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# VXC Cards User's Manual

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For VXC-114U, VXC-144U/144iU

## **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**

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# 1. Introduction

The VXC series multi-port serial card enables user to install additional communication ports on the PC. It's the best choice for time-critical and reliably communications and controls on the industrial environment. For example: communicates to PLC, FAB machine, meter, console management of devices, laboratory instruments and Modem link, etc. In harsh industrial environments, the onboard surge protection protects the computer and other equipment from being damaged by high potential voltages.

## **COM-Selector:**

The VXC series cards equip a **COM-Selector** (dip switch) for the COM port number selection (automatically or manually). It's an important and innovative feature of the VXC cards. It has the following advantages:

- Simplifies the COM port number selection without using configuration utility programs.
- Users specify the COM port number exactly what they want, no matter which PCI slot is using.
- Automatically select an available COM port number is supported by setting the COM-Selector (dip switch) to 0 (default).
- Needn't to install configuration utility for different OS, and needn't to study operations of the utility.
- Prevents confusion. Other PnP COM port devices always confusing users by using a dynamic COM port number.
- Replacing an existing card is very easy, just by setting the COM-Selector (dip switches) to the same.
- It's great for mass system installation, just setting the COM-Selector (dip switches) to use the same COM port number in systems.

## **Up to 128KB Software FIFO:**

The VXC card driver for Windows features a 128KB maximum software FIFO for each port (default is 4KB). It's practical for large file transmission.

## **Self-Tuner:**

The RS-485 ports of VXC cards equip a "Self-Tuner" chip or equivalence design, which controls the sending and receiving direction, baud rate and data format automatically and is helpful for reducing the software loading.

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## 1.1 Features

- Universal PCI V2.2, supports 5V and 3.3V PCI bus
- COM-Selector
- Provides surge protection
- 128-byte UART FIFO

## 1.2 Specifications

	VXC-114U	VXC-144U	VXC-144iU
<b>Bus</b>	Universal PCI (5V and 3.3V)		
<b>Connector</b>	Female DB-37		
<b>RS-232</b>	<b>4 Ports</b>	-	-
<b>RS-422/485</b>	-	<b>4 Ports</b>	<b>4 Ports</b>
<b>Self-tuner or equivalence design</b>	-	<b>Yes</b>	<b>Yes</b>
<b>Isolation</b>	-	-	<b>3KV</b>
<b>COM-Selector</b>	<b>Yes</b>		
<b>UART</b>	4 x 16C550 Compatible		
<b>Baud rate</b>	50 ~ 115200 bps		
<b>Data bits</b>	5, 6, 7, 8		
<b>Parity Bit</b>	None, Even, Odd, Mark, Space		
<b>Stop Bits</b>	1, 1.5, 2		
<b>FIFO size</b>	<b>128 Bytes</b>		
<b>Operating Temperature</b>	0 ~ 50 °C		
<b>Storage Temperature</b>	-20 to 70°C		
<b>Humidity</b>	0~90% non-condensing		
<b>Dimensions (mm)</b>	129 X83	129 X83	129 X83

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## 1.3 Product Check List

In addition to this manual, the package includes the following items:

- One VXC series card
- One ICP DAS software CD
- One release note

**It is recommended that you read the release notes to see the software driver location first.**

### **Attention!**

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

## 1.4 Ordering Information

- VXC-114U: Universal PCI, 4-port RS-232 Communication Board
- VXC-144U: Universal PCI, 4-port RS-422/485 Communication Board
- VXC-144iU: Universal PCI, 4-port Isolated RS-422/485 Communication Board

## 1.5 Options

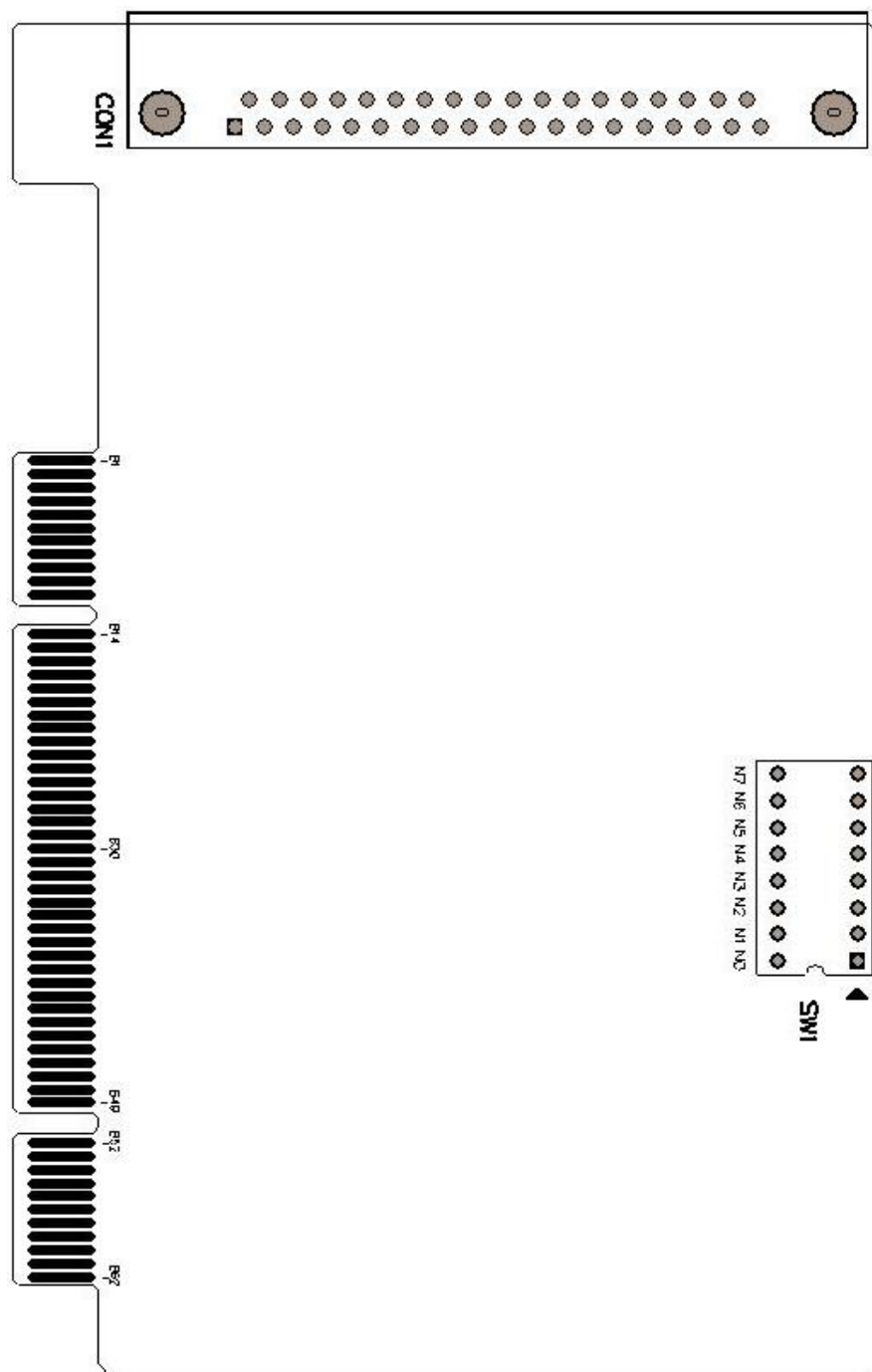
Item	Description	VXC-114U	VXC-144U/144iU
<b>CA-4002</b> 	37-pin Male D-sub connector with plastic cover	✓	✓
<b>DN-37</b> 	I/O Connector Block (Pitch= 5.08 mm) with DIN-Rail Mounting Include: One CA-3710 (37-pin Male-Male D-sub cable 1.0m)	✓	✓
<b>CA-3710</b> 	37-Pin Male-Male D-sub cable 1M (45°)	✓	✓
<b>CA-3710D</b> 	37-Pin Male-Male D-sub cable 1M (180°)	✓	✓
<b>CA-3720D</b> 	37-Pin Male-Male D-sub cable 2M (180°)	✓	✓
<b>CA-0903</b> 	9-pin Female D-sub & 5-wire RS-232 cable, 30cm	-	-
<b>CA-0910</b> 	9-pin Female D-sub & 3-wire RS-232 cable, 1M	-	-
<b>CA-090910</b> 	9-pin Female D-sub & (9-wire) RS-422 Cable, 1M	-	-

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## 2. Hardware configuration

### 2.1 Board Layout

- Board layout of the VXC-114U/144U/144iU



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## 2.2 COM Port Mapping and Board ID

The Board ID and COM port mapping are the same, which is set by the SW1 DIP switch. The SW1 DIP switch has different functions under different OS.

For **DOS** users, the SW1 DIP switch acts as **Board ID**. When there are two or more multi-port serial cards in a single system, it is difficult to identify individual card number. For easier identification, the VXC series card includes a Board ID function.

For **Windows** users, the SW1 DIP switch acts as **COM port number selector** and the COM port number is depending on the Board ID. If the Board ID is 0, then the driver finds a valid number for each port. If the Board ID is not 0, then the driver uses the “**Board ID**” to be the first COM port number and uses the “**Board ID +1**” to be the next COM port number and so on.

### Note:

It's recommended to select a unique COM port number (Board ID) by users. This helps users to identify and fix these cards and ports in a system without confuses.

### Warning:

The port will not work if the COM port number is conflicted under Windows or Linux system. In that case, users should try other COM port numbers.

Usually, the COM1 and COM2 are reserved by systems. And it's recommended to reserve the COM3 and COM4 if you will have other Plug&Play serial ports in the future. This prevents confliction.

For **Linux** users, it's the same as Windows users but for **TTY device number selector**.

The configuration examples are as follows.

