

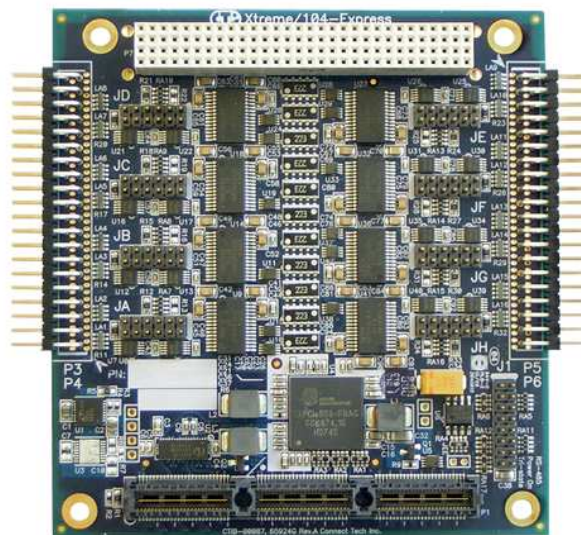


**Connect Tech Inc.**  
*Industrial Strength Communications*

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# Xtreme/104-Express

## User Manual



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## Table of Contents

Limited Lifetime Warranty.....	2
Copyright Notice .....	2
Trademark Acknowledgment .....	2
Table of Contents .....	3
Customer Support Overview .....	5
Contact Information.....	5
Introduction .....	6
Features .....	6
Xtreme/104-Express Board Diagram .....	7
Xtreme/104-Express Installation Overview .....	8
Hardware Configuration .....	8
Interrupts and Memory Address Selection .....	8
Electrical Interfaces .....	8
RS-232 Electrical Interface .....	8
RS-422/485 Electrical Interface .....	8
Full Duplex Mode.....	8
Half Duplex Mode .....	9
Multi-drop Mode.....	9
Line Bias/Termination .....	9
Jumper Block Settings.....	9
Tri-state Operation.....	11
Connectors/Pinouts.....	12
Hardware Installation .....	14
Installing the Xtreme/104-Express into your system.....	14
Software/Driver Installation .....	15
Windows Installation.....	15
Port Settings .....	24
COM Port Number.....	24
FIFOs.....	24
FIFOs.....	25
Receive and Transmit FIFO Settings .....	25
Specifications .....	26
Operating Environment .....	26
Communications.....	26
Baud Rates.....	26
UARTs.....	26
Dimensions.....	26

**List of Figures**

Figure 1: Xtreme/104-Express Hardware Components..... 7  
Figure 2: Jumper Block Diagrams..... 9  
Figure 3: Example port configuration jumper block settings ..... 10  
Figure 4: RS-422/485 Wiring Diagram ..... 13

**List of Tables**

Table 1: I/O Signal Assignments for Xtreme/104-Express ..... 12  
Table 2: DB-9 Male Pinouts ..... 13

## Customer Support Overview

If you experience difficulties after reading the manual and/or using the product, contact the Connect Tech reseller from which you purchased the product. In most cases the reseller can help you with product installation and difficulties.

In the event that the reseller is unable to resolve your problem, our highly qualified support staff can assist you. Our support section is available 24 hours a day, 7 days a week on our website at: [www.connecttech.com/sub/support/support.asp](http://www.connecttech.com/sub/support/support.asp). See the contact information section below for more information on how to contact us directly. Our technical support is always free.

## Contact Information

We offer three ways for you to contact us:

### Mail/Courier

You may contact us by letter at:

Connect Tech Inc.  
Technical Support  
42 Arrow Road  
Guelph, Ontario  
Canada N1K 1S6

### Email/Internet

You may contact us through the Internet. Our email and URL addresses on the Internet are:

[sales@connecttech.com](mailto:sales@connecttech.com)  
[support@connecttech.com](mailto:support@connecttech.com)  
[www.connecttech.com](http://www.connecttech.com)

#### Note:

Please go to the [Download Zone](#) or the [Knowledge Database](#) in the [Support Center](#) on the Connect Tech website for product manuals, installation guides, device driver software and technical tips.

Submit your technical support questions to our customer support engineers via the [Support Center](#) on the Connect Tech website.

### Telephone/Facsimile

Technical Support representatives are ready to answer your call Monday through Friday, from 8:30 a.m. to 5:00 p.m. Eastern Standard Time. Our numbers for calls are:

Telephone: 800-426-8979 (North America only)  
Telephone: 519-836-1291 (Live assistance available 8:30 a.m. to 5:00 p.m. EST, Monday to Friday)  
Facsimile: 519-836-4878 (on-line 24 hours)

## Introduction

Connect Tech's Xtreme/104-Express multi-port serial boards provide a fully compliant PCI/104-Express communications solution for industrial and embedded needs.

Xtreme/104-Express features a built-in baud rate prescaler to allow almost any non-standard baud rate to be matched with a high level of accuracy. The onboard fail-safe 1/8th load transceivers allow up to 256 devices on a multi-drop RS-485 bus. Filtering on all ports help improve immunity to EMI and noisy transmission lines for guaranteed dependability in communications.

The Xtreme/104-Express is perfect for military, aerospace, medical, instrumentation and industrial control applications, among others. Full industrial temperature range (-40°C to 85°C) operation is standard.

