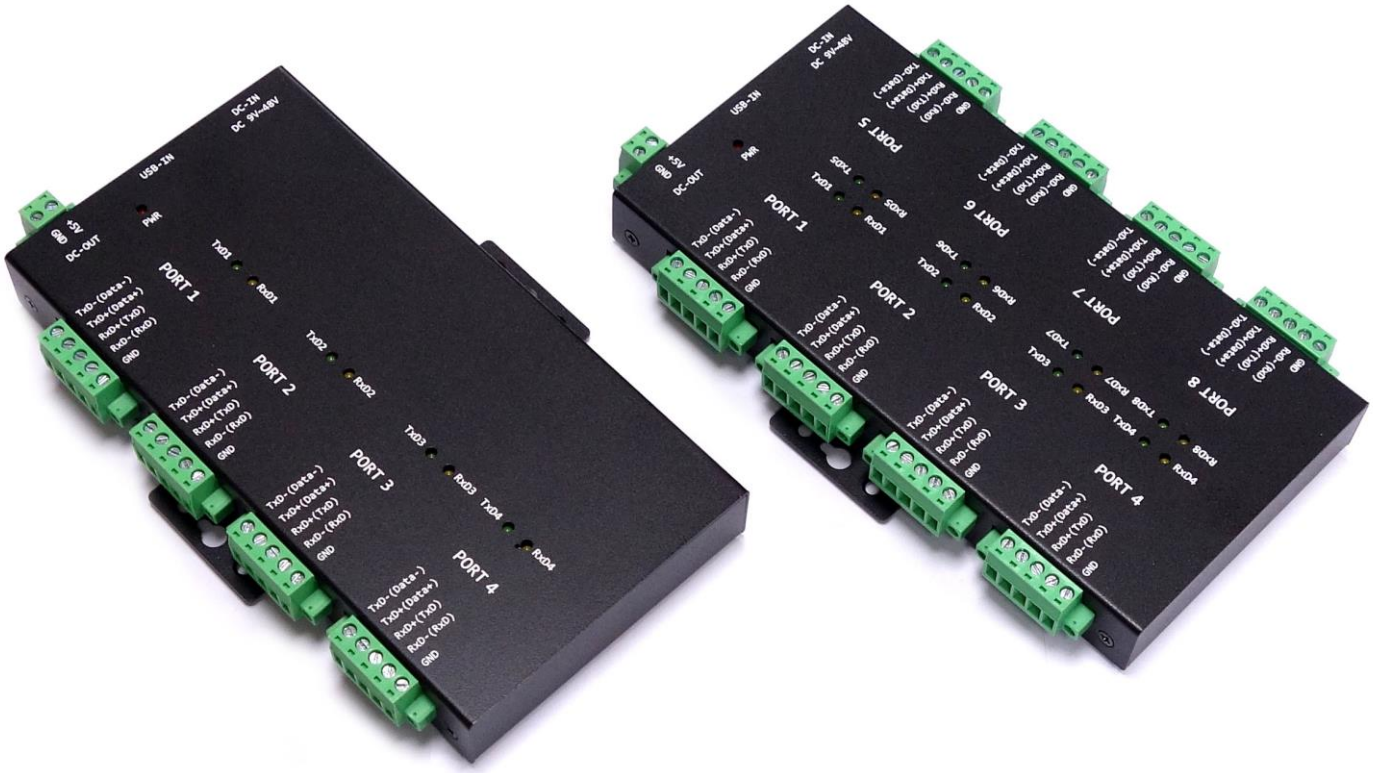
TITAN

USB 2.0 to Industrial 4/8-Port RS-232/422/485 Adapters User Guide



USB 2.0 to Industrial 4/8-Port RS-232/422/485 Adapters User Guide

Content

Introduction & Features

Introduction USB 2.0 to Industrial Quad/Octal Serial Adapters

The USB2-4COMi-TB, USB2-4COMi-SI-TB, USB2-8COMi-TB, and USB2-8COMi-SI-TB USB 2.0 to Quad and Octal industrial serial adapters are designed to make serial RS-422 and RS-485 port expansion quick and simple. Connecting to a USB port on your computer or USB hub, the USB to industrial serial adapter instantly adds four or eight RS-232/422/485 multi-electrical interface serial communication ports to your system. By taking advantage of the plug-and-play and hot-plug features of the USB bus, the USB2-xCOMi-TB industrial serial adapters make it easier than ever to add 4 or 8 industrial communication ports to your system.

Plugging the USB quad/octal industrial serial adapters to the USB port, the adapters are automatically detected and installed. There are no IRQ & COM port conflicts, since the port doesn't require any additional IRQ, DMA, memory as resources on the system. The RS-232 or RS-422/485 port functions as native Windows COM port, and it is compatible with Windows serial communication applications. Each port is individually configurable. The adapters are designed with external switches to set RS-232, RS-422 or RS-485 ports and different operation modes conveniently.

The isolation and surge protection models (USB2-4COMi-SI-TB, USB2-8COMi-SI-TB) support 3,000 Volt DC optical isolation, 15KV ESD protection and 600W surge protection for all serial signals.

Specifications & Features

- Supports USB 1.1 and USB 2.0 transfer speeds from 1.5 Mbps up to 480 Mbps, automatic link and speed detection
- Adds four (USB2-4COMi-TB, USB2-4COMi-SI-TB) or eight (USB2-8COMi-TB, USB2-8COMi-SI-TB) high speed RS-232/ 422/ 485 serial ports via USB connection
- 2K byte receive buffer
- 2K byte transmit buffer for high speed data throughput
- Requires no IRQ, DMA, I/O port
- Data rates: 300 bps to 921.6K bps.
- Each serial port supports 5-pin screw-lock-type terminal block connector
- Auto transmit buffer control for 2-wire RS-485 half-duplex operation
- Biasing and Termination resistors installed on-board
- Support RS-232 3-wire signals: RxD, TxD, GND
- Support RS-422, RS-485 4-wire signals: TxD-, TxD+, RxD+, RxD-
- Support RS-485 2-wire signals: data-, data+
- Monitor LEDs of TxD, RxD indicating port status
- AC to DC 12V, 1A switching power supply included
- Virtual COM port drivers available for Windows 10, 8.1, 8, 7, Vista, 2003, XP, 2000

- The USB2-4COMi-SI-TB and USB2-8COMi-SI-TB support 3KV optical isolation, 15KV ESD protection and 600W surge protection
- Industrial-grade metal case with DIN-rail ears for DIN-rail mounting

General Specifications

The table below shows the specifications of USB2.0 4/8-Port Industrial Serial I/O Adapters.

General	
Bus	USB 2.0
Chipset	FTDI FT4232H (4-Port) Genesys GL852G + FTDI FT4232H (8-Port)
Interface	RS-232/422/485
Plug & Play	Supported

Serial Port	
Serial Ports Number	4/8-Port
RS-232 Signals	TxD, RxD, GND
RS-422 Signals	TxD-, TxD+, RxD+, RxD-
RS-485 Signals	TxD-, TxD+, RxD+, RxD- (4 wire), data- , data+ (2 wire)
Max. Bitrates	921600 bps
Serial Configuration	Data bits : 7,8 Parity : None, Odd, Even, Mark , Space Stop bits : 1, 2
UART FIFO Buffer Size	Each port with 2K byte FIFO for transmit and receive

Specification of USB2-4COMi-TB

USB2-4COMi-TB	
Serial Ports	4-Port RS-232/422/485
RS-232 Signals	TxD, RxD, GND
RS-422 Signals	TxD-, TxD+, RxD+, RxD-
RS-485 Signals	TxD-, TxD+, RxD+, RxD- ,GND(4 wire) Data- , Data+, GND (2 wire)
Connectors	Four 5-pin screw-lock-type terminal block connectors
Protection	15KV ESD protection and 600W surge protection for all serial signals
Chipset	FTDI FT4232H USB 2.0 to quad UART chip

Specification of USB2-4COMi-SI-TB

USB2-4COMi-SI-TB	
Serial Ports	4-Port RS-232/422/485
RS-232 Signals	TxD, RxD, GND
RS-422 Signals	TxD-, TxD+, RxD+, RxD-
RS-485 Signals	TxD-, TxD+, RxD+, RxD- ,GND (4 wire) Data- , Data+, GND (2 wire)
Connectors	Eight 5-pin screw-lock-type terminal block connectors
Protection	15KV ESD protection for all serial signals 600W surge protection for all serial signals 3000 Volt DC optical isolation for all serial signals
Chipset	FTDI FT4232H USB 2.0 to quad UART chip

Specification of USB2-8COMi-TB

USB2-8COMi-TB	
Serial Ports	8-Port RS-232/422/485
RS-232 Signals	TxD, RxD, GND
RS-422 Signals	TxD-, TxD+, RxD+, RxD-, GND
RS-485 Signals	TxD-, TxD+, RxD+, RxD- ,GND (4 wire) Data- , Data+, GND (2 wire)
Connectors	Eight 5-pin screw-lock-type terminal block connectors
Protection	15KV ESD protection and 600W surge protection for all serial signals
Chipset	Genesys GT852G 4-port USB 2.0 hub chip FTDI FT4232H USB 2.0 to quad UART chip

Specification of USB2-8COMi-SI-TB

USB2-8COMi-SI-TB	
Serial Ports	8-Port RS-232/422/485
RS-232 Signals	TxD, RxD, GND
RS-422 Signals	TxD-, TxD+, RxD+, RxD-
RS-485 Signals	TxD-, TxD+, RxD+, RxD- ,GND (4 wire) Data- , Data+, GND (2 wire)
Connectors	Eight 5-pin screw-lock-type terminal blocks connector
Protection	15KV ESD protection for all serial signals 600W surge protection for all serial signals 3000 Volt DC optical isolation for all serial signals
Chipset	Genesys GT852G 4-port USB 2.0 hub chip FTDI FT4232H USB 2.0 to quad UART chip

Environment

Environment	
Operating Temperature	0°C to 60°C
Storage Temperature	-40°C to 85°C
Humidity	0 to 80% RH. Noncondensing
Safety Approvals	CE, FCC

Pin-out Information

Followings are the pin-out of 5-pin screw-lock-type terminal block connector.

RS-232 Pin-out for 5-pin Screw-Lock-Type Terminal Block Connector

Pin Name	Pin Type	Description
TxD- (Data-)	*X*	No Function
TxD+ (Data+)	*X*	No Function
RxD+ (TxD)	***Output***	TxD : Transmit RS-232 Data
RxD- (RxD)	***Input***	RxD : Receive RS-232 Data
GND	***Ground***	GND : Signal Ground

RS-422 Pin-out for 5-pin Screw-Lock-Type Terminal Block Connector

Pin Name	Pin Type	Description
TxD- (Data-)	***Output***	TxD- : Transmit RS-422 Data , negative polarity
TxD+ (Data+)	***Output***	TxD+ : Transmit RS-422 Data , positive polarity
RxD+ (TxD)	***Input***	RxD+ : Receive RS-422 Data , positive polarity
RxD- (RxD)	***Input***	RxD- : Receive RS-422 Data , negative polarity
GND	***Ground***	GND : Signal Ground

RS-485 Full Duplex (4 Wire) Pin-out for 5-pin Screw-Lock-Type Terminal Block Connector

Pin Name	Pin Type	Description
TxD- (Data-)	***Output***	TxD- : Transmit RS-485 Data , negative polarity
TxD+ (Data+)	***Output***	TxD+ : Transmit RS-485 Data , positive polarity
RxD+ (TxD)	***Input***	RxD+ : Receive RS-485 Data , positive polarity
RxD- (RxD)	***Input***	RxD- : Receive RS-485 Data , negative polarity
GND	***Ground***	GND : Signal Ground

RS-485 Half Duplex (2 Wire) Pin-out for 5-pin Screw-Lock-Type Terminal Block Connector

Pin Name	Pin Type	Description
TxD- (Data-)	***Output/Input***	Data- : Transmit/Receiver RS-485 Data, negative polarity
TxD+ (Data+)	***Output/Input***	Data+ : Transmit/Receive RS-485 Data , positive polarity
RxD+ (TxD)	***x***	No Function
RxD- (RxD)	***x***	No Function
GND	***Ground***	GND : Signal Ground

Power Output

The picture below shows a 2-pin screw-lock-type terminal block connector. All the USB quad and octal industrial serial adapters provide a lockable terminal power connector to supply 5V, 500mA power to external devices requiring power.

