



USB 2.0 to 4-Port RS232-422-485 Serial TB Adapter Isolation | Surge

Model Number: *USB2-4COMi-TB*

Installation Guide

Coolgear, Inc.

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Table of Contents

1. Introduction	2
2. Pin-out information	3
3. Power Output	5
4. Hardware Settings	5
5. Proper Wiring for RS-422/485 Operation	8
6. INSTALLATION	10
7. Pre-install Windows	15
8. Uninstalling Windows 10/8.1/8/7/Vista/XP/2003 Drivers	17
9. Manual Windows 10/8.1/8/7 Driver Uninstall	19
10. TOOLS	20
8. Specifications	23

Revision History

Revision	Date	Comments
1.0	04/24/2024	First Release

1. Introduction

Thank you for purchasing Coolgear's USB 2.0 to 4-Port RS232-422-485 Serial TB Adapter Isolation | Surge. The USB2-4COMi-TB USB2.0 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, this industrial serial adapter makes it easier than ever to add four/eight industrial communication ports to your system.

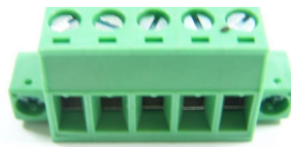
Plugging the USB quad/octal industrial serial adapters to the USB port, the adapters are automatically detected and installed. There are no IRQ & COM port conflicts, since the port doesn't require any additional IRQ, DMA, memory as resources on the system. The RS-232 or RS-422/485 port functions as native 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.

Features:

- ✓ With 2-pin power connector that has inverse polarity protection
- ✓ Supports USB1.1 and USB2.0 transfer speeds from 1.5Mbps up to 480Mbps, automatic link and speed detection
- ✓ Adds four high speed RS-232/422/485 serial ports via USB connection
- ✓ 2k bytes receive and transmit buffer for high speed data throughput
- ✓ Requires no IRQ, DMA, I/O port
- ✓ RS-232 max bitrates up to 1Mbps
- ✓ RS-422/485 max bitrates up to 10Mbps
- ✓ 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
- ✓ Supported RS-232 3-wire signals: RxD, TxD, GND
- ✓ Supported RS-422, RS-485 4-wire signals: TxD-, TxD+, RxD+, RxD-
- ✓ Supported RS-485 2-wire signals: Data-, Data+
- ✓ Monitor LEDs of TxD, RxD indicating port status
- ✓ AC to DC 12V, 1A switching power supply included
- ✓ Industrial-grade metal case with DIN rail ears for DIN rail mounting
- ✓ Supports Windows XP to 11, Server 2000 to Server 2022 (WHQL certified)
- ✓ Supports Linux Kernel 3.0 and above
- ✓ Supports Mac OS X 10.3 and above, driver signed by Apple

2. Pin-out information

5-pin Screw-Lock Type Terminal Block Pin-out Information



RS-232 Pin-out

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

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

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

Pin Name	Pin Type	Description
TxD- (Data-)	Output /Input	Data-: Transmit/Receive RS-485 data, negative polarity
TxD+ (Data+)	Output/In put	Data+: Transmit/Receive RS-485 data, positive polarity
RxD+ (TxD)	X	No Function
RxD- (RxD)	X	No Function
GND	Ground	GND: Signal ground

3. Power Output

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



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

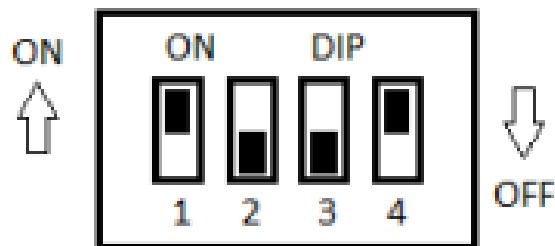
4. Hardware Settings

Selecting the Operation Mode

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, 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)



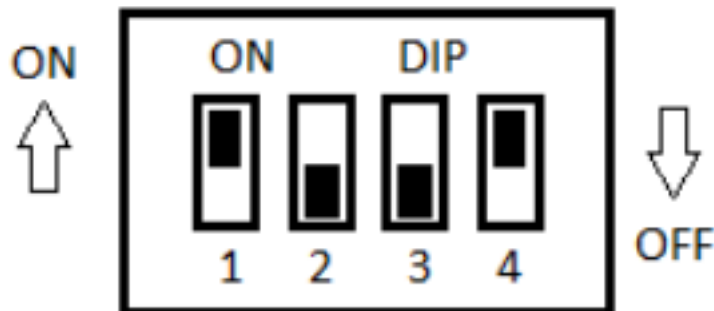
	Operation Mode	1	2	3	4
RS-232	Standard RS-232 Mode	OFF	ON	ON	ON
RS-422	Full Duplex (4-wire)	ON	ON	ON	ON
RS-485	Full Duplex (4-wire)	ON	OFF	ON	ON
	Half Duplex (2-wire) – with Echo	ON	OFF	OFF	ON
	Half Duplex (2-wire) – without Echo	ON	OFF	OFF	OFF

Selecting the Operation Mode

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, 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)



