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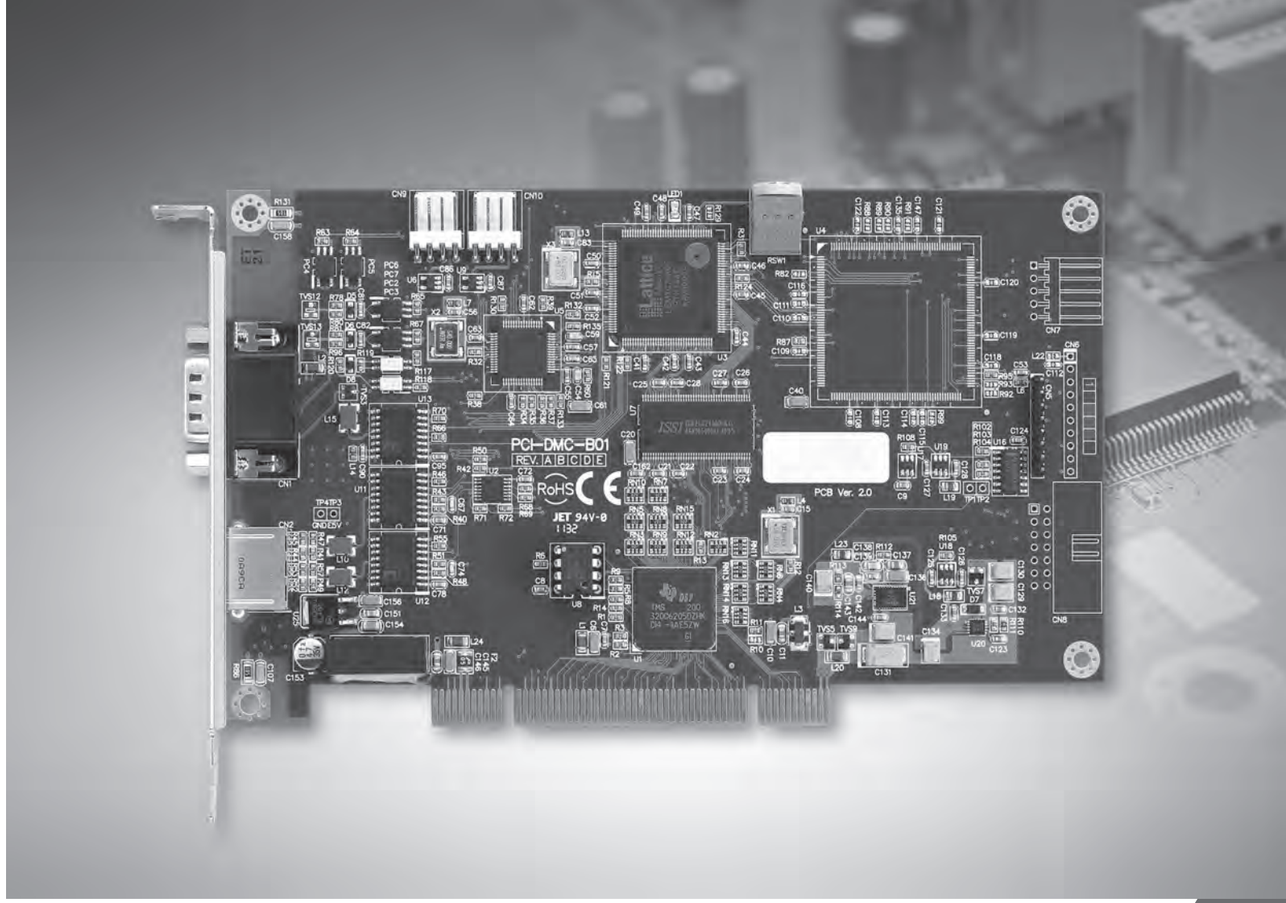
DELTA_IA-ASD_PCI DMC AB01_UM_EN_20140703



PCI-DMC-A01/B01
User Manual

www.deltaww.com

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About this Manual

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Table of Contents

Chapter 1 Installation Environment

1.1 Physical Architecture

The communications framework of the PCI-DMC-01 interface is based on the Delta Motion Control Network (DMCNET™) protocol. Figure 1.1 is a diagram of the physical architecture. As shown in Figure 1.1, when you wish to use the PCI-DMC-01 for communications, attach one end of the network cable (please refer to Cable Types in Section 1.2 Hardware Specifications for cable specifications) to CN2 on the PCI-DMC-01 interface card (end A in Figure 1.1), and attach the other end to the slave module (end B in Figure 1.1: CN6 on the Delta ASDA-A2-F Drive) to establish a series connection.

Make sure that both ends of the network cable use **RJ45 connectors with metal shielding** (indicated by yellow arrows in Figure 1.2). The last Slave Module in the link must have a **Terminal** (see Figure 1.3 left) connected to its RJ45 port (Figure 1.1 B-side: port CN6 on the Delta ASDA-A2-F Servo Drive.).

Terminal operation: Connect pin 1 and pin 2 of the RJ45 connector (Figure 1.3: right side) with a 150Ω (Ohm) resistor then connect pin 3 and pin 6 with another 150Ω (Ohm) resistor to make a terminal.

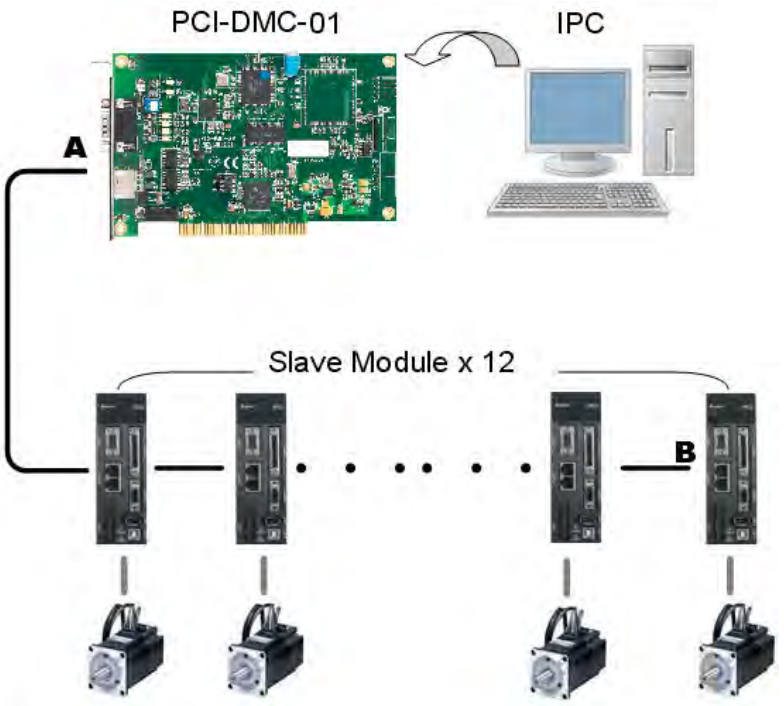

Figure 1.1 PCI-DMC-01 Overview of Physical Architecture

Figure 1.2 Connector with Metal Shielding

Figure 1.3 Actual Terminal

1.2 Hardware Specifications

Motion Control

- Supported Module: Delta ASDA -A2-F Servo Drive
- Homing modes: 35 types (controlled by DMCNET parameter settings)
- Acceleration mode: T-curve, S-curve
- Interpolation modes: linear, arc, helical, and continuous

DMCNET

- Ring quantity: 1 set
- Serial Control Interface: half duplex RS-485 with transformer isolation
- Cabling Type:CAT-5e STP Ethernet cable (24AWG/4Pairs)
- Communications distance: Maximum 30 meters (12 slave module)

General

- Axis card size (including bracket): 189mm x 126mm x 20mm (l x w x h)
- PCI specifications: ver. 2.2;Supports 32-bit, 3.3V/5VDC operating mode
- Power Consumption: +5V DC at 0.5A typical
- Surge Voltage Tolerance: 1500VAC(Primary-secondary);
  1500VAC(Primary-PE)
- ESD:8KV Air Discharge
- EFT: Power Line-2KV
- RS:80MHz ~ 1GHz, 10V/m
- Operating temperature:0 ^{o}C ~ 50 ^{o}C

1.3 Electrical Safety Precautions

1. To prevent electrical hazards, please disconnect the system from the power supply before moving the system.
2. Make sure that all power supply cables have been disconnected before connecting or disconnecting any signal wires from the main board.
3. Please make sure that the voltage of the power supply has been set to the standard voltage used for your current country/region. If you are not sure what the voltage of your local power supply is, please contact your local electrical company.
4. If the power supply is damaged, do not attempt to repair it by yourself. Please contact professional technicians or your distributors for assistance.

1.4 PCB Layout

■ PCI-DMC-A01 (Ver.2.0)

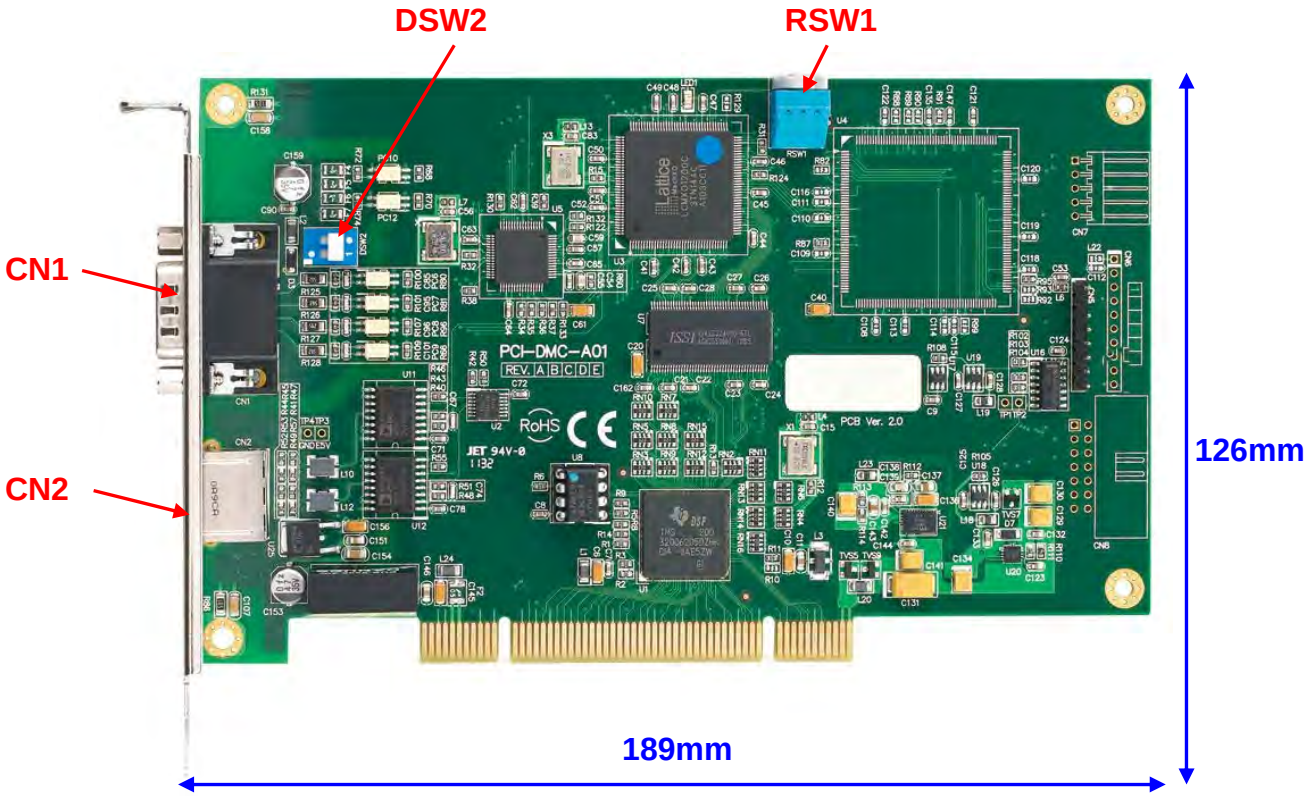

Figure 1.4 PCI-DMC-A01 Physical Layout

Table 1.1 Functions of PCI-DMC-A01 Card

Title	Function
CN1	Digital Input/output Connector
CN2	DMCNET Expansion Module Connection Port
RSW1	Card ID Number Configuration Switch
DSW2	Input/Output Signal SINK/SOURCE Device Switch

■ PCI-DMC-B01

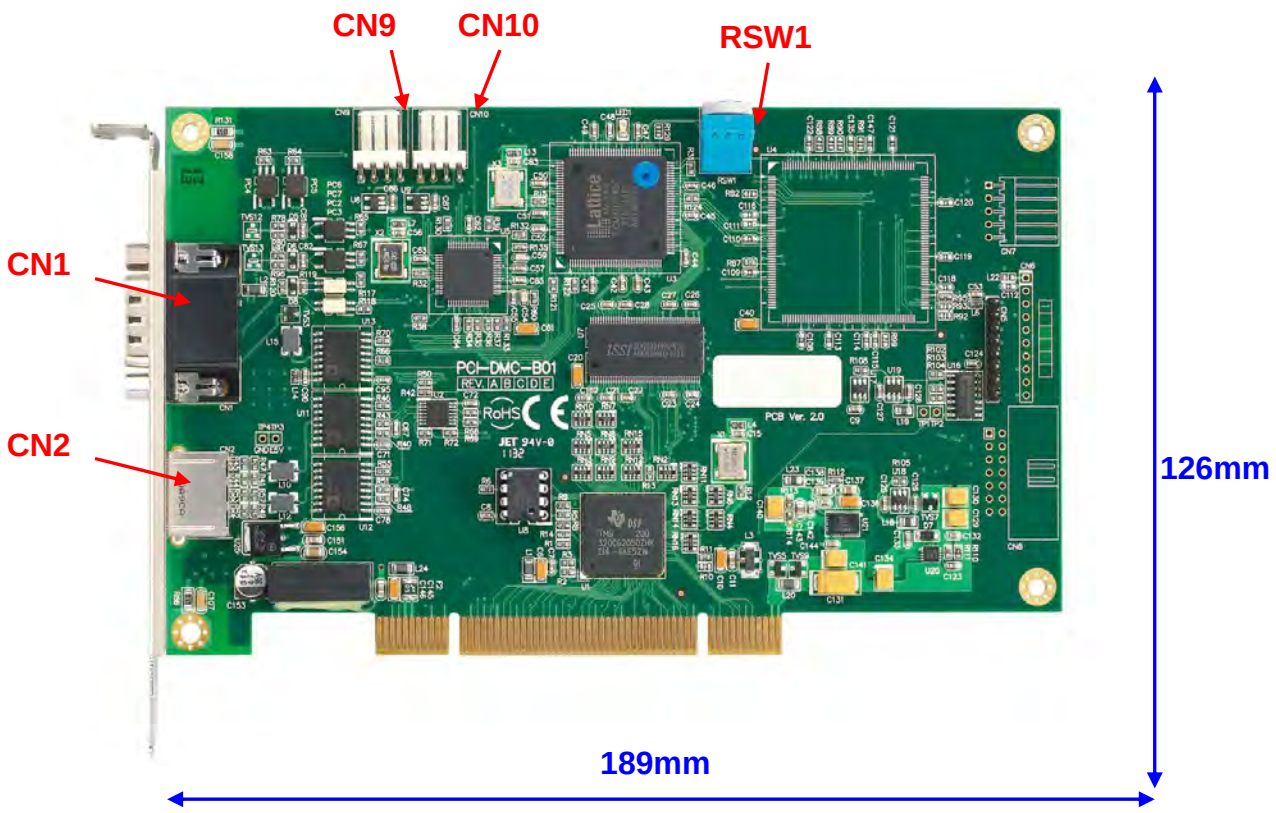

Figure 1.5 PCI-DMC-B01 Physical Layout

Table 1.2 Functions of PCI-DMC-B01 Card

Title	Function
CN1	Connector (digital input/output, encoder & compare)
CN2	DMCNET Expansion Module Connection Port
CN9	Position compare signal output (channel 1, 3.3V)
CN10	Position compare signal output (channel 1, 3.3V)
RSW1	Card ID Number Configuration Switch

1.5 Connector Pin Guide

■ CN1: Digital Input / Output (for A01_Ver.2.0)

Figure 1.6

CN1 pin definition

Pin	Label	Description
1	GPIO IN 0	GPIO Input signal
2	GPIO IN 1	GPIO Input signal
3	GPIO IN 2	GPIO Input signal
4	GPIO IN 3	GPIO Input signal
5	External GND	GND Signal
6	E24V	24VDC Power Input
7	GPIO IN 4	GPIO Input signal
8	GPIO IN 5	GPIO Input signal
9	GPIO IN 6	GPIO Input signal
10	GPIO IN 7	GPIO Input signal
11	External GND	GND Signal
12	GPIO OUT 0	GPIO Output signal
13	GPIO OUT 1	GPIO Output signal
14	GPIO OUT 2	GPIO Output signal
15	GPIO OUT 3	GPIO Output signal

GPIO: General Purpose Input & Output

■ CN1: Digital Input / Output (for A01_Ver.1.1 & B01)

Figure 1.7

CN1 pin definition

Pin	Label	Description
1	QA_1-	QA Signal 1 (-)
2	QB_1-	QB Signal 1 (-)
3	QA_2-	QA Signal 2 (-)
4	QB_2-	QB Signal 2 (-)
5	External GND	GND Signal
6	QA_1+	QA Signal 1 (+)
7	QB_1+	QB Signal 1 (+)
8	QA_2+	QA Signal 2 (+)
9	QB_2+	QB Signal 2 (+)
10	GPIO IN	GPIO Input signal
11	CMP_1+(RS-422)	1st RS422 Differential Signal (+)
12	CMP_1- (RS-422)	1st RS422 Differential Signal (-)
13	CMP_2+(RS-422)	2nd RS422 Differential Signal (+)
14	CMP_2- (RS-422)	2nd RS422 Differential Signal (-)
15	GPIO OUT	GPIO Output signal

GPIO: General Purpose Input & Output

※This is the pin definition for PCI-DMC-B01 Ver2.0. On PCI-DMC-A01 Ver1.1 only **Pin 5, Pin 10 and Pin 15** are **valid.**

■ CN2: DMCNET Expansion Module Connection Port

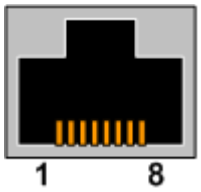

Figure 1.8

CN2 pin definition

Pin	Label	Description
1	RS485T_1(+)	1st RS485 transmission signal(+)
2	RS485T_1(-)	1st RS485 transmission signal(-)
3	RS485T_2(+)	2nd RS485 transmission signal(+)
6	RS485T_2(-)	2nd RS485 transmission signal(-)
7	EGND	9V Ground Signal
8	EGND	9V Ground Signal

■ DSW2:SINK/SOURCE Loop Switch

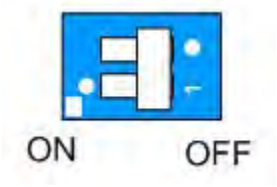

Figure 1.9

DSW2 pin definition

Label	Description
ON	SOURCE (connected with PNP device)
OFF	SINK (connected with NPN device)

DSW2 is for PCI-DMC-A01 only. There is no such part in Ver. 1.1.