The table below shows the pin-out of the 2-pin terminal block for power output on the quad and octal serial adapters.

Pin Name	Pin Type	Description
+5V	***Power Output***	Supply DC +5V, 500mA to each connected devices
GND	***Ground***	GND ：Signal Ground

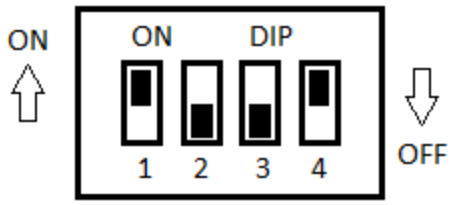
Hardware Setting and Installation

Selecting the RS-232/422/485 Operation Mode for USB2-4COMi-TB and USB2-4COMi-SI-TB

There are four 4-pin DIP switches on the bottom of the metal case. The DIP switches are used to select the serial mode of operation. You need to open up the plate on the bottom of the case, and set the switch settings to RS-232 mode, or RS-422, or RS-485 mode as per the requirements of your application.

The operation mode configuration settings are listed as follows:

SW1 (Port-1), SW2 (Port-2), SW3 (Port-3), SW4 (Port-4)



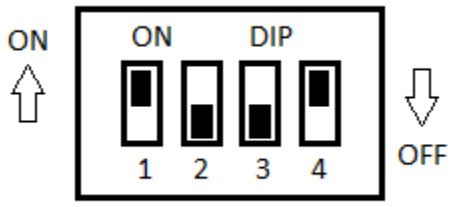
	Operation Mode	in1	in2	in3	in4
RS-232	**Standard RS-232 Mode**	**OFF**	**ON**	**ON**	**ON**
RS-422	**Full Duplex (4 wire)**	**ON**	**ON**	**ON**	**ON**
RS-485	**Full Duplex (4 wire)**	**ON**	**OFF**	**ON**	**ON**
	Half Duplex (2 wire) - with Echo	**ON**	**OFF**	**OFF**	**ON**
	Half Duplex (2 wire) - without Echo	**ON**	**OFF**	**OFF**	**OFF**

Selecting the RS-232/422/485 Operation mode for USB2-8COMi-TB and USB2-8COMi-SI-TB

There are eight 4-pin DIP switches on the bottom of the metal case. The DIP switches are used to select the serial mode of operation. You need to open up the plate on the bottom of the case, and set the switch settings to RS-232 mode, or RS-422, or RS-485 mode as per the requirements of your application.

The operation mode configuration settings are listed as follows:

SW1 (Port-1), SW2 (Port-2), SW3 (Port-3), SW4 (Port-4)
SW5 (Port-5), SW6 (Port-6), SW7 (Port-7), SW8 (Port-8)



	Operation Mode	in1	in2	in3	in4
RS-232	**Standard RS-232 Mode**	**OFF**	**ON**	**ON**	**ON**
RS-422	**Full Duplex (4 wire)**	**ON**	**ON**	**ON**	**ON**
RS-485	**Full Duplex (4 wire)**	**ON**	**OFF**	**ON**	**ON**
	Half Duplex (2 wire) - with Echo	**ON**	**OFF**	**OFF**	**ON**
	Half Duplex (2 wire) - without Echo	**ON**	**OFF**	**OFF**	**OFF**

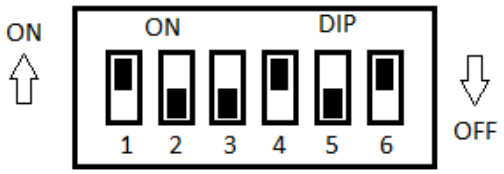
Enable Termination and Biasing for RS-422/485 Mode

There are four/eight 6-pin DIP switches on the bottom of the metal case. The DIP switches are used to enable 120 Ohm termination resistors and 750 Ohm biasing resistors of TxD and RxD. To enable termination and biasing for RS-422/485 mode, you need to open up the plate on the bottom of the metal case and set the DIP switches to enable termination and biasing.

Settings are listed as follows for termination and biasing resistors configuration options.

S1 (Port-1), S2 (Port-2), S3 (Port-3), S4 (Port-4)

S5 (Port-5), S6 (Port-6), S7 (Port-7), S8 (Port-8)



DIP Switches		Function
Pin1	On	**Pull-up TxD+ to VCC by 750 Ohm Bias resistor**
	Off	**No function**
Pin2	On	**Enable TxD 120 Ohm termination resistor**
	Off	**No function**
Pin3	On	**Pull-down TxD- to GND by 750 Ohm Bias resistor**
	Off	**No function**
Pin4	On	**Pull-up RxD+ to VCC by 750 Ohm Bias resistor**
	Off	**No function**
Pin5	On	**Enable RxD 120 Ohm termination resistor**
	Off	**No function**
Pin6	On	**Pull-down RxD- to GND by 750 Ohm Bias resistor**
	Off	**No function**

Note : Sometimes, when operating in RS-422 or RS-485, it is necessary to configure termination and biasing of the data transmission lines. Generally this must be done in the cabling, since this depends on the installation of connections. Before applying the option, check your cable specification for proper impedance matching.

Proper Wiring for RS-422/485 Operation

This section will provide proper wiring information about RS-422 and RS-485 data communication. It is necessary to have the basic knowledge, to avoid or find errors in data transmission. Failures in cabling are responsible for the vast majority of transmission problems.

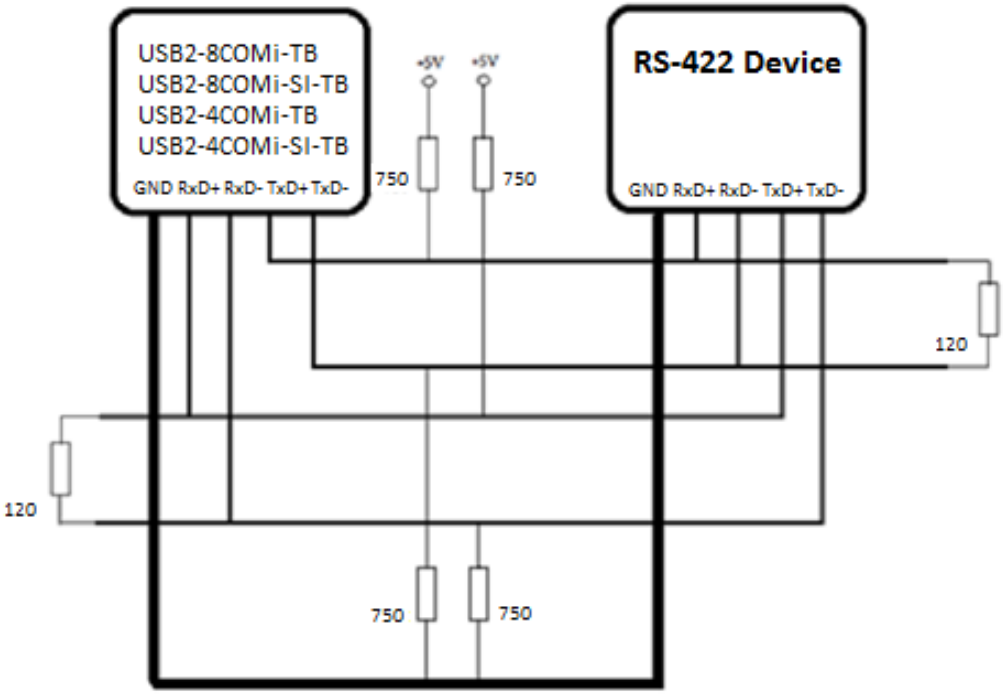
RS-422 and RS-485 Transmission Technique

The RS-422 and RS-485 use the same balanced transmission method. Signals are not transmitted as voltage on a single wire, as RS-232 does. Instead two wires are used; when one carries high voltage, the other one carries low voltage. The signal is defined by the difference in voltage between those two wires. This hardens the transmission against noise. Usually twisted pair cables are used, which further reduces the sensitivity for noise.

To make sure the signals meet the common voltage range, the GND of sender and receiver must be connected somehow. To insure the signals are in the valid voltage range and the differential voltage can be correctly sensed by the receiver, the GND lines of the transmitter and receiver must be connected.

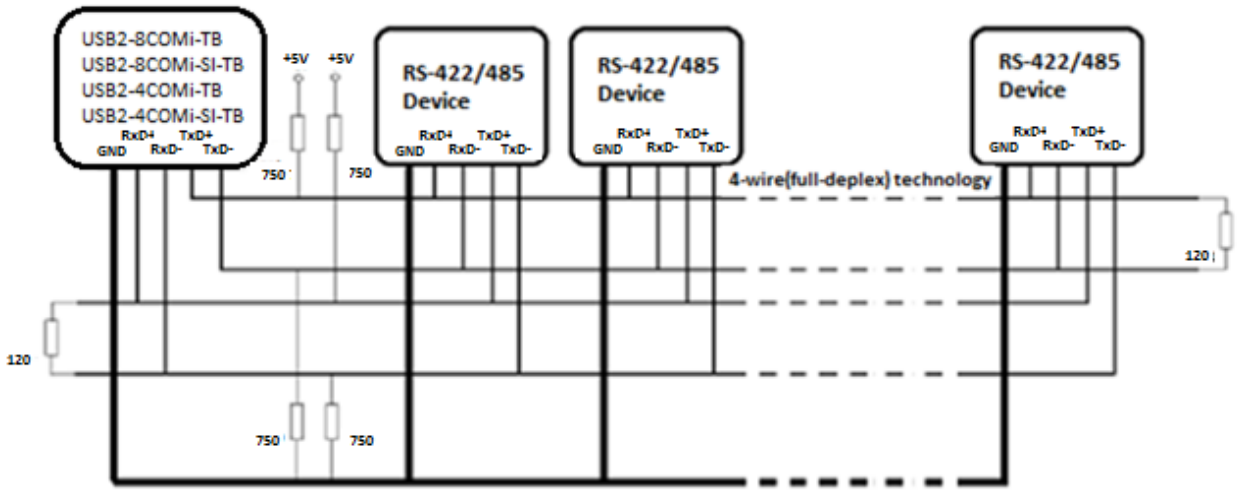
RS-422 signals connected

The following diagram shows RS-422 signals connected.



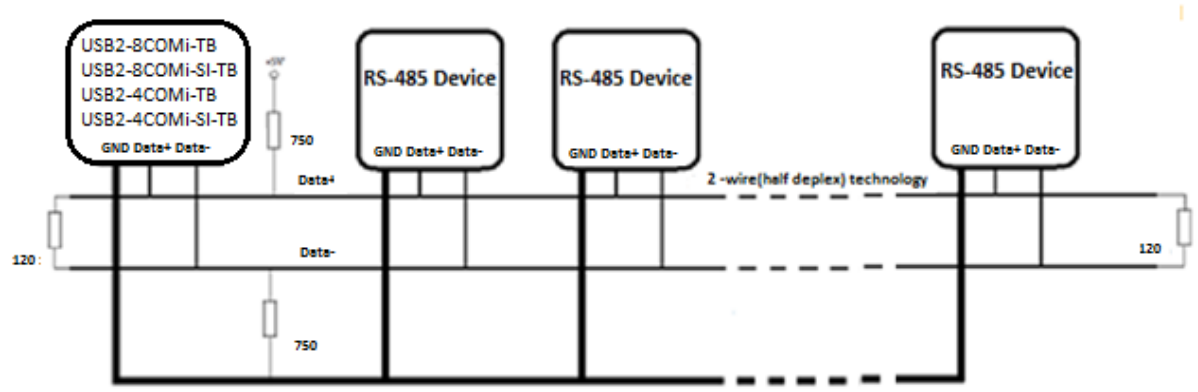
RS-422 and RS-485 4-Wire Scheme

The RS-422 requires dedicated wire pairs for transmit and receive. The transmit wires are used to send data to as many as 10 receivers, as stated in the specifications of RS-422. Since the USB quad/octal industrial serial adapters use RS-485 line driver technology, up to 32 receivers are possible. The following diagram shows RS-422 and RS-485 4-wire scheme:



RS-485 2-Wire Scheme

The following diagram shows RS-485 2-Wire scheme:



Installing Windows Drivers

Windows Update

In most cases, the Windows driver of the USB quad and octal industrial serial adapters will be installed from Windows Update website automatically.