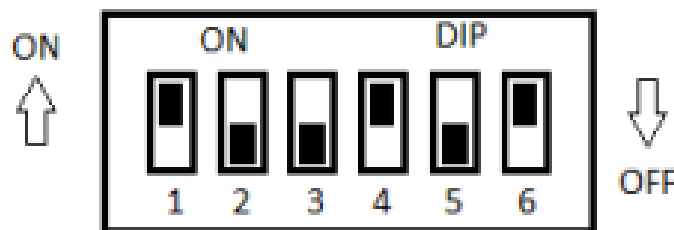
	Operation Mode	1	2	3	4
RS-232	Standard RS-232 Mode	OFF	ON	ON	ON
RS-422	Full Duplex (4-wire)	ON	ON	ON	ON
RS-485	Full Duplex (4-wire)	ON	OFF	ON	ON
	Half Duplex (2-wire) – with Echo	ON	OFF	OFF	ON
	Half Duplex (2-wire) – without Echo	ON	OFF	OFF	OFF

Enabling Termination and Biasing Resistors

There are four/eight 6-pin DIP switches on the bottom of the metal case. The DIP switches are used to enable 120Ω termination resistors and 750Ω 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.

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



Dip Switches		Function
Pin 1	On	Pull-up TxD+ to VCC by 750Ω bias resistor
	Off	No function
Pin 2	On	Enable TxD 120Ω termination resistor
	Off	No function
Pin 3	On	Pull-down TxD- to GND by 750Ω bias resistor
	Off	No function
Pin 4	On	Pull-up RxD+ to VCC by 750Ω bias resistor
	Off	No function
Pin 5	On	Enable TxD 120Ω termination resistor
	Off	No function
Pin 6	On	Pull-down RxD- to GND by 750Ω 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.

5. Proper Wiring for RS-422/485 Operation

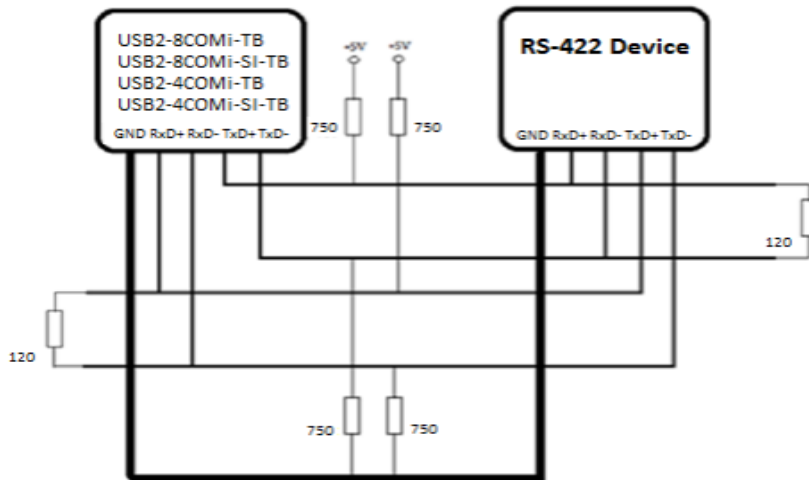
This section will provide proper wiring information about RS-422 and RS-485 data communication. It is necessary to have the basic knowledge to avoid and find errors in data transmission. Failures in cabling are responsible for the vast majority of transmission problems.

RS-422/485 Transmission Technique

The RS-422 and RS-485 use the same balanced transmission method. Signals are not transmitted as voltage on a single wire like in RS-232. 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.

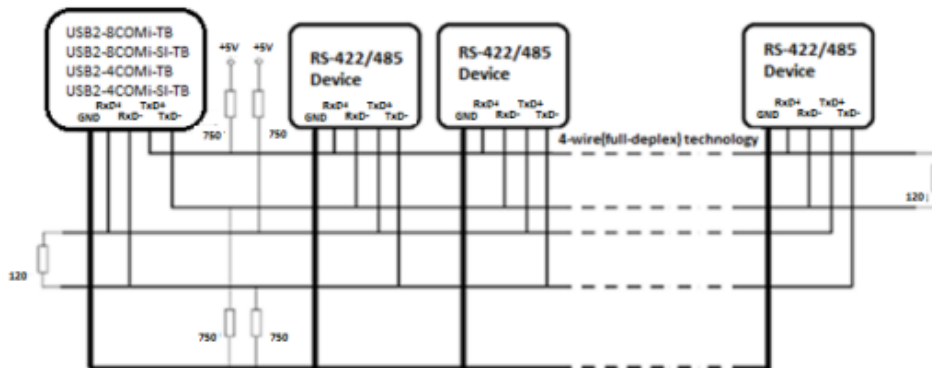
To make sure the signals meet the common voltage range, the GND of sender and receiver must be connected. To ensure the signals are in the valid voltage range so the differential voltage can be correctly sensed by the receiver, the GND lines of the transmitter and receiver must be connected.