### **Features**

- Eight hardware switchable RS-232/422/485 ports
- Fully PCI/104-Express compliant
- 9-bit data support allows for command/data addressing in RS-485 networks
- Supports RS-485 full duplex (four wire) with RTS/CTS flow control, half duplex (two wire) with auto TxD echo cancellation and multi-drop (four wire) communication modes
- Data communication speeds up to 15.625 Mbps in RS-422/485
- Each port is individually hardware selectable for tri-state on power-up in RS-485 mode
- 1/8 load RS-485 transceivers allow up to 256 devices on a bus
- Industrial temperature range of -40°C to 85°C
- Filtering on all ports to improve immunity to EMI and noisy transmission lines
- Plug and play - no jumpers to set for memory or interrupt configuration

# Xtreme/104-Express Board Diagram

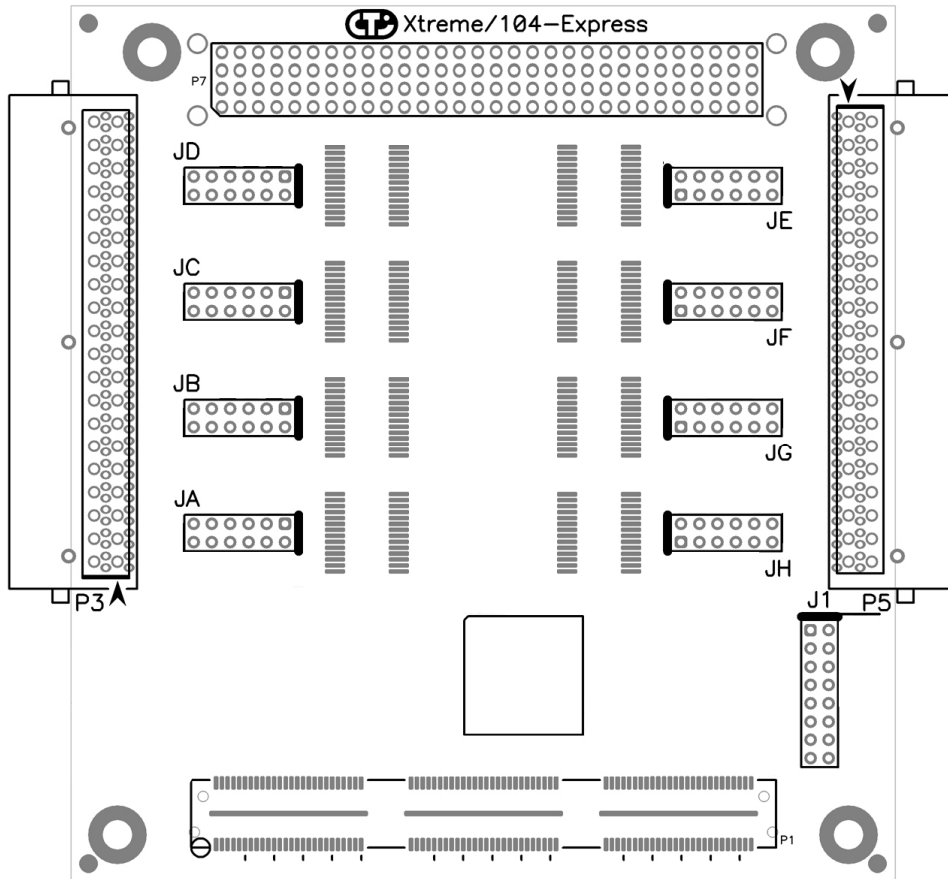


Figure 1: Xtreme/104-Express Hardware Components

## Xtreme/104-Express Installation Overview

Before you begin, take a moment to ensure your package includes the components that ship with your product. These components should include:

One Xtreme/104-Express adapter  
One CD containing software and documentation  
DB-9 male fan-out cables (optional)

If any of these components are missing, contact [Connect Tech](#) or your reseller.

There are three stages to installing your Xtreme/104-Express:

1. [Hardware Configuration](#)  
Interrupts and memory selection will be set by the host computer's BIOS and operating system. This section outlines jumper settings and configuration.
2. [Hardware Installation](#)  
Installation involves the physical installation of the Xtreme/104-Express into your computer. Please note that you should configure any jumper settings prior to installing the board.
3. [Software/Driver Installation](#)  
Load the appropriate driver for your operating system, as found on the accompanying CD. Installation guides are also available on the CD to aid you in this process.

## Hardware Configuration

### ***Interrupts and Memory Address Selection***

The Xtreme/104-Express board is a PCI/104-Express card, so the host computer's BIOS will automatically set interrupts and memory addresses when you power up the system. Depending on the operating system you are using, the operating system may opt to re-configure the devices.

## Electrical Interfaces

### ***RS-232 Electrical Interface***

This is the default setting for the selectable interface of the Xtreme/104-Express. To operate a port in RS-232 mode, no jumpers are installed on the corresponding jumper block.

### ***RS-422/485 Electrical Interface***

Xtreme/104-Express models offer three modes of RS-422/485 communication, as outlined below. (See [Figure 2](#) to see examples of jumper settings.)

#### ***Full Duplex Mode***

In this mode, TxD+/- is being driven to a known level all the time. This mode is typically used in point-to-point situations much like RS-232. It is the default setting for RS-422/485 mode.

**Half Duplex Mode**

In this mode the TxD+/- line driver is enabled only when data is transmitted and RxD+/- is disabled when data is being transmitted. This mode is typically used in either point-to-point 2-wire connections OR in multi-drop 2-wire bus connections. This mode requires software setup in **Control Panel – System – Hardware – Device Manager – Ports – CTI Xtreme/104 PCI Express UART Serial Port**.

**Multi-drop Mode**

In this mode the TxD+/- line driver is enabled only when data is transmitted and RxD+/- is enabled all the time. This mode is typically used in multi-drop 4-wire connections. This mode requires software setup in **Control Panel – System Properties – Hardware – Device Manager – Ports – CTI Xtreme/104 PCI Express UART Serial Port**.