SW1





SW1 DIP Switch	8	7	6	5	4	3	2	1
Board ID= <b>0x00</b> (Default) COM = Auto-defined	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Board ID= <b>0x03</b> COM = 3/4/5/6	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON
Board ID= <b>0x05</b> COM = 5/6/7/8	OFF	OFF	OFF	OFF	OFF	ON	OFF	ON
Board ID= <b>0x07</b> COM = 7/8/9/10	OFF	OFF	OFF	OFF	OFF	ON	ON	ON
Board ID= <b>0x09</b> COM = 9/10/11/12	OFF	OFF	OFF	OFF	ON	OFF	OFF	ON
Board ID= <b>0x14</b> COM = 20/21/22/23	OFF	OFF	OFF	ON	OFF	ON	OFF	OFF
Board ID= <b>0x1E</b> COM = 30/31/32/33	OFF	OFF	OFF	ON	ON	ON	ON	OFF
Board ID= <b>0x28</b> COM = 40/41/42/43	OFF	OFF	ON	OFF	ON	OFF	OFF	OFF
Board ID= <b>0x32</b> COM = 50/51/52/53	OFF	OFF	ON	ON	OFF	OFF	ON	OFF
Board ID= <b>0x3C</b> COM = 60/61/62/63	OFF	OFF	ON	ON	ON	ON	OFF	OFF
Board ID= <b>0x64</b> COM = 100/101/102/103	OFF	ON	ON	OFF	OFF	ON	OFF	OFF
Board ID= <b>0x96</b> COM = 150/151/152/153	ON	OFF	OFF	ON	OFF	ON	ON	OFF
Board ID= <b>0xC8</b> COM = 200/201/202/203	ON	ON	OFF	OFF	ON	OFF	OFF	OFF
.								
.								
.								
Board ID= <b>0xFF</b> COM = 255/256/x/x	ON	ON	ON	ON	ON	ON	ON	ON

## 2.3 Pin Assignment

### 2.3.1 VXC-114U Pin Assignment and Wiring

Pin Assignment Name	Terminal No.	Pin Assignment Name
N.C.	01	
DCD3	02	20 RI3
GND	03	21 DTR3
CTS3	04	22 DSR3
RxD3	05	23 RTS3
RI4	06	24 TxD3
DTR4	07	25 DCD4
DSR4	08	26 GND
RTS4	09	27 CTS4
TxD4	10	28 RxD4
DCD2	11	29 RI2
GND	12	30 DTR2
CTS2	13	31 DSR2
RxD2	14	32 RTS2
RI1	15	33 TxD2
DTR1	16	34 DCD1
DSR1	17	35 GND
RTS1	18	36 CTS1
TxD1	19	37 RxD1

37-Pin Female D-Sub Connector\_RS232

#### RS-232 Null Modem Cable Wiring

System 1		System 2
TX	→	RX
RX	←	TX
RTS	→	DCD
CTS		
GND	↔	GND
DSR	←	DTR
DCD	←	RTS
		CTS
DTR	→	DSR

## 2.3.2 VXC-144U/144iU Pin Assignment and Wiring

Pin Assignment Name	Terminal No.	Pin Assignment Name
N.C.	01	
TxD2- (A)/Data2-(A)	02	20 CTS2- (A)
GND/VEE2	03	21 RxD2- (A)
CTS2+ (B)	04	22 RTS2- (A)
TxD2+ (B)/Data2+(B)	05	23 RTS2+ (B)
CTS3- (A)	06	24 RxD2+ (B)
RxD3- (A)	07	25 TxD3- (A)/Data3-(A)
RTS3- (A)	08	26 GND/VEE3
RTS3+ (B)	09	27 CTS3+ (B)
RxD3+ (B)	10	28 TxD3+ (B)/Data3+(B)
TxD1- (A)/Data1-(A)	11	29 CTS1- (A)
GND/VEE1	12	30 RxD1- (A)
CTS1+ (B)	13	31 RTS1- (A)
TxD1+ (B)/Data1+(B)	14	32 RTS1+ (B)
CTS0- (A)	15	33 RxD1+ (B)
RxD0- (A)	16	34 TxD0- (A)/Data0-(A)
RTS0- (A)	17	35 GND/VEE0
RTS0+ (B)	18	36 CTS0+ (B)
RxD0+ (B)	19	37 TxD0+ (B)/Data0+(B)

37-Pin Female D-Sub Connector\_RS422/485

### RS-485 Cable Wiring

System 1		System 2
DATA – (A)	↔	DATA – (A)
DATA + (B)	↔	DATA + (B)

### RS-422 Cable Wiring

System 1		System 2
TxD-	→	RxD-
TxD+	→	RxD+
RxD+	←	TxD+
RxD-	←	TxD-
GND	↔	GND
RTS-	→	CTS-
RTS+	→	CTS+
CTS+	←	RTS+
CTS-	←	RTS-

#### Warning:

The RS-485 bus is a differential (balanced) signal, thus **you cannot wire the Data+ with Data- directly for a single port loop-back test.** It will not work at all!

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## 2.4 Hardware Installation

**Warning:**

Static electricity can easily damage computer equipment. Ground yourself by touching the chassis of the computer before touching any boards.

To install your VXC series cards, complete the following steps:

1. Refer to Chapter 3 for installing driver first
2. Turn off your computer
3. Remove all covers from the computer
4. Select an unused PCI slot
5. Remove the PCI slot cover from the PC
6. Carefully insert your VXC card into the PCI slot
7. Attach the cable to the connector
8. Replace the PC cover
9. Power on the computer

**Note:**

It's recommended to install driver first, since some OS (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.

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## 3. Software Installation

ICP DAS provides following device drivers for most operation systems such as Windows NT 4.0 and Windows 2000/XP/2003/Vista32. These Windows drivers provide full interrupt-driven, buffered I/O for each COM ports. And also supports the Plug & Play mechanism for easy installation.

### **VxCard\_NT\_Vista32\_V102.exe:**

This is the VXC Card driver for Windows NT 4.0, 2000/XP/2003 and Vista32.

**Note:**

Please refer to “**Release Note**” for getting the location of setup program on CD.

For Windows users to access COM ports, please refer to the “**Serial Communications in Win32**” article for programming information. Which can be found by searching on the <http://msdn.microsoft.com>.

This chapter shows you the detail steps to install these drivers.

**Note:**

For more information about COM port number selection, please refer to **Section 2.2 “COM Port Mapping & Board ID”**.

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## 3.1 Windows NT 4.0

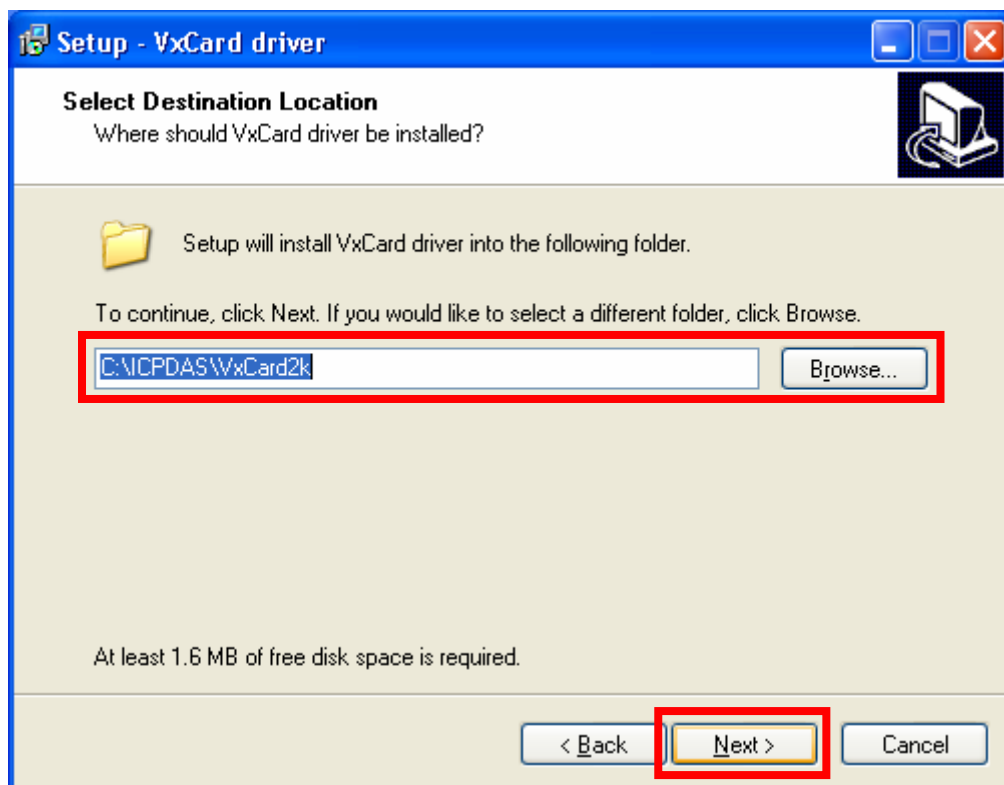
### 3.1.1 Installation

**Note:**

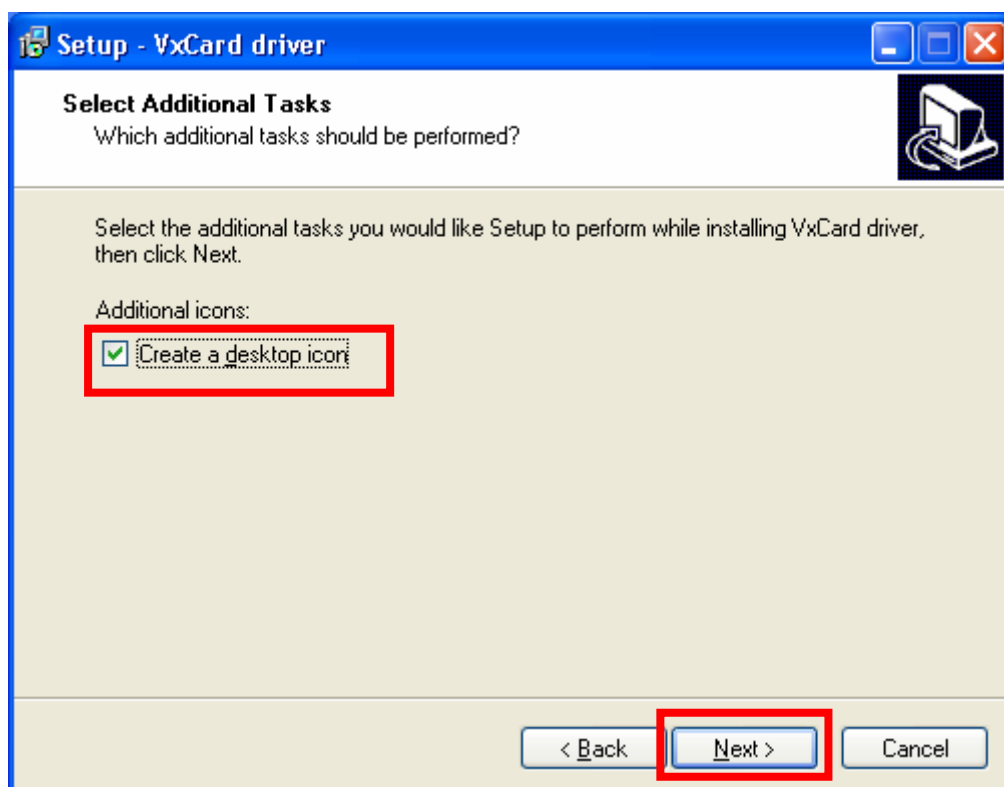
It's recommended to install the software first, and then the hardware. This reduces the configuration procedures.

Refer to “**Release Note**” for getting the location of setup program on CD.