※ When the connected external device is Low active then DSW2 must be set to OFF; If it is High active then DSW2 must be set to ON instead.

■ CN9: 3.3V Compare Output 1

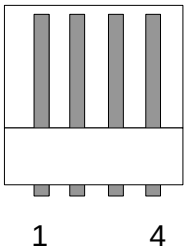

Figure 1.10

CN9 pin definition

Pin	Label	Description
1	CMP_OUT1(QEP1)	CMOS 3.3V to level comparison trigger signal output
2	GND	GND Signal
3	CMP_1+(LVDS)	LVDS Differential Signal (+)
4	CMP_1- (LVDS)	LVDS Differential Signal (-)

CN9 is for PCI-DMC-B01 only. PCI-DMC-A01 does not contain this part.

※ This is the socket-side pin definition. PIN 1 on the cable corresponds to PIN 4 here.

■ CN10: 3.3V Compare Output 2

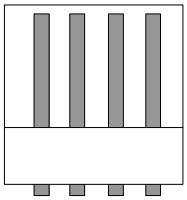

Figure 1.11

CN10 pin definition

Pin	Label	Description
1	CMP_OUT2(QEP2)	CMOS 3.3V to level comparison trigger signal output
2	GND	GND Signal
3	CMP_2+(LVDS)	LVDS Differential Signal (+)
4	CMP_2- (LVDS)	LVDS Differential Signal (-)

CN10 is for PCI-DMC-B01 only. PCI-DMC-A01 does not contain this part.

※ This is the socket-side pin definition. PIN 1 on the cable corresponds to PIN 4 here.

■ SW1: Dial for Setting the Card ID Number

Figure 1.12

SW1 dial

Card ID is the value that the dial is turned to.

It can be set to a value between 0 ~ 15.

※ This dial is used to set the Card ID on PCI-DMC-A01 / PCI-DMC-B01 Ver.2.0.

■ SW1: Card ID Number Configuration Switch

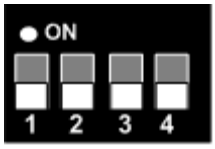

Figure 1.13

SW1 Dip Switch

Pin	Label	Description
1	Bit3	Card ID Bit3
2	Bit2	Card ID Bit2
3	Bit1	Card ID Bit1
4	Bit0	Card ID Bit0

Card ID = $Bit3x2*^{3}+Bit2x2*^{2}+Bit1x2*^{1}+Bit0x2*^{0}$

※ This dip switch is used on PCI-DMC-A01 Ver.1.1 to set the Card ID.

1.6 Wiring Example

■ Connecting the PCI-DMC-A01 Digital Output to External Input Device

SINK type

PCI-DMC-A01 ver.1.1

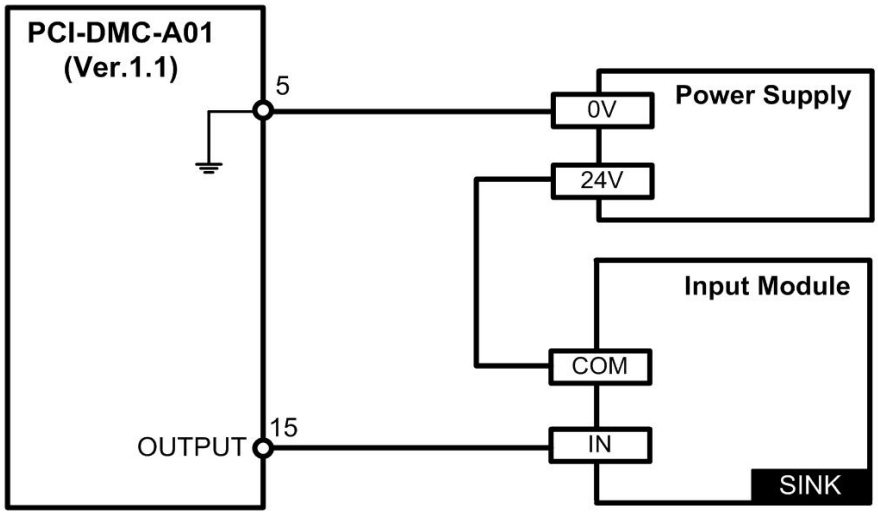

Figure 1.14

PCI-DMC-A01 ver.2.0

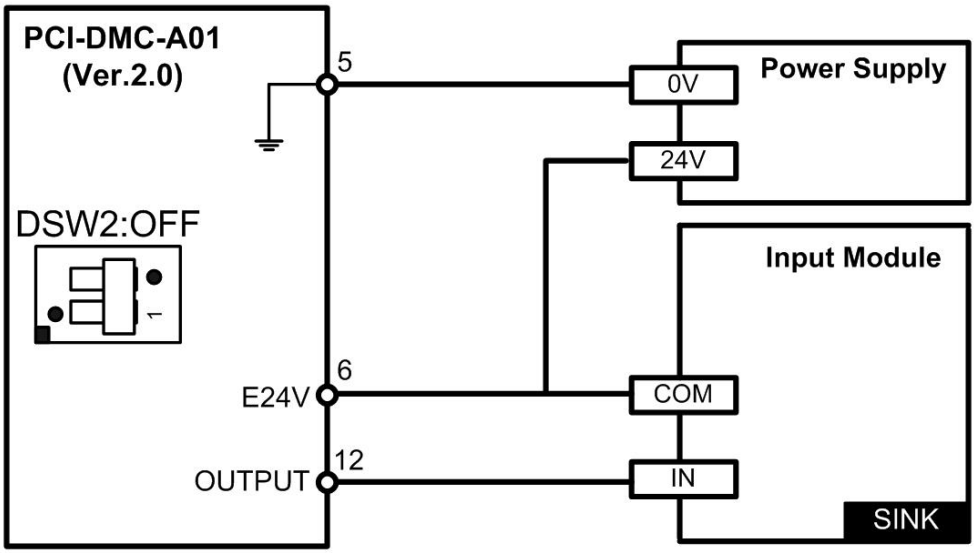

Figure 1.15

SOURCE type

PCI-DMC-A01 ver.2.0

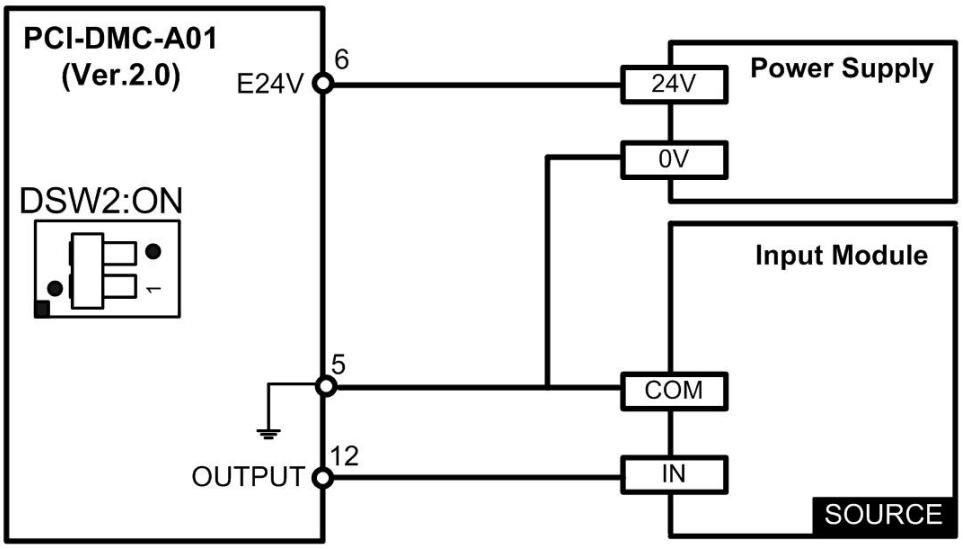

Figure 1.16

※ PCI-DMC-A01 Ver.1.1 output points do not support connections of SOURCE type Input devices.

■ Connecting the PCI-DMC-A01 Digital Input to External Output Device

SINK type

PCI-DMC-A01 ver.1.1

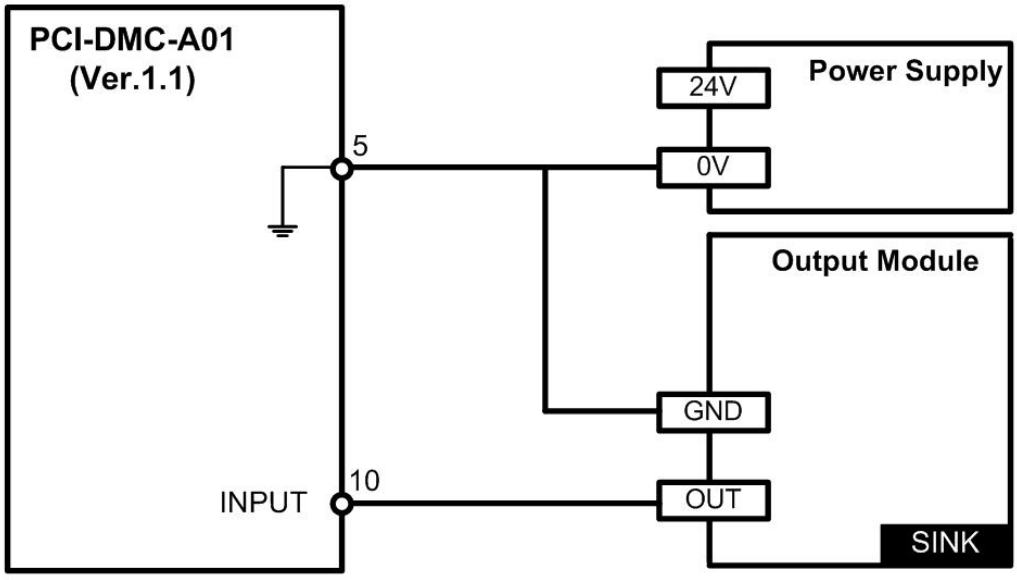

Figure 1.17

PCI-DMC-A01 ver.2.0

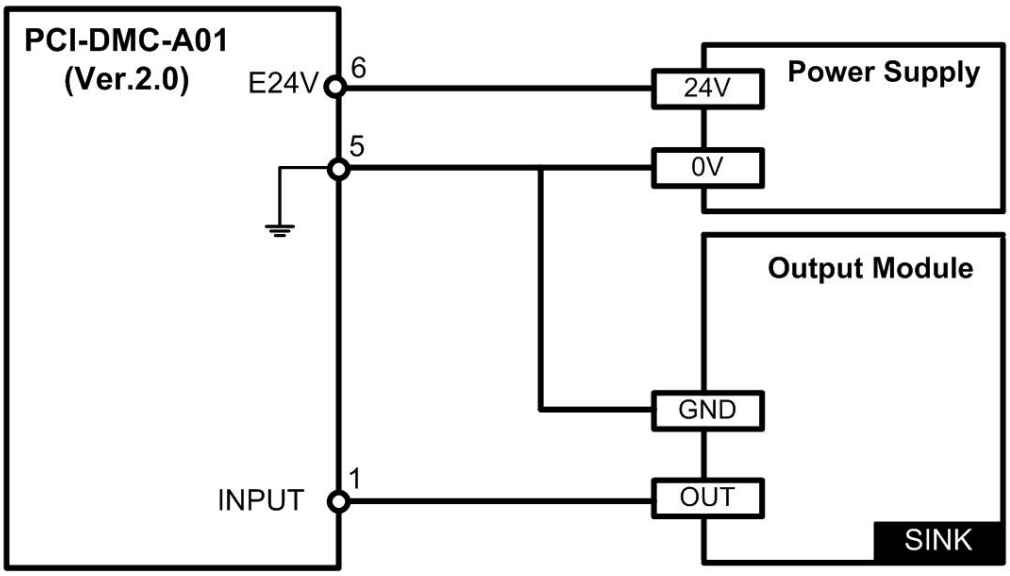

Figure 1.18

※ PCI-DMC-A01 input point only supports connection of SINK type output devices.

■ Wiring of PCI-DMC-B01 High-speed Counter

Encoder

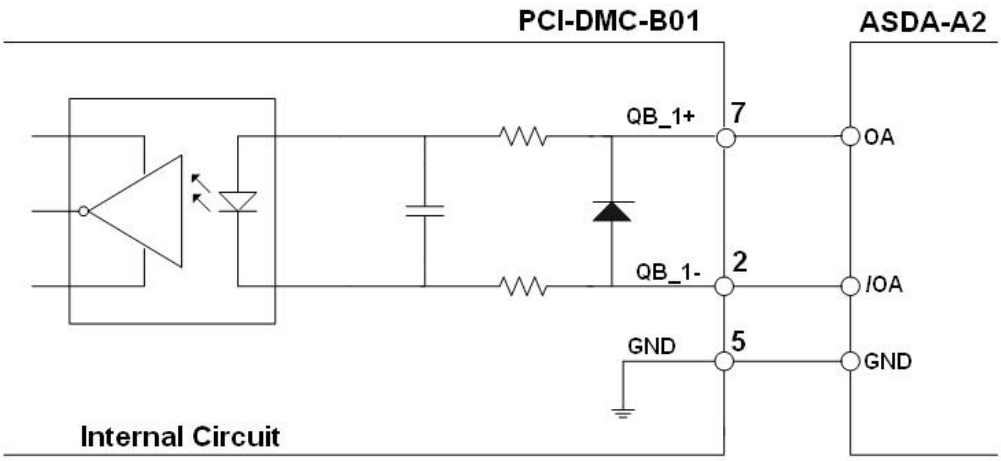

Figure 1.19

Compare (RS-422 differential)

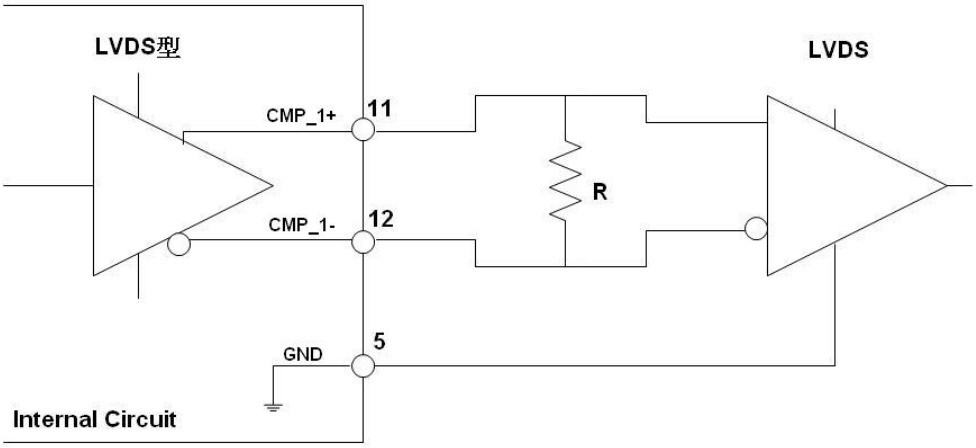

Figure 1.20

Compare (non-differential)

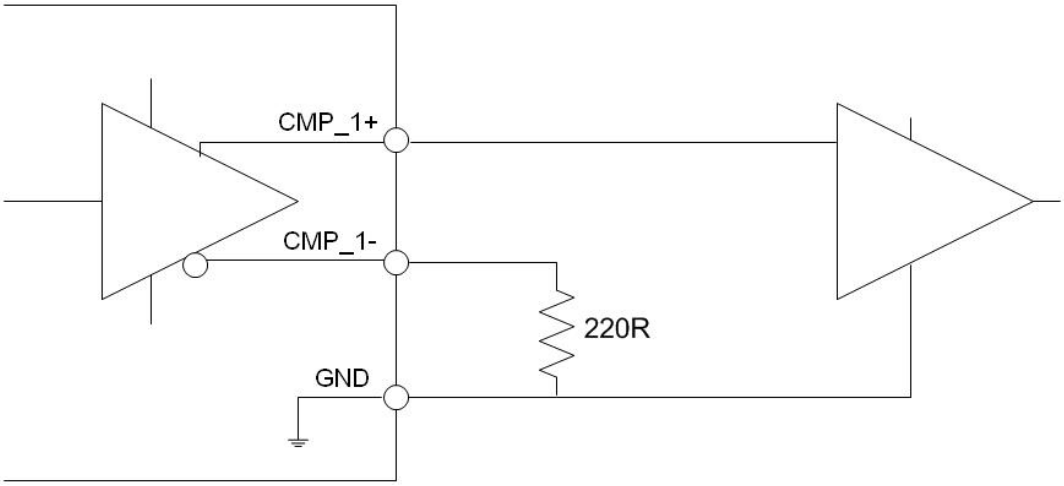

Figure 1.21

■ 3.3V Compare Output Wiring (CN9, CN10)

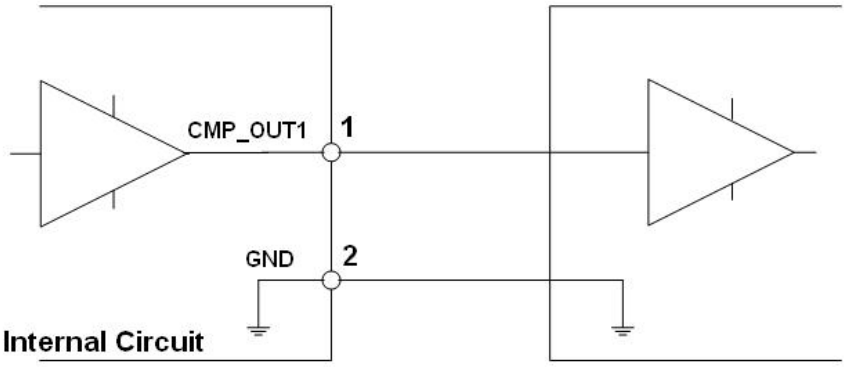

Figure 1.22

1.7 Card Compatibility

Please check the number of cards you plan to use before installing the PCI-DMC-01 card. If you plan to install **3 or less** PCI-DMC-01 cards, the recommended power supply for the system, is **300W (Watt)** at least. For **8 or more** PCI-DMC-01 cards, please use a power supply rated higher than **500W (Watt)** to ensure that the PCI-DMC-01 cards will operate normally.