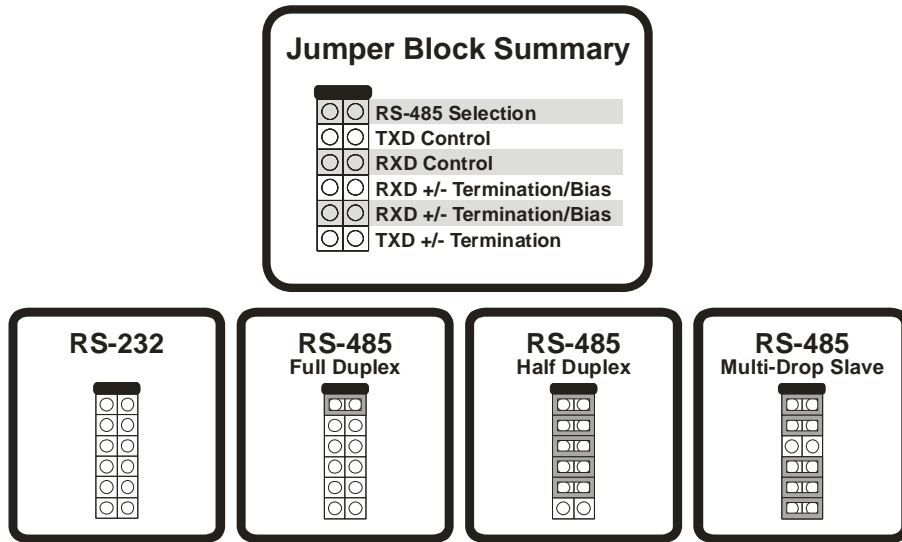
**Line Bias/Termination**

The RS-422/485 transceivers can be configured to terminate and produce a line level mark condition on the receiver, and/or terminate the transmitter. These options are enabled through on-board jumper selectable resistors. These options are typically used in multi-drop 4-wire or half duplex 2-wire connections.

**Jumper Block Settings**

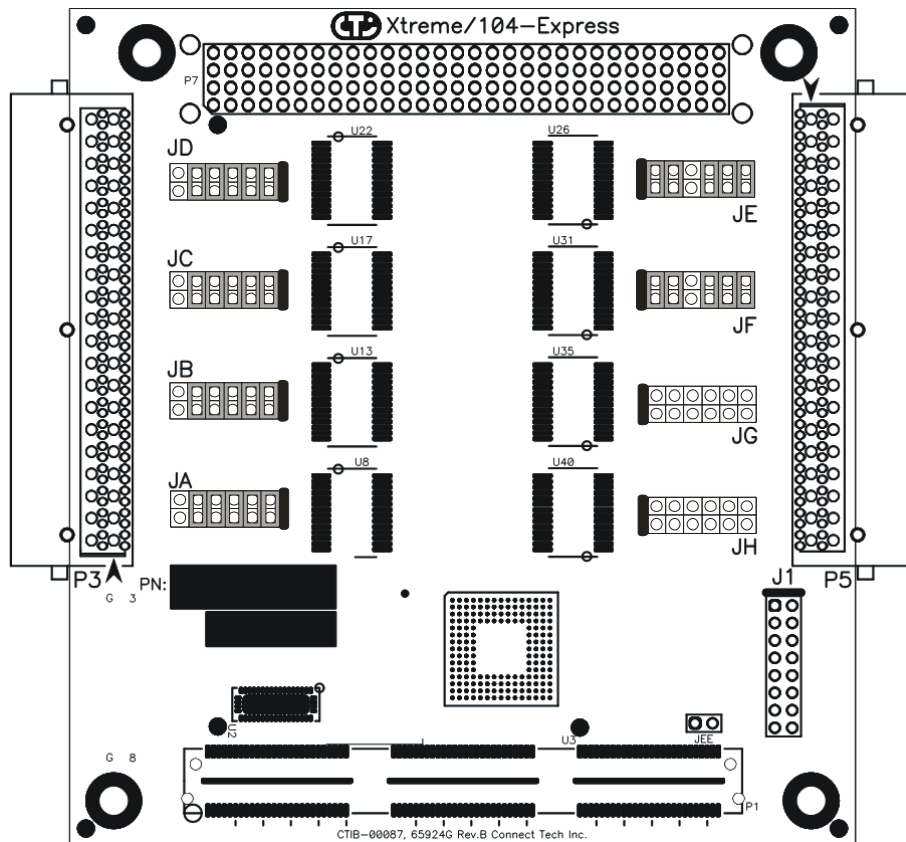
The following jumper block diagram depicts typical settings on an interface-selectable Xtreme/104-Express. (See [Figure 1](#) for location of jumper blocks.)

*Figure 2: Jumper Block Diagrams*



**NOTE:** You must configure your jumper block settings before installing the Xtreme/104-Express into your system.

Figure 3: Example port configuration jumper block settings



NOTE: The example above illustrates the following:  
 Ports 1, 2, 3 and 4 are configured for RS-485 Half-Duplex  
 Ports 5 and 6 are configured for RS-485 Multi-Drop Slave  
 Ports 7 and 8 are configured for RS-232

**RS-485 Selection:** Install this jumper to configure a port for RS-422/485 mode. If the jumper is not installed, the port will function in RS-232 mode. All jumpers should be removed from any port operating in RS-232 mode.

**TxD Control:** Install this jumper to enable the RS-485 transmitter only when sending data. This mode is useful for half-duplex operation when only one device is allowed to send data at a time. If the jumper is not installed, the transmitter will always drive the line to an idle state when not sending data.