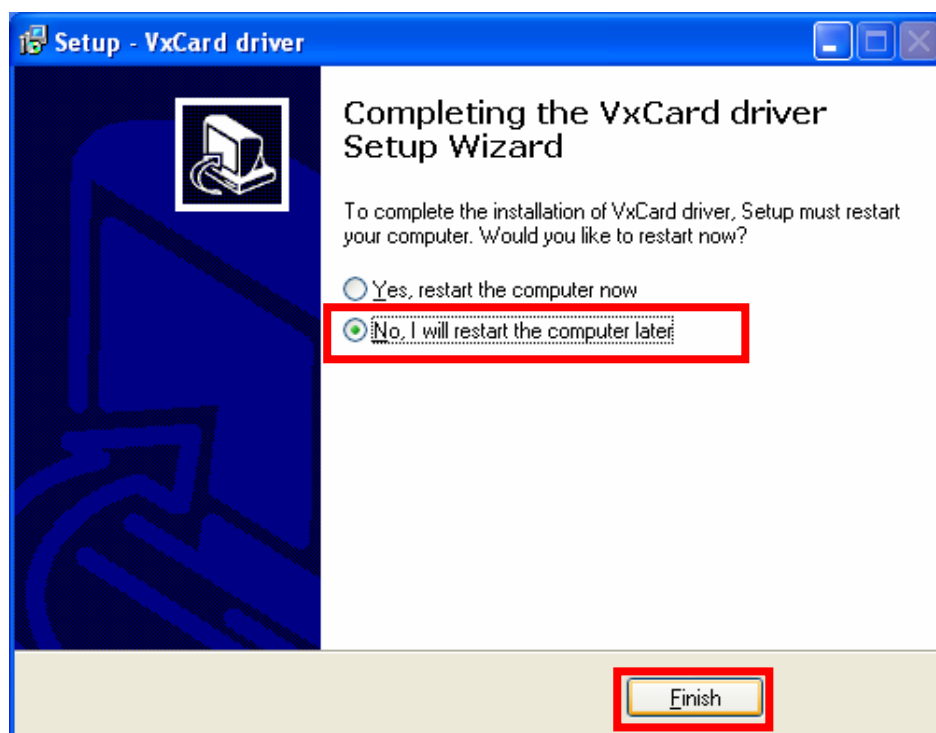
1. Launch the “**VxCard\_NT\_Vista32\_v102.exe**” setup program.
2. Click the “**Next >**” button to start installation.
3. Select a folder where setup will install files, and click “**Next>**” button.



4. Check “**Create a desktop icon**” and click “**Next>**” button.



5. Select “**No, I will restart the computer later**” and click “**Finish**” button.

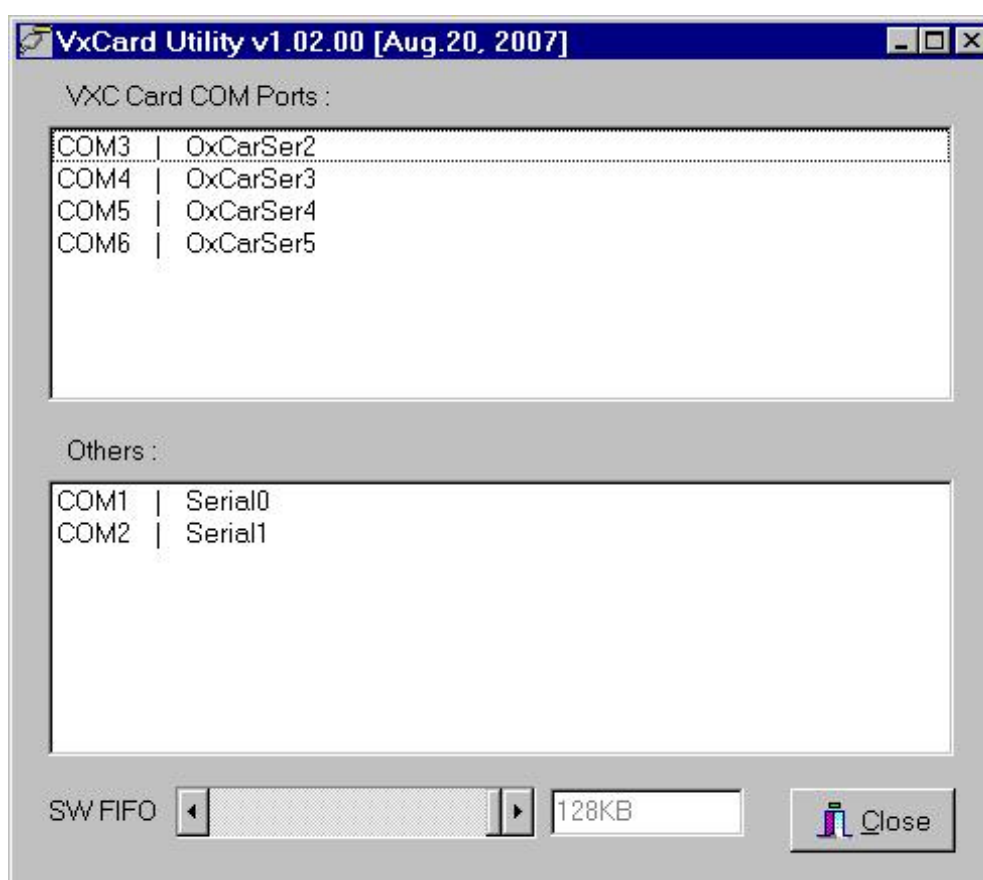


- 
6. Turn off the computer and install the VXC card into the PC.
  7. Power on the computer.

### 3.1.2 Verification

ICP DAS provides a "**VxCard Utility**" program (VxCardUtil.exe) for users to see all the COM ports on the system. It shows COM ports in two groups, one for VXC Card and one for others. So, users can check if any conflict occurred between COM ports.

To launch the utility, just double-click on the "**VxCard Utility**" short-cut on your desktop.



### 3.1.3 Configuration

If need, users can change the input buffer size (default is 4KB for each port, up to 128KB) by setting the "SW FIFO" scroll-bar on the VxCard Utility.

To change the COM port mappings (see **Section 2.2 COM Port Mappings and Board ID**), users should restart the driver by rebooting the computer.



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## 3.2 Windows 2000

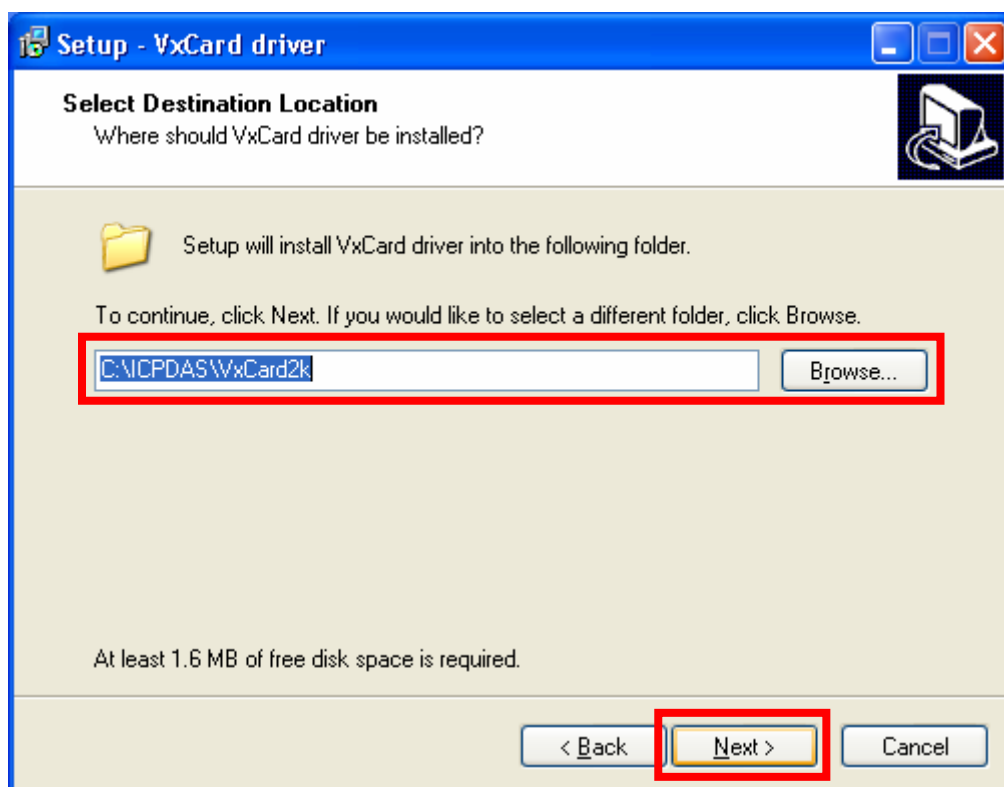
### 3.2.1 Installation

**Note:**

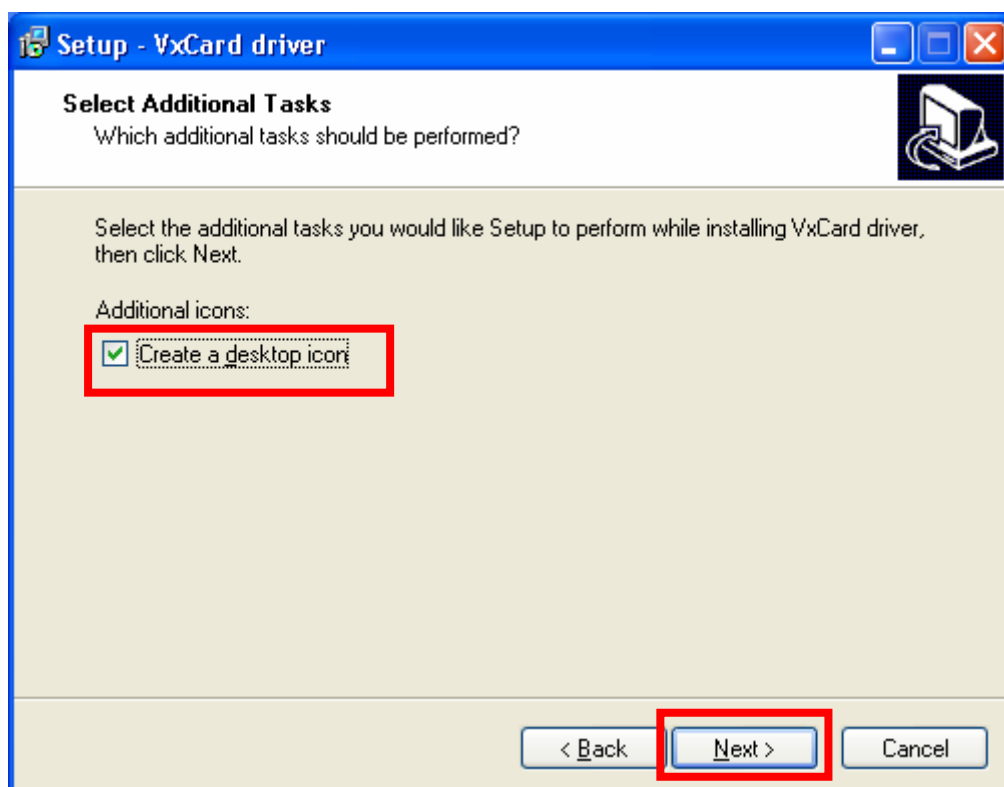
It's recommended to install the software first, and then the hardware. This reduces the configuration procedures.

Refer to “**Release Note**” for getting the location of setup program on CD.