The following table lists the testing environment used for PCI-DMC-01 card's compatibility tests.

Table 1.3 Overview of compatible IPC specifications

Test PC Name	CPU Card	Power Supply	Operation System
IEI IP-4SA-RS	IP-4SA-RS-R30 Rev.3.0	200W	Windows XP
IEI IPC	Intel N270 1.6GHz / HPE-8S0	300W	Windows XP
Advantech IPC	PCA-6106P3-0C1 Rev.C1	200W	Windows XP
ADLINK IPC	HPCI6S VER6.0	230W	Windows XP
iSM ICS-2442-20	PEAK-765VL2 / NBP-1412P	500W	Windows XP

Table 1.4 Overview of compatible commercial specifications PCs

Test PC Name	CPU Card	Power Supply	Operation System
DELL Vistro 220	G45M03 / Core 2 Duo 2.8GHz	350W	Windows Vista
DELL Vistro 430	Intel Core i5-750 2.66GHz	350W	Windows XP
DELL Vostro 230	Intel Pentium E6700 3.2GHz	350W	Windows 7

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Chapter 2 Installation Guide

This chapter describes how to install the PCI-DMC-01 multi-axis motion control card. Please follow the following installation process:

- Product Packaging and Accessories (section 2.1)
- Hardware Installation (section 2.2)
- Driver Installation (section 2.3)

2.1 Product Packaging and Accessories

This product should include:

- PCI-DMC-01 Multi-axis Motion Control Card 1 pcs
- PCI-DMC-01 Driver Installation CD x 1

If this product's standard accessories are missing or damaged, please contact your distributor for replacement. Please store the packaging in a safe place in case you need to mail the product in the future.

2.2 Hardware Installation

■ Hardware Configuration

PCI-DMC-01 is treated as a standard Plug and Play device by the PC. Basic system functions such as memory allocation and I/O port assignments can all be managed through BIOS of the PC system. The user does not need to configure the hardware directly.

■ PCI Slot Selection

When the PC system has both built-in ISA and PCI expansion slots, please take care not to insert this product into an ISA expansion slot! The card is not only physically incompatible but is also designed for use with PCI only, so it will only work normally in a PCI expansion slot.

■ Motion Card Installation

Step 1: Turn off the main power supply of the computer in which the PCI-DMC-01 will be installed, and disconnect any peripherals such as printers and monitors. Confirm that the power supply is connected to the computer and is grounded.

Step 2: Touch the back plate of the system case to discharge any static electricity on your body. Once done, disconnect the system's power supply.

Step 3: Open the system case, choose an empty PCI slot and remove the corresponding back plate. Watch out for any sharp edges on the metal plating during the removal process.

Step 4: Remove PCI-DMC-01 from its packaging while keeping one hand touching the metallic part of the system case. This action is intended to earth any static electricity on your body through the system case. Make sure that you do not touch any of the components on the card to avoid electro-static damage. Put on rubber gloves and pick up the PCI-DMC-01 card in the manner shown in Figure 2.1.

Figure 2.1

Shown below are two wrong ways of handling the PCI-DMC-01 card. In Figure 2.2, the hands are in direct contact with the components of the PCI-DMC-01 card. Handling the card in this manner may crush the card components or damage them through static electricity. In Figure 2.3, the hand is in direct contact with the golden pins of the PCI-DMC-01 card. Handling the card in this manner may lead to static electricity on the hands discharging through the golden pins, which could damage the IC or other components.

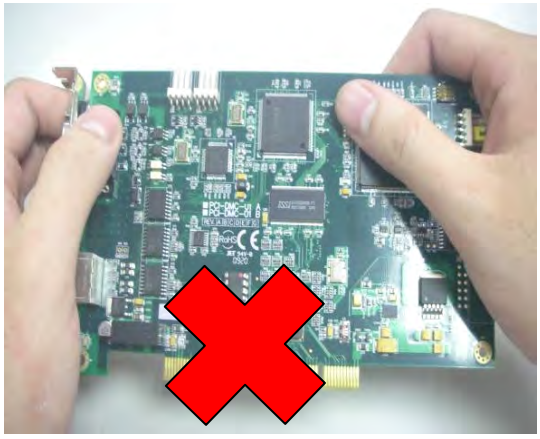


Figure 2.2

Do not touch the card components directly with your hands.

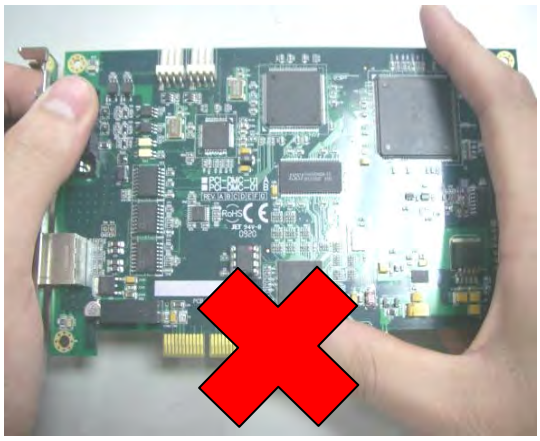


Figure 2.3

Do not touch the golden pins of the card directly with your hands.

Step 5: Make sure that the PCI-DMC-01 card is inserted vertically into the PCI slot as shown in Figure 2.4. Press the PCI-DMC-01 card firmly into the slot. Extra care should be taken where the card touches the slot as shown in Figure 2.5. This will help avoid damage to the card or main board.

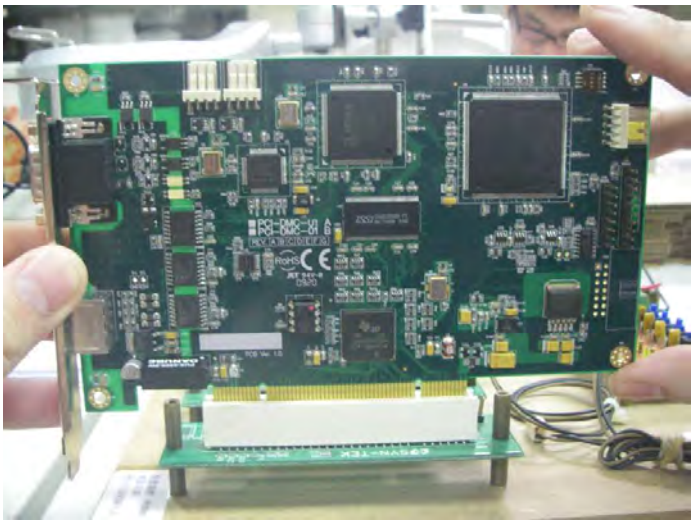


Figure 2.4

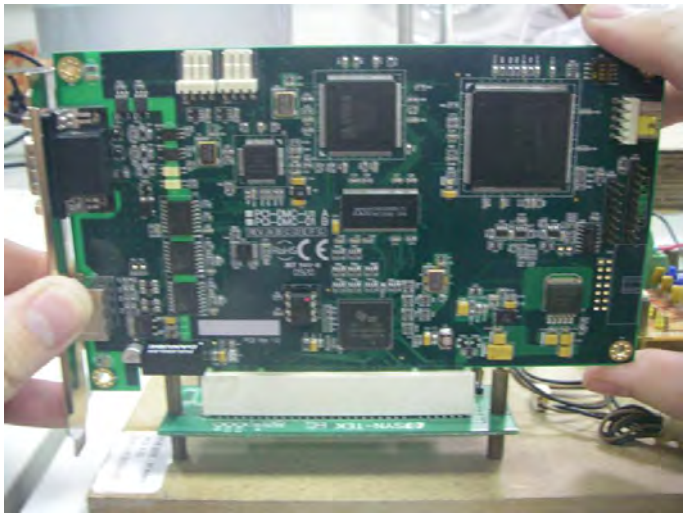


Figure 2.5

Step 6: Secure the PCI-DMC-01 card in its PCI slot to the case with a screw.

Step 7: Reinstall the system case. This completes the hardware installation of the PCI-DMC-01 card.

■ Hardware Installation Troubleshooting

If you installed the card following the above procedure but the system will not restart normally, please turn off the system and disconnect the power. Open the system case and check that the PCI-DMC-01 card is inserted properly. Check to see if the screw is loose or the PCI-DMC-01 is not properly seated in the PCI slot. Try removing the PCI-DMC-01 from the PCI slot then restart the system to see if the system runs normally. If the system runs normally, follow the above procedure and install the PCI-DMC-01 again. If the system still does not start normally, please contact your distributor for assistance.

2.3 Preparation for Driver Software Installation

2.3.1 Close New Hardware Wizard

When you install the hardware and start the system for the first time, the "New Hardware Wizard" window will pop up as shown in Figure 2.6. Please click on "Cancel" to close the wizard as the next step is to install the software bundle.

Figure 2.6

2.3.2 Find the New PCI Device

Open the system “Control Panel” as shown in Figure 2.7, then find and open “System”.

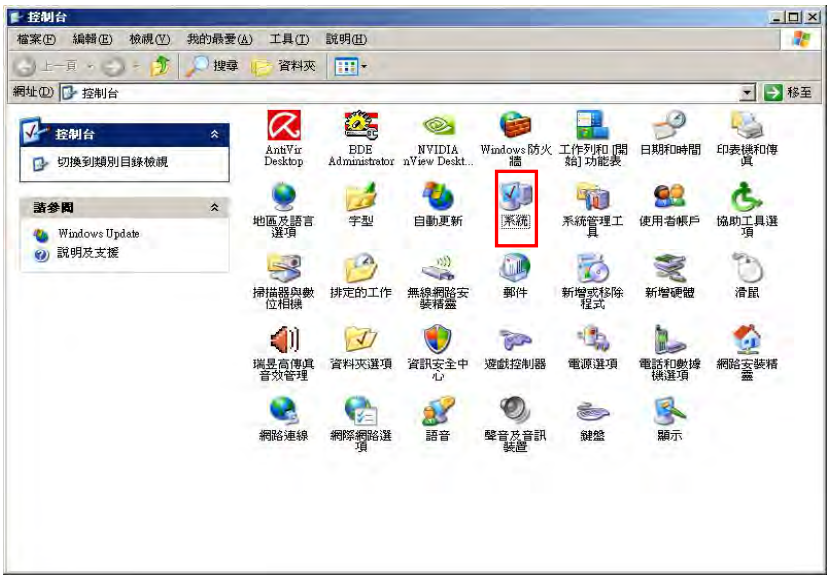


Figure 2.7

In the "Hardware" field of "System Properties", click on "Device Manager" as shown in Figure 2.8.

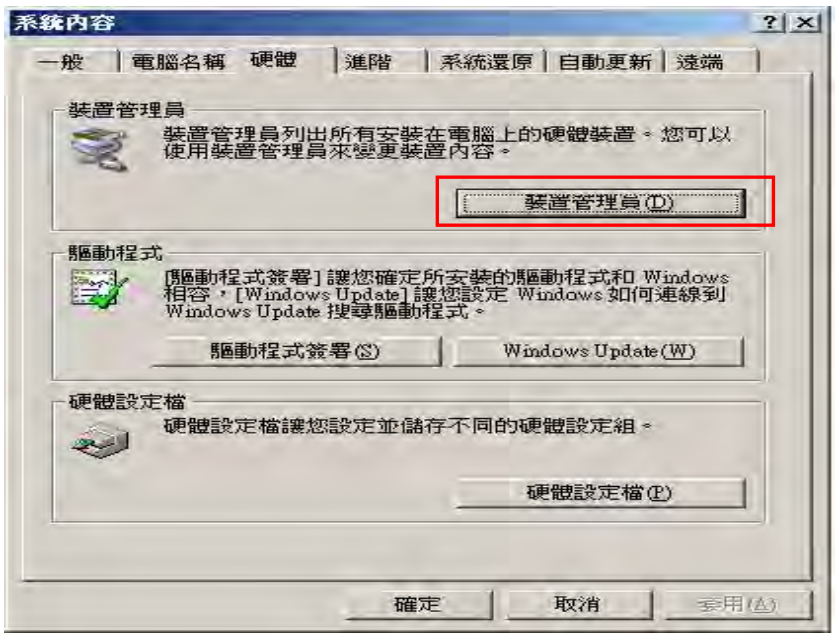


Figure 2.8

As shown in Figure 2.9, if you have only one PCI-DMC-01 card installed in the PCI slot, the listing will show one unknown "PCI Device". This means that the PCI-DMC-01 card you installed has been detected by the system. The next step is to install the driver software for this card. Please see section 2.4 "Driver Software Installation".

Figure 2.9

2.3.3 New PCI Device Not Detected by System

If you have installed the hardware and restarted the system, but the "New Hardware Wizard" shown in Figure 2.6 does not automatically pop up, an unknown PCI device is not detected in Device Manager (see Figure 2.10). To see if the system has detected a new PCI device, please refer to section 2.3.2 "Find the new PCI device"

Figure 2.10

PCI and ISA cards are installed differently by the system. For this reason, **do not** attempt to install the driver from the "Control Panel" using "Add new Hardware" (see Fig. 2.11 and Fig. 2.12). Try installing the PCI-DMC-01 card to another free PCI slot on the system or try to use another test system. If the problem is not resolved, please contact your distributor for assistance.

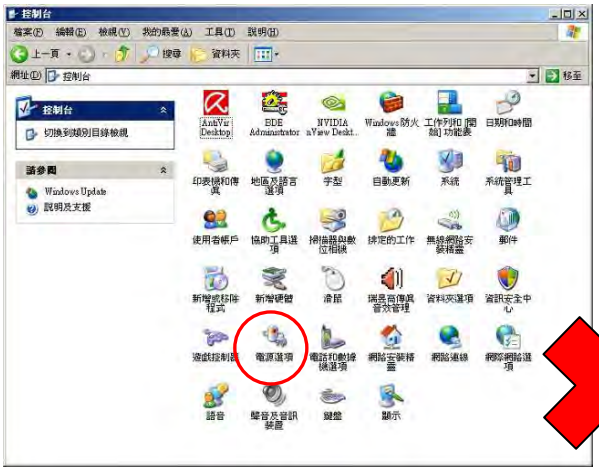


Figure 2.11

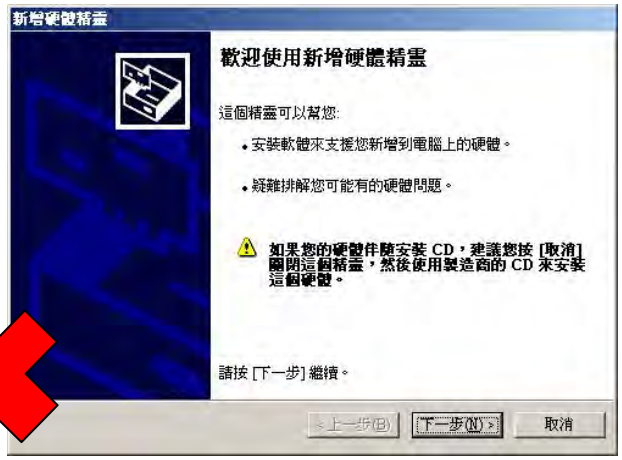


Figure 2.12

Do not use this method to install the PCI device

2.4 Driver Software Installation

2.4.1 Software Installation Procedure

Step 1: Open the CD and in the DISK1_32bit_XXXX folder select and run "setup.exe" as shown in Figure 2.13.

Figure 2.13

Step 2: As shown in Figure 2.14, the system program will start by checking the system resources.

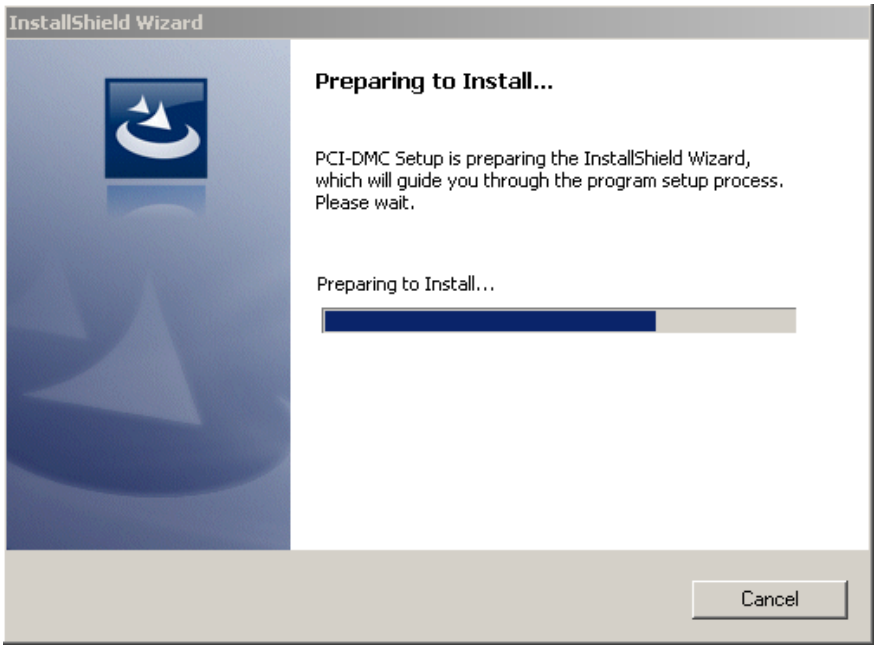


Figure 2.14

Step 3: As shown in Figure 2.15, once the system resources check has been completed, the software installation process will begin. Pleas click on "Next" to continue.