Install in Windows 10, 8.1, 8, 7, Server 2012, 2008 R2

Connect your computer to Internet and plug the USB quad/octal industrial serial adapters to the USB port. The driver will be installed automatically via Internet.

Install in Windows XP, Vista, Server 2003 and 2008

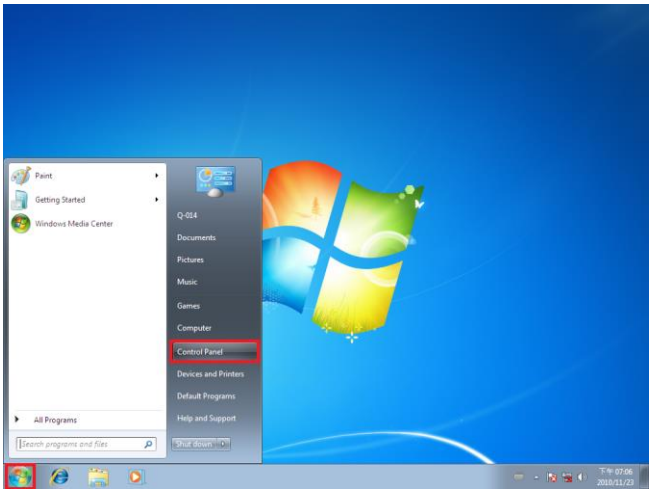
Connect your computer to Internet and plug the USB quad/octal industrial serial adapters to the USB port, when asked to install the drivers, allow your computer to search the Internet to load and install the drivers from Windows Update website automatically.

Manual Windows Drivers Installation

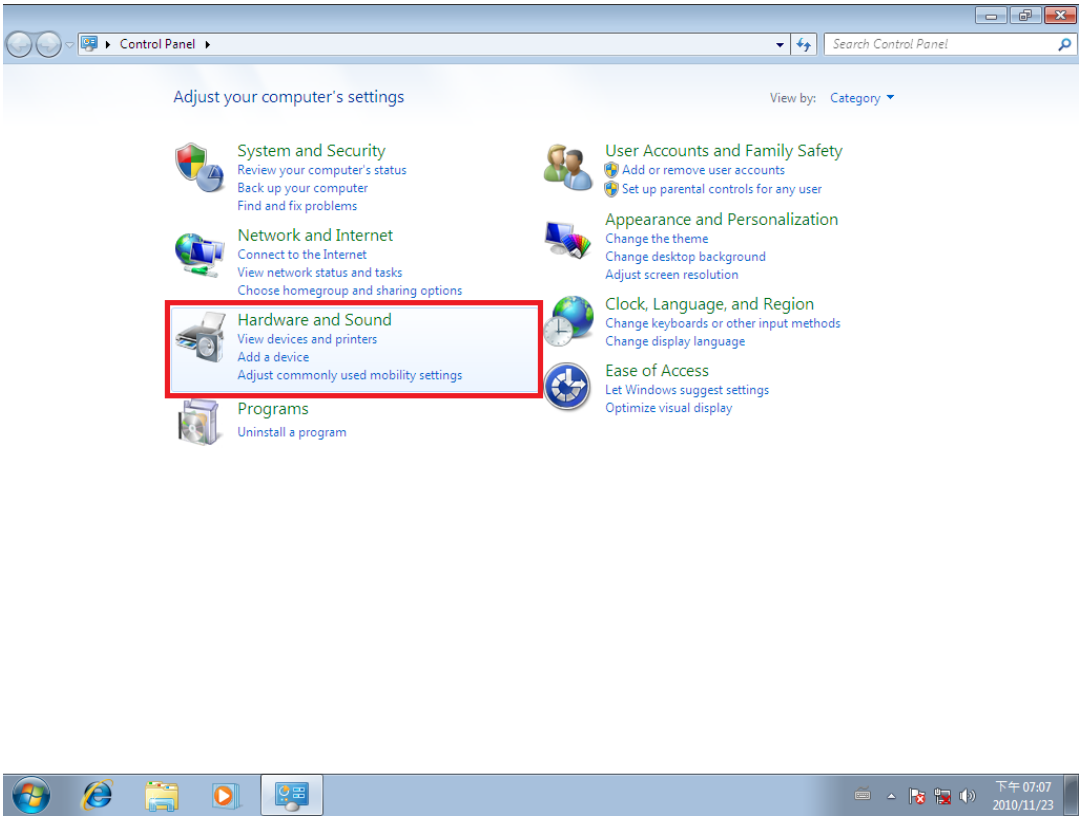
If no suitable drivers is automatically found then the following procedure should be followed.

Firstly download the latest Windows driver of the USB quad/octal industrial serial adapters from http://www.ftdichip.com/FTDrivers.htm , and save them to a known folder on the PC. The desktop can be used so that the driver folder can be easily located.

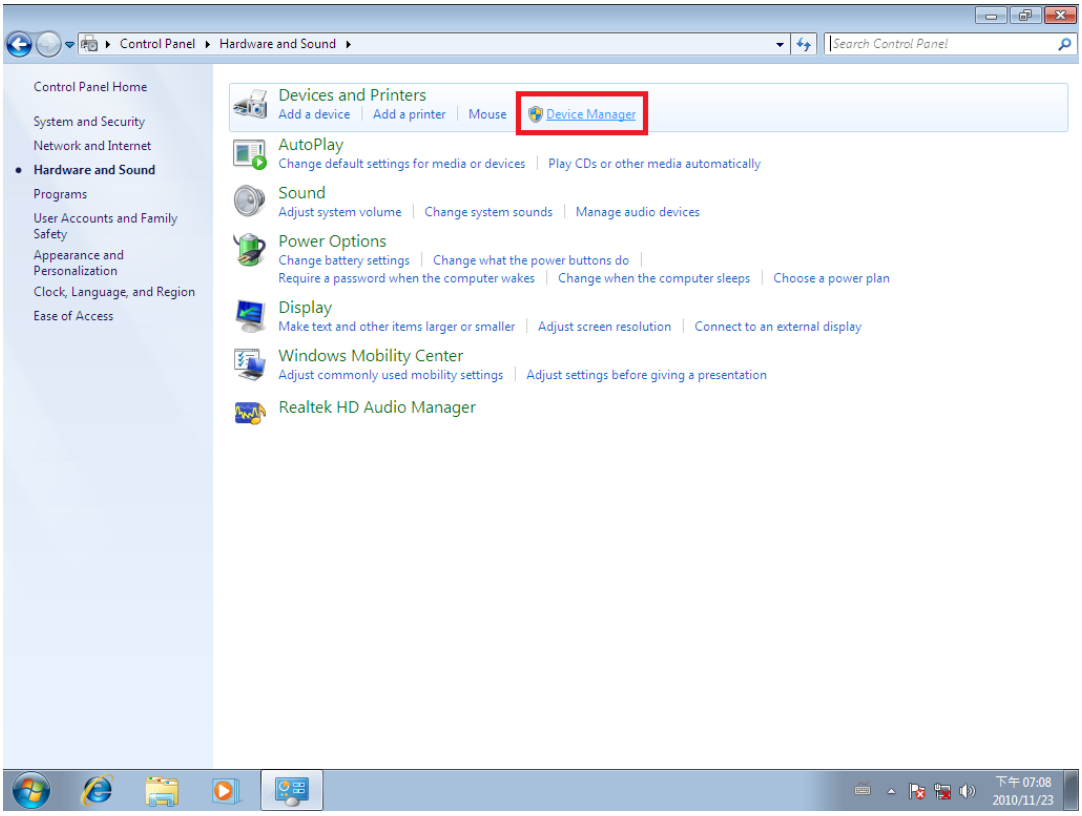
To locate the “Device Manager” on Windows -press “Start” button and select “Control Panel”(right click “Start” button for Windows 10, 8.1).



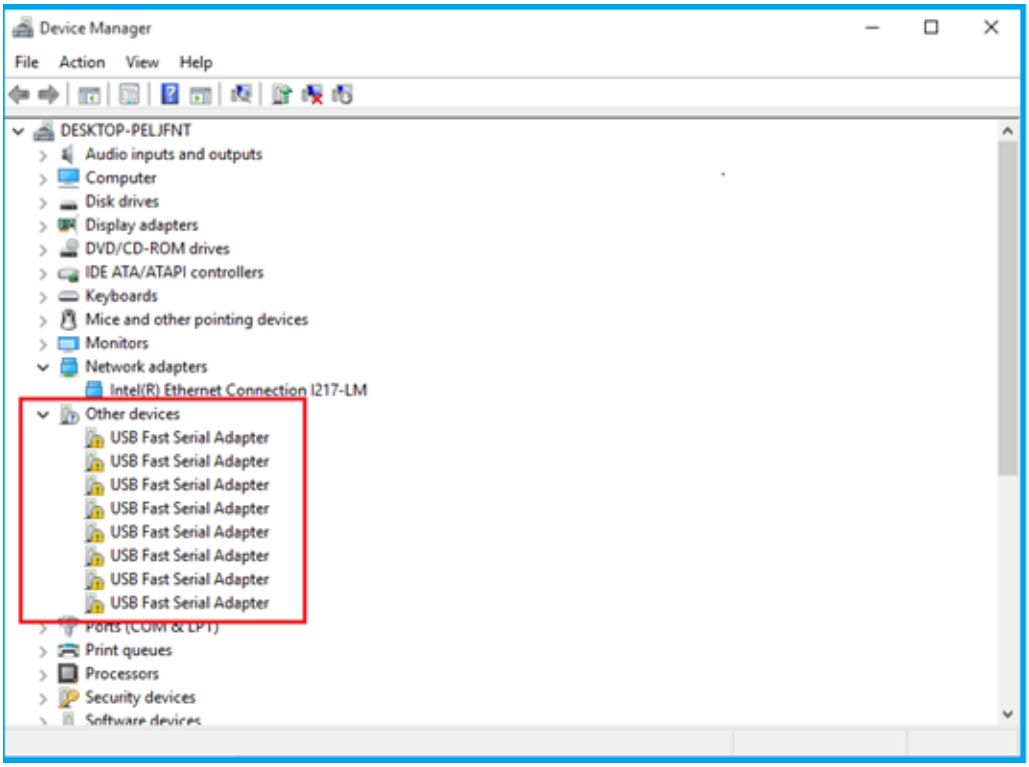
From the select “Control Panel” select “Hardware and Sound”



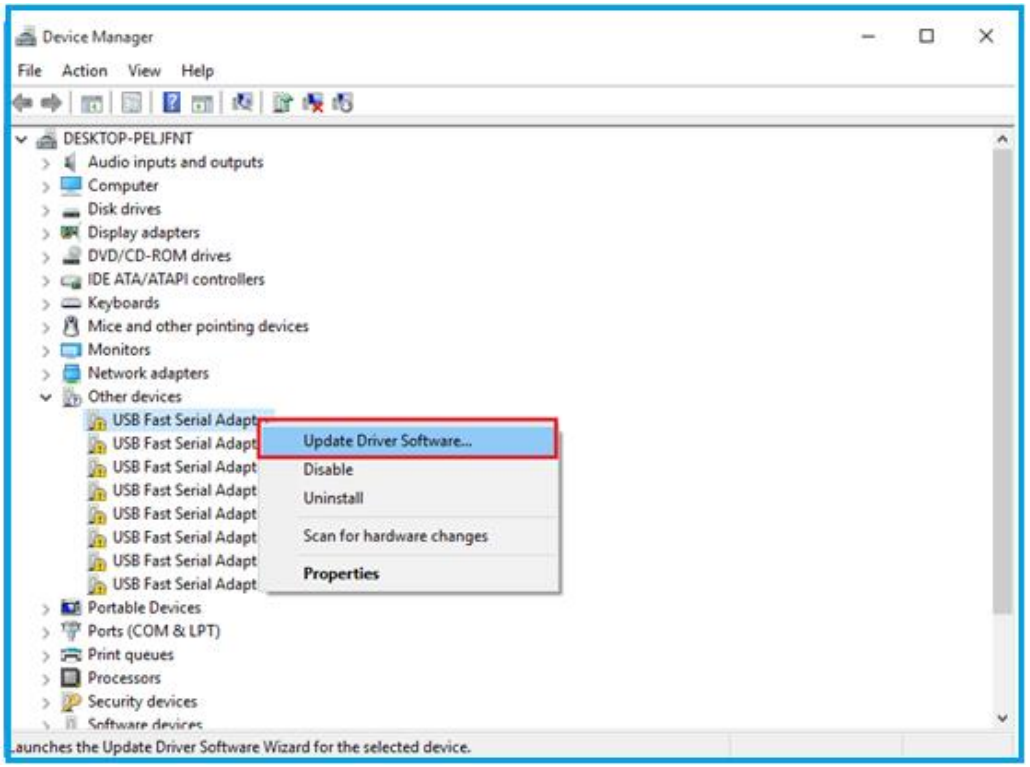
At the next screen select “Device Manager”:



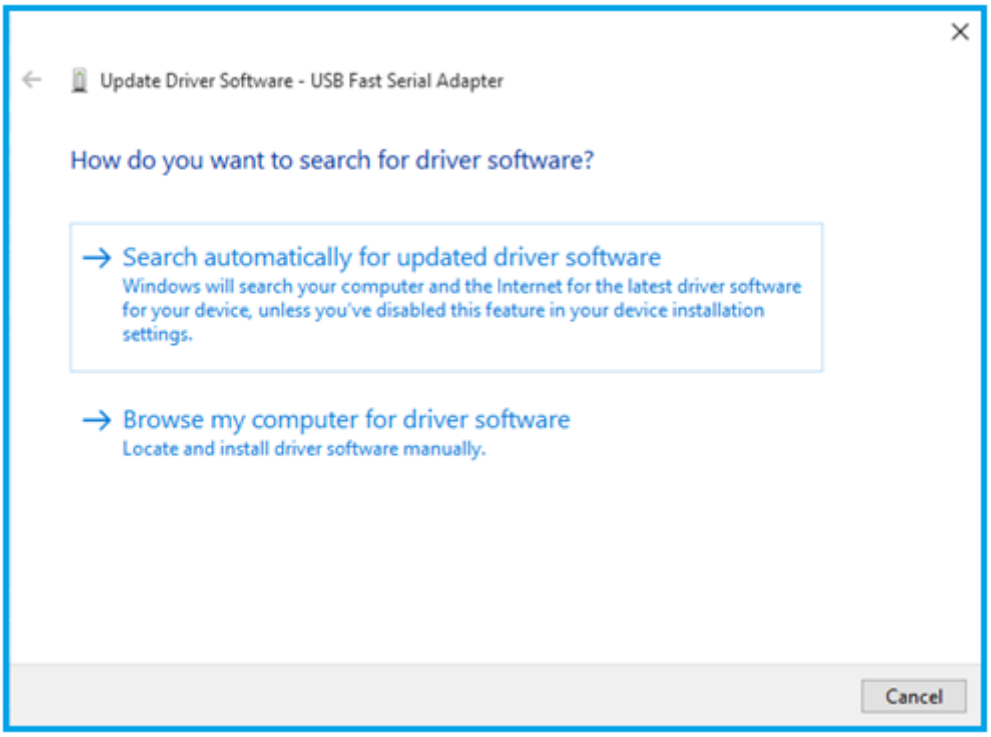
In the “Device Manager” of the System properties, there will be eight “USB Fast Serial Adapter” devices under “Other devices” with a yellow warning symbol to indicate no driver installed.



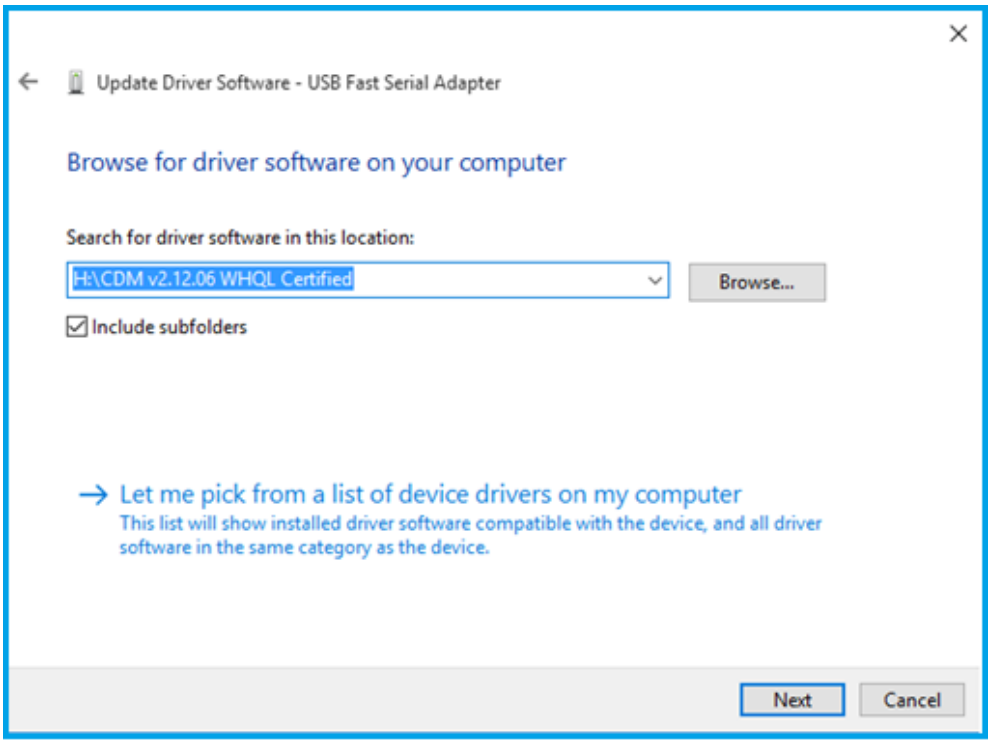
Right click on first “USB Fast Serial Adapter” to bring up a menu as show below.



From the displayed menu select “Update Driver Software…”
This then displays the option for an automatic search or a manual search.

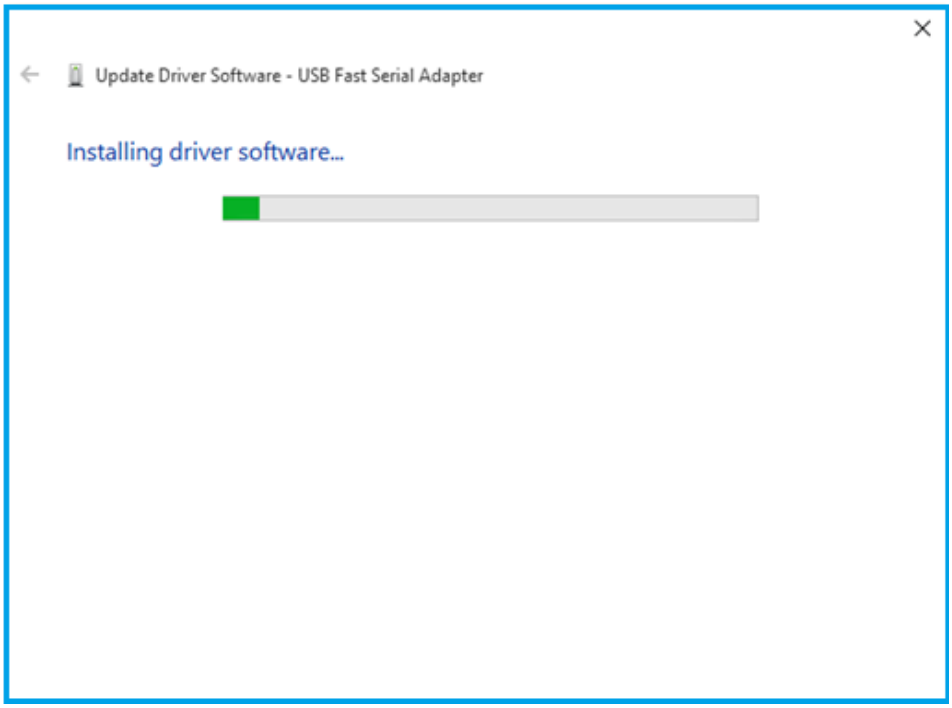


Select the second option to browse manually.

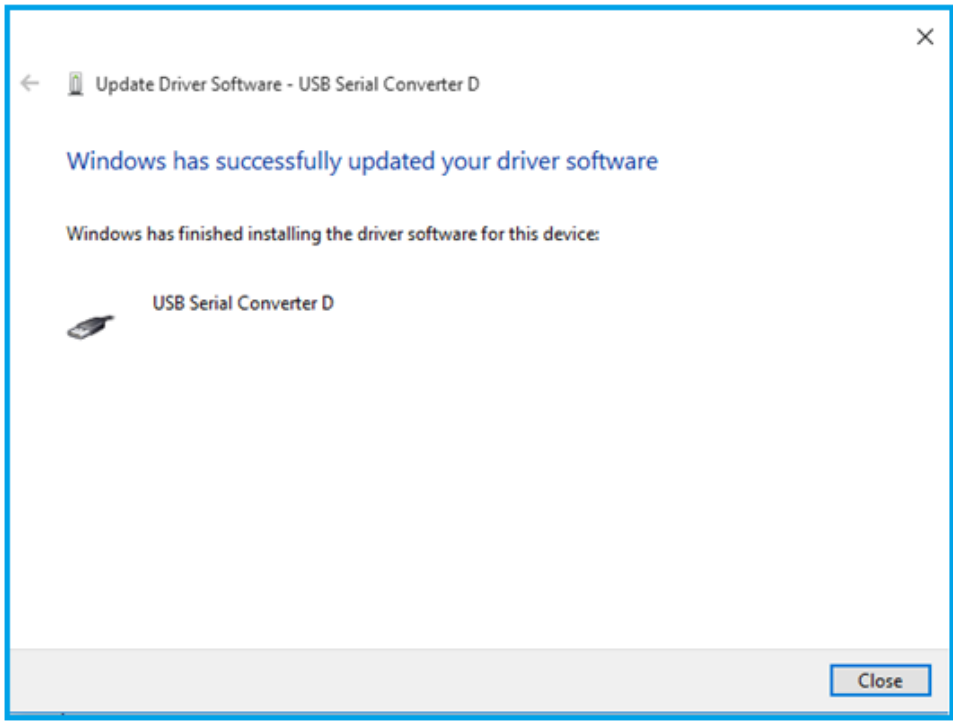


In the address box put the exact location where the Windows drivers have been saved to.

This may be on a CD, USB stick or in a folder on the PC. It is not necessarily the exact same location as shown in the screenshot. The drivers could have been saved anywhere of the users choosing.
After entering the address select “Next” to start the installation.