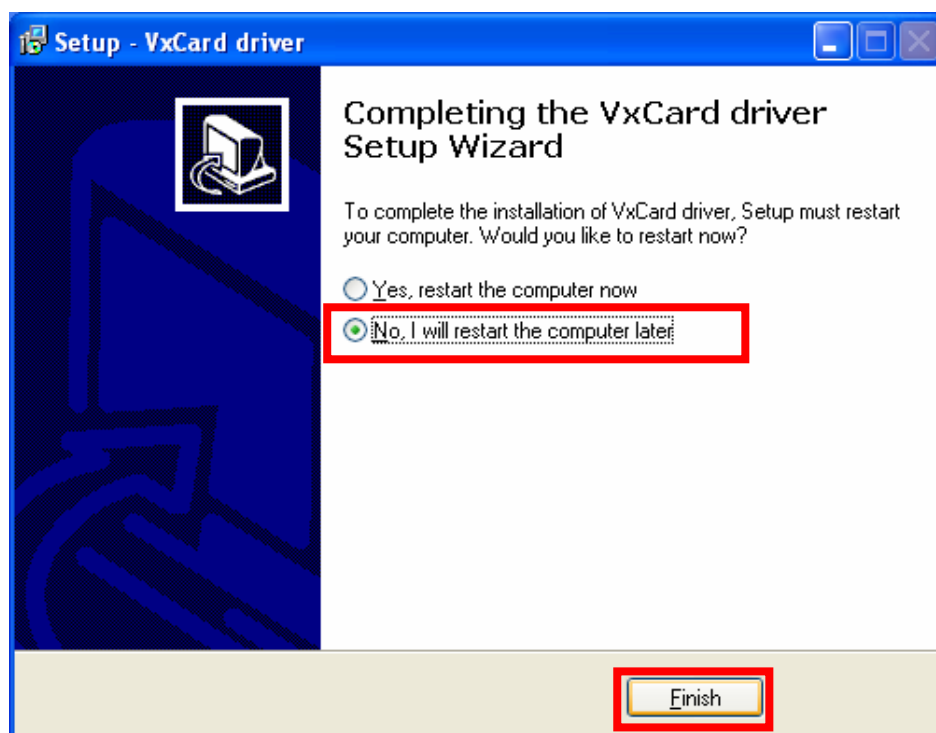
1. Launch the VxCard\_NT\_Vista32\_V102.exe to install the driver and register the related information onto the system.
2. Click “**Next>**” button to start installation.
3. Select a folder where setup will install files, and click “**Next>**” button.



4. Check “**Create a desktop icon**” and click “**Next>**” button.



5. Select “**No, I will restart the computer later**” and click “**Finish**” button.



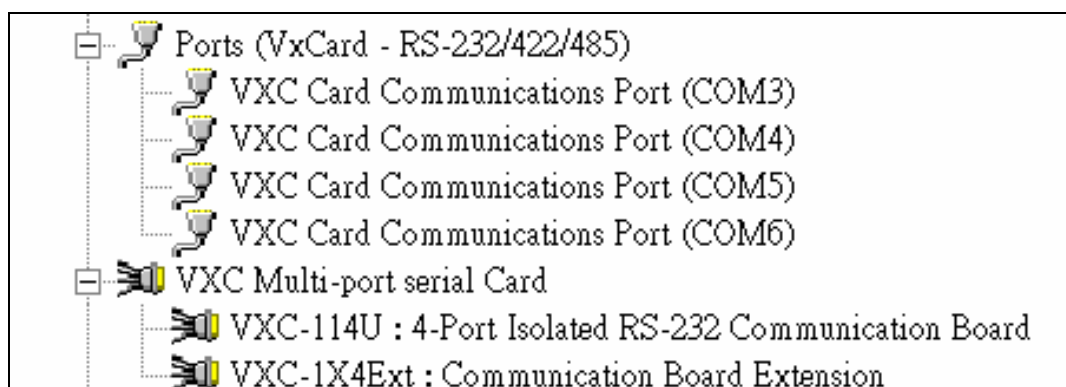
- 
6. Turn off the computer and install the VXC card into the PC.
  7. Power on the computer, Windows 2000 should find the new card and load the driver automatically. (Sometimes Win2K pops up few confirm dialog box, just click “next” or “OK” to finish it.)

## 3.2.2 Verification

To verify the installation, please complete the following steps:

1. Select **“Start / Settings / Control Panel”** and double-click the **“System”** icon.
2. Click the **“Hardware”** tab and then click the **“Device Manager”** button.

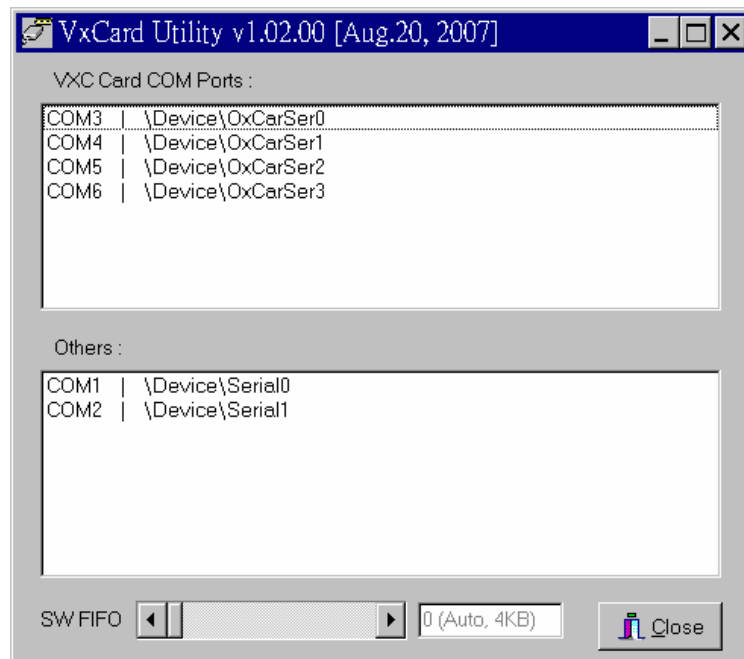
The VXC Card is listed under the **“VXC Multi-port serial Card”** class, and each Communications Port is listed under the **“Ports (VxCARD – RS-232/422/485)”** class.



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### 3.2.3 Configuration

If need, users can change the input buffer size (default is 4KB for each port, up to 128KB) by setting the “SW FIFO” scroll-bar on the VxCard Utility. The utility’s short cut is placed on the desktop after installation.



To change the COM port mappings (see **Section 2.2 COM Port Mappings and Board ID**), users should restart the driver by rebooting the computer, or re-install the “**VXC Card**” hardware in the “**Device Manager**” by un-install card and then scan new hardware.

### 3.2.4 Uninstallation

Before removing the card from your computer, it’s recommended to uninstall the device from the “**Device Manager**”. This removes unused hardware information from the database (registry) of Windows.

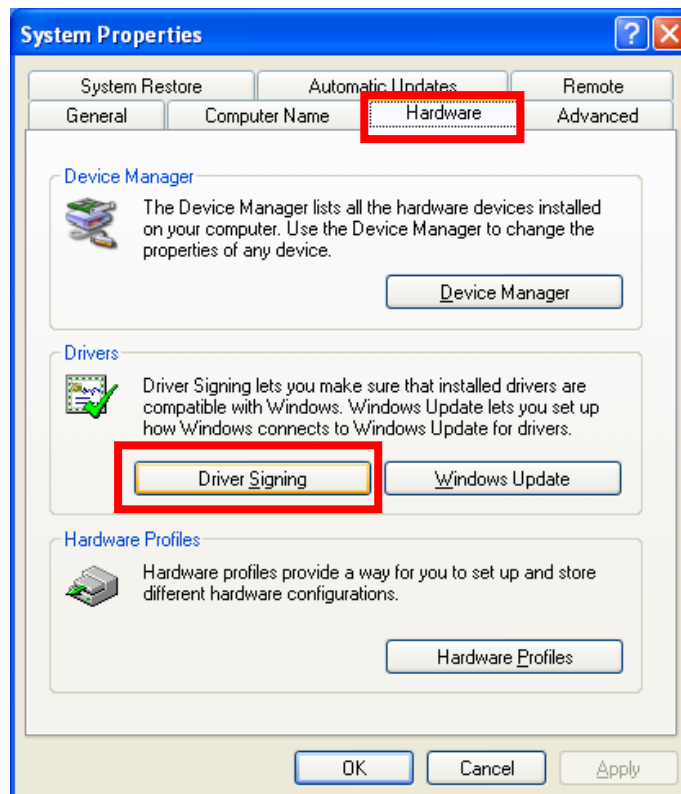
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## 3.3 Windows XP/2003

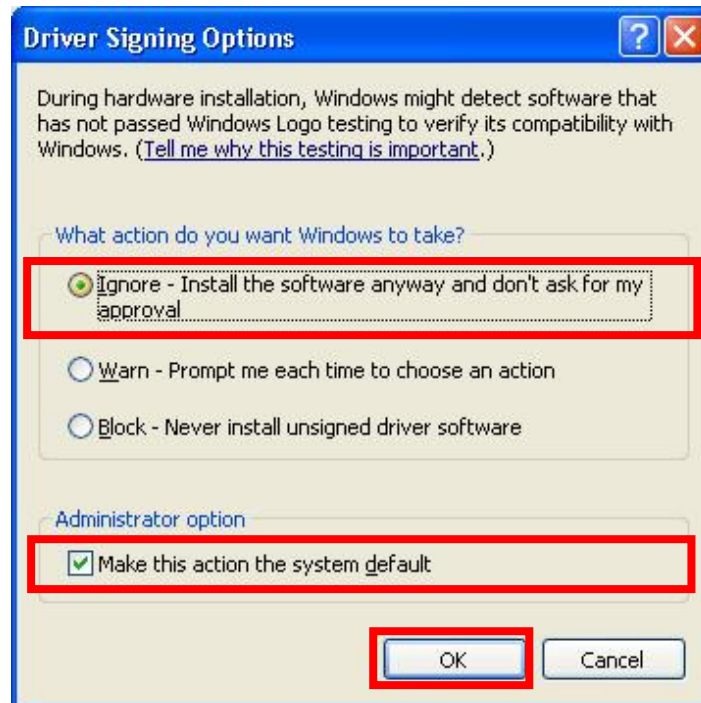
It's recommend to disable the **Driver Signing** and **Windows Update** options in Windows to suppress the lots of prompt messages during driver installation.

### 3.3.1 Disable Driver Signing

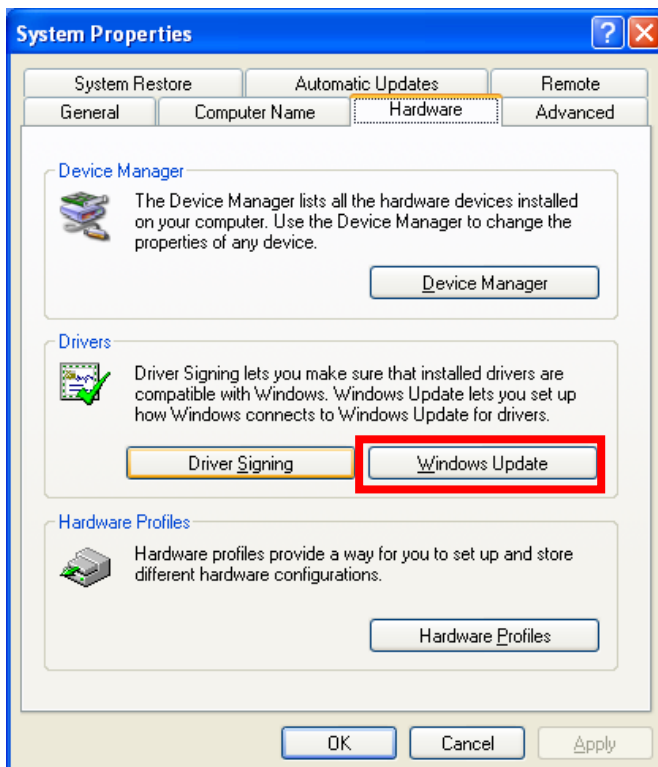
1. Select "**Start / Settings / Control Panel**" and then "**System**".
2. Select the "**Hardware**" page on "**System Properties**" window and click the "**Driver Signing**" button.