RS-422 Signals Connected

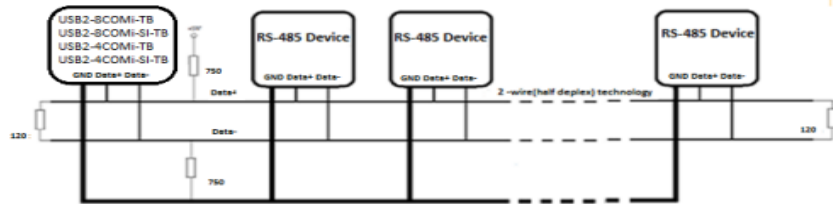


RS-422 and RS-485 4-wire Scheme

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 RS422. Since the USB quad/octal industrial serial adapters use the 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



6. INSTALLATION

Windows Update

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

Windows 10/8.1/8/7/Server 2012/Server 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 the Internet.

Windows Vista/XP/Server 2008/Server 2003

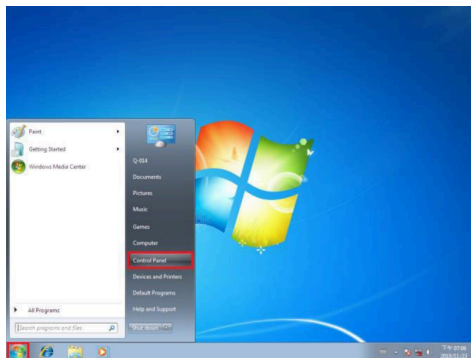
Connect your computer to Internet and plug the USB quad/octal industrial serial adapters to the USB port. When asked to install the drivers, allow your computer to search the Internet to load and install the drivers from Windows Update automatically.

Manual Driver Installation

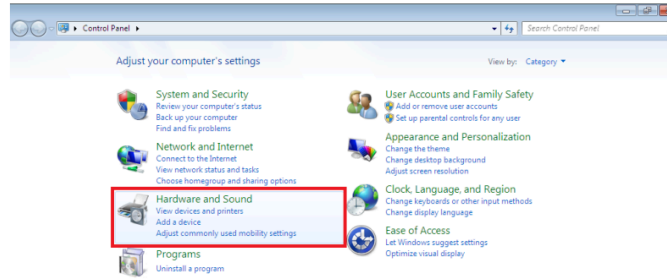
If no suitable drivers are automatically found, the following procedure should be followed.

First, download the latest Windows driver of the USB quad/octal industrial serial adapters from <http://www.ftdichip.com/FTDrivers.htm>.

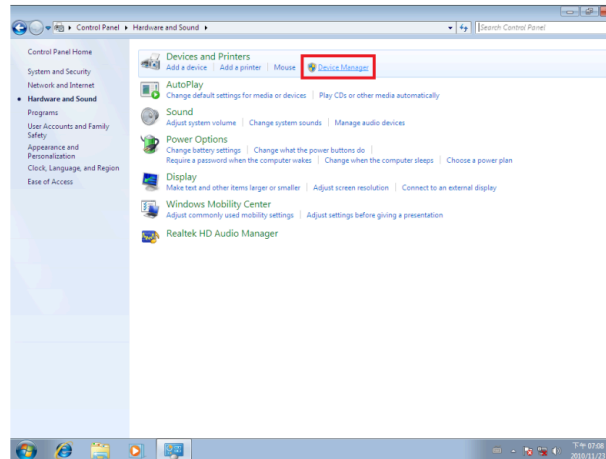
Press "Start" and select "Control Panel" (right click "Start" button for Windows 10, 8.1).



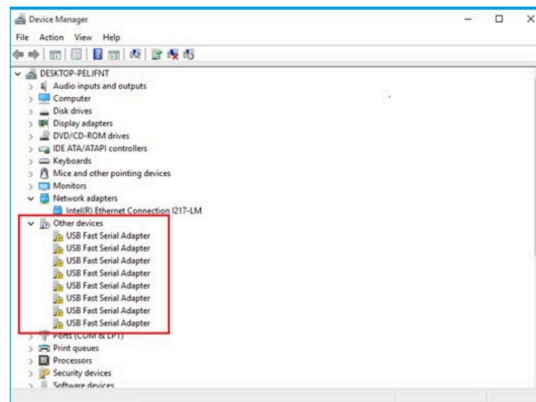
Select “Hardware and Sound” in “Control Panel”



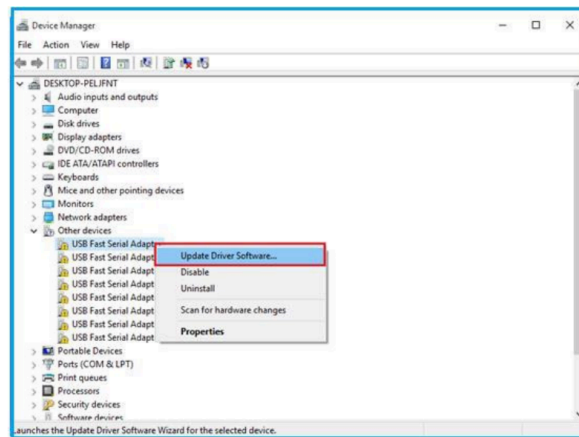
Select “Device Manager”



