…) function to get the information for a specific card, especially the wSlotBus and wSlotDevice details.

Step3: Identify the specific PIO/PISO card by comparing the data of the wSlotBus and wSlotDevice from Step1 and Step2.

Note: that normally the card installed in slot 0 is card0 and the card installed in slot1 is card1 for PIO/PISO series cards.

6.3 The I/O Address Map

The I/O address for PISO-1730U card is automatically assigned by the main board ROM BIOS. The I/O address can also be re-assigned by the user. It is strongly recommended that users do not change the I/O address. The Plug&Play BIOS will effectively perform the assignment of proper I/O addresses to each PISO-1730U card. The I/O address for the PISO-1730U is given in the table below, all of which are based on the base address of each card.

Table 6-4: Refer to Sec. 6.1 for more information about wBase.

Address	Read	Write
wBase+0	-	RESET\ Control Register
wBase+2	Same	Aux control register
wBase+3	Same	Aux data register
wBase+5	Same	INT mask control register
wBase+7	-	Aux pin status register
wBase+0x2a	Same	INT polarity control register
wBase+0xc0	Read data from DI0-DI7	Write data from DO0-DO7
wBase+0xc4	Read data from DI8-DI15	Write data from DO8-DO15
wBase+0xc8	Read data from DI16-DI23	Write data from DO16-DO23
wBase+0xcc	Read data from DI24-DI31	Write data from DO24-DO31
wBase+0xe0	Read DO0 to DO7 Readback	-
wBase+0xe4	Read DO8 to DO15 Readback	-
wBase+0xe8	Read DO16 to DO23 Readback	-
wBase+0xec	Read DO24 to DO31 Readback	-
wBase+0xd0	Read Card ID	-

6.3.1 RESET\ Control Register

(Read/Write): wBase+0

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	RESET\

When the PC's power is first turned on, RESET\ signal is in a Low-state. **This will disable all D/I/O operations.** The user has to set the RESET\ signal to a High-state before any D/I/O command applications are initiated.

For example:

```
outportb (wBase,1);        /* RESET\=High → all D/I/O are enable now */
outportb (wBase,0);        /* RESET\=Low → all D/I/O are disable now */
```

6.3.2 AUX Control Register

(Read/Write): wBase+2

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Aux7	Aux6	Aux5	Aux4	Aux3	Aux2	Aux1	Aux0

Aux?=0→ this Aux is used as a D/I
Aux?=1→ this Aux is used as a D/O

When the PC is first turned on, all Aux signals are in a Low-state. All Aux are designed as D/I for all PIO/PISO series. Please set all Aux to DI state.

6.3.3 Aux Data Register

(Read/Write): wBase+3

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Aux7	Aux6	Aux5	Aux4	Aux3	Aux2	Aux1	Aux0

When the Aux is used for D/O, the output state is controlled by this register. This register is designed for feature extension. Therefore, do not use this register.

6.3.4 INT Mask Control Register

(Read/Write): wBase+5

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	0	0	0	0	0	0	0

This register is designed for future applications, please do not change this register.

6.3.5 Aux Status Register

(Read): wBase+7

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Aux7	Aux6	Aux5	Aux4	Aux3	Aux2	Aux1	Aux0

Aux0= Reserved
Aux4 ~ 7 = Aux-ID

6.3.6 Interrupt Polarity Register

(Read/Write): wBase+0x2A

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	0	0	0	0	0	0	0

This register is designed for future applications, please do not change this register.