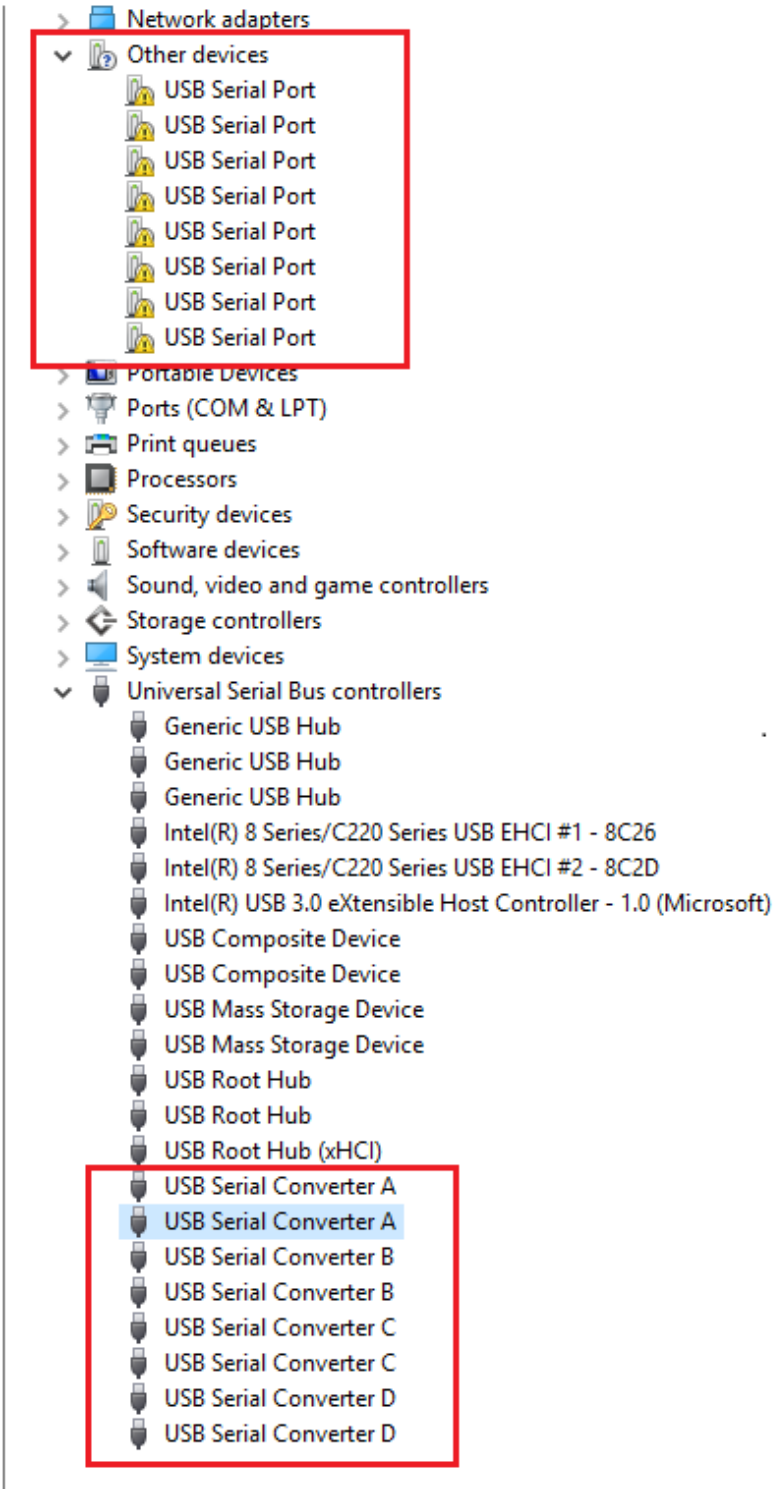
When the installation has finished a completion screen is displayed.



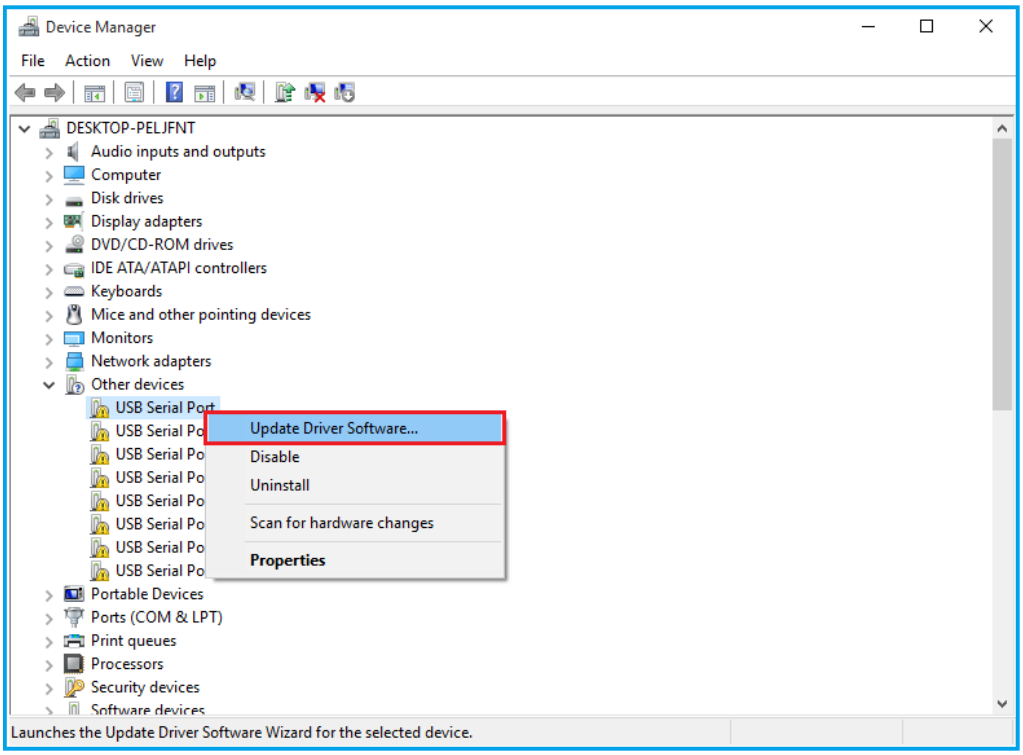
Press “Close” to close this window and go back to the “Device Manager” Windows.

When first “USB Fast Serial Adapter” driver installation is done, select next “USB Fast Serial Adapter” by order and repeat the driver install procedure for all “USB Fast Serial Adapter”.

After all “USB Fast Serial Adapter” driver installation is done successfully, you can find eight “USB Serial Converter X”(X=A,B,C,D) and eight “USB Serial Port” with a yellow warning symbol under Device Manager.

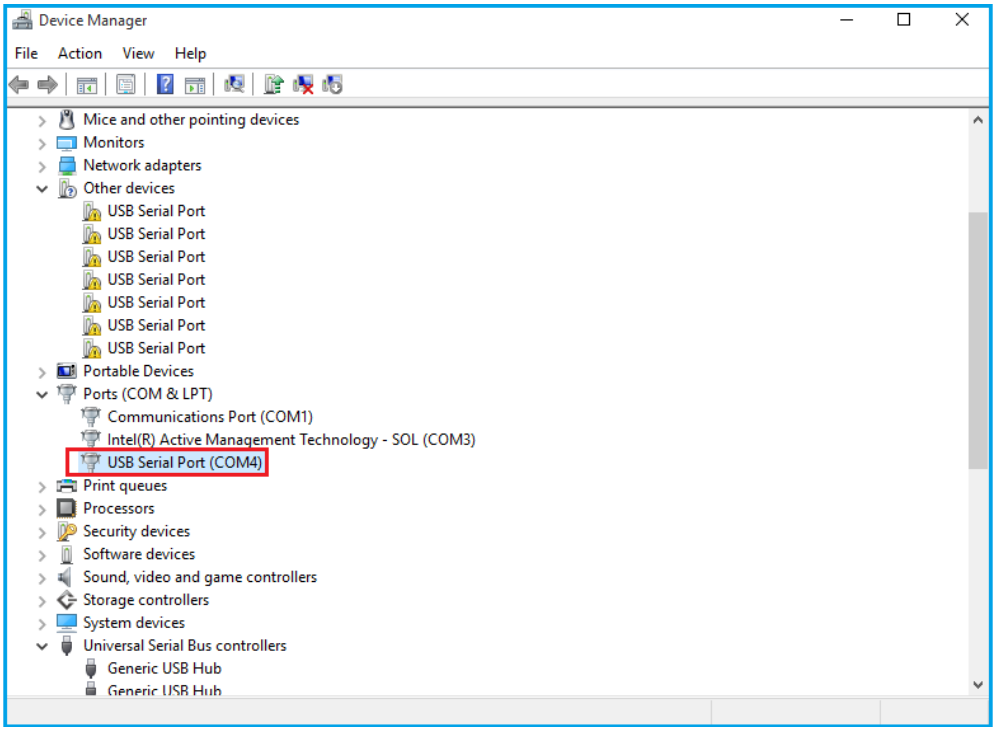


Right click on first “USB Serial Port” to bring up a menu as show below.

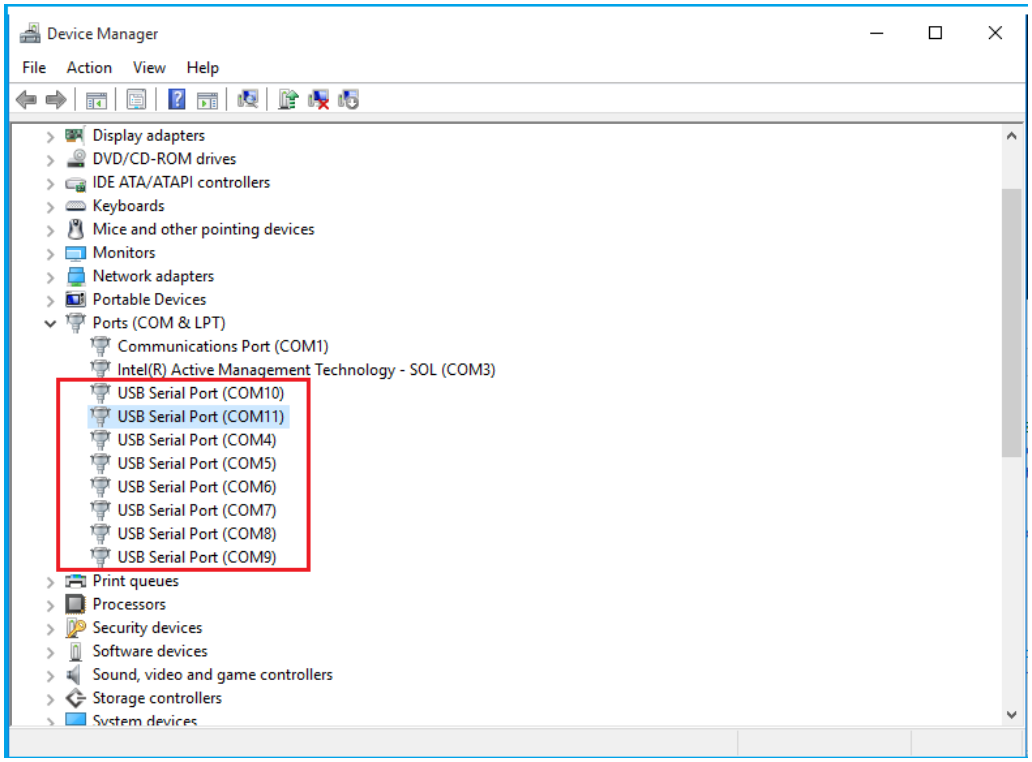


From the displayed menu select “Update Driver Software…”, repeat the same driver install procedure for first “USB Serial Port”.

When first “USB Serial Port” driver installation is done, you can find a “USB Serial Port (COMx)” under “Ports (COM & LPT)” of Device Manager.



After first “USB Serial Port” driver installation is done, select next “USB Serial Port” by order and repeat the driver install procedure for all “USB Serial Port”. When all “USB Serial Port” driver installation is done successfully, you can find eight “USB Serial Port (COMx)” under “Ports (COM & LPT)” of Device Manager.



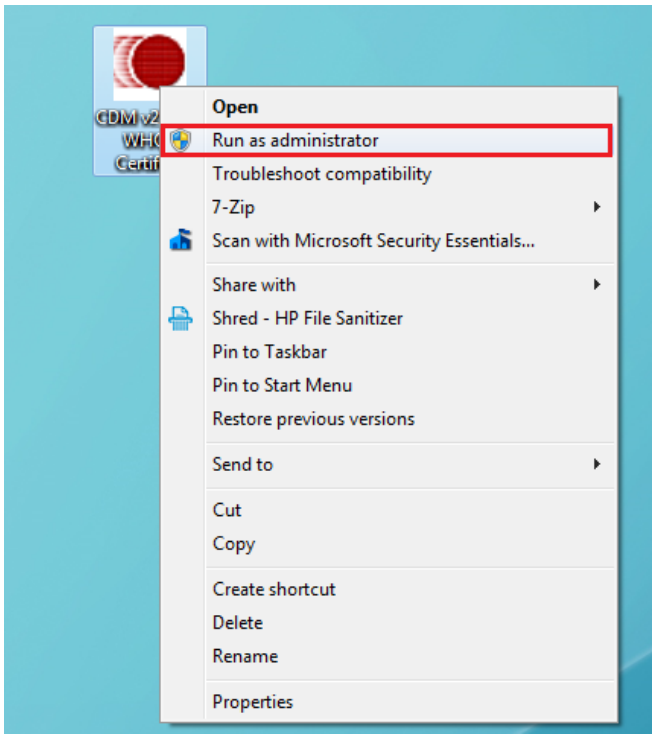
Restart computer to complete installation.