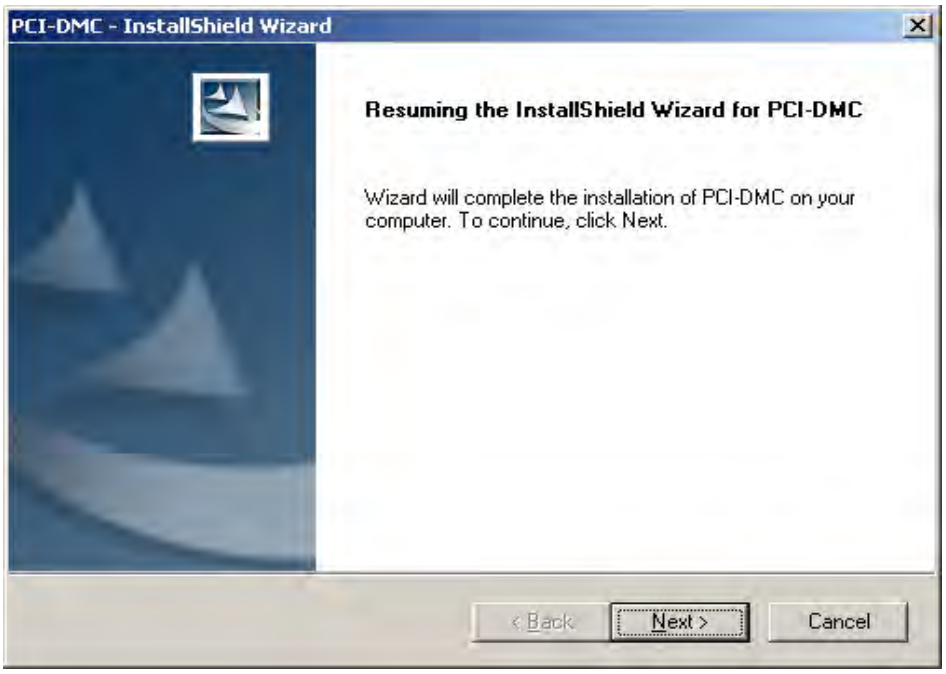


Figure 2.15

Step 4: As shown in Figure 2.16, select the software installation path to use on the system. Using the default path is recommended. Please click on "Next" to continue.

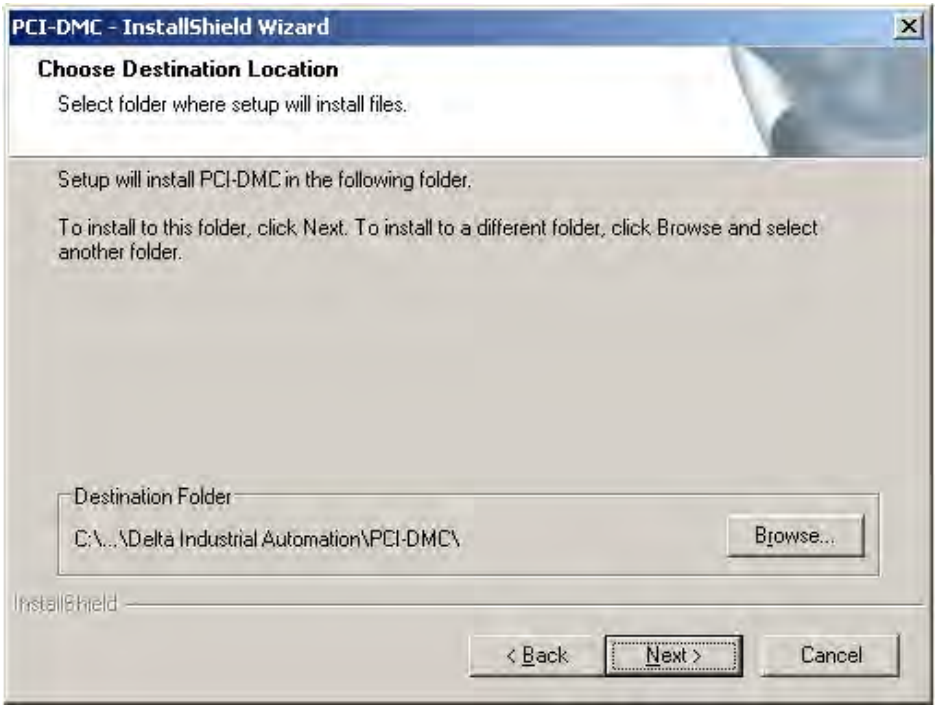


Figure 2.16

Step 5: As shown in Figure 2.17, the driver software is now being installed. Please do not interrupt the installation process.

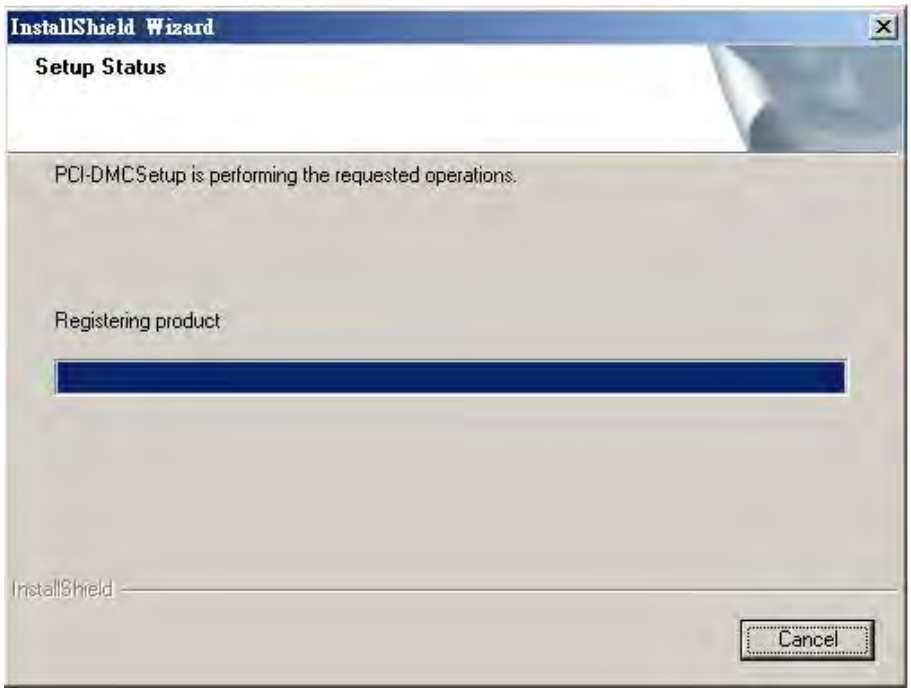


Figure 2.17

Step 6: As shown in Figure 2.18, the driver software has been successfully installed. Click on "Finish" to complete the installation process.

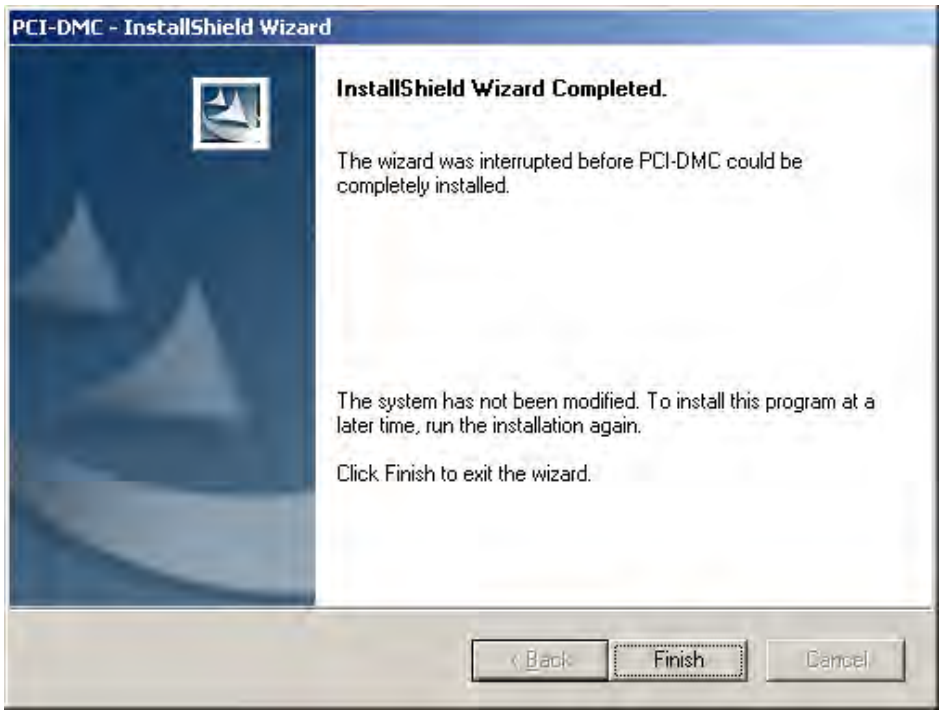


Figure 2.18

2.4.2 Software Installation Procedure (Windows 764 bit)

Step 1: Open the CD and in the DISK1_64bit_XXXX folder select and run "setup.exe" as shown in Figure 2.19.

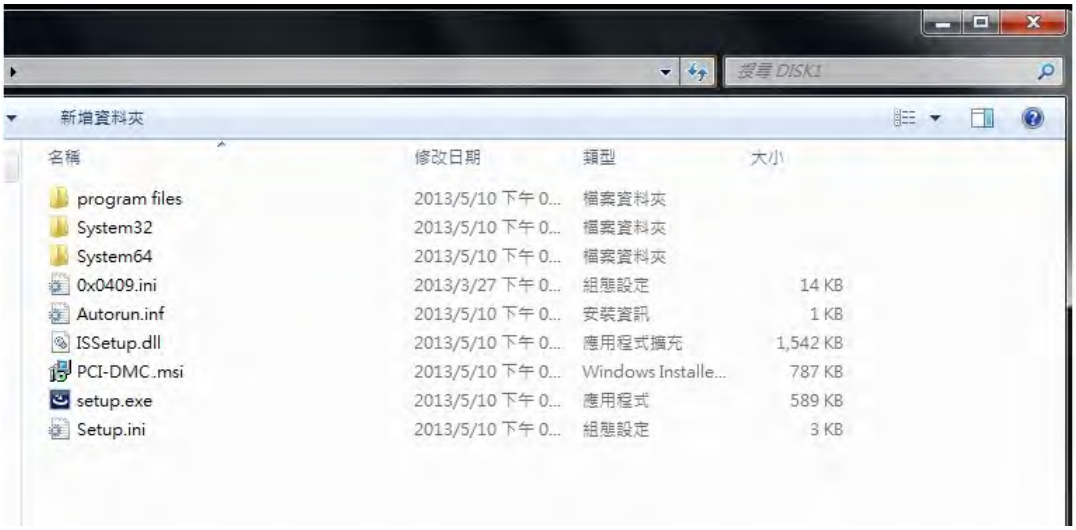
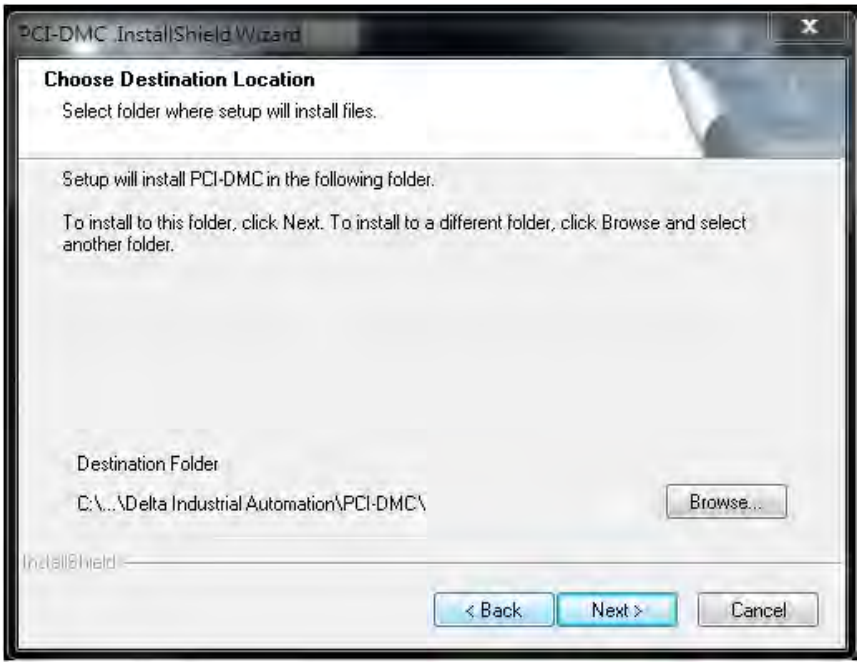


Figure 2.19

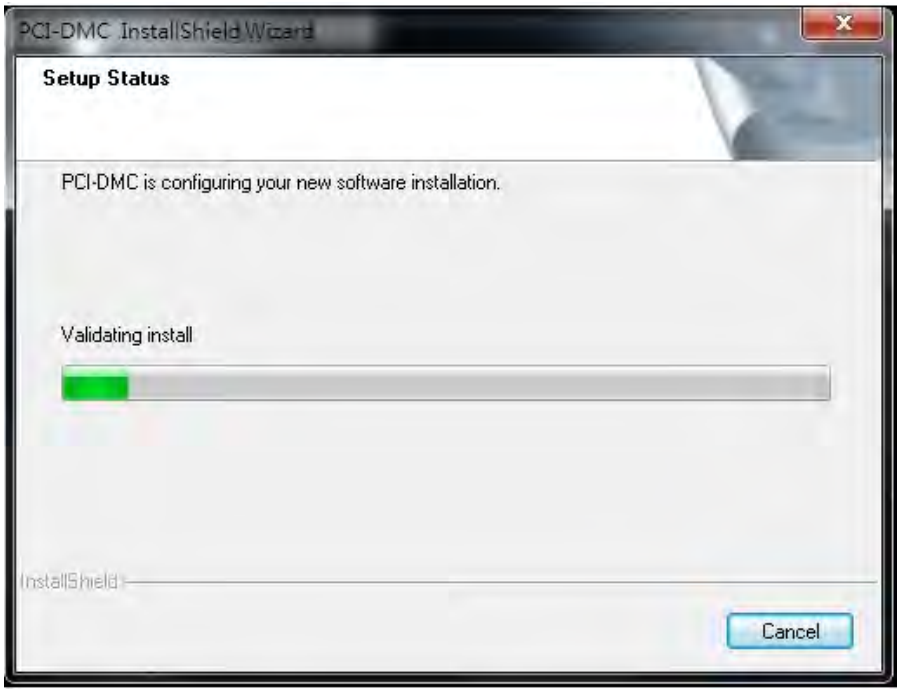
Step 2: The system program will start by checking the system resources.

Step 3: Once the system resources check has been completed, the software installation process will begin. Pleas click on "Next" to continue.

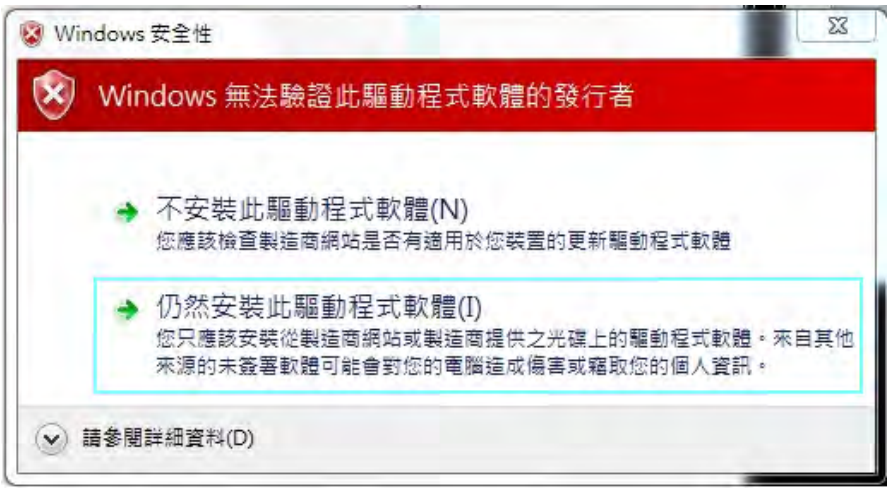
Step 4: Select the software installation path to use on the system. Using the default path is recommended. Please click on "Next" to continue.



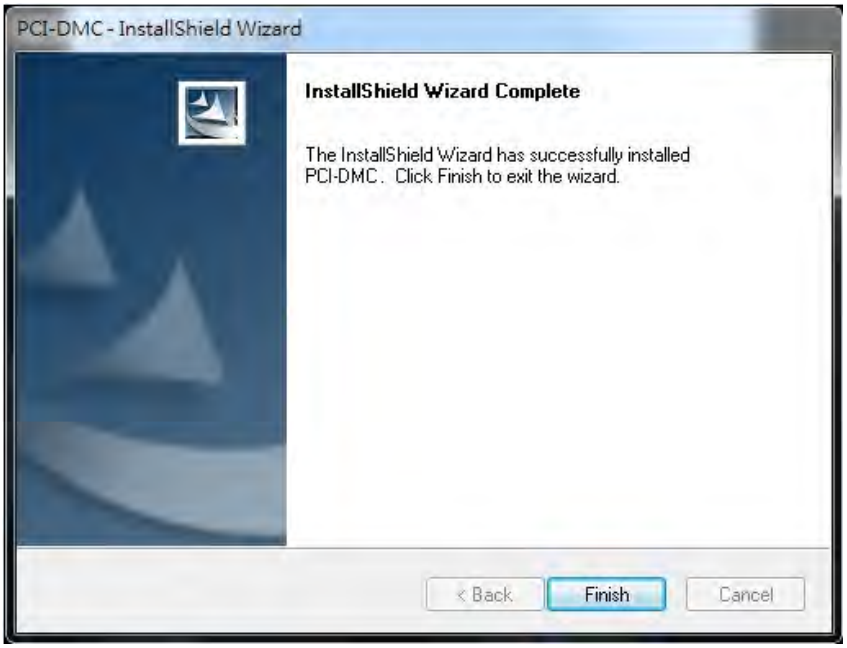
Step 5: The driver software is now being installed. Please do not interrupt the installation process.