**RxD Control:** Install this jumper to enable the RS-485 receiver only when NOT transmitting data. This is useful for half-duplex operation to prevent the transmitting device from receiving the data it has sent. If this jumper is not installed, the receiver is always enabled and ready to receive data.

**RxD ± Termination/Bias:** Install this pair of jumpers to enable a 120 Ohm terminator across the RxD+ and RxD- pins for the corresponding port. A biasing network is also enabled that drives the receiver to an inactive or safe mode. The receiver can still receive data from another device and the biasing helps to prevent the reception of data generated by noise on the transmission line, or a disconnected line. The two jumpers for RxD termination/bias must be installed and removed as a pair.

**TxD ± Termination:** Install this jumper to enable a 120 Ohm resistor across the TxD+ and TxD- pins of the corresponding port.

[Half Duplex](#) and [Multi-drop](#) modes require you to select the appropriate mode via software, appropriate wiring and the proper jumper block settings. Please refer to the wiring recommendations ([Figure 4](#)) and the `readme.txt` files found in the appropriate directories on the CD.

### ***Tri-state Operation***

Xtreme/104-Express models offer a power-on tri-state option to ensure glitch-free network operation while the system is powering up. If enabled, the Xtreme/104-Express will tri-state the transmitter until the driver opens the port. This operation is configurable for any port configured as RS-485, regardless of the RS-485 mode selected.

Jumper J1 controls the power-on tri-state functionality. Install a jumper on the first location of the J1 in order to tri-state Port 1 at power-on. Install a jumper on the second position for Port 2, etc. The ports will not come out of tri-state until the operating system driver begins transmitting on the associated port.

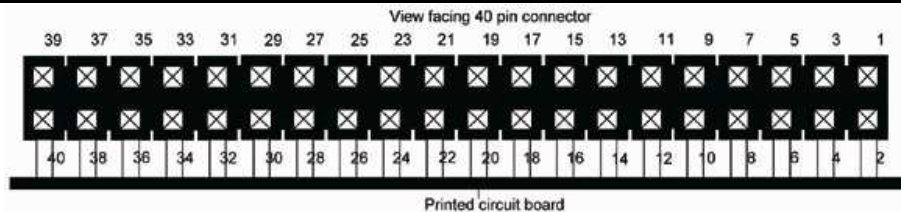
Installing a jumper on J1 will have no effect on ports configured in RS-232 mode.

## Connectors/Pinouts

**Table 1: I/O Signal Assignments for Xtreme/104-Express**

P3 contains the signals for ports 1-4, and P5 contains the signals for ports 5-8.

Header Port No.	Pin No.	RS-232	Direction	RS-422/485	Direction
1 or 5	1	DCD	Input	RxD+	Input
	2	DSR	Input	CTS-	Input
	3	RxD	Input	RxD-	Input
	4	RTS	Output	RTS+	Output
	5	TxD	Output	TxD+	Output
	6	CTS	Input	CTS+	Input
	7	DTR	Output	TxD-	Output
	8	RI	Input	RTS-	Output
	9	SG	Signal Ground	SR	Signal Reference
	10	N/C	No Connection	N/C	No Connection
2 or 6	11	DCD	Input	RxD+	Input
	12	DSR	Input	CTS-	Input
	13	RxD	Input	RxD-	Input
	14	RTS	Output	RTS+	Output
	15	TxD	Output	TxD+	Output
	16	CTS	Input	CTS+	Input
	17	DTR	Output	TxD-	Output
	18	RI	Input	RTS-	Output
	19	SG	Signal Ground	SR	Signal Reference
	20	N/C	No Connection	N/C	No Connection
3 or 7	21	DCD	Input	RxD+	Input
	22	DSR	Input	CTS-	Input
	23	RxD	Input	RxD-	Input
	24	RTS	Output	RTS+	Output
	25	TxD	Output	TxD+	Output
	26	CTS	Input	CTS+	Input
	27	DTR	Output	TxD-	Output
	28	RI	Input	RTS-	Output
	29	SG	Signal Ground	SR	Signal Reference
	30	N/C	No Connection	N/C	No Connection
4 or 8	31	DCD	Input	RxD+	Input
	32	DSR	Input	CTS-	Input
	33	RxD	Input	RxD-	Input
	34	RTS	Output	RTS+	Output
	35	TxD	Output	TxD+	Output
	36	CTS	Input	CTS+	Input
	37	DTR	Output	TxD-	Output
	38	RI	Input	RTS-	Output
	39	SG	Signal Ground	SR	Signal Reference
	40	N/C	No Connection	N/C	No Connection



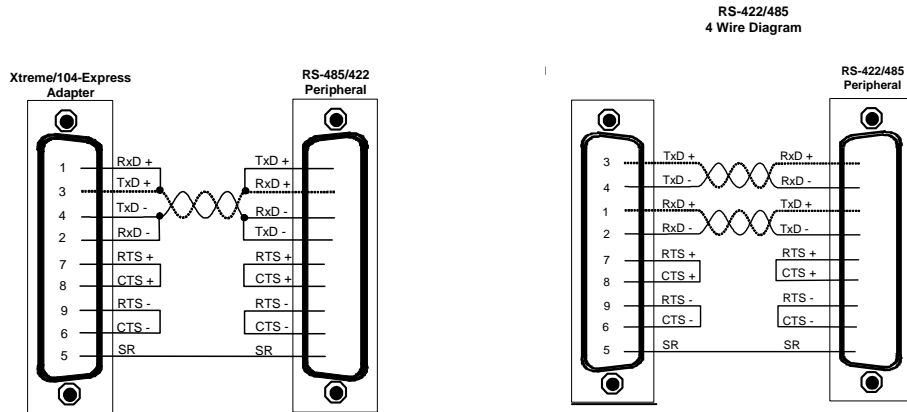
Cable CAG08104 will send signals to eight DB-9 male connectors. See [Table 2](#) for DB-9 pinouts