Pre-Installation Windows Driver

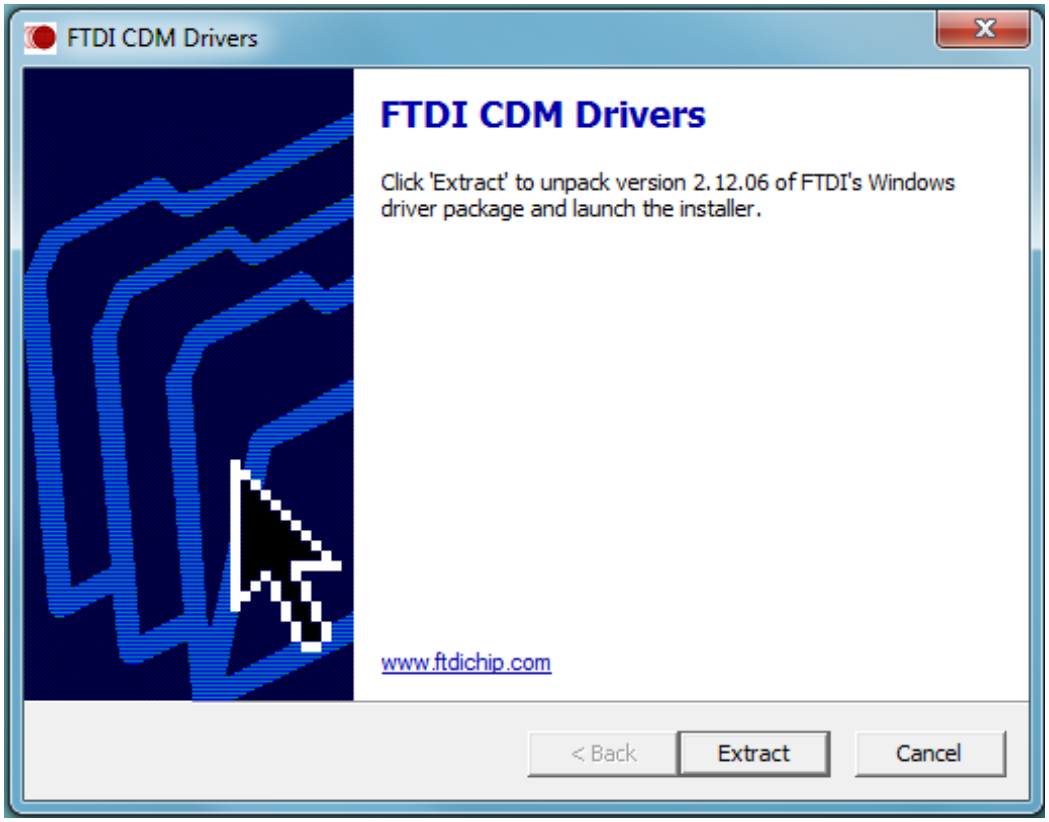
The Windows driver is also available as a setup program (CDMvx.xx.xx WHQL Certified.exe) to per-install Windows driver into your PC. Before you plug the USB 2.0 4/8-Port Industrial Serial I/O Adapters into the PC, You need to run pre-install program (setup program) first. You can download the setup program (CDMvx.xx.xx WHQL Certified.exe) from http://www.ftdichip.com/FTDrivers.htm.

After downloaded the driver setup program, right click it and select “Run as administrator”.

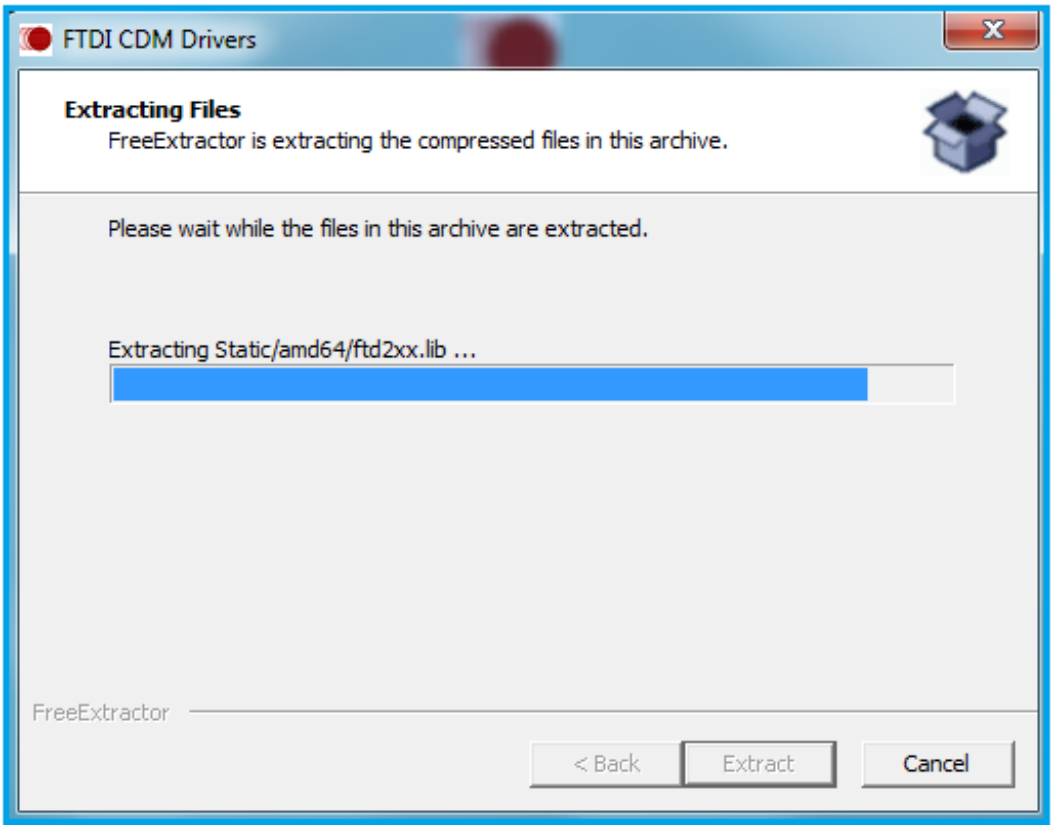
Setup Program



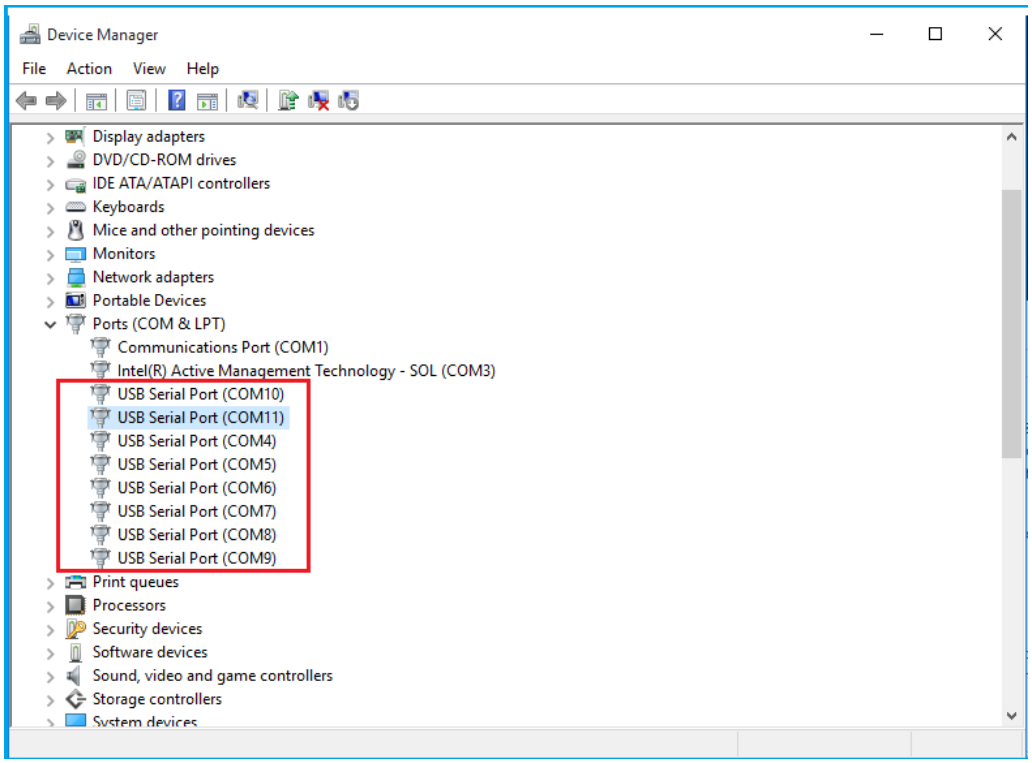
Press the “Extract” button



The driver will now be automatically installed.



Whenever the USB 2.0 4/8-Port Industrial Serial I/O Adapters is plugged into the PC, the Windows driver will be installed and listed in “Device Manager”.



Uninstall Windows Drivers:

Uninstall Windows 10/8.1/8/7/Vista/XP/2003 Drivers

Overview of the functionality of the CDMuninstallerGUI.exe

This application is used to remove installed drivers from the user's system and clean them from the Windows registry.

You can download this application program (CDMUninstaller_v1.4.zip) from

http://www.ftdichip.com/Support/Utilities_htm#CDMUninstaller

Supported Operating Systems

Uninstaller is currently supported on the following operating systems:

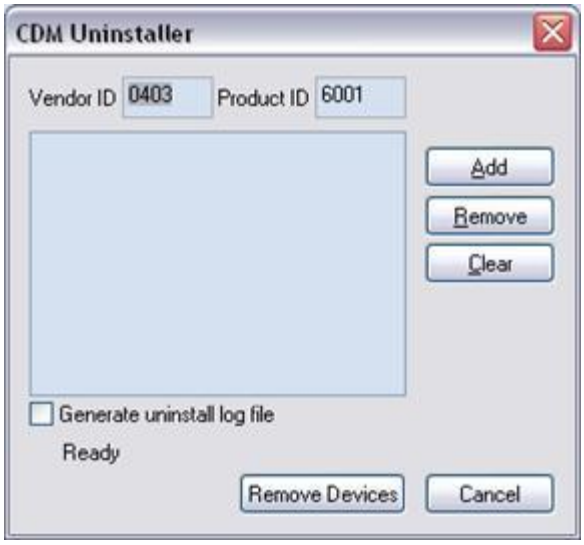
- Windows 10/ 8.1/ 8/ 7 (32 and 64 bit)
- Windows Vista (32 and 64 bit)
- Windows XP/ 2003 (32 and 64 bit)

Running the Application

To run the application, simply double click on the .exe file.

Removing a Driver

The figure below shows the window displayed upon running the application. The Vendor ID and Product ID text boxes allow the user to enter a 4 character hex value specifying the device that they wish to remove. All installed device drivers can be viewed from within the Windows Device Manager. The USB Quad/Octal industrial serial adapters use the FTDI default Vendor ID (0x0403). Depending on the specific model of USB Quad/Octal industrial serial adapters, valid Product IDs is: 0x6001.



To remove a device it must be added into the device window; they all must have a unique

Vendor ID and Product ID combination. To remove the device(s) click on the '*Remove Devices*' button.

The '*Remove*' button will remove the currently selected item from the device window, and the '*Clear'* button will remove all the devices from the device window.

A message box will confirm successful removal from the system and the device will be removed from the device window. To create an uninstall log file, check '*Generate uninstall log file*' prior to removing the device. This will create a text file outlining all operations that were attempted during the removal process that will be saved in the same directory as the .exe file.

Error Messages

If there are no devices specified within the device window the following message will appear. Make sure that at least one device has been specified within the window by using the '*Add'* button.

If after attempting to remove a device the application was unable to find any devices matching the Vendor ID and Product ID, the following message box will appear. In this situation make sure that the details that you have entered are indeed correct by checking with the windows device manager.