Step 6: Select "Install this driver software anyway".



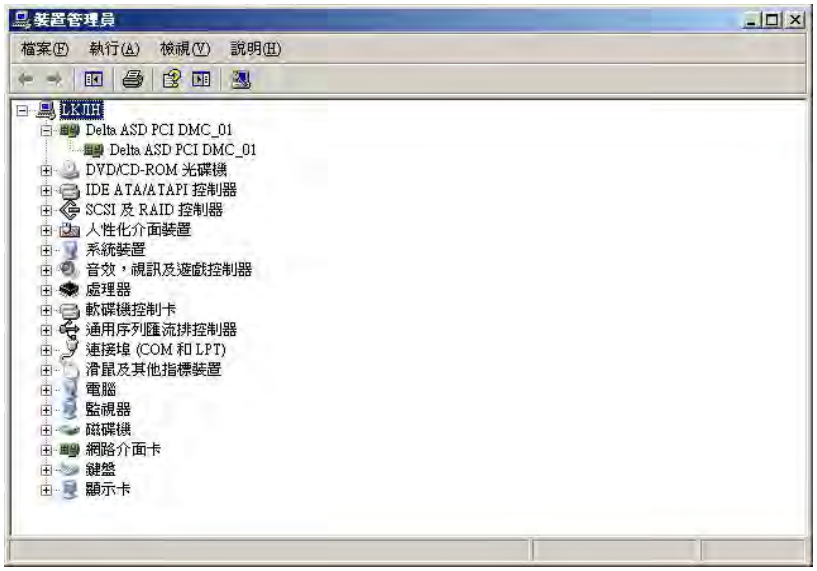
Step 7: The driver software has been successfully installed. Click on "Finish" to complete the installation process.



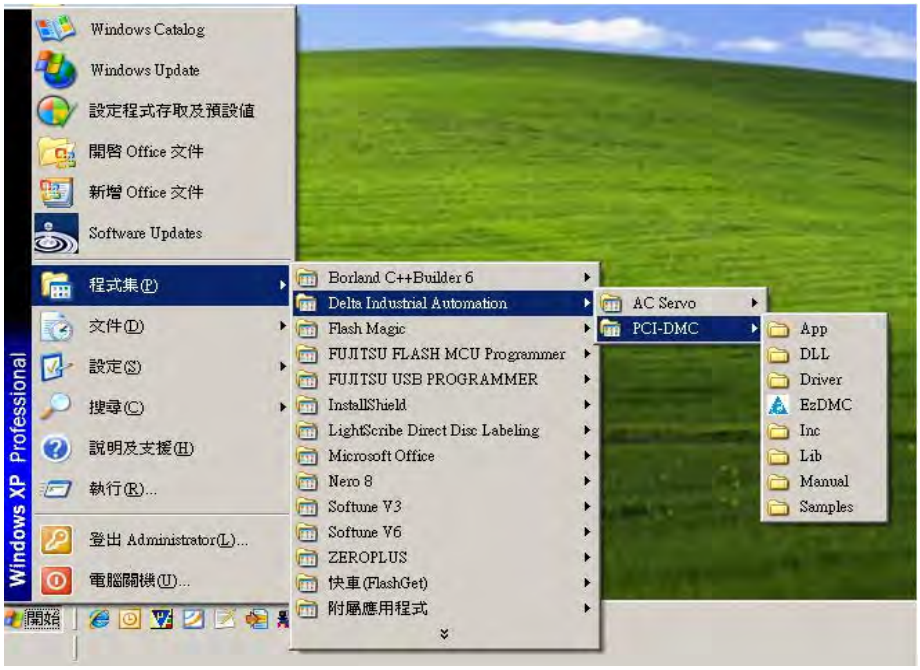
2.5 Checking Software Pack Installation Results

2.5.1 Check that Software has been Installed Successfully

Step 1: Open "Device Manager" (Control Panel →System→ Hardware→ Device Manager) and use the same method as section 2.3.2. If a device named "Delta ASD PCI DMC_01" was added, this means the driver was installed successfully.



Step 2: There should be a new "Delta Industrial Automation" folder in "Start\All Programs" containing the application program as well as other files included in with the CD.



2.5.2 Software Installation Failure

If "Device Manager" (Control Panel →System →Hardware →Device Manager) still shows the device as an unknown PCI device (see Figure 2.20) or there is an "exclamation mark" (see Figure 2.21) for the new device, this means the driver software did not install properly.

Figure 2.20

Figure 2.21

2.6 Dealing with Software Installation Failure

If driver installation failed and the device information shown in "Device Manager" (Control Panel →System →Hardware →Device Manager) is the same as Figure 2.28, please install the driver manually. Please refer to section 2.20 "Manual Driver Installation" for more details.

If the device information shown in “Device Manager” (Control Panel →System →Hardware →Device Manager) is the same as Figure 2.21, please select and "right mouse click" on the device. A pop-up window will appear as shown in Figure 2.22. Please click on "Properties" to inspect the device properties and resources.

Figure 2.22

When you view the device properties of this Delta ASD PCI DMC_01 device, under the "General" tab is a "Device Status" field. This shows the error message and error code for this device as shown in Figure 2.23 and Figure 2.24.

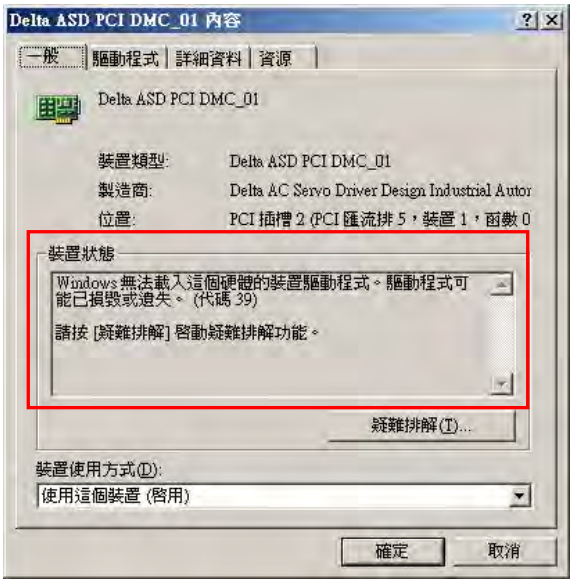


Figure 2.23

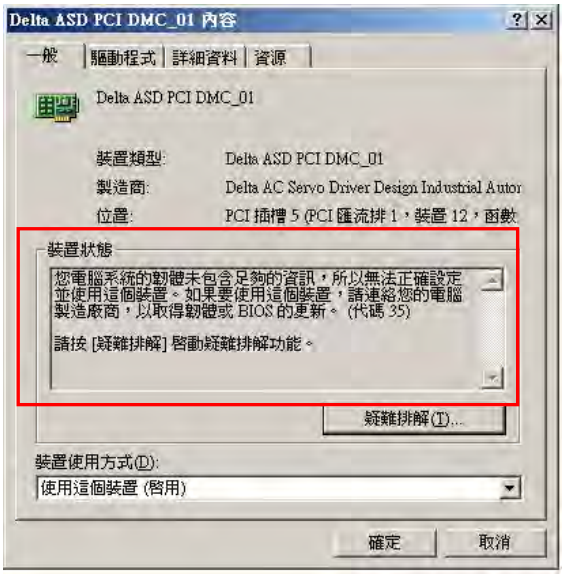


Figure 2.24

If the error code is 39 (see Figure 2.23) you can try manually installing the driver as described in section 2.8 "Manual Driver Installation". If the error code is 39 (see Figure 2.24), we recommend trying to install the PCI-DMC-01 card in another free PCI slot or another system. If you still can't install the driver software, please record the error message and code in this field. Inform your distributor of this error message and error code then ask for their assistance.

2.7 Install the Card in Another PCI Slot

As suggested in section 2.6, if you need to switch the PCI-DMC-01 card to another free PCI slot system, please discharge any static electricity, disconnect the system power supply then remove the PCI-DMC-01 card. Follow the instructions in section 2.2.3 to re-install the card.

Once you have switched the PCI-DMC-01 card to another free PCI slot on the system, check to see if the drivers have been installed on the system before your restart the system. If they are not yet installed, please skip the following section and go to section 2.8 "Manual Driver Installation".

When the PCI-DMC-01 card has been properly installed in the new PCI slot and the system is restarted, the "New Hardware Wizard" window (see Figure 2.25) will pop-up. Please select "No, not this time" then click on "Next" to continue.

Figure 2.25

As shown in Figure 2.26, the wizard will indicate that it will now install the driver for "Delta ASD PCI DMC_01". Please select "Install from a list or specific location (Advanced) (S)" then click on "Next" to continue.

Figure 2.26

As shown in Figure 2.27, the system asks you to choose your search and installation options. Choose "Don't search. I will choose a driver to install (D)" then click on "Next" to continue.

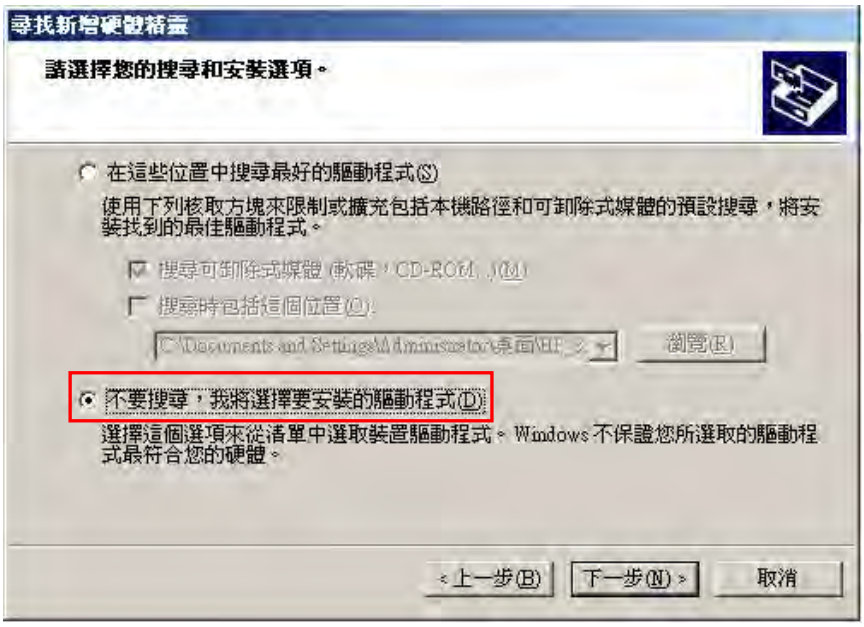


Figure 2.27

The system will now look for compatible drivers as shown in Figure 2.28. Select the "Delta ASD PCI DMC_01" driver listed by the system then click on "Next" to continue.

Figure 2.28

The system is now installing the driver.

The system has finished installing the driver for PCI-DMC-01 card.

Once installation is completed, please open "Device Manager" (Control Panel →System →Hardware →Device Manager) to check current device driver status. Figure 2.29 shows that the PCI-DMC-01 card has been installed successfully.

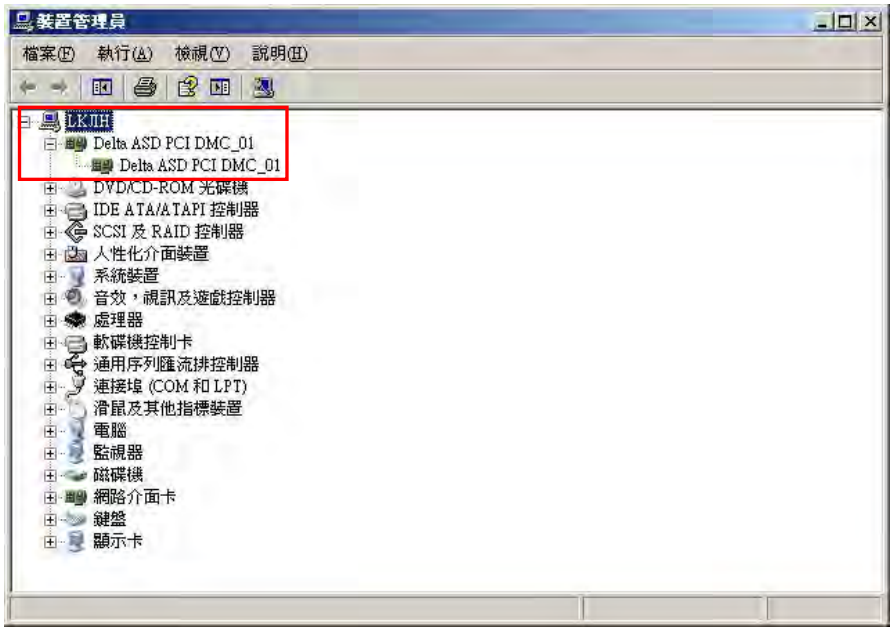
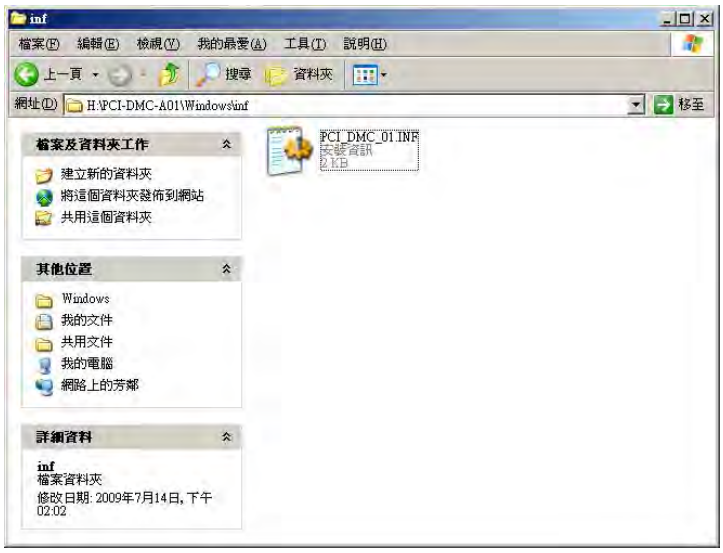


Figure 2.29

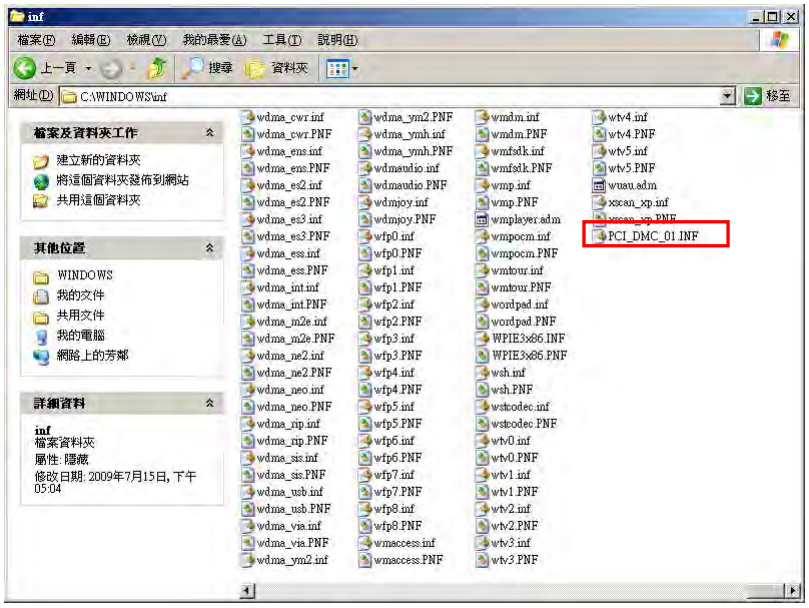
2.8 Manual Driver Installation

If you can't use installer to successfully install the PCI-DMC-01 card drivers on the system, you can try the following manual driver installation process.

Step 1: Go to the "… \ Windows \ inf" folder on the CD and select the file "PCI_DMC_01.INF", then hold down "Ctrl + C" to copy.

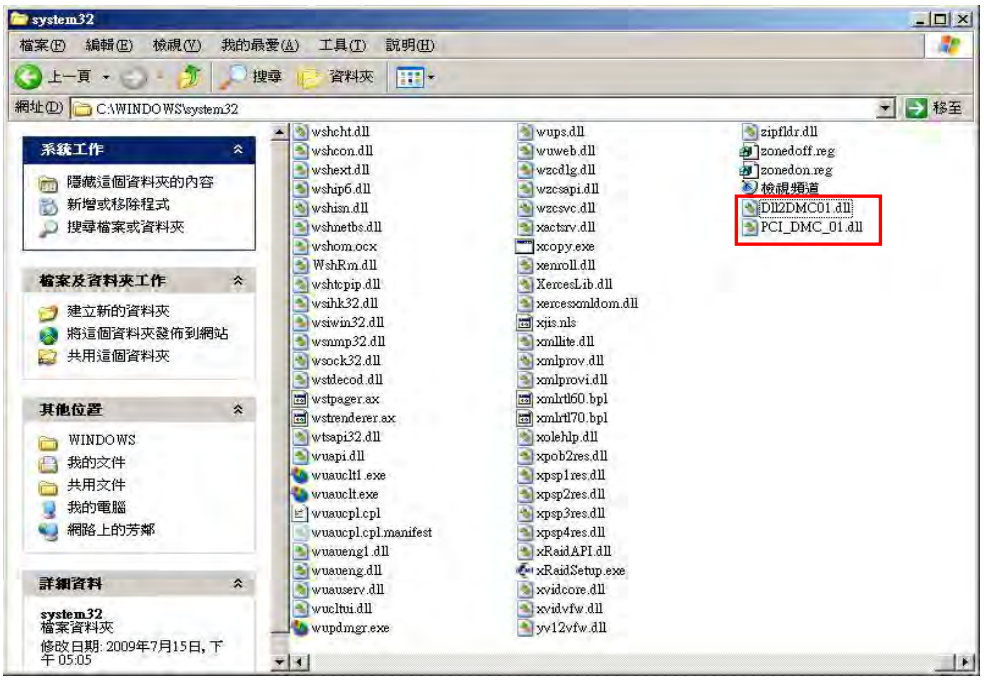


Step 2: Copy the file "PCI_DMC_01.INF" to "C: \WINDOWS\inf".