6.3.7 Read/Write 8-bit Data Register

(Read/Write): wBase+0xc0/ 0xc4/ 0xc8/ 0xcc

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
D7	D6	D5	D4	D3	D2	D1	D0

For example:

```
outportb(wBase+0xc0,Val);        /* write to DO 0~7 */
outportb(wBase+0xc4,Val);        /* write to DO 8~15 */
outportb(wBase+0xc8,Val);        /* write to DO 16~23 */
outportb(wBase+0xcc,Val);        /* write to DO 24~31 */

Val=inportb(wBase+0xc0);         /* read from DI 0~7*/
Val=inportb(wBase+0xc4);         /* read from DI 8~15 */
Val=inportb(wBase+0xc8);         /* read from DI 16~23 */
Val=inportb(wBase+0xcc);         /* read from DI 24~31 */
```

6.3.7 Read D/O Readback

(Read): wBase+0xe0/ 0xe4/ 0xe8/ 0xec

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
D7	D6	D5	D4	D3	D2	D1	D0

For example:

```
Val=inportb(wBase+0xe0);         /* read DO Readback DO 0~7*/
Val=inportb(wBase+0xe4);         /* read DO Readback DO 8~15 */
Val=inportb(wBase+0xe8);         /* read DO Readback DO 16~23 */
Val=inportb(wBase+0xec);         /* read DO Readback DO 24~31 */
```

6.3.9 Read Card ID Register

(Read): wBase+0xd0

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	0	0	0	ID3	ID2	ID1	ID0

For example:

```
wCardID=inportb(wBase+0xd0);      /* Read Card ID */
```

Appendix: Digital I/O Applications

- The D/I/O circuit diagram for the PISO-1730U, as follows:

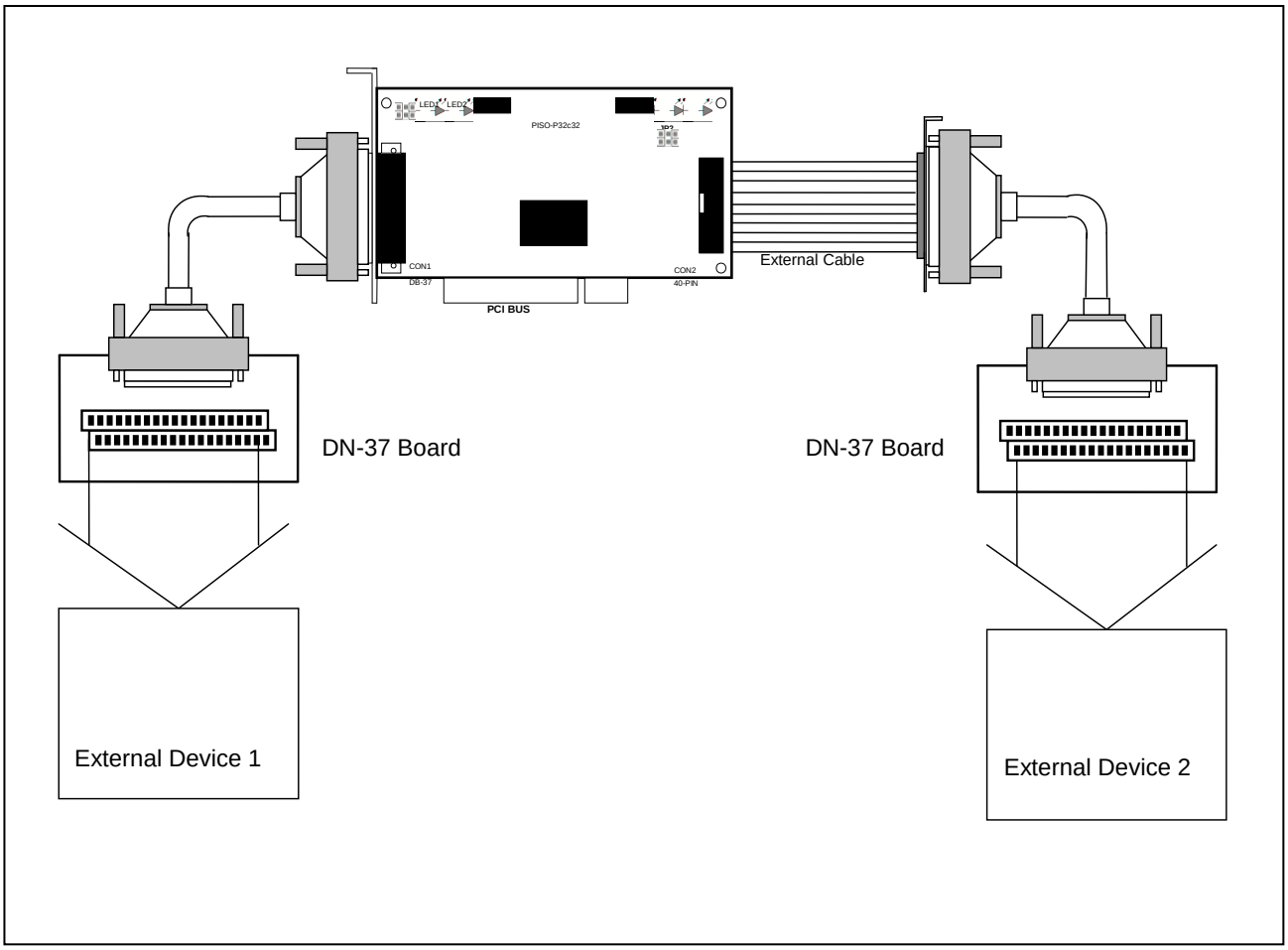
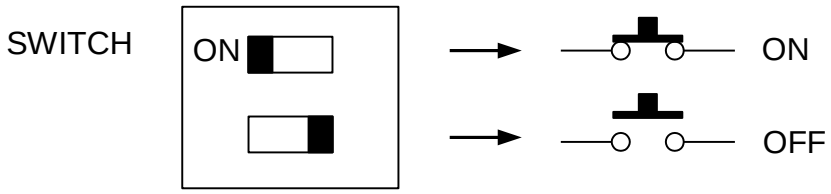