3. Select “**Ignore – Install the software anyway and don’t ask for my approval**”, check “**Make this action the system default**” and then click “**OK**” to close the “**Driver Signing Options**” window.



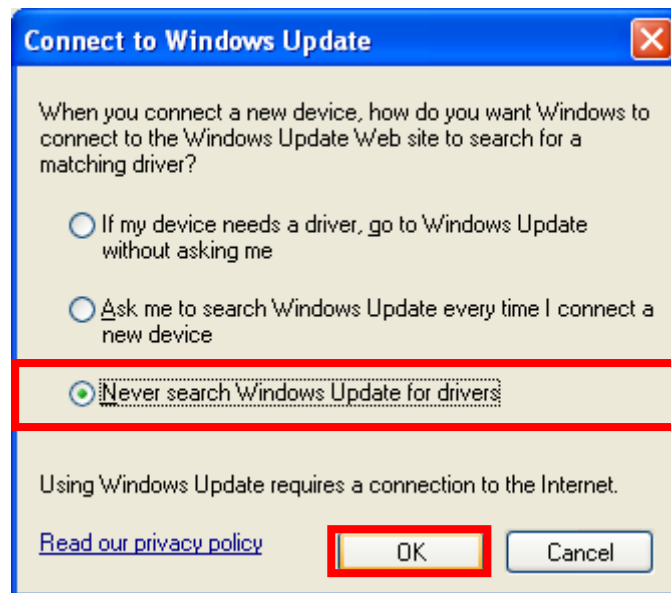
4. Click the “**Windows Update**” button on “**System Properties**” window.



**Note:**

The “**Windows Update**” setting supports **Windows XP SP2** only. If the system is not Windows XP SP2, please skip step 4 to 6.

- 
5. Select “**Never search Windows Update for drivers**” and click “**OK**”.



6. Click “**OK**” on “**System Properties**” window to close it.

### 3.3.2 Driver Installation

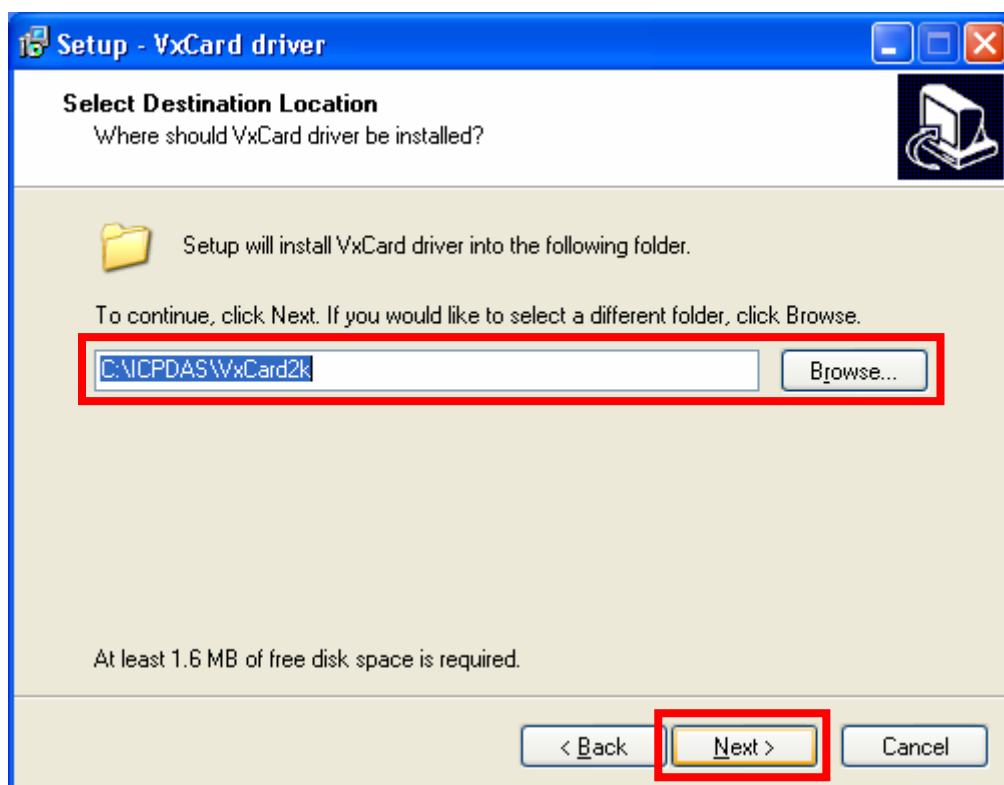
**Note:**

It's recommended to install the software first, and then the hardware. This reduces the configuration procedures.

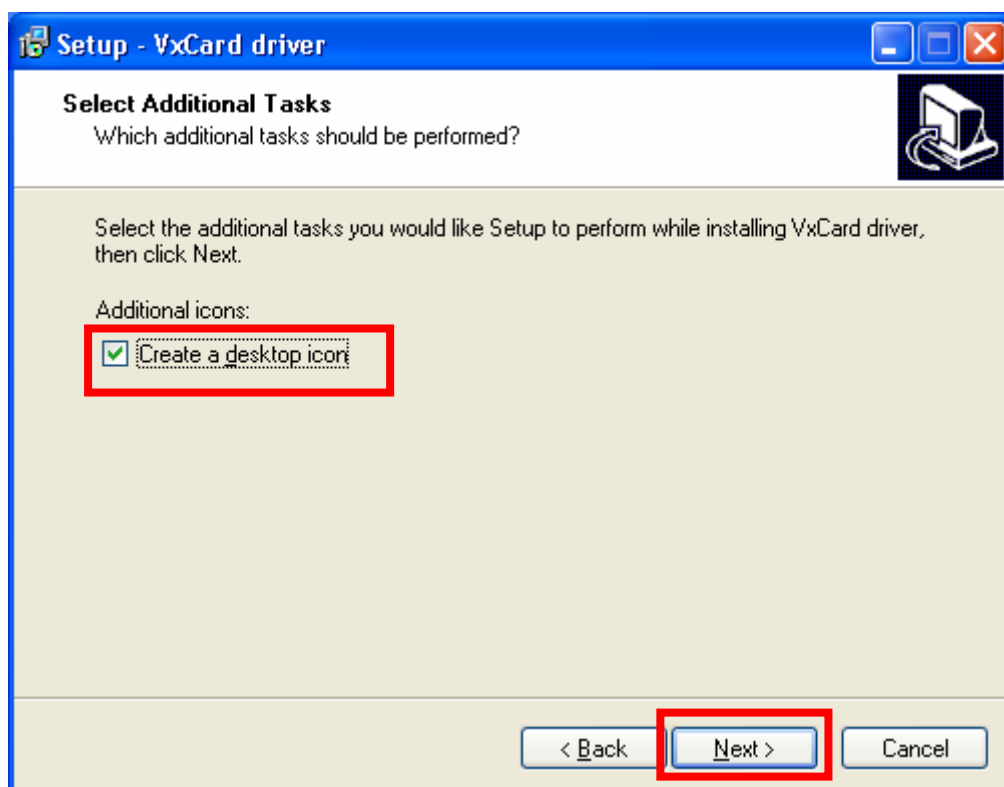
Refer to “**Release Note**” for getting the location of setup program on CD.

1. Launch the VxCard\_NT\_Vista32\_V102.exe to install the driver and register the related information onto the system.
2. Click “**Next>**” button to start installation.