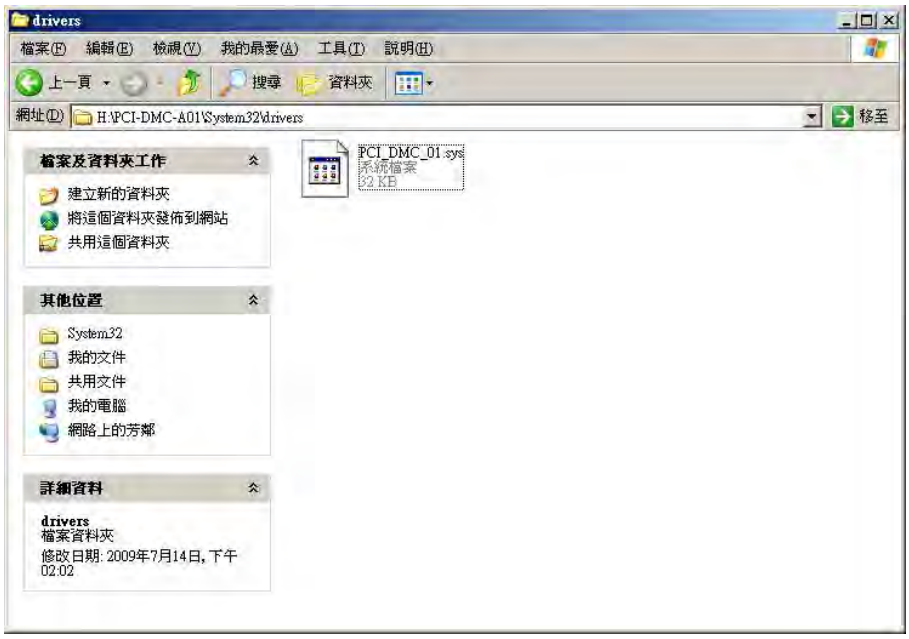


Step 3: Select the files "Dll2DMC01.dll" and "PCI_DMC_01.dll" in the CD's "… \ System32" folder, and press "Ctrl + C" to copy these two files.

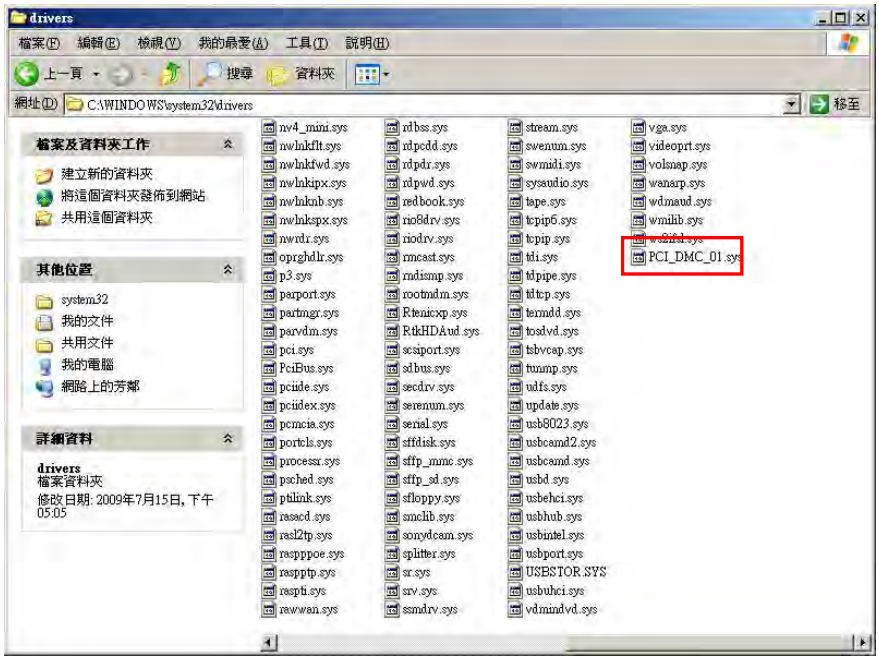
Step 4: Copy "Dll2DMC01.dll" and "PCI_DMC_01.dll" to "C: \WINDOWS \ system32."



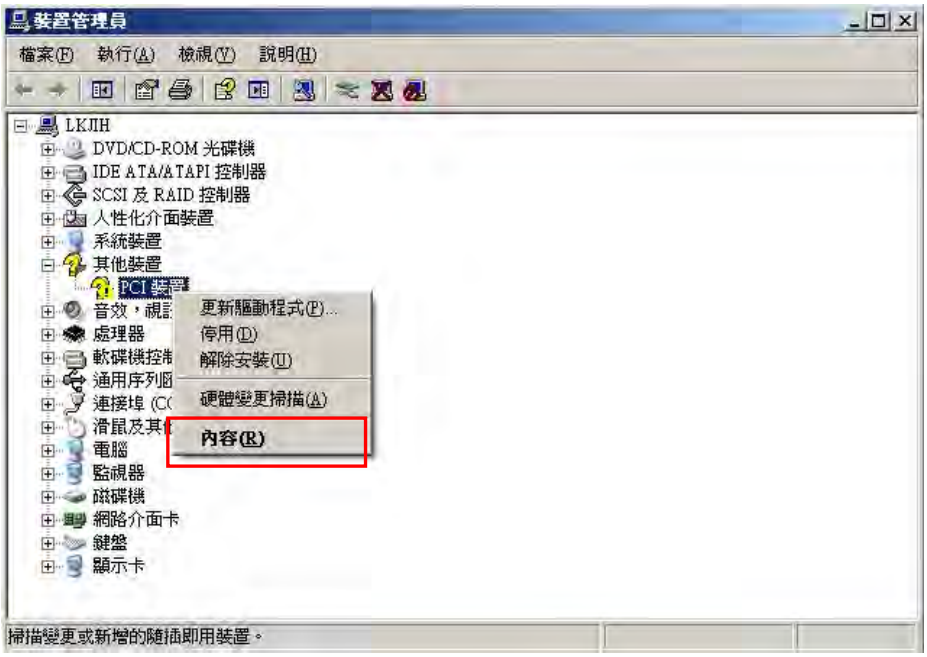
Step 5: Go to the "… \ System32 \ drivers" folder on the CD, select the file "PCI_DMC_01.sys", then hold down "Ctrl + C" to copy.



Step 6: Copy "PCI_DMC_01.sys" to "C: \ WINDOWS \ system32 \ drivers."



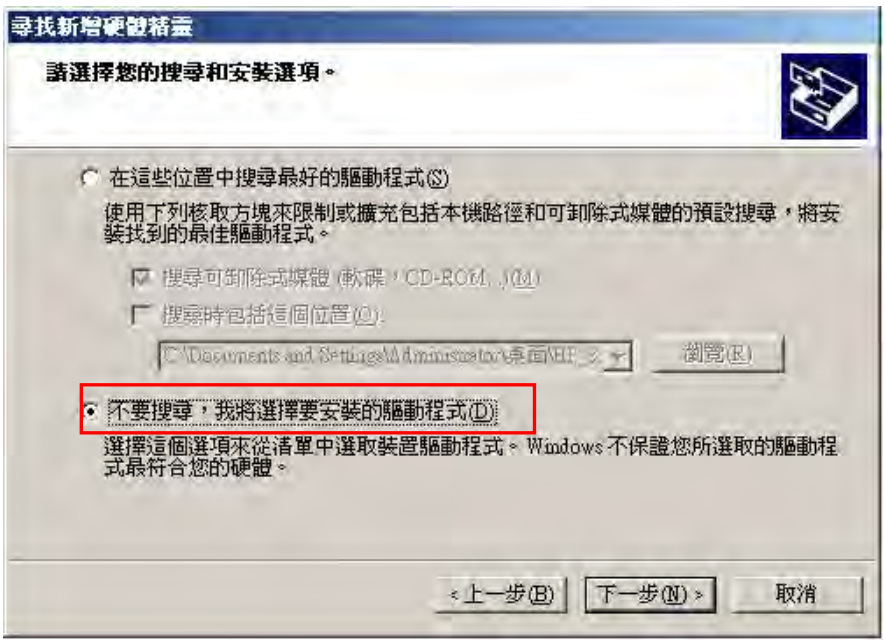
Step 7: Open "Device Manager" (Control Panel →System →Hardware →Device Manager), "right mouse click" the unknown "PCI Device", then select "Scan for hardware changes."(Please check that the PCI device has been installed in the system).



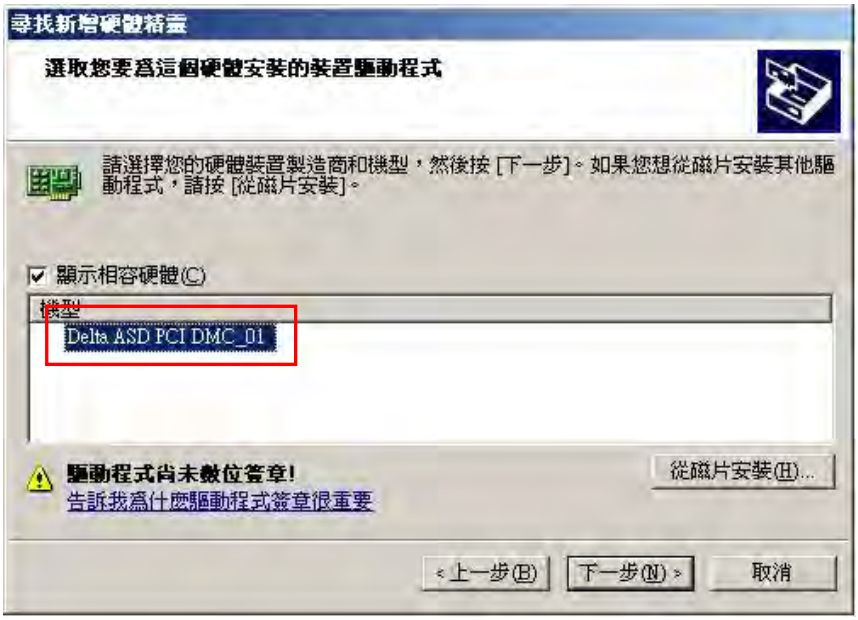
Step 8: The "New Hardware Wizard" window will pop-up. Select "No, not this time" and click on "Next" to continue.

Step 9: The wizard will indicate that it will now install the driver for "Delta ASD PCI DMC_01." Please select "Install from a list or specific location (Advanced) (S)" and click on "Next" to continue.

Step 10: The system asks you to choose your search and installation options. Choose "Don't search. I will choose a driver to install (D)", then click on "Next" continue.



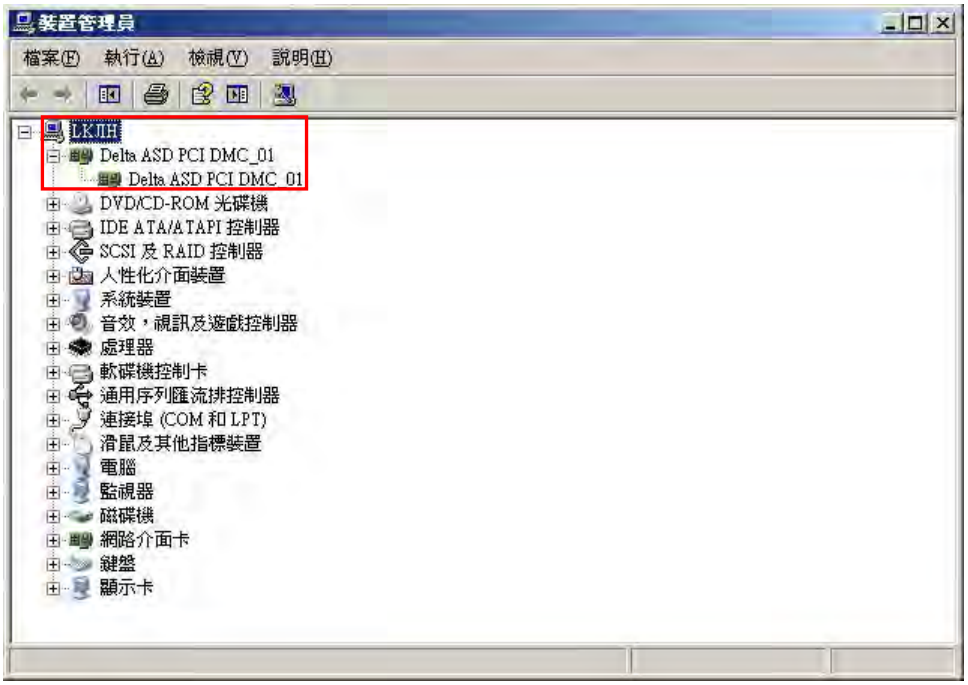
Step 11: The system will list the compatible drivers for "Delta ASD PCI DMC_01." Click on "Next" to continue.



Step 12: The system is now installing the driver.

Step 13: The system has finished installing the driver for the PCI-DMC-01 card.

Step 14: Once installation is completed, please open "Device Manager" (Control Panel →System →Hardware →Device Manager) to check current device driver status. Figure 2.53 shows that the PCI-DMC-01 card has been installed successfully.



2.9 Borland C++ Builder (BCB) Example

After completing software installation in 2.4, there will be program libraries in C: \Program Files\Delta IndustrialAutomation \PCI-DMC\samples for the six languages, including BCB (Borland C++ Builder), C#, Delphi, VB, VB.Net, and VC. Of these, BCB employs dynamic link (PCI_DMC.dll). If you wish to use PCI_DMC.dll with a static link, copy the two files PCI_DMC.h and BCBPCI_DMC.lib, which can be found in the location C: \Program Files\Delta Industrial Automation \PCI-DMC\lib to BCB\Sample File. After launching the BCB program, select BCBPCI_DMC.lib in Project\Add to project (see Figure 2.30, Figure 2.31).

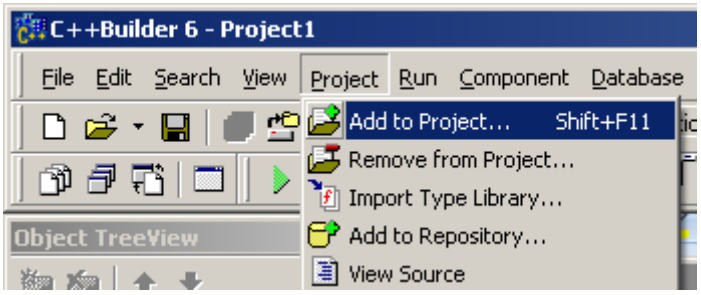


Figure 2.30

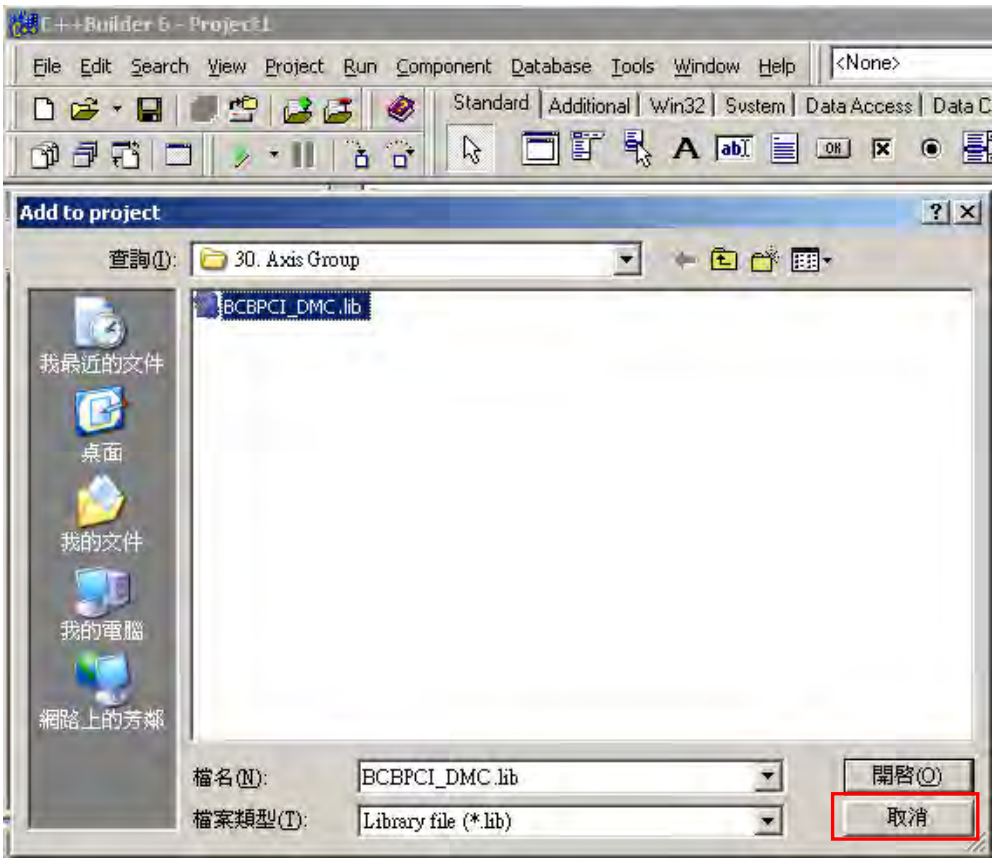


Figure 2.31

When you have added the BCB lib file, be sure to add "#include “PCI_DMC.h”" to the BCB program code (see Figure 2.32). Once these two actions have been completed, you can begin the demonstration of BCB examples included with the CD.