Table 2: DB-9 Male Pinouts

Pin #	RS-232		RS-422/485	
	Signal	Direction	Signal	Direction
1	DCD	Input	RxD+	Input
2	RxD	Input	RxD-	Input
3	TxD	Output	TxD+	Output
4	DTR	Output	TxD-	Output
5	SG	Signal Ground	SR	Signal Reference
6	DSR	Input	CTS-	Input
7	RTS	Output	RTS+	Output
8	CTS	Input	CTS+	Input
9	RI	Input	RTS-	Output

DB-9 Male

Figure 4: RS-422/485 Wiring Diagram



## Hardware Installation

### Installing the Xtreme/104-Express into your system

1. Turn off the power to your PCI/104-Express system and open any relevant enclosure to gain access to the stack (consult your system's documentation for more information on this procedure).
2. Mount the Xtreme/104-Express into an available PCI Express slot.

**NOTE:** Ensure that all PCI/104-Express cards are within 6 cards from the CPU and are stacked closest to the CPU. PCI/104-Express cards must stack in only one direction, either on top of or below the CPU, and there must be no more than six PCI/104-Express cards installed in a given stack without specialized extender circuitry.

The Xtreme/104-Express provides support for Windows 2000/XP/XP x64/XPe/Server 2003/Server 2003 x64 and Vista. Please refer to the **readme.txt** files found in the appropriate directories on the CD containing drivers and documentation. These files contain technical tips or release notes concerning installation and configuration of the device driver. For further information concerning software installation of Xtreme/104-Express products please visit the Connect Tech website at [www.connecttech.com](http://www.connecttech.com).

If you are interested in a device driver for an operating system not listed, please contact the [Connect Tech Sales Department](#). Also, visit the [Download Zone](#) of the [Support Center](#) on the Connect Tech website for the latest product manuals, installation guides, diagnostic utilities and device driver software.

## Software/Driver Installation

### Windows Installation

The following instructions outline how to install the Xtreme/104-Express to a computer running Windows XP. For other operating system installations, consult the **readme.txt** and Installation Guides available on the CD shipped with your board(s).

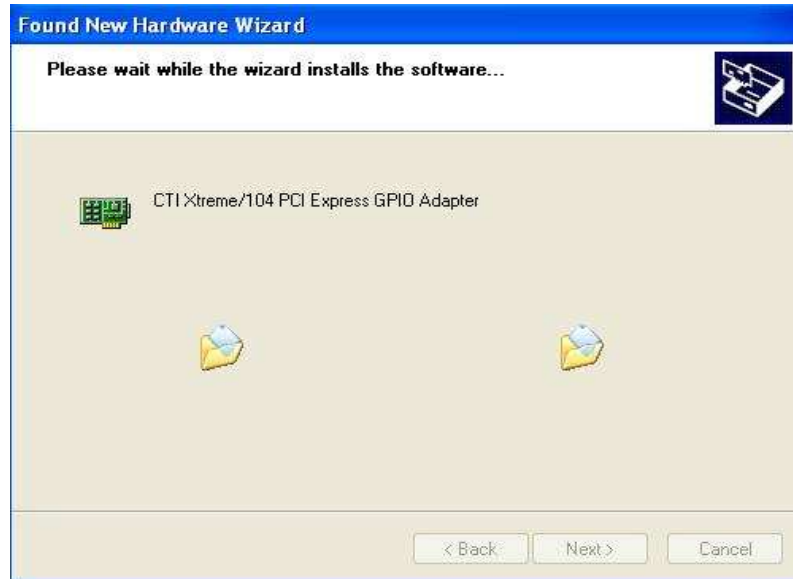
1. After inserting the Xtreme/104-Express into your system's PCI Express slot, turn on your system. A **Found New Hardware Wizard** will appear. Insert the Xtreme/104-Express CD into your drive as requested. Select **Install from a list or specific location (Advanced)**. Select **Next**.



2. Choose **Select removable media (floppy, CD-ROM)** and **Include this location in the search** and type **D:\Drivers\Win2K-XP**, where D is the drive letter of your CD ROM. Now select **Next**.



3. Once you have clicked **Next** , the **Found New Hardware Wizard** will begin to install the software.



4. Next a window will appear indicating that the software for Xtreme/104-Express has not passed Windows logo testing. Select **Continue Anyway**.



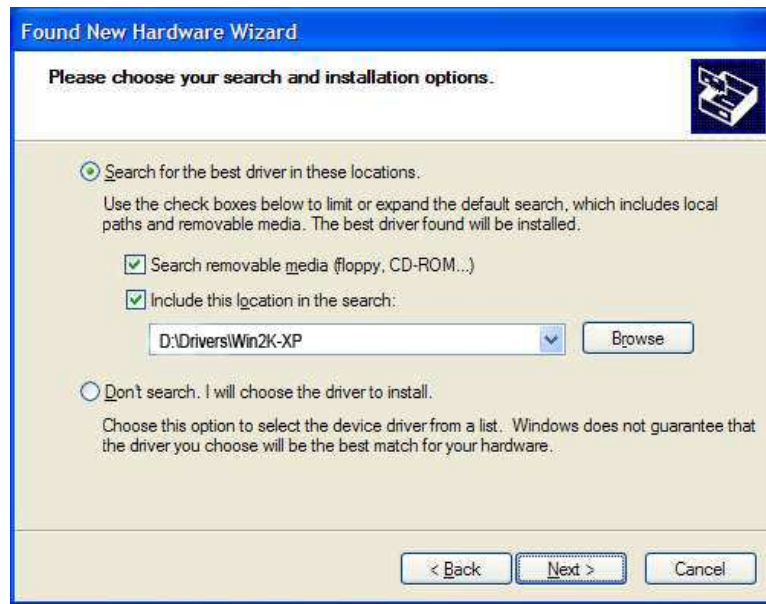
5. CTI Xtreme/104 PCI Express GPIO Adapter installation is complete. Select **Finish**.