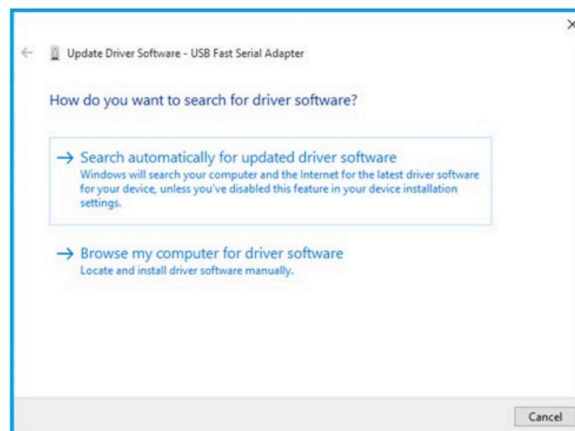
In “Device Manager”, there will be eight “USB Fast Serial Adapter” devices under “Other devices” with a yellow warning symbol indicating that the driver is not installed



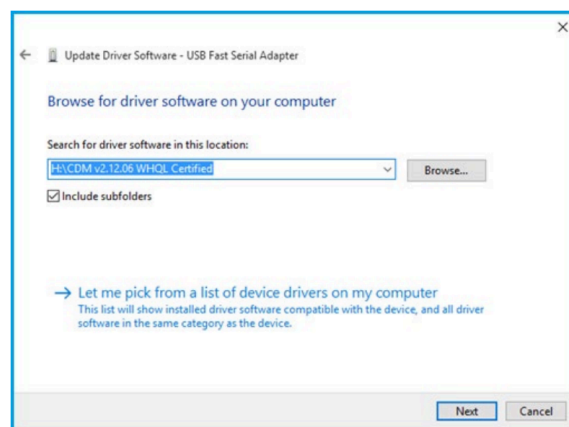
Right click on the first “USB Fast Serial Adapter” to bring up a menu as shown below.



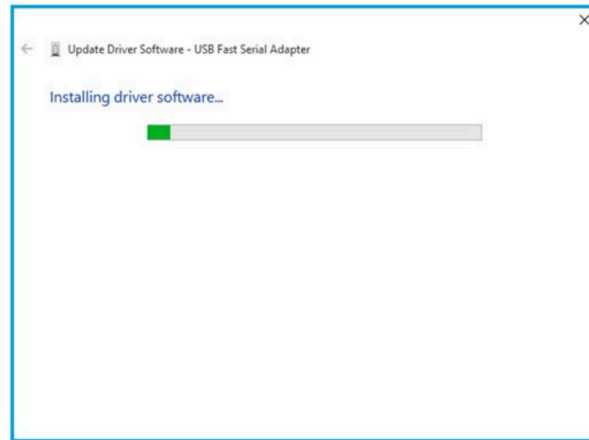
Click “Update Driver Software...”. This then displays the option for an automatic search or a manual search.



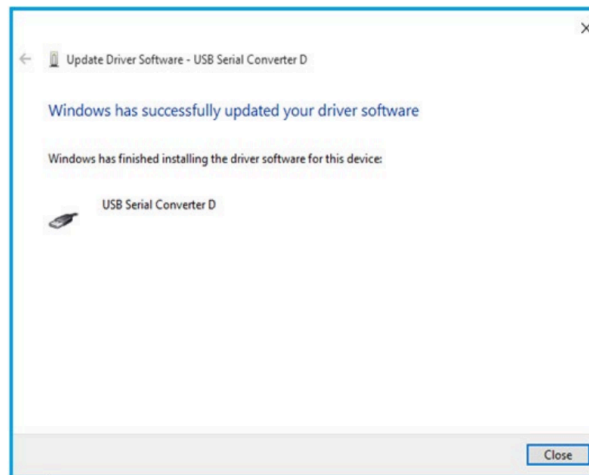
Select the second option to browse manually.



In the address box, put the exact location where the Windows drivers have been saved to. After entering the address select “Next” to start the installation.



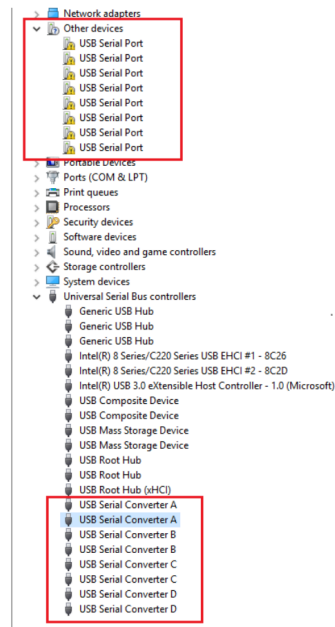
When the installation has finished a completion screen is displayed.