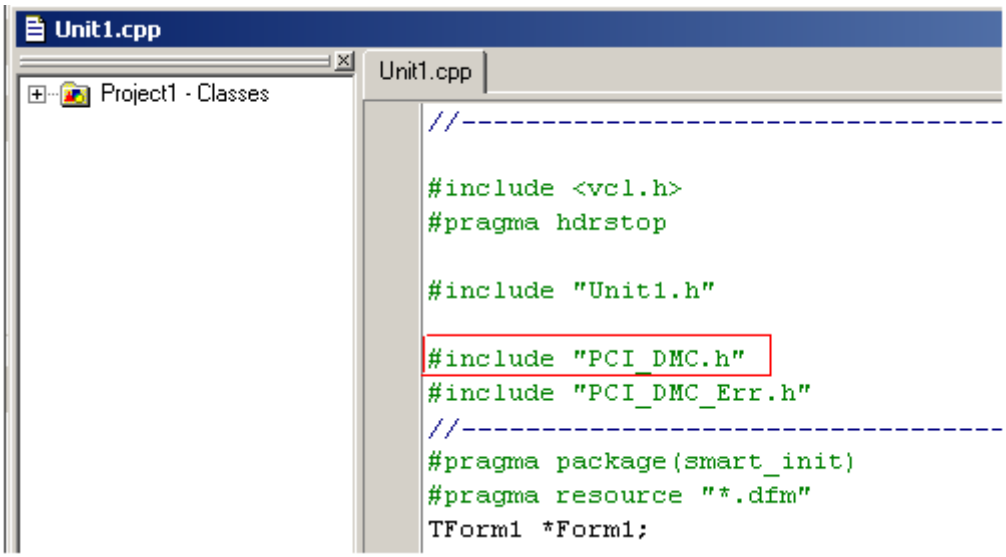


Figure 2.32

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Chapter 3 Using EzDMC

EzDMC is a serial control utility that tests the serial connection to see if it is working properly. When EZDMC is running, the system automatically scans and classifies all known online extension modules. You can use the listed modules to determine if the serial control modules on the system are working normally and select each expansion module for function testing. A brief description of EzDMC functions is provided below.

3.1 Introduction to EzDMC Functions

As shown in Figure 3.1, once you launch EzDMC the following program screen will appear on your computer system. The very top is the function menu block (❶).Below the function menu block is the toolbar (❷). This can be used for basic status control. There are two display blocks beneath the toolbar: The left display block (❸) displays the control system and expansion module list; the right display block (❹) is used expansion function's basic messages and command console. Part of the window is the SDI operation mode that shows various information. Below the display screen is the program status display block (❺). It not only shows the system's basic connection status but also the connection details.

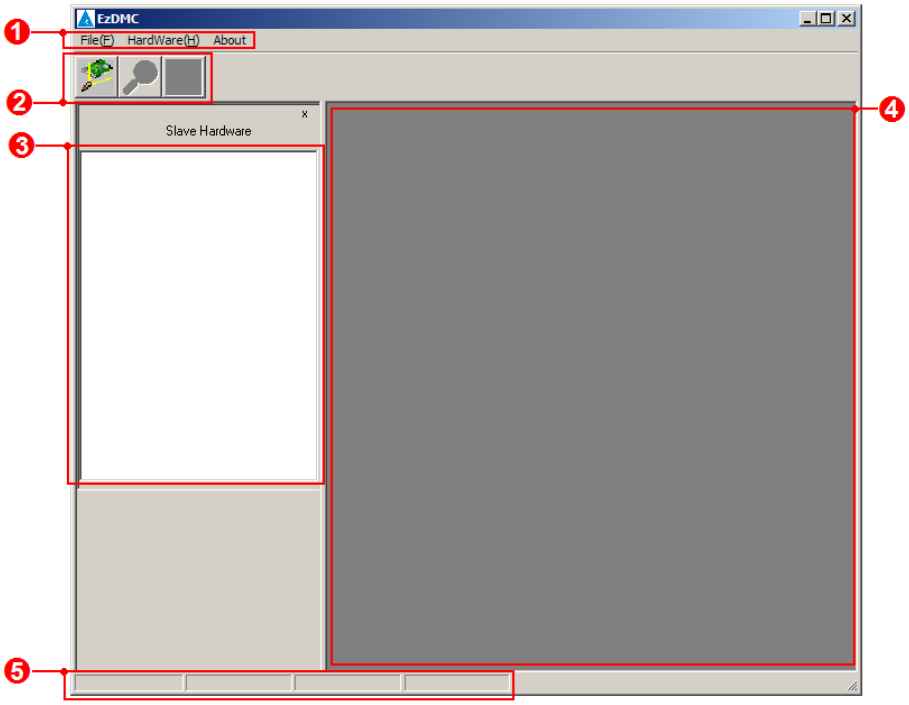

Figure 3.1

3.2 EzDMC Connection Procedure

After you have configured the PCI-DMC-01 interface card and linked modules (such as driver and motor), if you wish to use EzDMC to test the serial link, you must carry out the following testing and operating procedure in order.

Step 1: Launch EzDMC.

Step 2: Find the PCI-DMC-01 control card. (see section 3.3)

Step 3: Find linked expansion module devices. (see section 3.4)

Step 4: Motion control on single-axis and multi-axis. (see section 3.6 and 3.7)

Step 5: Stop using expansion device.

Step 6: PCI-DMC-01 interface card reset. (see section 3.8)

Step 7: Exit EzDMC.

3.3 Finding the PCI-DMC-A01

The first menu function (marked with bracket) is the "Search Card" function for finding the PCI-DMC-01 card. All the PCI cards and their setup in the system can be found using this function as shown below in Figure 3.2. When Search Card is completed, the device list shows the status of all found cards as well as the number and setup of master cards.

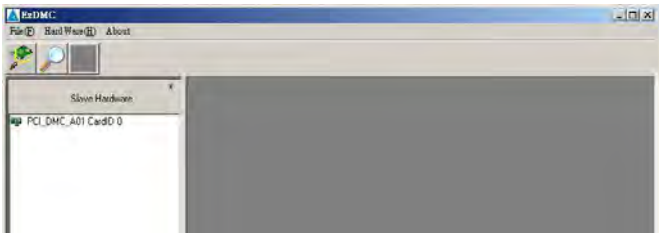

Figure 3.2

If the first menu function (Search Card) does not find any PCI-DMC-01 cards, the "No PCI_DMC_A01 Card Found!" error will pop up as shown in Figure 3.3. Please check that your PCI-DMC-01 card is properly installed in the system. Or turn off the power and remove the card. Follow the "2.2.3 Physical Card Installation" process to reinstall the PCI-DMC-01 card on a free PCI slot on the system before trying to find the PCI-DMC-01 card again.

Figure 3.3

3.4 Find Connected Extension modules

When the PCI-DMC-01 card has been found and marked, this means that the serial communications link has been established. The next step is to scan and see how many connected modules are linked in series on the same Ring. As shown in Figure 3.4, the second menu function (marked with bracket) is Scan Slave. You can use it to find the available and working modules on the Ring as well as the properties of these connected modules.

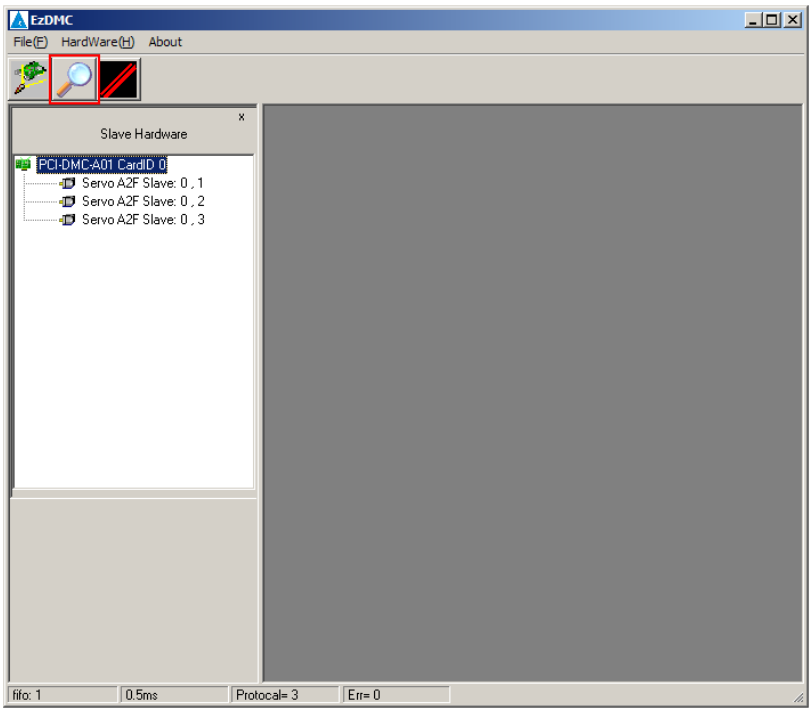

Figure 3.4

If the second menu option (Scan Slave) can't find the extension modules you wish to connect to, the "No slave found!" error message shown in Figure 3.5 will pop up. Please check that your extension modules are all connected properly. Also check that the expansion module is receiving power from the power supply.

Figure 3.5

3.5 EzDMC Status Display

The status display at the bottom of EzDMC shows information about the current status of the PCI-DMC-01 card. This is shown in Figure 3.6:

Figure 3.6

❶: FIFO length

❷: Task time that currently used

❸: Linkage status of control card and connected extension modules

❹: MailBox error count

3.6 Single-axis Control Interface

When you add the connected extension modules to the serial communications link, the next step is to test the expansion module operations. As shown in Figure 3.7, you can go to the "Left Display Block (❶)" and click on the "icon (❷)" for any expansion module and the "right display block (❸)" will pop-up with the single-axis control interface window for that module. This can be used to control the single-axis operation of that module.

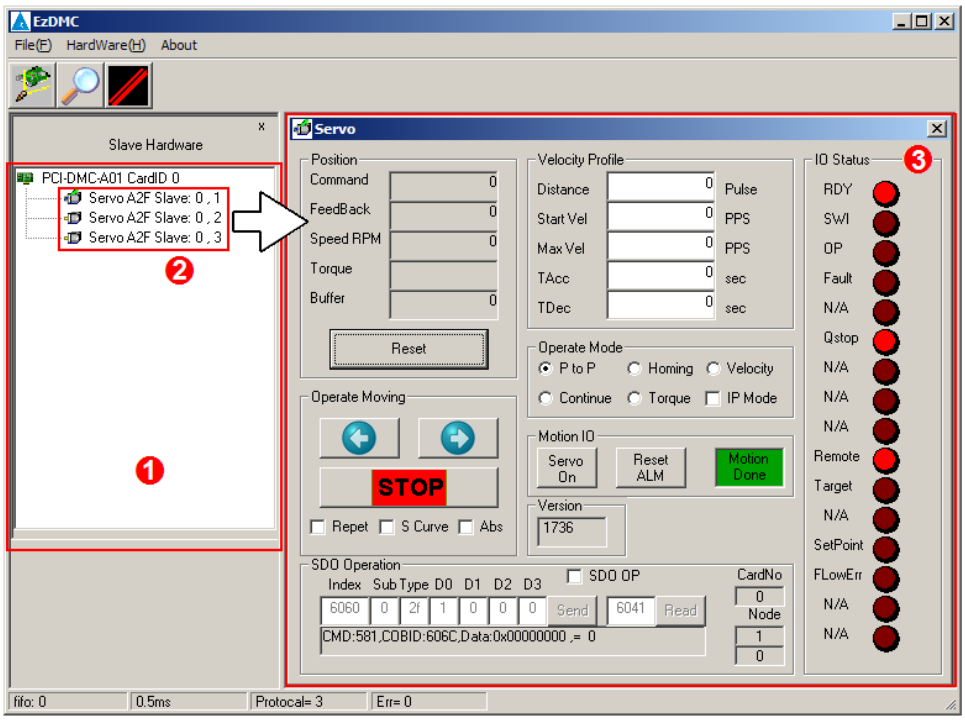

Figure 3.7

When you have opened the single-axis control interface of expansion module, Figure 3.8 below will explain the functions of each block in single-axis control interface as well as their purpose.

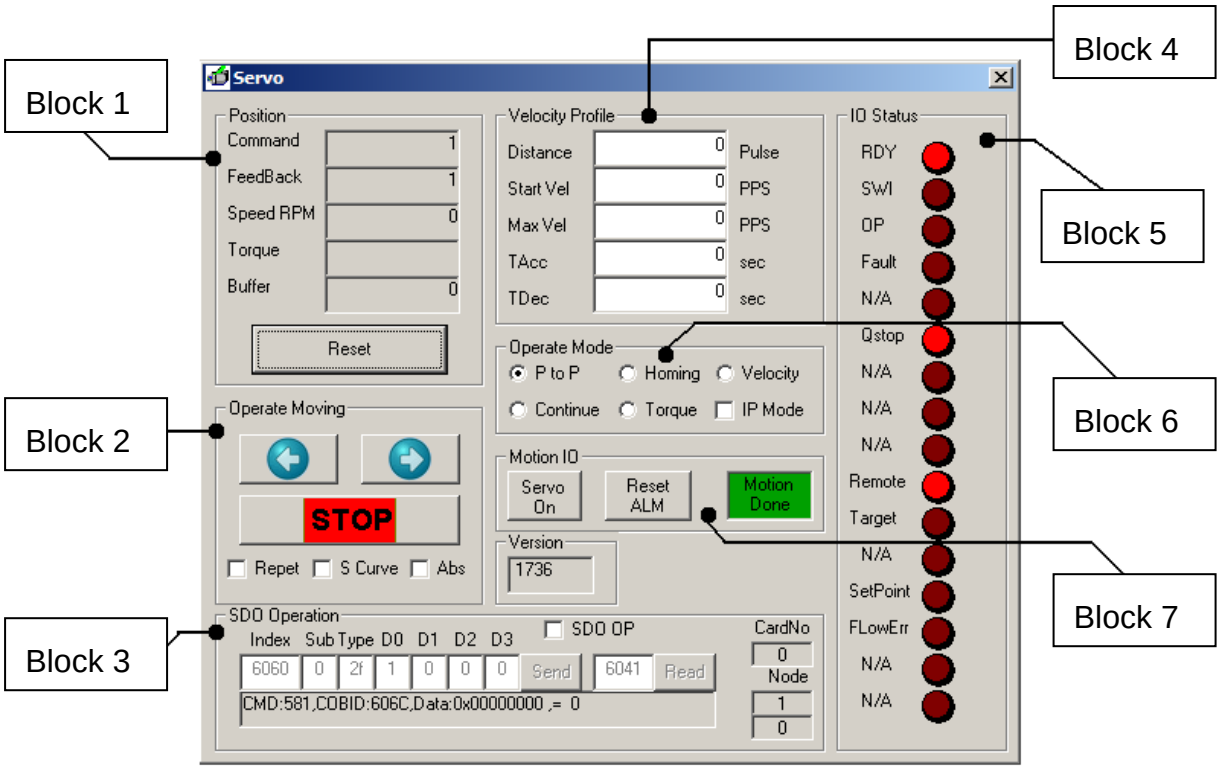

Figure 3.8

First block: Displays count values of motions. These include the position, velocity, torque, position reset function and number of buffered commands.

Second block: Execute motion commands such as clockwise rotation, CCW rotation and stop.

- Check "Repeat" to repeatedly execute clockwise and CCW motion.
- Check "S Curve" to set acceleration/deceleration as S-curve. The T-curve will be used otherwise.
- Check "Abs" to use absolute motion. Relative motion will be used otherwise.

Third block: Sets CANOpen commands. The module's CANOpen commands can be read / sent here.

Fourth block: Sets the motion command. This includes motion distance, starting velocity, maximum velocity and acceleration/deceleration time.

Fifth block: Displays the status of the connected expansion module using an ON/OFF status light.

Sixth block: Motion operating mode settings. Available operation modes include point to point, home and constant velocity.

- Check "IP Mode" to use PDO service for motion control. Otherwise SDO service will be used for motion control instead.

Seventh block: Set motor excite, motion status display and reset servo alarm message.

3.7 Multi-axis Control Interface

When you have added the connected extension modules to the serial communications link, if you wish to perform multi-axis motion control then click on the third menu motion (marked with square bracket❶) in the EzDMC "Toolbar" to execute Multi-Axis Control. The multi-axis control window will appear in the right display block (❷) as shown in Figure 3.9.

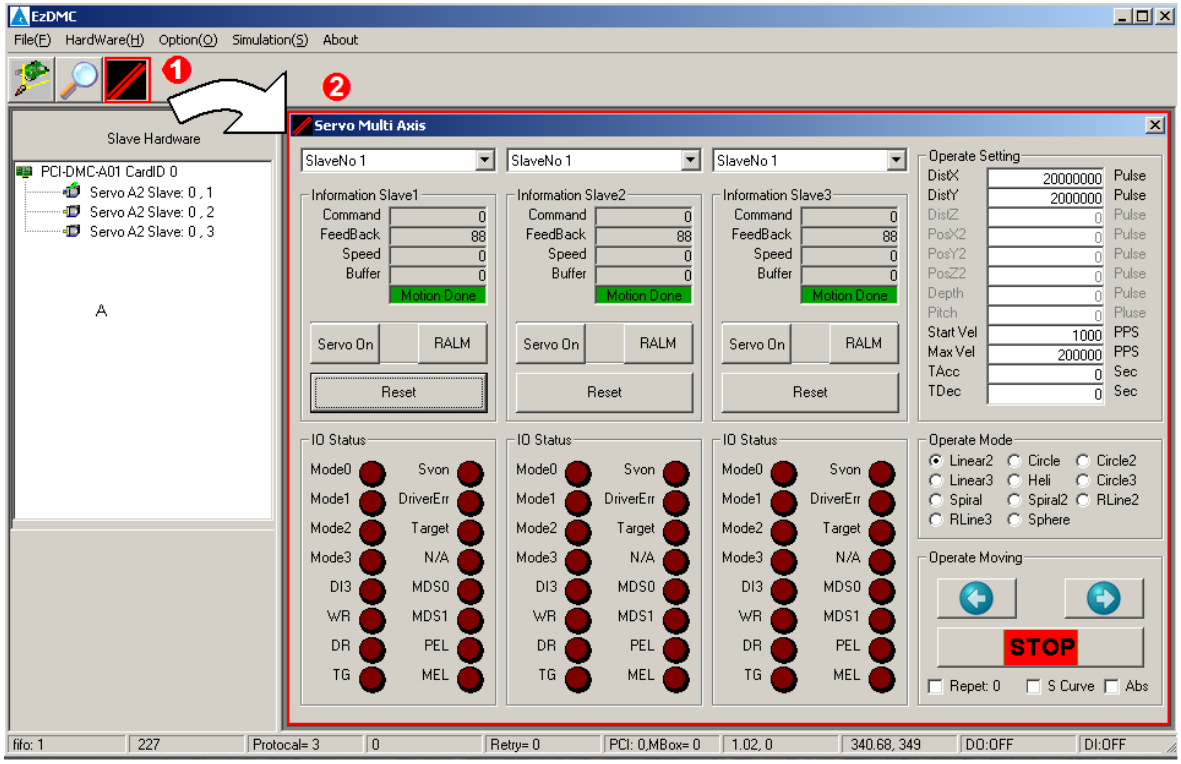

Figure 3.9

The multi-axis control window will be divided into four blocks and each explained individually on the following page.