3. Select a folder where setup will install files, and click “**Next>**” button.

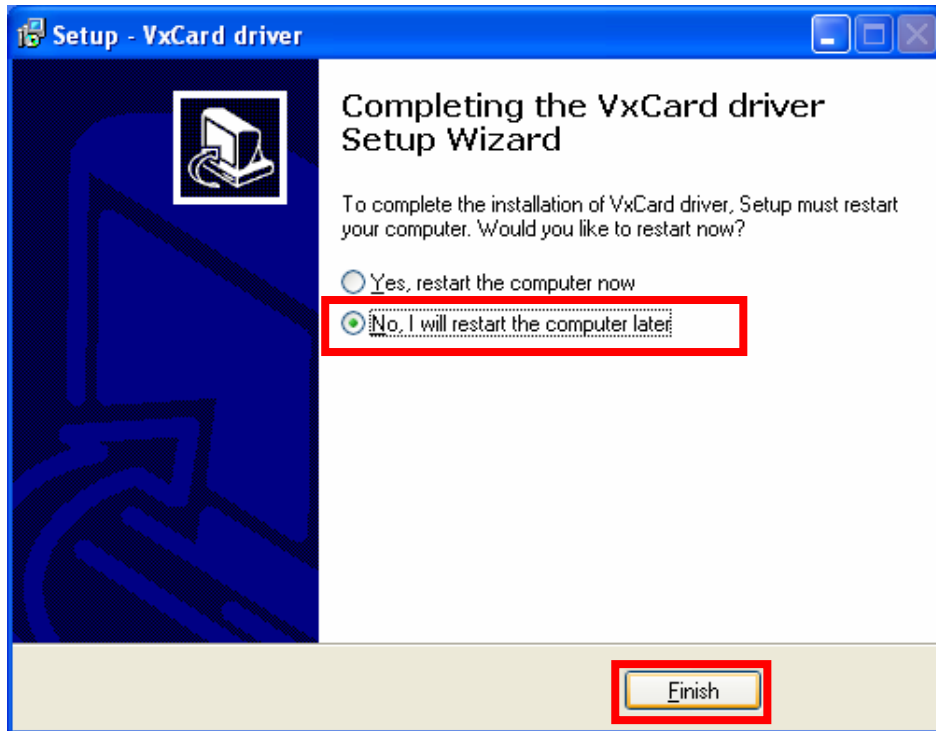


4. Check “**Create a desktop icon**” and click “**Next>**” button.

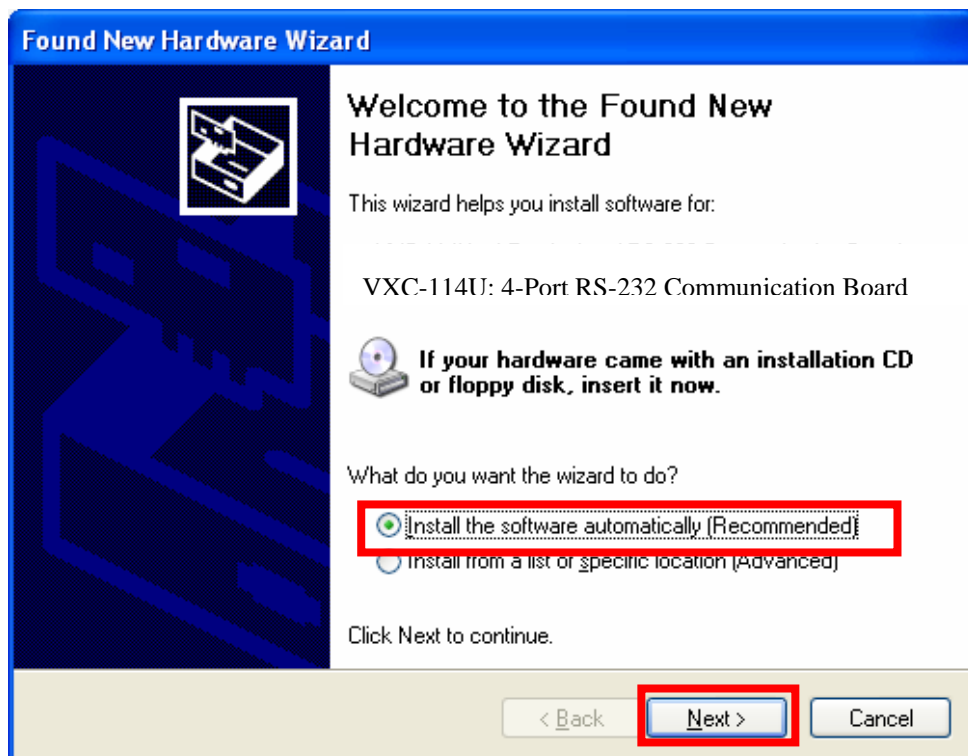




5. Select “**No, I will restart the computer later**” and click “**Finish**” button.



6. Turn off the computer and install the VXC card into the PC.
7. Power on the computer and continue to finish the Plug and Play procedures.
8. Select “**Install the software automatically [Recommended]**” and Click “**Next>**” button.



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9. Click "**Finish**" button.

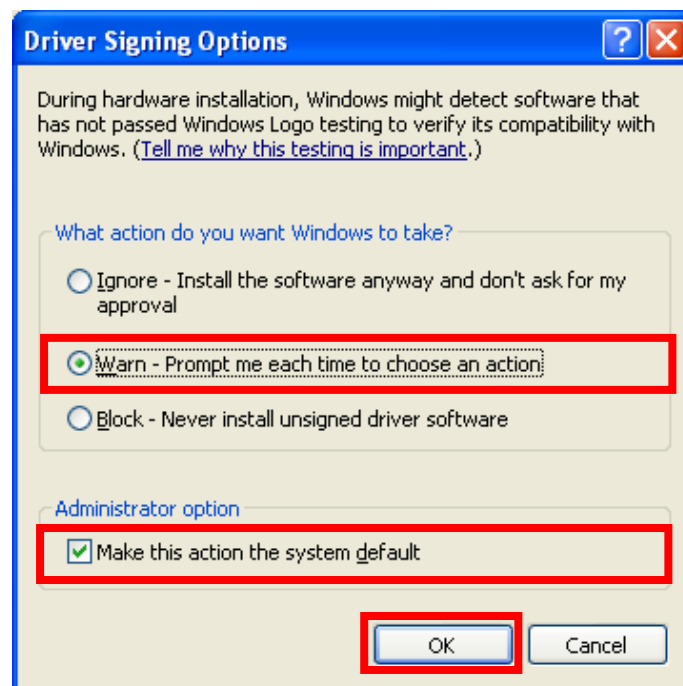
10. Windows pops up "**Found New Hardware Wizard**" dialog box again. Please repeat the step 8 to 9 to finish the installation for all COM ports.

### 3.3.3 Restore the Driver Signing Setting

1. Select "**Start / Settings / Control Panel**" and then "**System**".

2. Select the "**Hardware**" page on "**System Properties**" window and click "**Driver Signing**".

3. Select "**Warn – Prompt me each time to choose an action**", check "**Make this action the system default**" and then click "**OK**" to close the "**Driver Signing Options**" window.

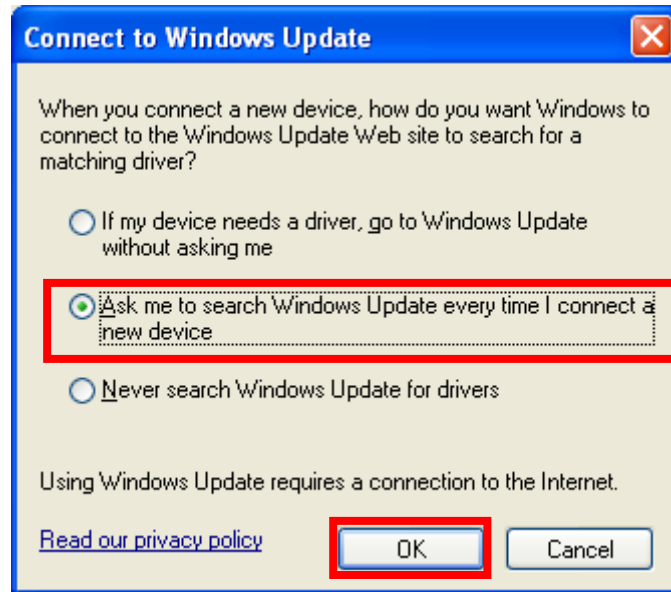


4. Click the "**Windows Update**" button on "**System Properties**" window.

**Note:**

The "**Windows Update**" setting supports **Windows XP SP2** only. If the system is not Windows XP SP2, please skip step 4 to 6.

5. Select “**A**sk me to search Windows Update every time I connect a new device” and click “**OK**” button.



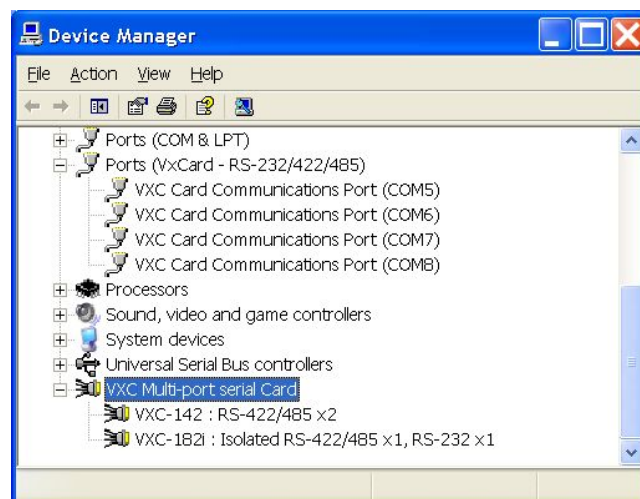
6. Click “**OK**” button to close the “**System Properties**” window.

### 3.3.4 Verification

To verify the installation, please complete the following steps:

1. Select “**Start / Settings / Control Panel**” and double-click the “**System**” icon.
2. Click the “**Hardware**” tab and then click the “**Device Manager**” button.

The VXC Card is listed under the “**VXC Multi-port serial Card**” class, and each Communications Port is listed under the “**Ports (VxCard – RS-232/422/485)**” class.



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## 3.3.5 Configuration

If need, users can change the input buffer size (default is 4KB for each port, up to 128KB) by setting the “SW FIFO” scroll-bar on the VxCard Utility. The utility’s short cut is placed on the desktop after driver installed.



To change the COM port mappings (see **Section 2.2 COM Port Mappings and Board ID**), users should restart the driver by rebooting the computer, or re-install the “**VXC Card**” hardware in the “**Device Manager**” by un-install card and then scan new hardware.

## 3.3.6 Uninstallation

Before removing the card from your computer, it’s recommended to uninstall the device from the “**Device Manager**”. This removes unused hardware information from the database (registry) of Windows.

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## 3.4 Windows Vista

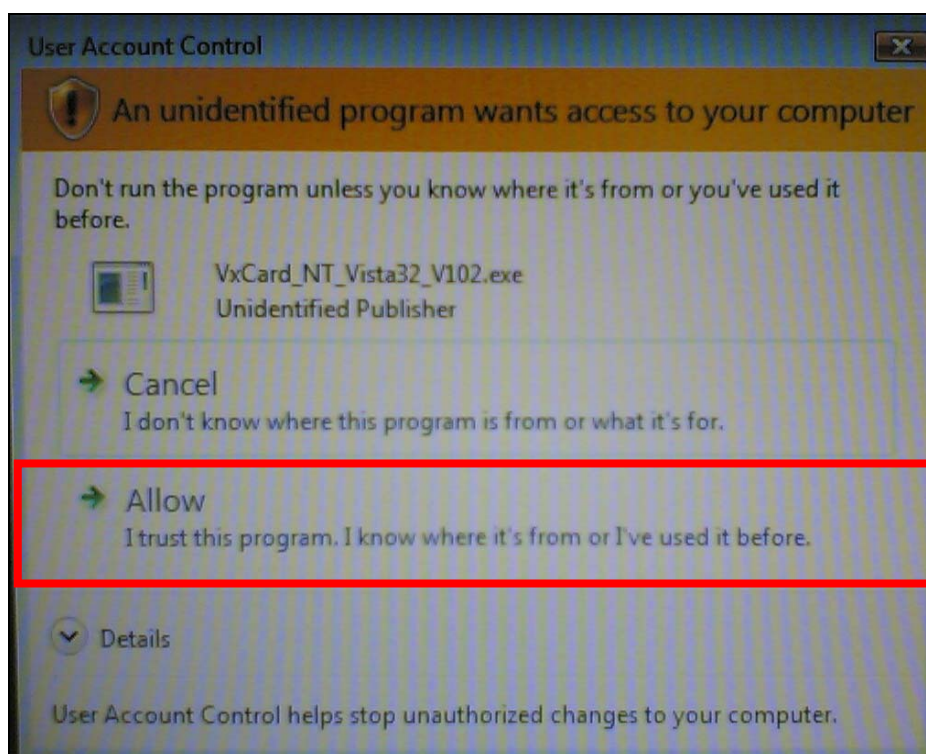
### 3.4.1 Driver Installation

**Note:**

It's recommended to install the software first, and then the hardware. This reduces the configuration procedures.