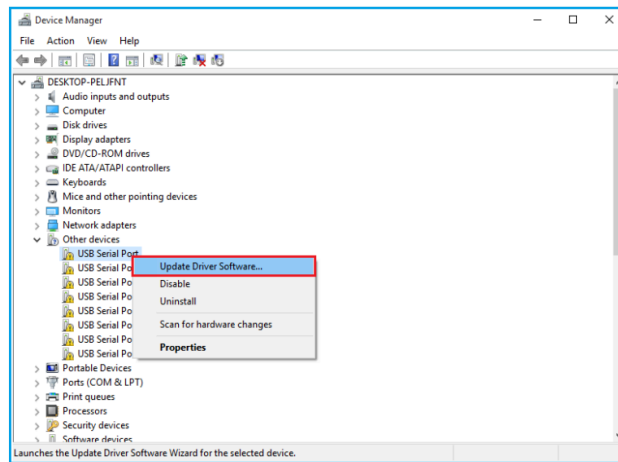
Press “Close” to close this window and go back to “Device Manager”.

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

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

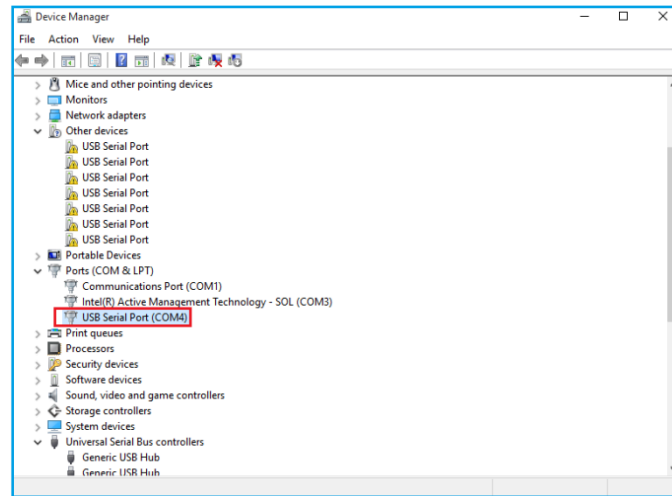


Right click on the first “USB Serial Port” to bring up a menu as shown below.



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

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

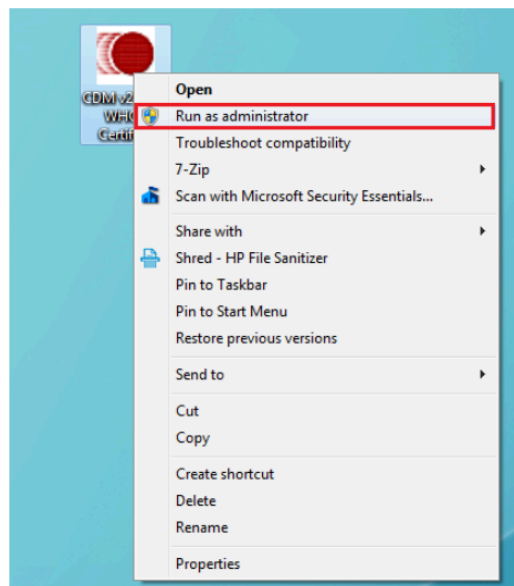


Restart computer to complete installation.

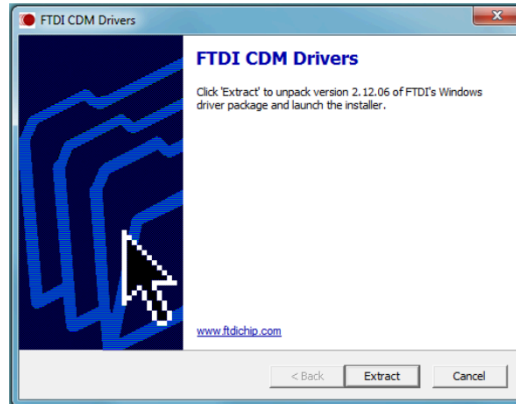
7. Pre-install Windows

The Windows driver is also available as a setup program for pre-installing Windows driver into your PC. Before you plug the USB2.0 4/8-port Industrial Serial I/O adapter into the PC, you need to run the pre-install program. You can download the setup program from <http://www.ftdichip.com/FTDrivers.htm>.

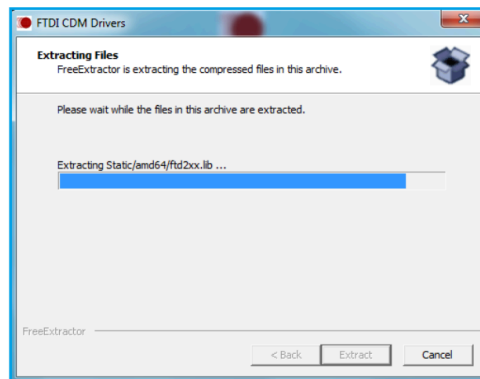
After downloading the driver setup program, right click it and select “Run as administrator”.