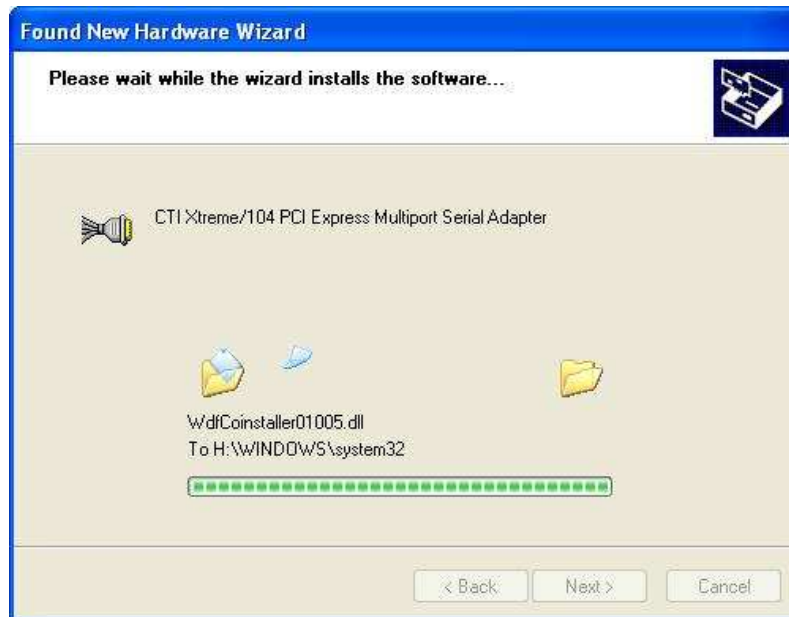
6. Once the software for the CTI Xtreme/104 PCI Express GPIO Adapter has been installed, a window will appear to begin the installation for the PCI Serial Port. Select **Install from a list or specific location (Advanced)**. Select **Next**.



7. Choose **Select removable media (floppy, CD-ROM)** and **Include this location in the search** and type **D:\DriversWin2K-XP**, where D is the drive letter of your CD ROM. Now select **Next**.



8. Once you have clicked **Next**, the **Found New Hardware Wizard** will begin to install the software.



- Next a window will appear indicating that the software for Xtreme/104-Express has not passed Windows logo testing. Select **Continue Anyway**.



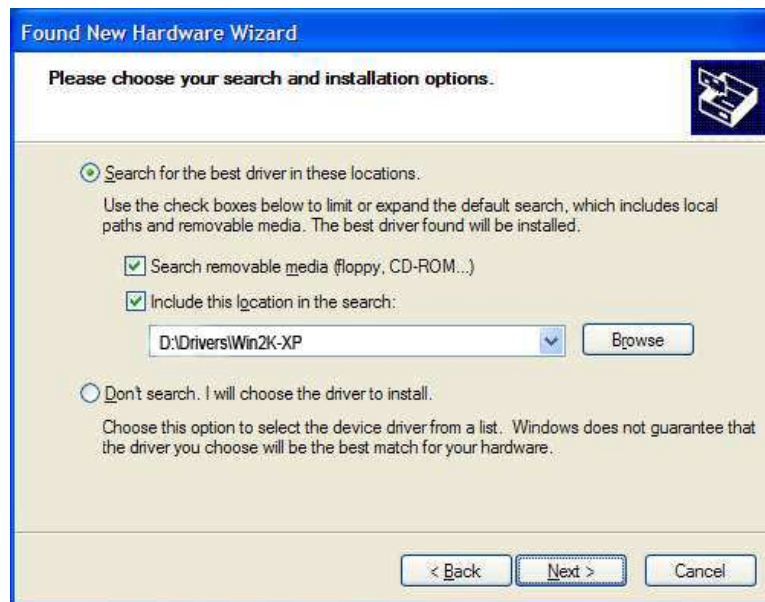
- CTI Xtreme/104 PCI Express Multiport Serial Adapter installation is complete. Select **Finish**.