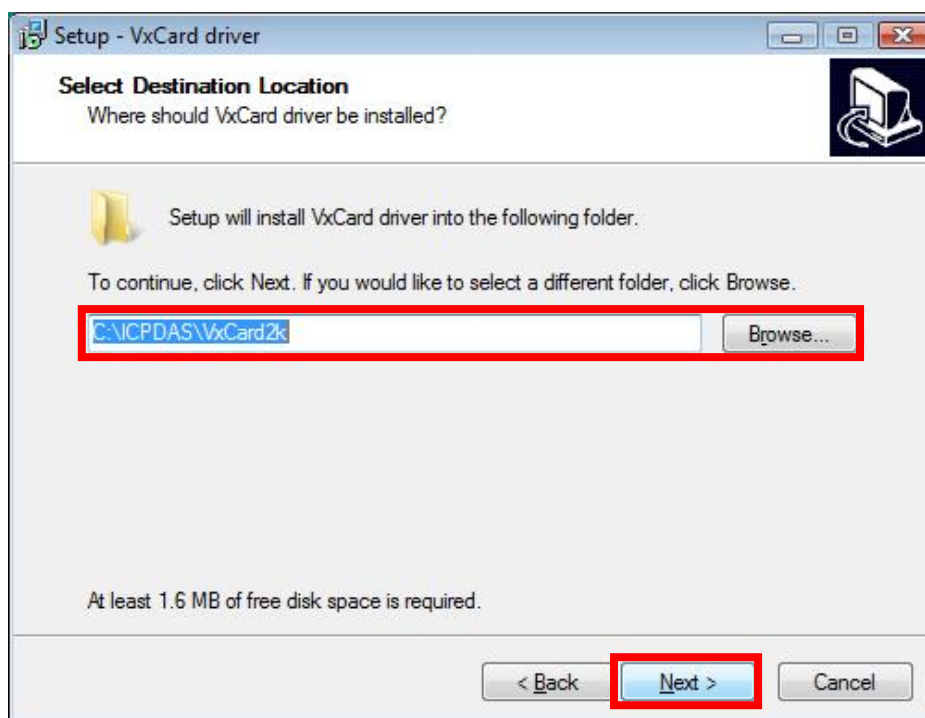
Refer to "**Release Note**" for getting the location of setup program on CD.

1. Launch the VxCard\_NT\_Vista32\_V102.exe to install the driver and register the related information onto the system.
2. Click "**Allow, I trust this program. I know where it's from or I've used it before**" on the "**User Account Control**" window.

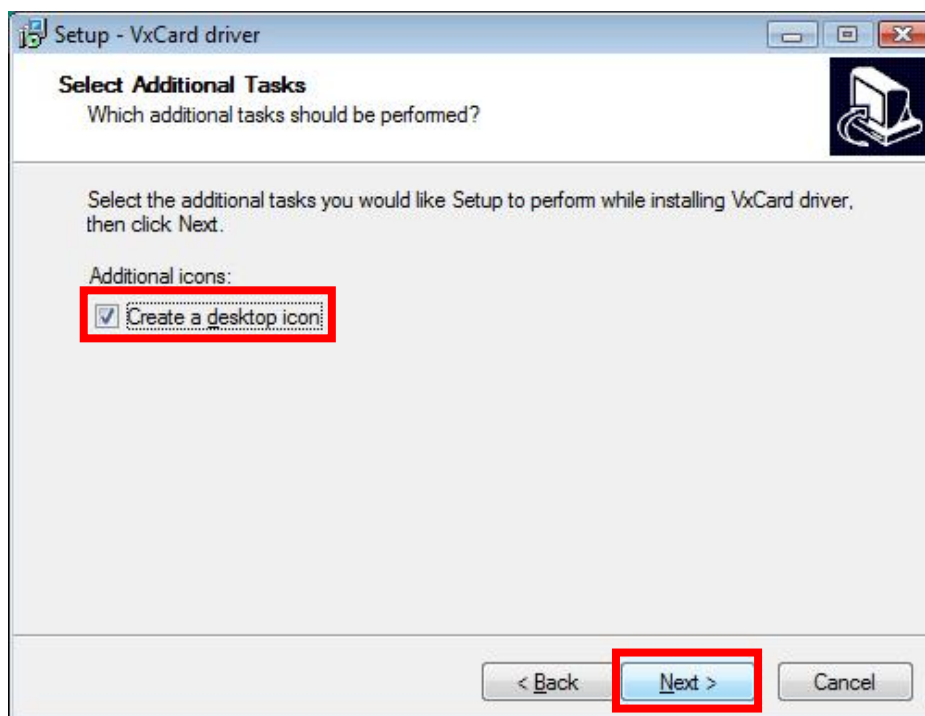


3. Click "**Next>**" button to start installation.

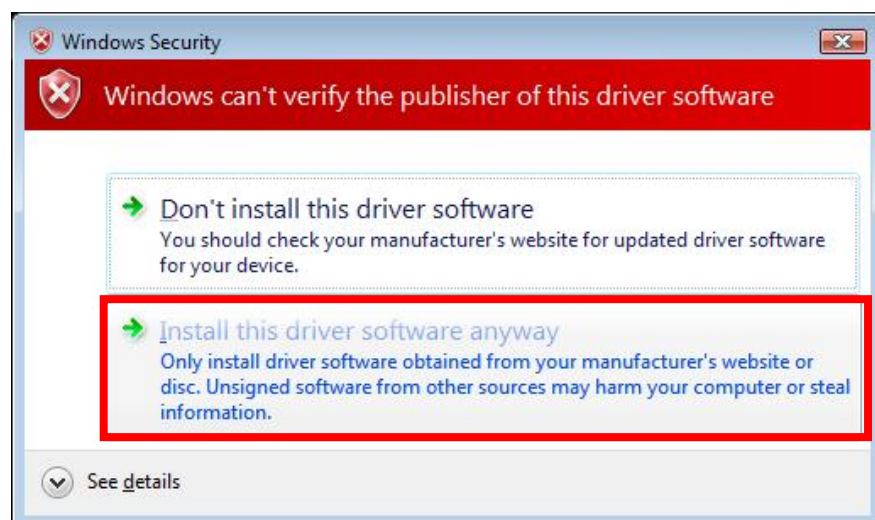
- 
4. Select folder where setup will install files, and click “**Next>**” button.



5. Check “**Create a desktop icon**” and click “**Next>**” button.



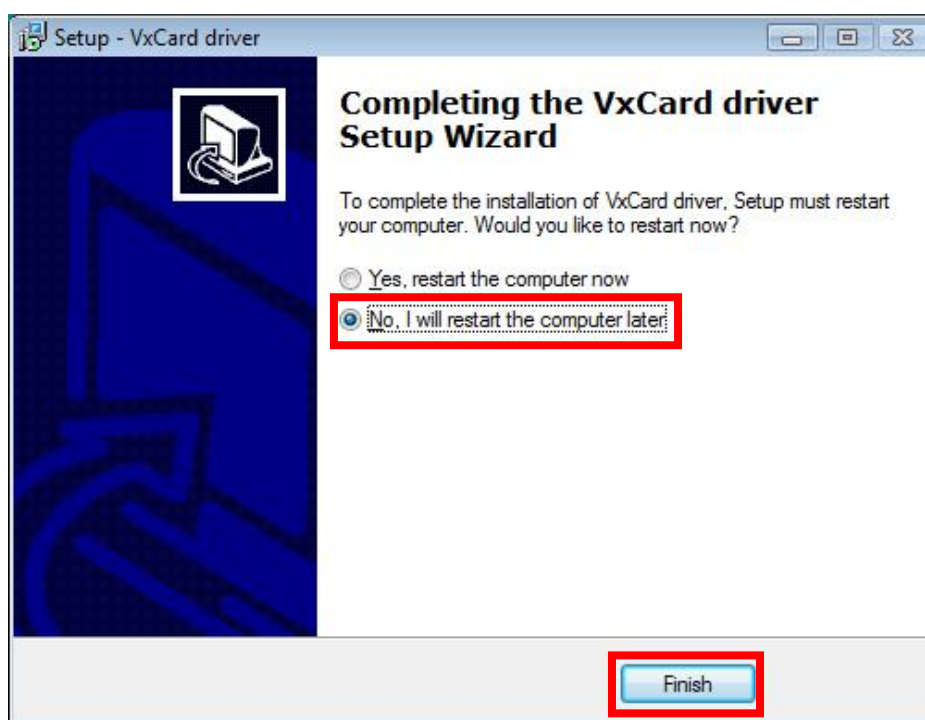
6. Click **“Install this driver software anyway”**.



**Note:**

The prompt will repeat for several times. Please click **“(Install this driver software anyway)”** for all these prompts.

7. Select **“No, I will restart the computer later”** and click **“Finish”** button.



8. Turn off the computer and install the VXC card into the PC.
9. Power on the computer and system will find the new card and make it work automatically.



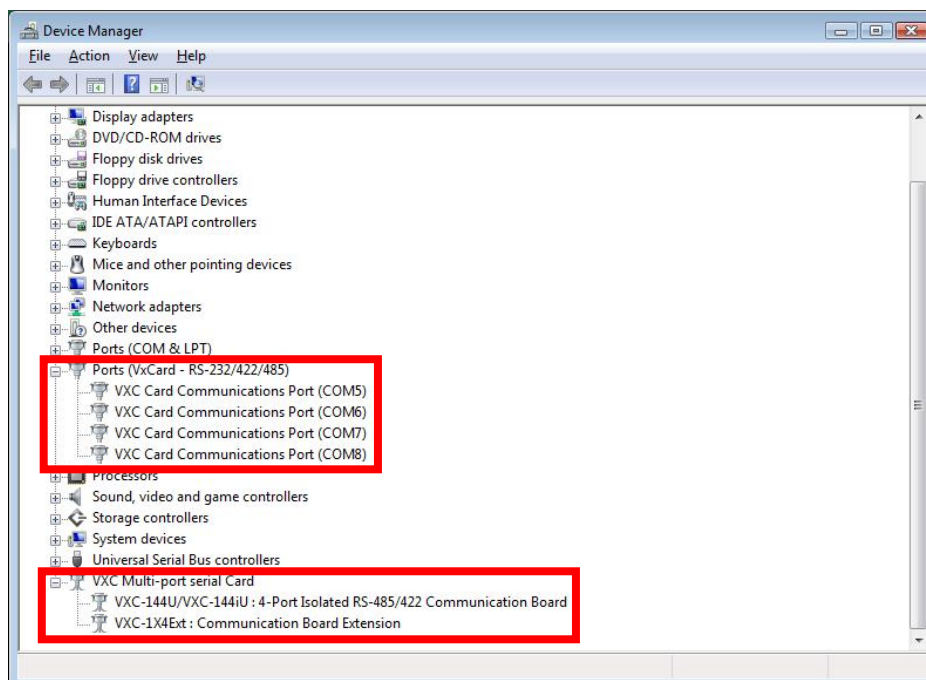
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## 3.4.2 Verification

To verify the installation, please complete the following steps:

1. Select "**Start / Settings / Control Panel**" and double-click the "**System**" icon.
2. Click the "**Hardware**" tab and then click the "**Device Manager**" button.

The VXC Card is listed under the "**VXC Multi-port serial Card**" class, and each Communications Port is listed under the "**Ports (VxCard – RS-232/422/485)**" class.