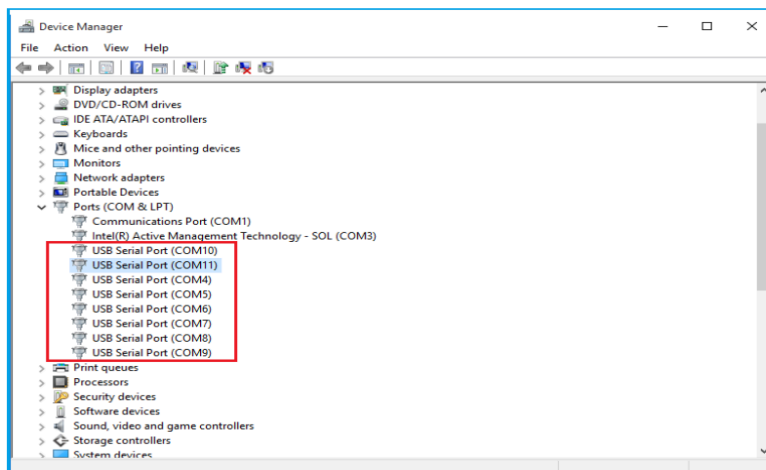
Click “Extract”.



The drivers will be 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”.



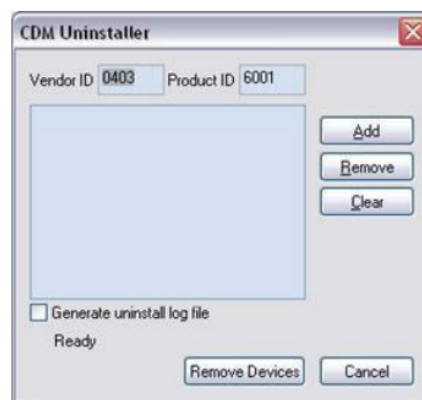
8. Uninstalling Windows 10/8.1/8/7/Vista/XP/2003 Drivers

CDMuninstallerGUI.exe 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_h.htm#CDMUninstaller

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



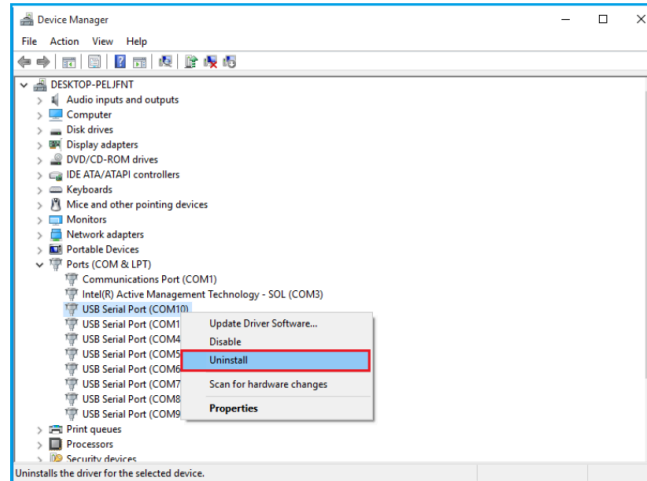
The Vendor ID and Product ID must be a unique combination, if an attempt is made to add the same device twice, the following message box will appear.



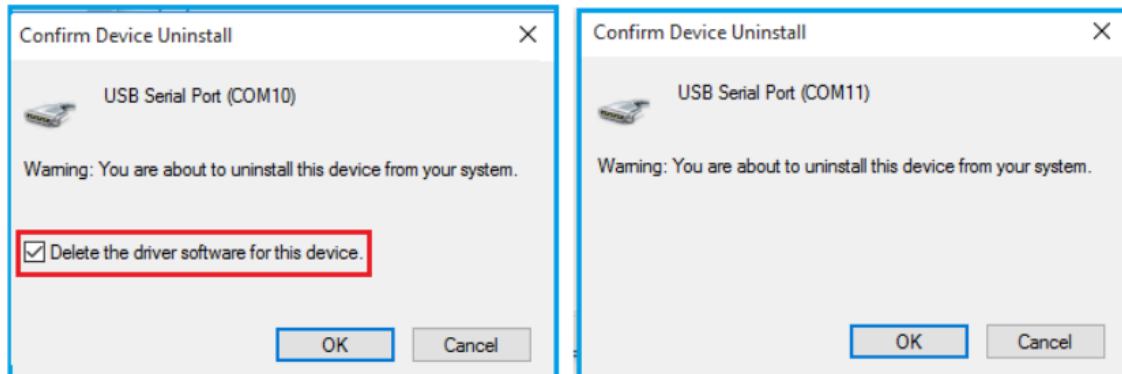
9. Manual Windows 10/8.1/8/7 Driver Uninstall

To manually uninstall the Windows 10/8.1/8/7 driver from Device Manager, please follow the steps below:

Right click on “USB Serial Port (COMx)” in “Device Manager” and select “Uninstall” to start “USB Serial Port (COMx)” Windows driver uninstall.



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



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

10. 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.

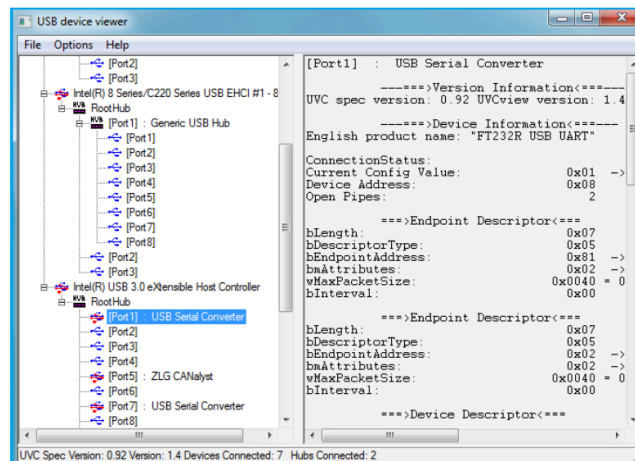
USBView is also available in the Windows driver samples repository on GitHub.