As shown in Figure 3.10, the multi-axis control window can be divided into the four following blocks and functions.

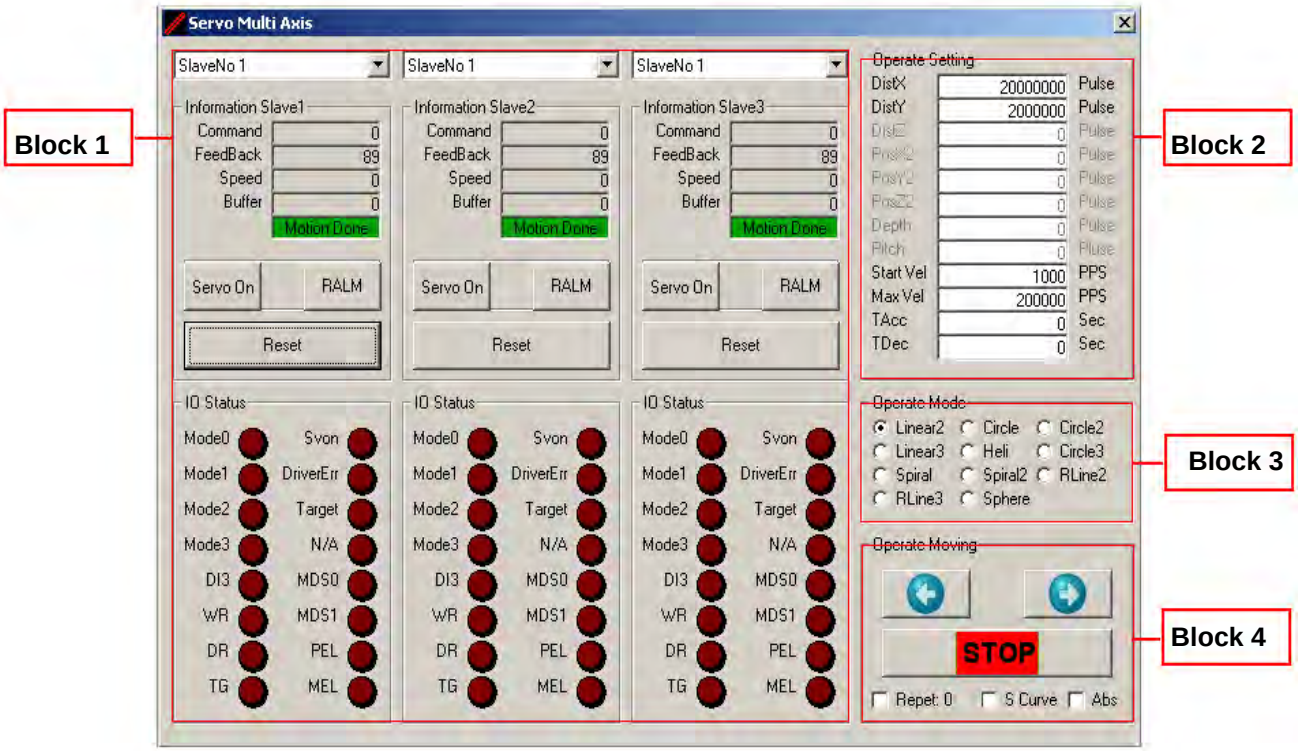

Figure 3.10

First block: Select the motion status display, position reset and motor excite function. Only 3-axis motion control is available at the moment.

Second block: Each motion parameter that must be set for motion operation; these settings are linked with the selections in the "Third block: Motion operating mode settings."

Third block: Motion operating mode settings. The 6 motion control commands available include 2-axis linear interpolation, 3-axis linear interpolation, 2-axis arc interpolation and 3-axis helical.

Fourth block: Execute motion commands such as clockwise rotation, CCW rotation and stop.

- Check "Repeat" to repeatedly execute clockwise and CCW motion.
- Check "S Curve" to set acceleration/deceleration as S-curve. The T-curve will be used otherwise.
- Check "Abs" to use absolute motion. Relative motion will be used otherwise.

3.8 Master Security Interface

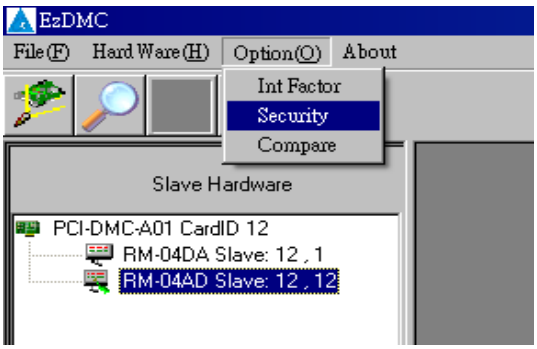

Figure 3.11 Launching Master Security operating interface

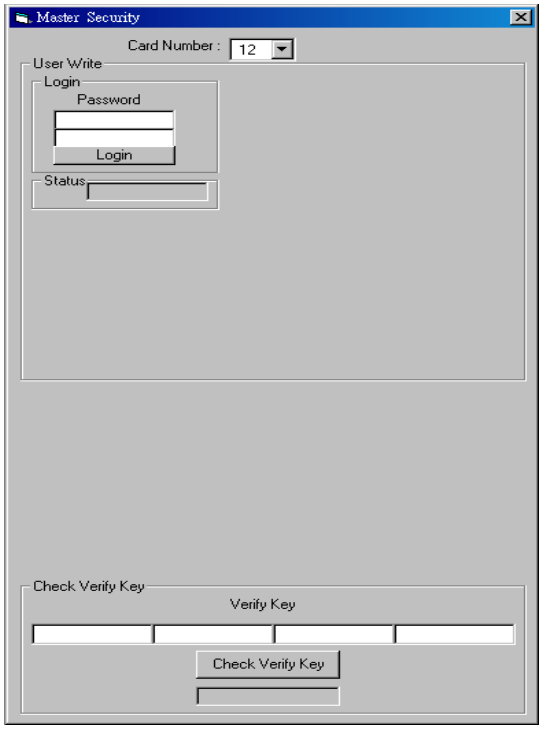

Figure 3.12 Open Master Security user login interface

The above input fields all have 1~8 bits and accept hexadecimal values between 0~F.

❶ Card ID of DMCNET motion card.

❷ User login and status display field.

Default password	
Password1	FFFFFFFF
Password2	FFFFFFFF

(If login is successful, status will display "Pass" and grant access to the functions in Blocks ❸, ❺ and ❻ in Figure 3.13; if not, status will display "Failed", and user must re-login)

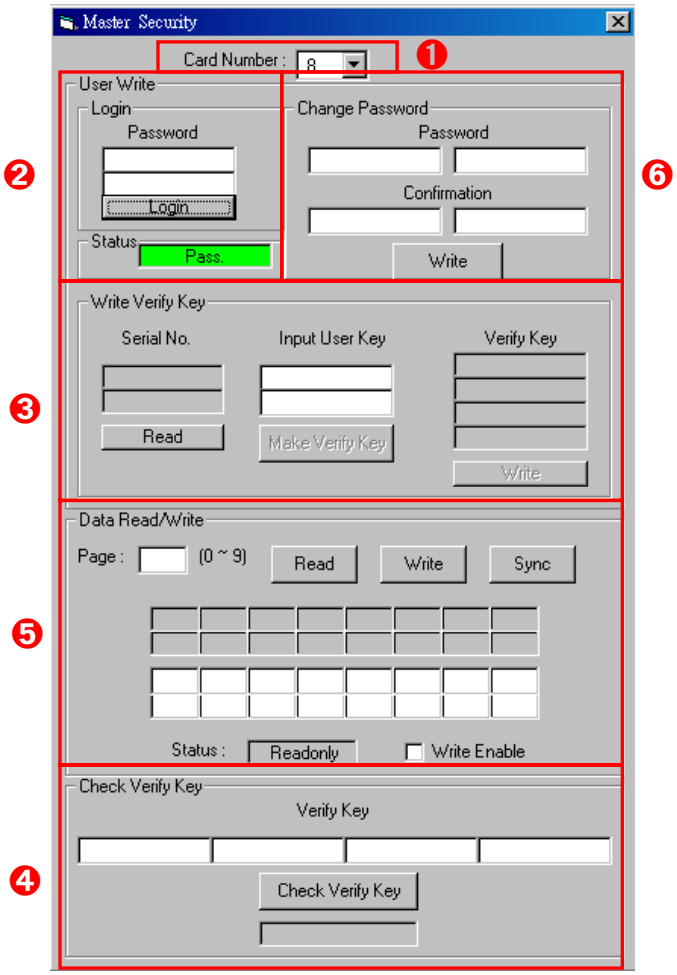

Figure 3.13 Open Master Security interface after user login.

The above input fields all have 1~8 bits and accept hexadecimal values between 0~F.

❶ Card ID of DMCNET motion card.

❷ User login and status display field.

❸ Generate verify key.

Step1: Click on the "Read" button to read the product serial number. This gives two sets of 1 ~ 8 bit values made up of hexadecimal values between 0 ~ F.

Step2: User enters a custom User Key then click on "Make Verify Key" to generate a verify key. (The input and output will be 1 ~ 8 bits made up hexadecimal values between 0 ~ F)

Step3: Click on the "Write" button to write the generated Verify Key. (If write is successful, block ❷ will display "Done". "Failed" is displayed otherwise)

❹ Verify key confirmation field and status display. Enter the 4 sets of Verify Key generated above into the 4 fields of Check Verify Key then click on "Check Verify Key". (If verification is successful then "Pass" is displayed on the status bar below". "Lock!" is displayed otherwise)

❺ Data read and write area. (Please see Figure 3.14 for details)

❻ Change password field.

Step1: Enter two new passwords in the "Password" field. Each is 1~8 bits in length and takes hexadecimal values between 0~F.

Step2: Enter the same password from "Password" in "Confirmation" again for verification.

Step3: If the two passwords in "Password" and "Confirmation" match, clicking on "Write" will change the password. If the passwords do not match, then block ❷ will show the error message "Confirmation Error". The change password procedure must now be repeated again.

Below is a more detailed description of block ❺ in Figure 3.13

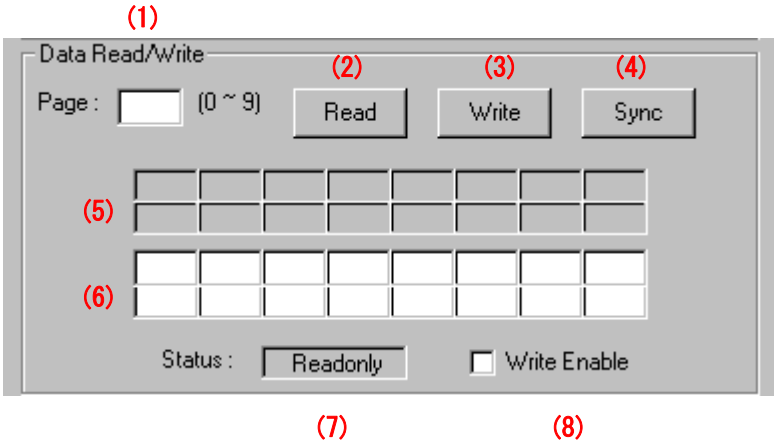

Figure 3.14 Description of master security block ❺ functions

(1) Page: Page to read or write to (0 ~ 9).

(2) Read: Read data from specified page.

(If read successful then block (5) will display 16 binary 0 ~ F hexadecimal values)

(3) Write: Data to write to specified page.

Step 1: In block (6), please fill in the desired 16 binary 0 ~ F hexadecimal values.

Step 2: Check "Write Enable" and Status bar will now display "Write/Read."

Step 3: Click on "Write" to write data.

(4) Sync: Copy data from block (5) to block (6).

(5) Displays the output data when Read function is executed.

(6) Contains the input data when Write function is executed.

(7) Status: Shows the read status as either Read-only or Write/Read.

(8) Write Enable: Change status to Write Enable.

3.9 Card Reset

When you are finished with serial motion control and wish to turn off the EzDMC program, please click on "Hardware/PCI_Card_Reset" to reset the PCI-DMC-01 card. Initialize the PCI-DMC-01 card again the next time you wish to use the card to ensure that the stability of data transmission/reception and the validity of test data. As shown in Figure 3.11, clicking this function resets the card. The card will be re-initialized the next time "Search Card" is executed.

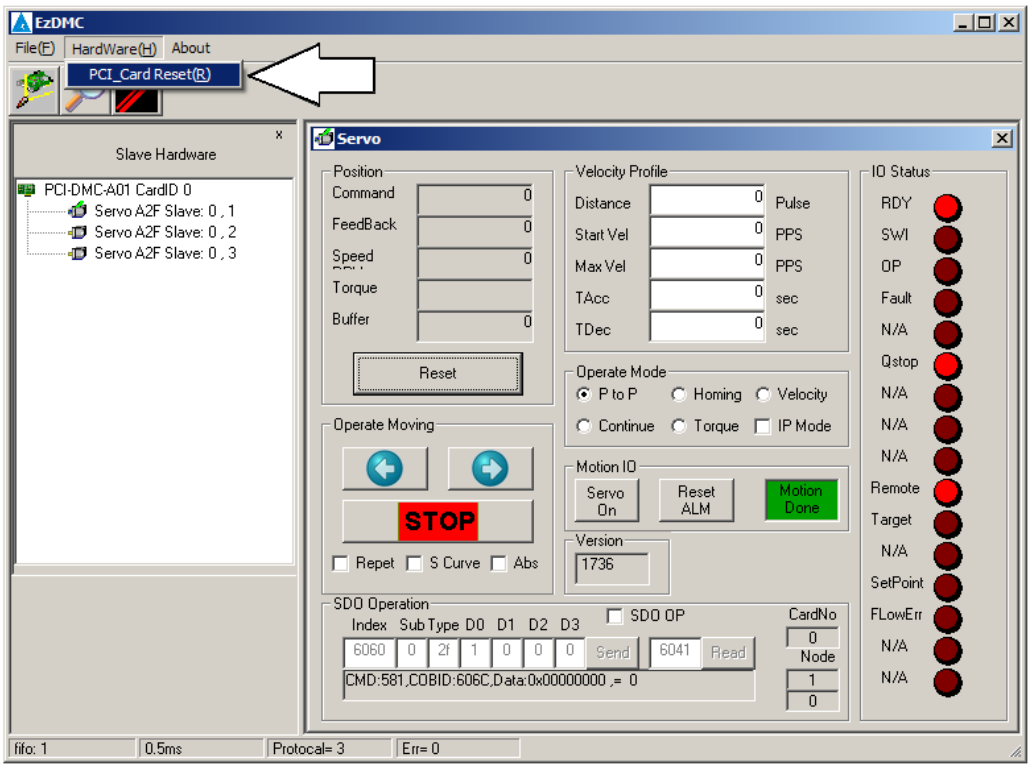

Figure 3.15

3.10 Other Functions

When you are finished with single-axis or multi-axis motion control, you can use "File/Save Configuration" from the menu to save your motion control parameter. The next time you open EzDMC, "File/Load Configuration" from the menu can be used to load the motion control parameter you previously set into EzDMC to begin motion control right away. Figure 3.12 (indicated by arrow) shows the position of the menu option described above.

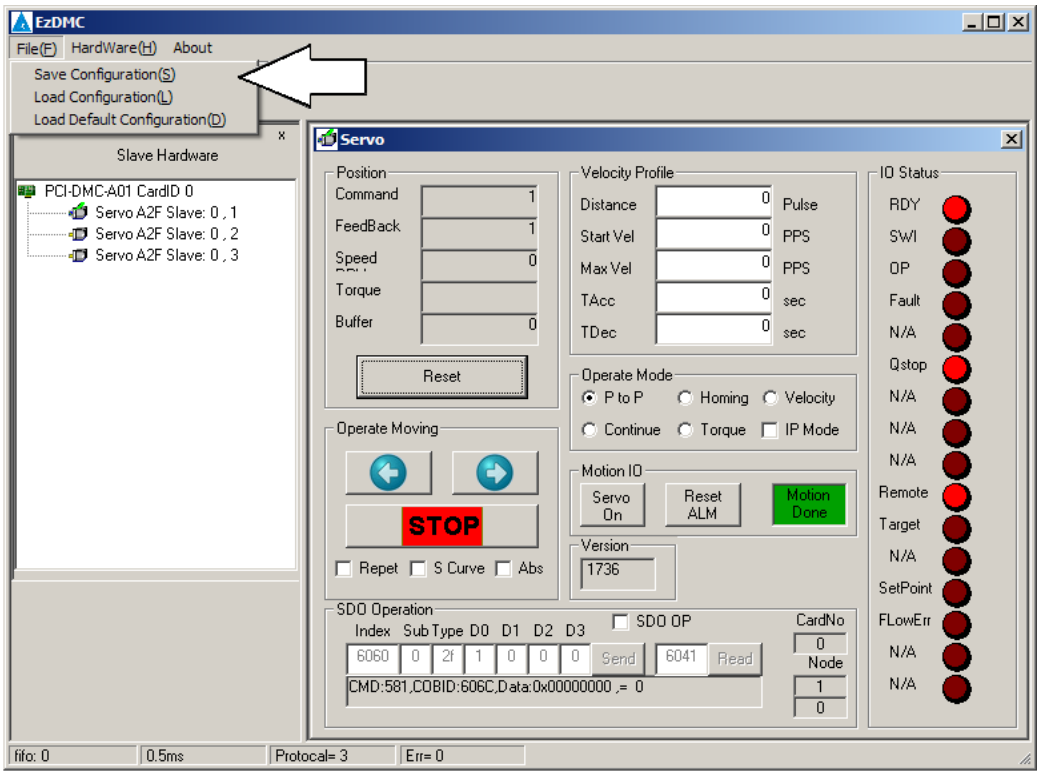

Figure 3.16

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