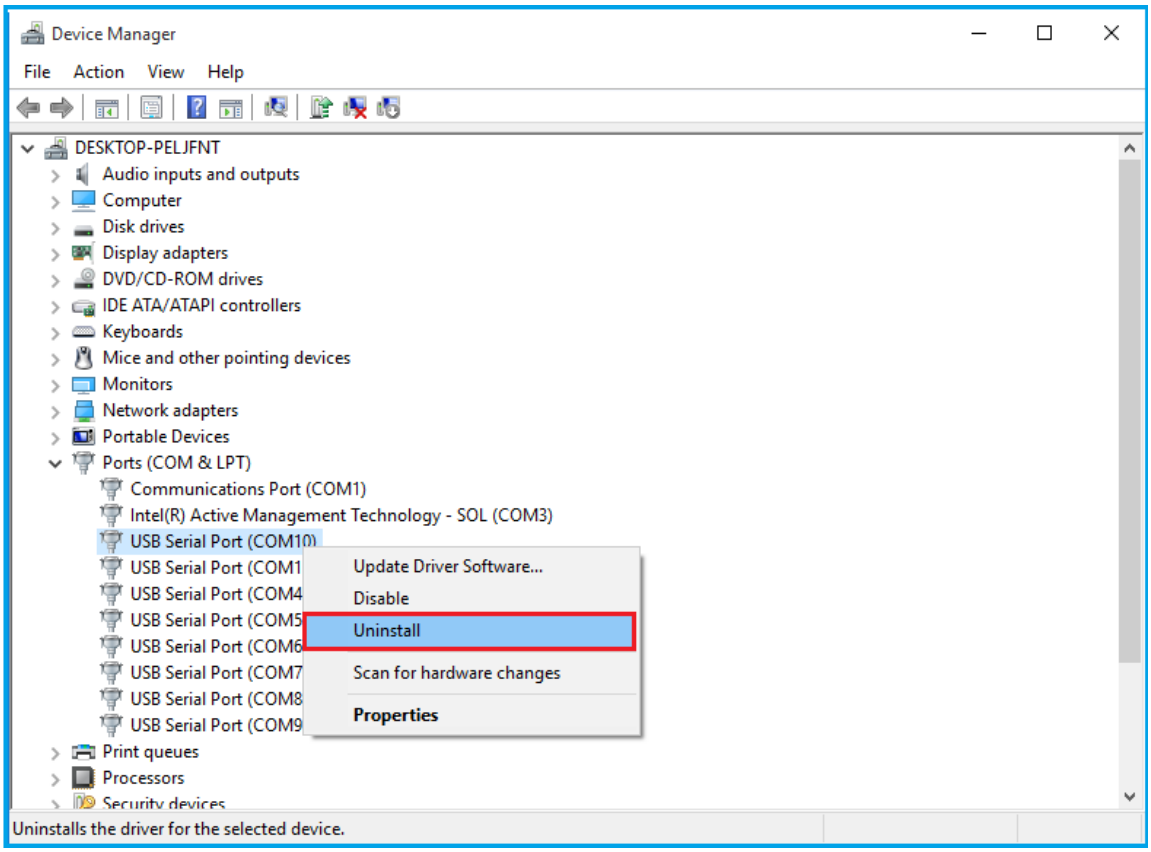
The Vendor ID and Product ID must be a unique combination, if an attempt is made to add the

same device twice the following message box will appear.

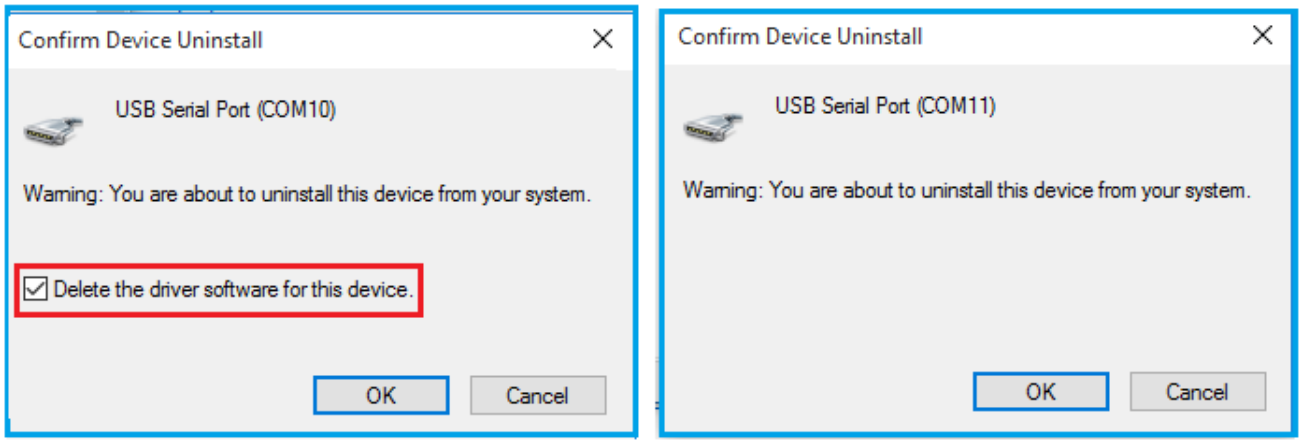
Manual Uninstall Windows 10/ 8.1/ 8/ 7 Driver

To manual uninstall the Windows 10/ 8.1/ 8/ 7 driver from Device Manager for USB 2.0 4/8-Port Industrial Serial I/O Adapters, please follow the steps below:

Right click on “USB Serial Port (COMx)” in “Device Manager “ to expand to “Device Control” screen. Select “Uninstall” to start “USB Serial Port (COMx)” Windows driver uninstall.

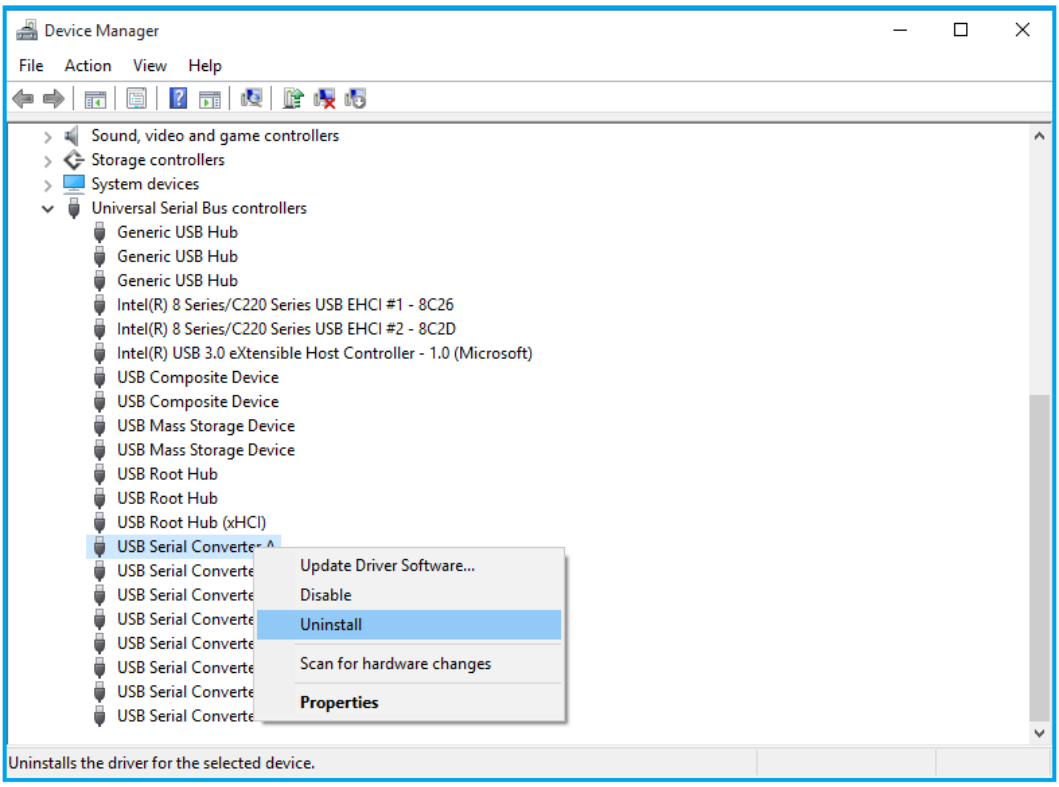


Under “Confirm Device Uninstall” screen, check “Delete the driver software for this device”. Click “OK” to uninstall the software driver. If you do not find “Delete the driver software for this device” message, then just click “OK” to uninstall the software driver.

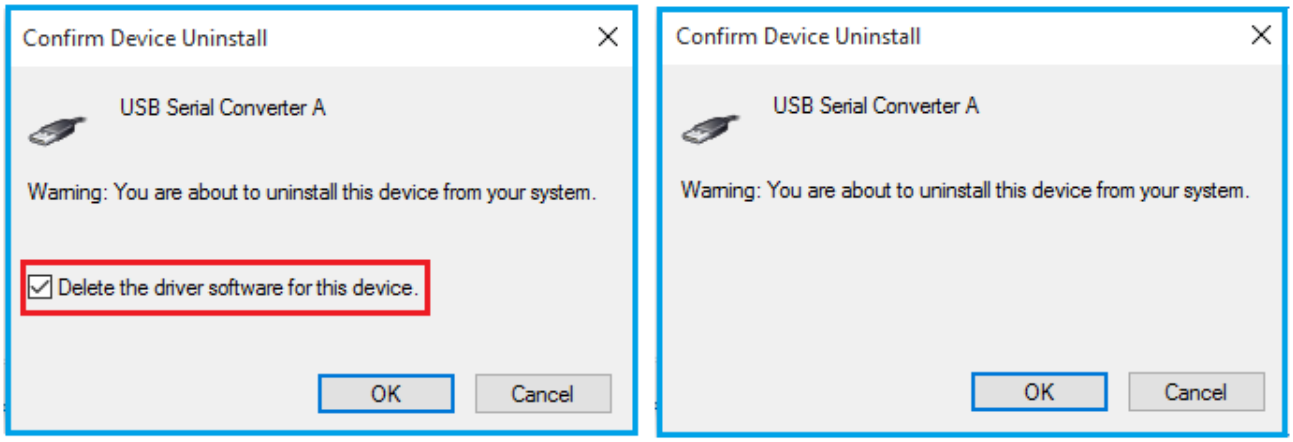


Right click on other “USB Serial Port (COMx)” and repeat the driver uninstall procedure to uninstall all “USB Serial Port” Windows driver.

Right click on “USB Serial Converter X” under “Device Manager” to expand to “Device Control ” screen. Select “Uninstall” to start “USB Serial Converter X” software driver uninstall.



Under “Confirm Device Uninstall” screen, check “Delete the driver software for this device”. Click “OK” to uninstall the software driver. If you do not find “Delete the driver software for this device” message, then just click “OK” to uninstall the software driver.



Right click on other “USB Serial Converter X” and repeat the driver uninstall procedure to uninstall all “USB Serial Converter X” Windows driver.

Tools

Microsoft USBView – USB Connection Viewer

USBView (Universal Serial Bus Viewer, Usbview.exe) is a free utility from Microsoft that displays the USB connection tree and shows the USB devices that are connected to it together with their configuration data. This is very useful for debugging USB enumeration errors. USBView works on all versions of Windows.

Where to get USBView

USBView is included in Debugging Tools for Windows.