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 loopback 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

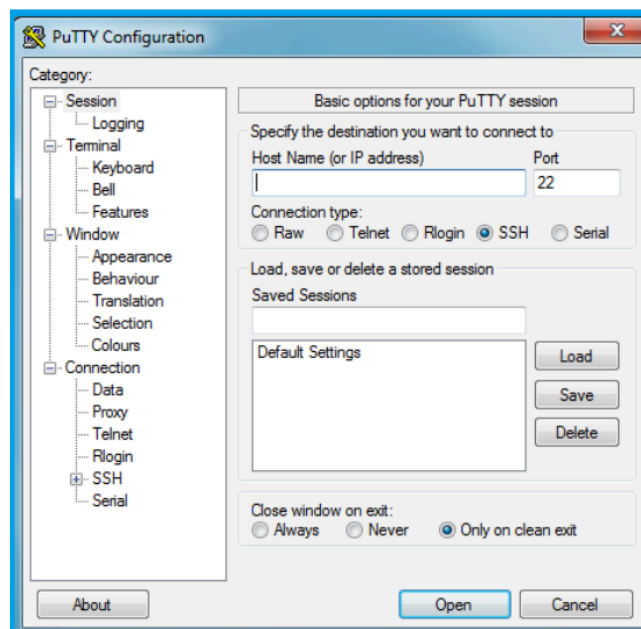
Where to get PuTTY

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-).

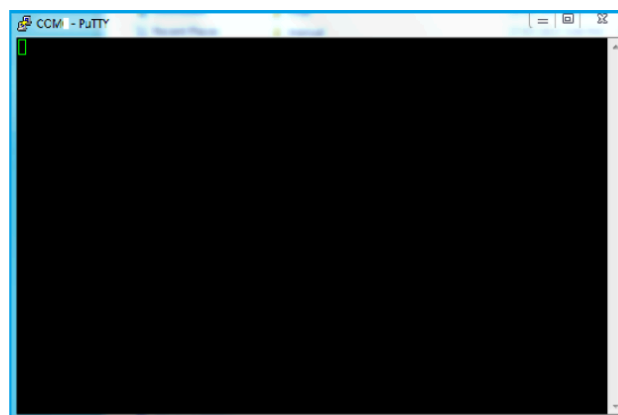
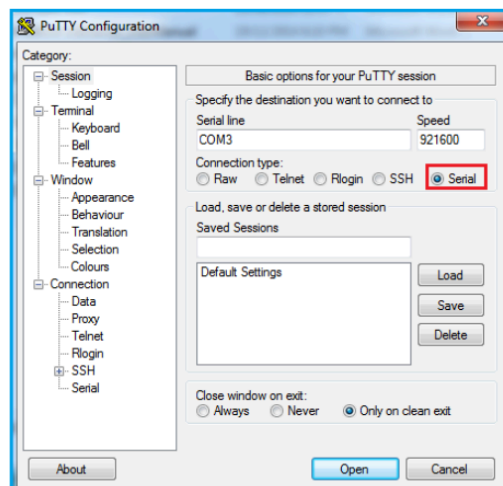
After downloading putty.exe PuTTY application program, click the putty.exe to open PuTTY Configuration window.



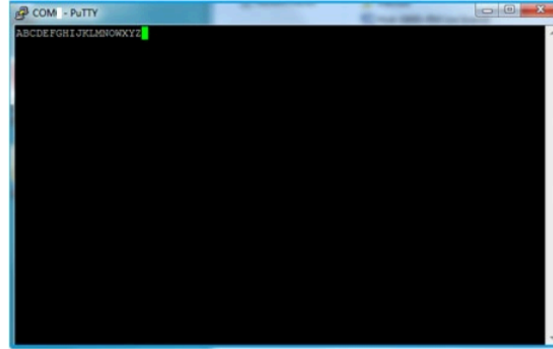
From “Category” select “Serial” in the PuTTY Configuration window. The Serial Line Configuration window is displayed. Select the following setting for loop-back test:

- 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: 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 the PuTTY session. Select “Serial” radio button under “Connection type” menu and click “Open” to start the loop-back test.



After the “COMx PuTTY” window screen appears, under the “COMx PuTTY” window you can key-in any test string from the 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 the first “USB Serial Port (COMx)” loop-back test is done, you can select the 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.