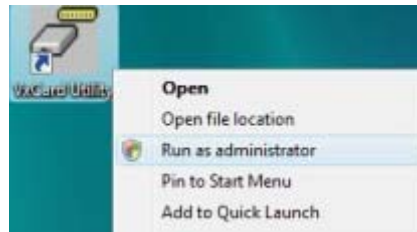


## 3.4.3 Configuration

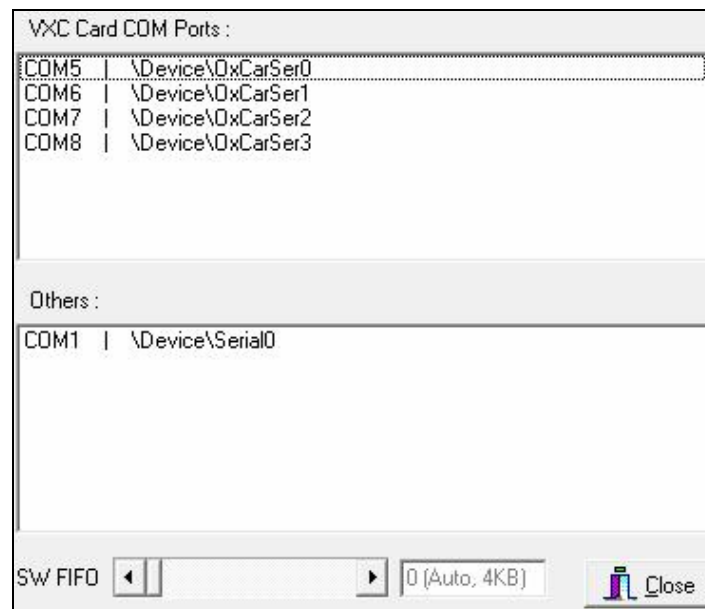
If need, users can change the input buffer size (default is 4KB for each port, up to 128KB) by setting the "SW FIFO" scroll-bar on the VxCard Utility. The utility's short cut is placed on the desktop after driver installed.



1. Right-click “**VxCard Utility.exe**” and select “**Run as administrator**”.



2. Click “**Allow, I trust this program. I know where it’s from or I’ve used it before**” on the “**User Account Control**” window.
3. The VXC Card Utility shows all COM ports that existing in the system.



To change the COM port mappings (see **Section 2.2 COM Port Mappings and Board ID**), users should restart the driver by rebooting the computer, or re-install the “**VXC Card**” hardware in the “**Device Manager**” by un-install card and then scan new hardware.

### 3.4.4 Uninstallation

Before removing the card from your computer, it’s recommended to uninstall the device from the “**Device Manager**”. This removes unused hardware information from the database (registry) of Windows.

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## 3.5 Linux

This section describes VXC Card Linux driver's features and how to compile and install into a general Linux system (Linux kernel 2.4.X or 2.6.X). The VXC Card Linux driver is modified from Linux kernel source and supports most of popular PC-based Linux distributions.

### 3.5.1 Driver Features

- Device file.
- Dynamic device allocation.
- Dynamic major number.
- One major number for multiple devices.
- Use the GNU configure and build system.

### 3.5.2 Installation

Please refer to the following steps to complete it.

1. Download or copy the **ixCOM** package to a directory that you have access to.
2. Extract the package. For example, the package's file name is "**ixcom-0.8.1.tar.gz**" and its path related to your current working directory is `../pkg`, then the extraction command would be

```
#tar -zxvf ../pkg/ixcom-0.8.1.tar.gz
```

An `ixcom-0.8.1` directory is created after extraction.

3. For convenient access, it is a good idea to put a symbol-link on it.

```
#ln -s ixcom-0.8.1 ixcom
```

4. Change to the **ixcom** working directory you just made, type

```
#!/configure to create proper Makefiles.
```

---

5. Once the configuring has done successfully, type “**make**” to build all.

**Note:** If you like to install files to system directory, the make install will do it for you. However, install files to system directory is not necessary for further operation. You will need the root privilege for that.

Script “**/ixcom.inst**” loads modules automatically. Script “**/ixcom.remove**” removes the loaded modules. The root privilege is required when installing or removing these kernel modules.

### 3.5.3 Access To VXC Serial Port

Script “**ixcom.inst**” will establish unused device major number dynamically and create correspond device node for access VXC serial port.

```
# ./ixcom.inst
IxCOM Installer 0.5.0
Check kernel version... 2.6
Use proc-file /proc/icpdas/ixcom
Load module ixcom
```

Use “**dmesg**” command to inspect the driver output message.

```
dmesg
.....
.....
ICPDAS VXC multi-serial card Serial driver version ixcom-0.8.1 (2007-08-21)
Found ICPDAS VXC-114U series board(BusNo=0,DevNo=20)
PCI: Found IRQ 11 for device 0000:00:14.0
PCI: Sharing IRQ 11 with 0000:00:07.2
PCI: Sharing IRQ 11 with 0000:00:14.1
ttySV0 at port cc00 (irq = 11) is a 16C950/954
ttySV1 at port d000 (irq = 11) is a 16C950/954
ttySV2 at port d400 (irq = 11) is a 16C950/954
ttySV3 at port d800 (irq = 11) is a 16C950/954
```

---

The script “**ixcom.inst**” had loaded module into kernel and find a VXC card that have four serial port, ttySV0, ttySV1, ttySV2 and ttySV3.

The “**ixcom.inst**” script will use major number 254 to create correspond device on the /dev.

```
# ls -la /dev/ttySV?  
crw-rw-rw- 1 root root 254, 64 Jul 14 10:13 /dev/ttySV0  
crw-rw-rw- 1 root root 254, 65 Jul 14 10:13 /dev/ttySV1  
crw-rw-rw- 1 root root 254, 66 Jul 14 10:13 /dev/ttySV2  
crw-rw-rw- 1 root root 254, 67 Jul 14 10:13 /dev/ttySV3  
crw-rw-rw- 1 root root 254, 68 Jul 14 10:13 /dev/ttySV4  
crw-rw-rw- 1 root root 254, 69 Jul 14 10:13 /dev/ttySV5  
crw-rw-rw- 1 root root 254, 70 Jul 14 10:13 /dev/ttySV6  
crw-rw-rw- 1 root root 254, 71 Jul 14 10:13 /dev/ttySV7  
crw-rw-rw- 1 root root 254, 72 Jul 14 10:13 /dev/ttySV8  
crw-rw-rw- 1 root root 254, 73 Jul 14 10:13 /dev/ttySV9
```

To remove VXC driver from system use script “**./ixcom.remove**” to removes the loaded modules.

---

## 4. Programming Reference

### 4.1 PCI Hardware IDs

Card	Vendor ID	Device ID	Sub-Vendor ID	Sub-Device ID
<b>VXC-114U</b>	<b>0x1415</b>	<b>0x9504</b>	<b>0x1441</b>	<b>0x0090</b>
Extension for VXC-114U	0x1415	0x9511	0x1441	0x0000
<b>VXC-144U</b> <b>VXC-144iU</b>	<b>0x1415</b>	<b>0x9504</b>	<b>0x1440</b>	<b>0x0090</b>
Extension for VXC-144U/144iU	0x1415	0x9511	0x1440	0x0000

### 4.2 I/O Address Mapping

The I/O address of the VXC series card is automatically assigned by the main-board ROM BIOS. The VXC-114U and VXC-144U/144iU cards using two PCI functions as followings:

Base Address Register	Function 0	Function 1
<b>BAR0</b>	<b>UART0</b> (I/O Mapped)	Local Bus (I/O Mapped)
<b>BAR1</b>	<b>UART1</b> (I/O Mapped)	Local Bus (Memory Mapped)
<b>BAR2</b>	<b>UART2</b> (I/O Mapped)	Reserved
<b>BAR3</b>	<b>UART3</b> (I/O Mapped)	Reserved
<b>BAR4</b>	Local Configuration Registers (I/O Mapped)	Reserved
<b>BAR5</b>	UARTs / Local Configuration Registers (Memory Mapped)	Reserved

**Note:** Please contact us for more information about I/O Address Mapping.

## 4.3 UART Register

Register Name	Address	R/W	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	
THR <sup>1</sup>	000	W	Data to be transmitted								
RHR <sup>1</sup>	000	R	Data received								
IER <sup>1,2</sup> 650/950 Mode  550/750 Mode	001	R/W	CTS interrupt mask	RTS interrupt mask	Special Char. Detect	Sleep mode	Modem interrupt mask	Rx Stat interrupt mask	THRE interrupt mask	RxRDY interrupt mask	
			Unused		Alternate sleep mode						
FCR <sup>3</sup> 650 mode 750 mode 950 mode	010	W	RHR Trigger Level		THR Trigger Level		Tx Trigger Enable	Flush THR	Flush RHR	Enable FIFO	
			RHR Trigger Level		FIFO Size	Unused					
			Unused								
ISR <sup>3</sup>	010	R	FIFOs enabled		Interrupt priority (Enhanced mode)		Interrupt priority (All modes)			Interrupt pending	
LCR <sup>4</sup>	011	R/W	Divisor latch access	Tx break	Force parity	Odd / even parity	Parity enable	Number of stop bits	Data length		
MCR <sup>3,4</sup> 550/750 Mode  650/950 Mode	100	R/W	Unused		CTS & RTS Flow Control	Enable Internal Loop Back	OUT2 (Int En)	OUT1	RTS	DTR	
			Baud prescale	IrDA mode	XON-Any						
LSR <sup>3,5</sup> Normal 9-bit data mode	101	R	Data Error	Tx Empty	THR Empty	Rx Break	Framing Error	Parity Error  9 <sup>th</sup> Rx data bit	Overrun Error	RxRDY	
MSR <sup>3</sup>	110	R	DCD	RI	DSR	CTS	Delta DCD	Trailing RI edge	Delta DSR	Delta CTS	
SPR <sup>3</sup> Normal 9-bit data mode	111	R/W	Temporary data storage register and Indexed control register offset value bits								
			Unused								9 <sup>th</sup> Tx data bit
Additional Standard Registers – These registers require divisor latch access bit (LCR[7]) to be set to 1.											
DLL	000	R/W	Divisor latch bits [7:0] (Least significant byte)								
DLM	001	R/W	Divisor latch bits [15:8] (Most significant byte)								

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## 4.4 Programmable Baud Rate

**Baud Rates Using a 14.7456-MHz Crystal (VXC-114U, VXC-144U/144iU)**

DESIRED BAUD RATE	DIVISOR USED TO GENERATE 16x CLOCK	PERCENT (%) ERROR
50	18432	
75	12288	
110	8376	0.026
150	6144	
300	3072	
600	1536	
1200	768	
2400	384	
4800	192	
9600	96	
14400	64	
19200	48	
23040	40	
28800	32	
38400	24	
56000	16	2.86
57600	16	
115200	8	
184320	5	
230400	4	
307200	3	
460800	2	

**Warning:** The baud rates higher than 115,200 bps are not guaranteed to work.

---

**To generate baud rate 125,000 bps:**

$$125,000 * 16 * 8 = 16,000,000 = 16\text{MHz crystal}$$

So, when you use a 16MHz crystal and selecting the baud rate 115,200 bps in your software setting, the hardware will generate baud rate 125kbps actually.

**Warning:** The baud rates higher than 115,200 bps are not guaranteed to work.

**To generate baud rate 250,000 bps:**

$$250,000 * 16 * 4 = 16,000,000 = 16\text{MHz crystal}$$

$$(\text{Baud rate} * 16x \text{ clock} * \text{Divisor} = \text{Crystal Clock Frequency})$$

Thus, when you use a 16MHz crystal and selecting the baud rate 230,400 bps in your software setting, the hardware will generate baud rate 250kbps actually.

**Note:** The multi-port serial cards can have a special baud rate in OEM version. Please contact us for more information regarding the OEM products.