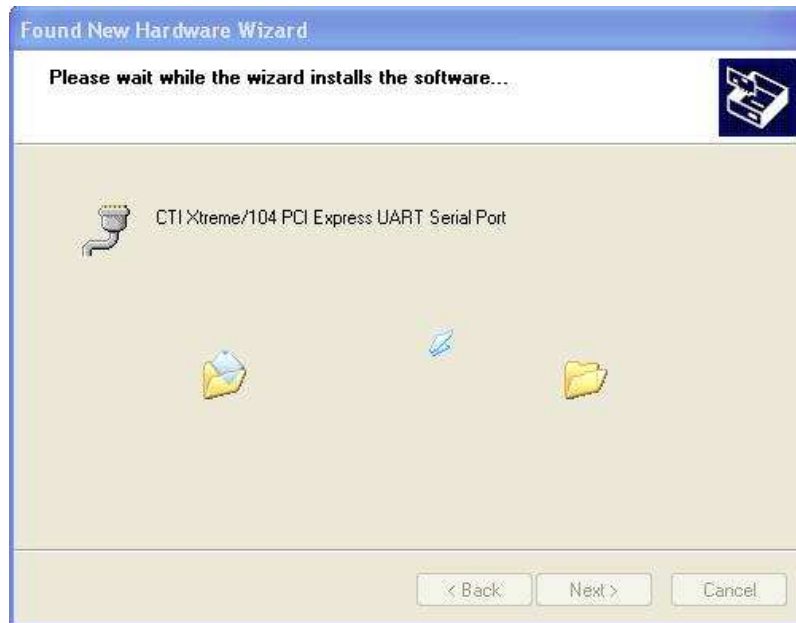
11. Once the software for the CTI Xtreme/104 PCI Express Multiport Serial Adapter has been installed, a window will appear to begin the installation for the Xtreme/104 PCI Express UART Serial Port. Select **Install from a list or specific location (Advanced)**. Select **Next**.



12. Choose **Select removable media (floppy, CD-ROM)** and **Include this location in the search** and type **D:\Drivers\Win2K-XP**, where D is the drive letter of your CD ROM. Now select **Next**.



- Once you have clicked **Next**, the **Found New Hardware Wizard** will begin to install the software.



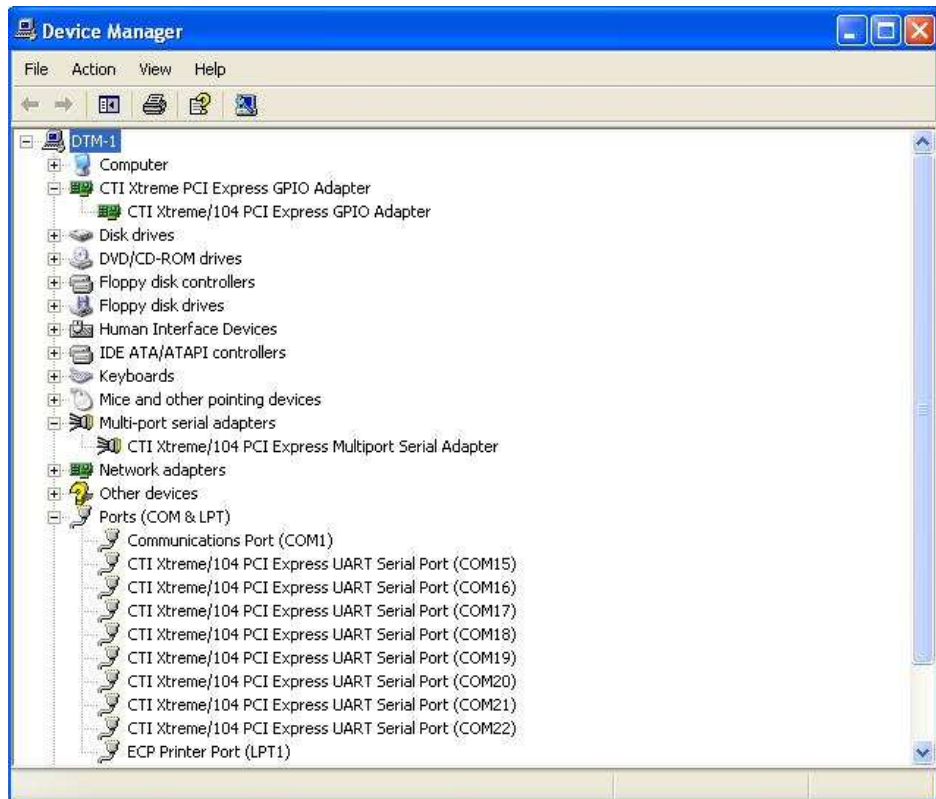
- Next a window will appear indicating that the software for Xtreme/104-Express has not passed Windows logo testing. Select **Continue Anyway**.



15. CTI Xtreme/104 PCI Express UART Serial Port installation is complete. Select **Finish**.



16. Verify the presence of the Xtreme/104-Express serial ports in your system by going to **Start – Control Panel – System – Hardware – Device Manager**. You should see **CTI Xtreme/104 PCI Express GPIO Adapter, Xtreme/104 PCI Express Multiport Serial Adapter, and Ports**.