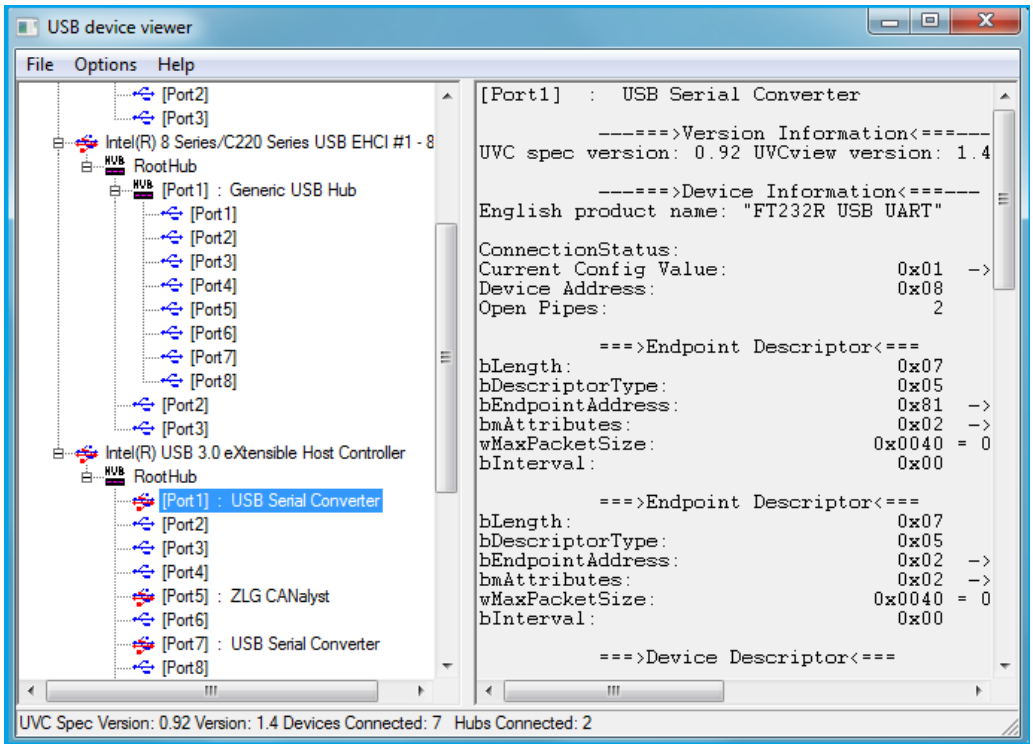
USBView is also available in the Windows driver samples repository on GitHub.

Using USBView

USBView can enumerate USB host controllers, USB hubs, and attached USB devices. It can also query information about the devices from the registry and through USB requests to the devices.

The main USBView window contains two panes. The left pane displays a connection-oriented tree view, enabling you to select any USB device.

The right pane displays the USB data structures that pertain to the selected USB device. These structures include Device, Configuration, Interface, and Endpoint Descriptors, as well as the current device configuration.



PuTTY- Terminal Emulator

PuTTY is a free and open-source terminal emulator, serial console and network file transfer application. It can open a serial port (since version 0.59) and connect a loop-back for serial port to verify the serial ports of USB 2.0 4/8-Port Industrial Serial I/O adapters are working fine or not.

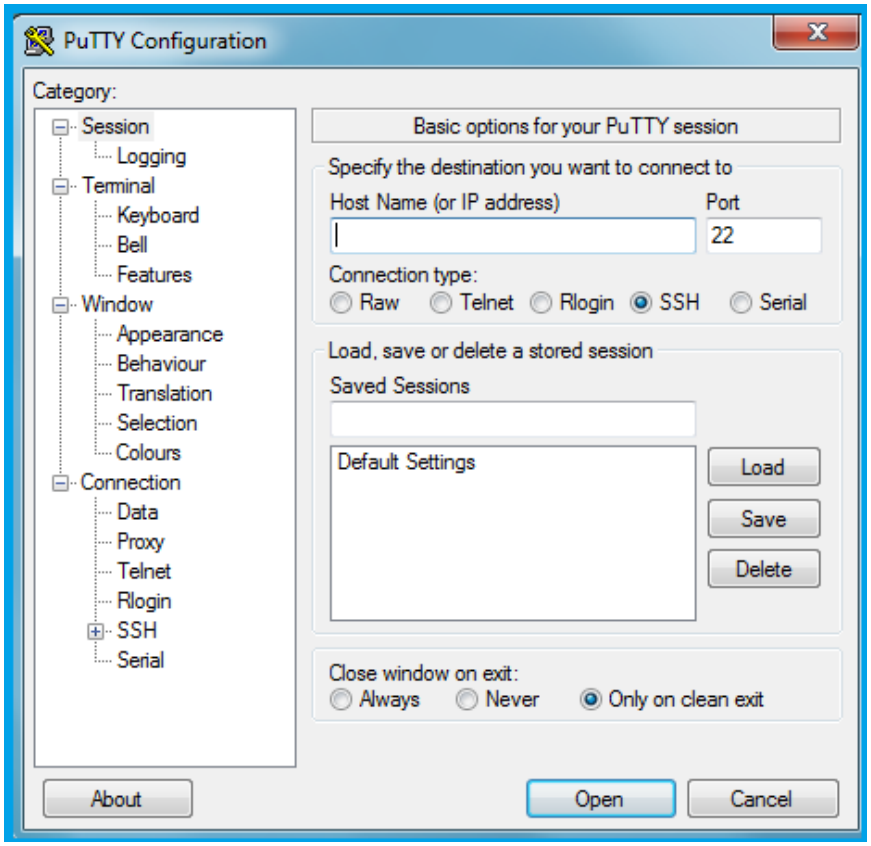
Where to get PuTTY

You can download PuTTY application program (putty.exe) from
http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html

Using PuTTY for Loop-back Test

The loop-back test is a simple and easy test, which will determine if your USB 2.0 4/8-Port Industrial Serial I/O adapters can send and receive data. You need to open up the back side of metal case and set the SW1~SW8 switches in RS-422 mode for all serial ports and connecting transmit RS-422 data positive polarity (TxD+) to receive RS-422 data positive polarity (RxD+); connecting transmit RS-422 data negative polarity (TxD-) to receive RS-422 data negative polarity (RxD-).

After downloading putty.exe PuTTY application program, click the putty.exe to open PuTTY Configuration window.



From “Category” select “Serial” in the PuTTY Configuration window. The Serial Line Configuration window is displayed. Select the following setting for loop-back test:

-Serial line to connect to: Select COM port number for serial port under test (e.g.COM3)

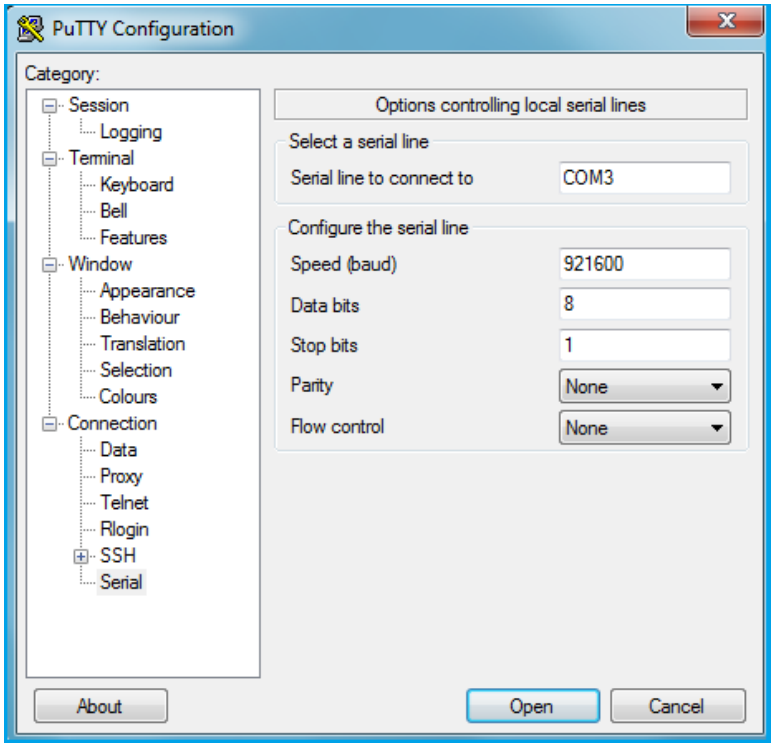
-Speed (baud): Select baud rate for serial port under test (e.g.921600)

-Data bits: Select data bits for serial port under test (e.g.8)

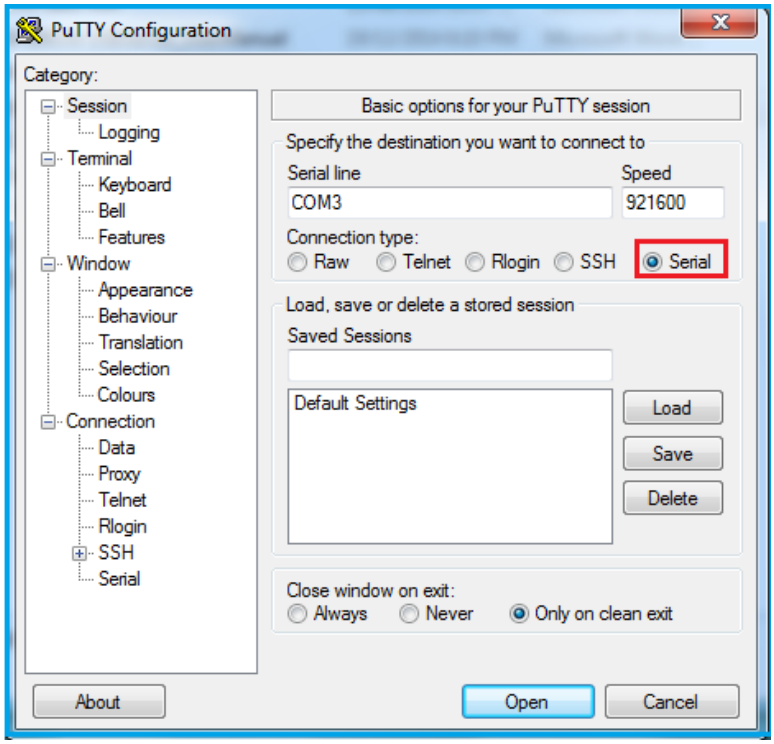
-Stop bits: Select stop bits for serial port under test (e.g.1)

-Parity check: Select parity check for serial port under test (e.g. None)

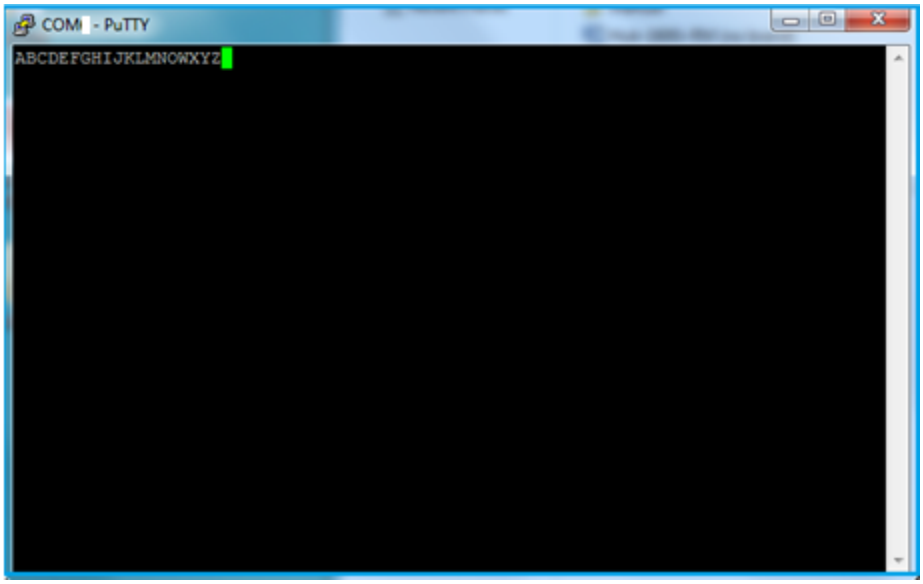
-Flow Control: Select flow control for serial port under test (e.g. None)



From “Category” select “Session” in the PuTTY Configuration window. The basic option for PuTTY session appears. Select “Serial” radio button under “Connection type” menu and click “Open” to start the loop-back test.



After “COMx PuTTY” window screen appears, under “COMx PuTTY” window screen you can key-in any test string from keyboard. If the USB 2.0 4/8-Port Industrial Serial I/O adapters are working properly, the test string should now be sent out on the TxD +/- pins and looped back to the RxD +/- pins. The test string will be received in the “COMx PuTTY” window screen:



After first “USB Serial Port (COMx)” loop-back test is done, you can select to other “USB Serial Port (COMx)” and repeat the loop-back test procedure for other “USB Serial Port (COMx)” on the USB 2.0 4/8-Port Industrial Serial I/O adapters.