8. Specifications

General

Bus	USB 2.0
Interface	RS-232/422/485
Plug & Play	Supported

Serial 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 Bitrate	921.6kbps
Serial Configuration	Data bits: 7, 8 Parity: None, odd, even, mark, space Stop bits: 1, 2
UART FIFO Buffer Size	Each port has 2kb FIFO for transmit and receive

USB2-4COMi-TB

Serial Ports	Four
Connectors	Four 5-pin screw-lock type terminal block connectors
Protection	15kV ESD protection 600W surge protection
Chipset	FTDI FT4232H USB2.0 to Quad UART Chip

Environmental

Operating Temperature	0°C to 60°C (32°F to 140°F)
Storage Temperature	-40°C to 85°C (-40°F to 185°F)
Operating Humidity	0 to 80% RH. Noncondensing
Safety Approvals	CE, FCC

System Requirements

Any PC with an available USB port and USB compliant operating system such as Windows 10, 8.1, 8, 7, Vista, XP, ME or 2000.

Contact Us:

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Clearwater, Florida 33760 U.S.A.

Toll Free: 1 888-688-2188

Local: 1 727-209-1300

Fax: 1 727-209-1302

Safety

- Read the entire Installation Guide before implementing this product for your application. This guide contains important information about electrical connections that must be followed for safe and proper operation.
- Inspect the product closely for visual defects before putting it to use.
- Keep away from areas where moisture builds, this product contains electrical components that can be damaged by moisture build up, this can adversely affect your equipment connected to it.
- Do not disassemble the product. Handling the product's internal components can expose it to ESD (Electro-Static Discharge) hazards that can affect the function of the device.
- If this product is not functioning properly, email our support team at support@coolgear.com.

USB CHARGING & CONNECTIVITY EXPERTS

Within Every Great Machine

For over 20 years our rugged, off-the-shelf USB hubs, chargers, and serial products are ready to go for your next project. Based in the US, Coolgear has successfully engineered and deployed millions of connectivity solutions into industrial, medical, automotive, commercial, and aerospace industries.

We understand the importance of reliability, build quality, & consider all our customers' applications as critical, wanting to ensure long-lasting event-free integrations.

Compliance Statement

View compliance within the product's respective Technical Data Sheet, found on the product's online listing.

Technical Support

When you reach out to Coolgear support, you'll find yourself in the hands of a solution-oriented and knowledgeable expert ready to answer whatever question you throw at them. If you ever need help with your product, visit coolgear.com/support for support tickets, downloads, and other support resources. For the latest drivers, please visit coolgear.com/download.

Product Standard Warranty

One (1) Year Warranty from Date of Purchase Invoice. Coolgear will repair or replace any Product determined to be defective and which has been returned, at your risk and expense, to Coolgear. Where Coolgear determines in its sole judgment that repair or replacement of such Product is not reasonable, Coolgear will keep the non-conforming Product and refund to you the amount you paid for such Product. Returned Products shall be subject to the balance of the Warranty Period otherwise applicable. Any reconditioned parts used by Coolgear shall be subject to all the same provisions as otherwise applicable to new parts. THE FOREGOING DESCRIBES COOLGEAR'S SOLE LIABILITY, AND YOUR SOLE REMEDY, FOR ANY BREACH OF WARRANTY. IF YOU DO NOT AGREE WITH THE TERMS OF THIS LIMITED WARRANTY, YOU MUST RETURN THE PRODUCTS UNUSED AND IN THEIR ORIGINAL CONTAINERS TO YOUR ORIGIN OF PURCHASE.

Limitation of Liability

This Limited Warranty does not cover: (i) defects or damages resulting from natural causes, casualty, accident, misuse or abuse, neglect, alterations, service or repair by other than Coolgear, including without limitation by you; (ii) improper installation or de-installation, operation or maintenance, improper connections with peripherals or other causes not arising out of defects in the materials or workmanship of Products; (iii) any Product for which the warranty sticker has been removed, modified or defaced; (iv) normal wear and tear; (v) damage to or loss of repaired or replaced Products during shipping by Coolgear except when such damage or loss is caused by poor or inadequate packaging by Coolgear; or (vi) Products purchased outside the United States. UNDER NO CIRCUMSTANCES WILL COOLGEAR BE LIABLE FOR ANY LOSS OF USE, INTERRUPTION OF BUSINESS OR ANY INDIRECT, SPECIAL, INCIDENTAL, PUNITIVE OR CONSEQUENTIAL DAMAGES OF ANY KIND (INCLUDING LOST PROFITS) REGARDLESS OF THE FORM OF ACTION WHETHER IN CONTRACT, TORT (INCLUDING NEGLIGENCE), STRICT PRODUCT LIABILITY OR OTHERWISE, EVEN IF COOLGEAR HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. IN NO EVENT SHALL THE TOTAL LIABILITY OF COOLGEAR HEREUNDER EXCEED THE GREATER OF \$50.00 OR THE AMOUNT YOU ACTUALLY PAID FOR THE PRODUCT GIVING RISE TO SUCH LIABILITY, REGARDLESS OF THE CAUSE OF ACTION, IN CONTRACT, TORT, STRICT LIABILITY OR OTHERWISE. NOT ALL JURISDICTIONS ALLOW SUCH LIMITATIONS OF DAMAGES SO THE FOREGOING LIMITATIONS MAY NOT APPLY TO YOU.

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