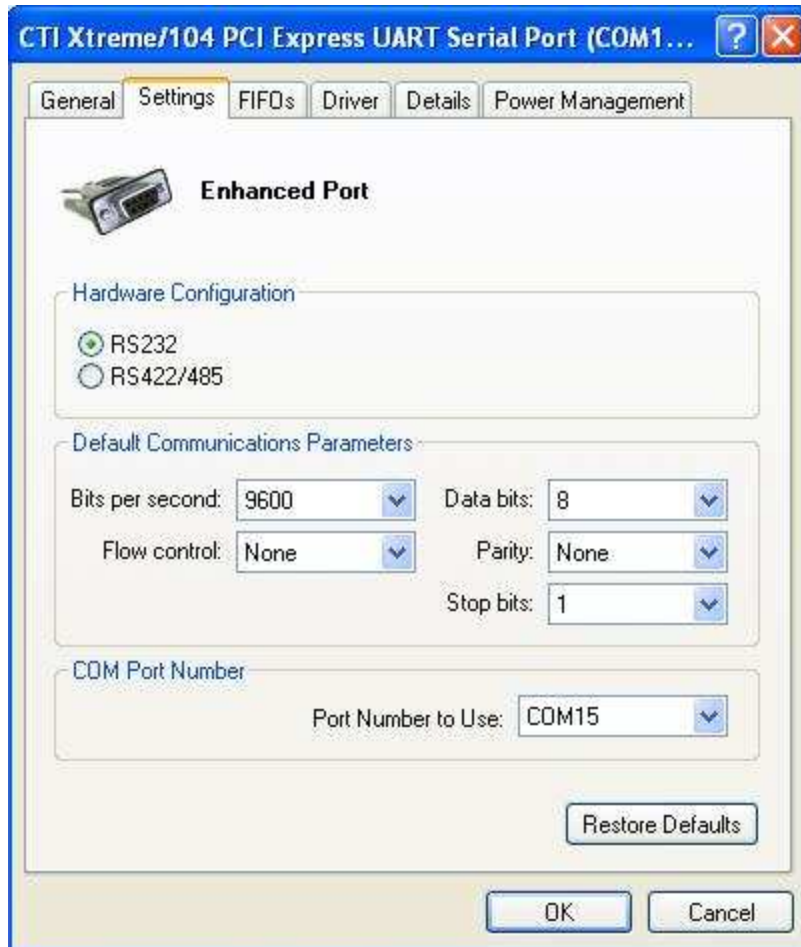
17. Double click on CTI Xtreme/104 PCI Express GPIO Adapter. Click on the General tab to see that your device is working properly.



**NOTE:** The Windows driver provided with your Xtreme/104-Express unit has not been signed by Microsoft. If you require a signed driver, please contact [Connect Tech](#).

## Port Settings

You can now access individual port settings such as baud rate, data bits, parity, stop bits and flow control by choosing the appropriate CTI Xtreme/104 PCI Express UART Serial Port under **Settings** in the **Device Manager**.



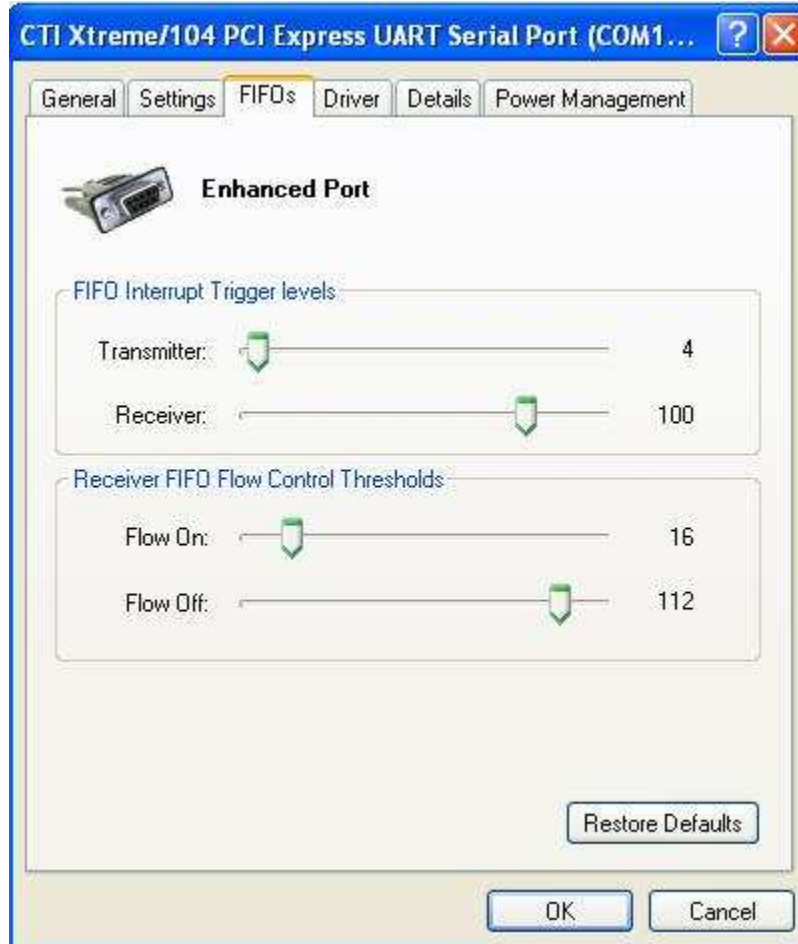
### COM Port Number

The driver supports the ability to change COM port names, which is also referred to as COM port mapping. For example specifying COM5 would set the COM name for the port selected to COM5.

**NOTE:** Ensure the COM name selected is not already in use or the port may not respond properly.

## FIFOs

Choosing the **FIFOs** tab, located at **Start – Control Panel – System – Hardware – Device Manager - Ports** will allow you to select the settings for the FIFO buffers.



### *Receive and Transmit FIFO Settings*

These sliders adjust the size of UART FIFO levels used by the CTI Xtreme/104 PCI Express UART serial ports. You obtain more buffering the further you move the slider to the right. This results in higher throughput and lower load on the system. Note that high buffer levels can cause communication problems with some applications.

## Specifications

### **Operating Environment**

- Storage temperature: -40° C to 105° C
- Operating temperature: -40° C to 85° C
- Relative humidity: 95% non-condensing
- Air movement: no requirement

### **Communications**

#### ***Baud Rates***

- **RS-232:** up to 1.000 Mbps
- **RS-422/485:** up to 15.625 Mbps

*Custom baud rates are also available. The onboard fractional baud rate divisor will match almost any custom baud rate..*

#### ***UARTs***

- One octal PCI Express UART with up to 128 byte transmit and receive FIFO buffers

### **Dimensions**

Fully PCI/104-Express compliant

- Length: 9.017 cm, 3.550 inches
- Height: 9.5885 cm, 3.775 inches