Figure A-1. Digital inputs/outputs for the PISO-1730U

- Figure A-2 (PISO-1730U) shows the circuit diagram for external device 1
- Figure A-3 (PISO-1730U) shows the circuit diagram for external device 2



- The circuit diagram for external device 1, as follows:

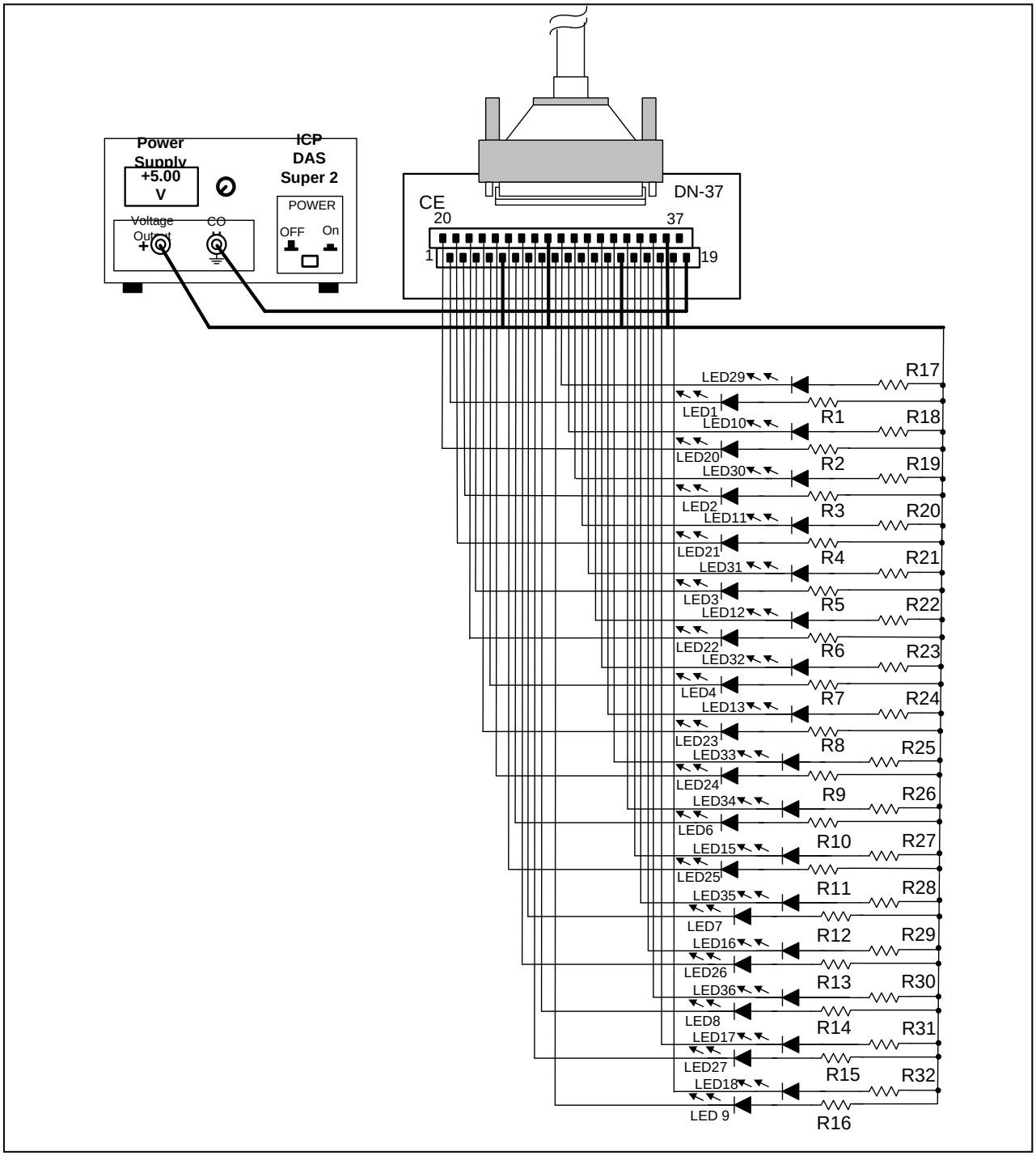


Figure A-2. The circuit diagram for external device 1 for D/O of PISO-1730U

- Pin 19 is the GND signal for EGND.
- Pin 05/14/28/37 is the voltage (+) signal for P COM (input 5 V_{DC}~24 V_{DC}).

- The D/I circuit diagram for the PISO-1730U, as follows:

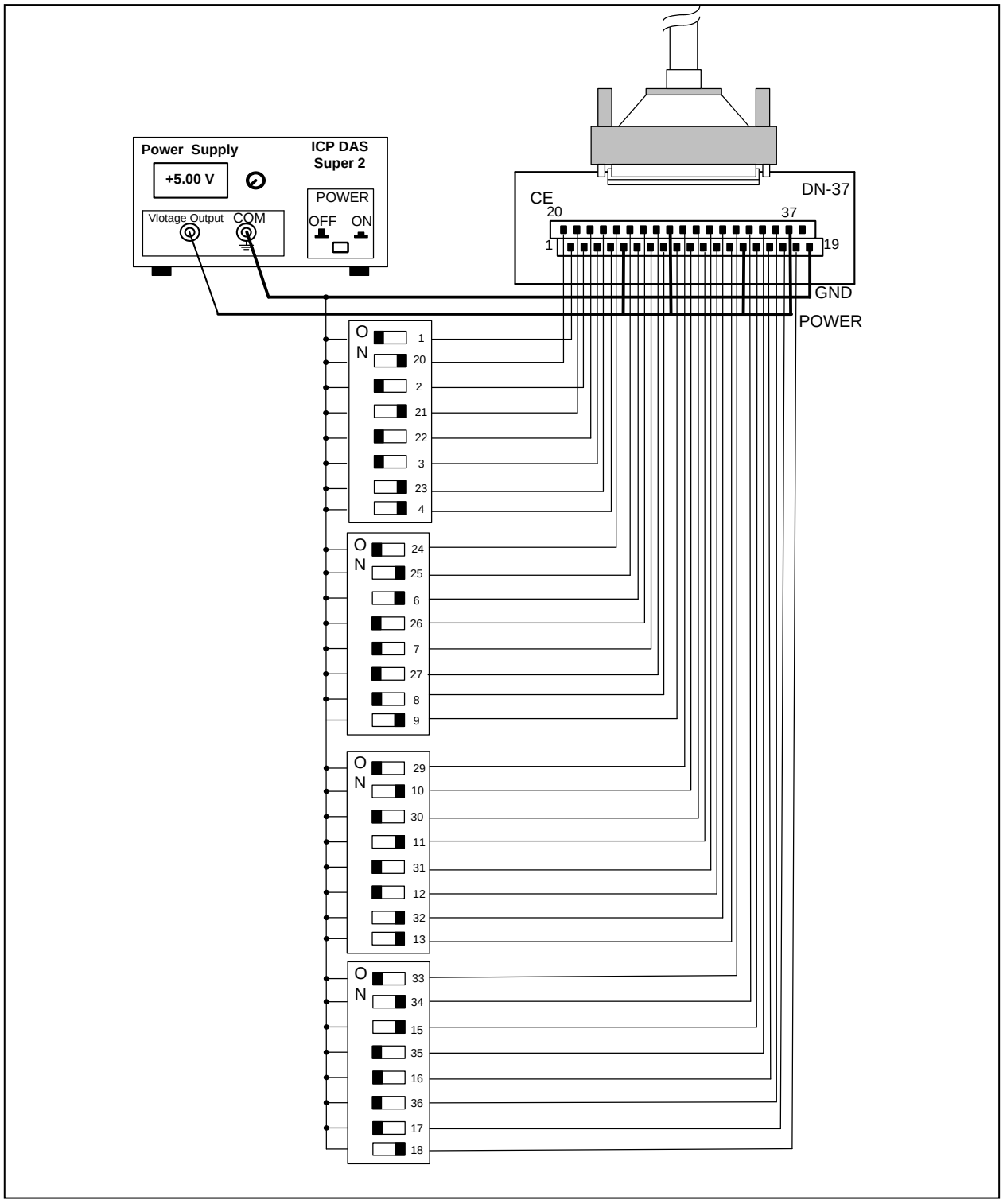


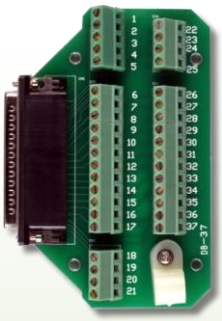
Figure A-3. The DI circuit diagram for external device 2 of PISO-1730U

- Pin 19 is the GND signal for E GND.
- Pin 05/14/28/37 is the voltage (+) signal for E COM (input 5 V_{DC}~24 V_{DC}).

Appendix: Daughter Board

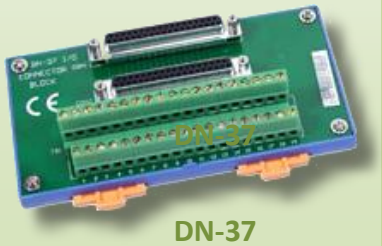
A1. DB-37 and DN-37

- **DB-37:** The DB-37 is a general purpose daughter board for D-sub 37 pins. It is designed for easy wire connection via pin-to-pin.



DB-37

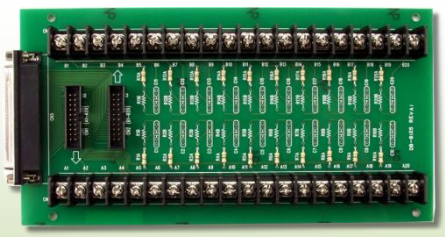
- **DN-37:** The DN-37 is a general purpose daughter board for DB-37 pins with DIN-Rail Mountings. They are also designed for easy wire connection via pin-to-pin.



DN-37

A2. DB-8125

The DB-8125 is a general purpose screw terminal board. It is designed for easy wire connection. The DB-8125 consists of one DB-37 and two 20-pin flat-cable headers.



DB-8125