



# USB to Optical Adapter Industrial Isolated RS- 232/422/485

## Product Manual

Coolgear, Inc.

Version 2.1

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Model Number: USB-COMi-Si-M



## Revision History

Revision	Date	Author	Comments
1.0	02/27/2018	Coolgear	New Manual
2.0	11/09/2018	Coolgear	Added RS-232 Functionality to Device
2.1	12/21/2018	Coolgear	Revised DIP table – Edited formatting

## About this document

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This product manual outlines installation and features of the USB-COMi-Si-M USB to Optical Adapter Industrial Isolated RS-232/422/485.

## Scope

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The scope of this manual is to give the user of the product an understanding of its use with detailed diagrams and verbiage. The manual allows the users to apply the product to their application.

## Intended Audience

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This product is intended for use in numerous industries including but not limited to applications such as; Factory Automation, Data Centers, Serial Equipment, Kiosk, Office, and others.

## Product Support

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[support@coolgear.com](mailto:support@coolgear.com)

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## 1. Introduction

The USB-COMi-SI-M USB-to-Optically Isolated RS-422/485 Adapter is designed to provides instant connectivity to RS-232/422/485 communication devices for factory automation equipment, multi-drop data collection devices, barcode readers, time clocks, scales, data entry terminals, PC to PC long distance communications, ATMs and serial communication in harsh environment.

WEIGHT	.31 lbs
DIMENSIONS	72.10(L 81.34 w/ears))x58.13(W)x22.68mm(H)
UPC	729440690885
WARRANTY	1 year from date of purchase
COLOR	Black
PORTS	1 DB-9 Serial Port / 1 6-pin Terminal Connector

### 1.1 Features

- TAA Compliant
- Adds a high speed RS-232 / 422 / 485 serial port via USB connection.
- 2000V DC optical isolation for all signals
- Requires no IRQ, DMA, I/O port.
- Data rates: 300 bps to 921.6K bps
- High speed serial port with the baud rate up to 921.6K bps.
- Serial Connector: one DB-9 male connector, and one 6-pin Terminal Block.
- Auto transmit buffer control for 2-wire RS-485 half-duplex operation
- 384 byte receive buffer.
- 128 byte transmit buffer for high speed data throughput.
- Termination resistors installed on-board.
- RS-232 data signals: RxD, TxD, GND, RTS, CTS
- RS-422 data signals: Tx-, Tx+, Rx+, Rx-, GND, RTS-, RTS+, CTS+, CTS-.
- RS-485 data signals: Tx-, Tx+, Rx+, Rx- (4 wire), and data-, data+ (2 wire).
- Monitor LEDs of TxD, RxD indicating port status.
- External 4-pin DIP switch to set RS-232, 422, or RS-485 modes.
- Virtual COM port drivers provided for Windows 7, Vista, 2003, XP, 2000.
- Self-power (500mA, 5V)

## 2. Hardware Installation

Outside the unit, there is a 4-pin DIP switch used to select the mode of operation. You will need to set the switch settings to RS-232 mode, RS-422 mode, or RS-485 mode, as per the requirements of your application. After setting the switches, plug in the adapter to a USB port to start driver installation. The RS-232 & RS-422 & RS-485 mode block configuration settings are listed as follows.



After the setting of DIP switch, you then plug the adapter to USB port to start driver installation. The USB-COMi-SI-M only supports RxD, TxD, GND, RTS, CTS signals for RS-232 mode. The Mode Block Configuration Settings are listed as follows:

### 2.1 External DIP Switch

	Operation Mode	S1	S2	S3	S4
<b>RS-232</b>	Standard RS-232 Mode	OFF↓	ON↑	ON↑	ON↑
<b>RS-422</b>	4 wire with handshaking	ON↑	ON↑	ON↑	ON↑
<b>RS-485</b>	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↓

Inside the unit, there are 7x2 (JP1) header blocks for jumpers which enable Tx, Rx, CTS 120Ω termination resistors and Rx, Tx 750Ω biasing resistor. You will need to open up the case and set the jumper setting for RS-422 mode, or RS-485 mode, as per the requirements of your application. Settings are listed below:

You will need to open up the metal case and set the jumper setting for RS-422 mode or RS-485 mode as per the requirements of your application.

Settings are listed as follows:

JP1 Jumper		Function
1-2	Close	Tx+/- termination of 120Ω. This jumper should always be populated for RS-485.
3-4	Close	Pull-up Tx+ to VCC by 750Ω bias resistor. This jumper should be populated for pull-up Tx+.
5-6	Close	Pull-down Tx- to GND by 750Ω bias resistor. This jumper should be populated for pull-down Tx-.
7-8	Close	Rx+/- termination of 120Ω. This jumper should always be populated for RS-232/422/485 full-duplex mode.
9-10	Close	Pull-up Rx+ to VCC by 750Ω bias resistor. This jumper should be populated for pull-up Rx+.
11-12	Close	Pull-down Rx- to GND by 750Ω bias resistor. This jumper should be populated for pull-down Rx-
13-14	Close	CTS termination of 120 Ohm. This jumper should always be populated for RS-422 mode.

**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.

Biasing of data lines must only occur at a single point anywhere in the cabling. USB-COMi-SI-M provides biasing for ease of installation. If your cabling already provides biasing, please be sure to disable this inside the unit.

Termination must not be installed in the middle of the cable. It is only permitted at both ends. Since a computer controlled serial port is almost always at one end of the cable, termination is disabled by default.

## 2.2 JP2 Enabling the +5V 150mA Power for an External Device

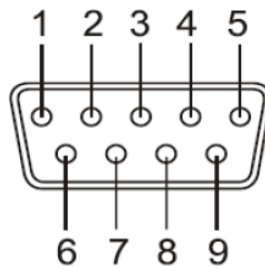
The USB-COMi-SI-M provides a unique feature of supplying power output of 5V/150mA through pin 5 of the terminal block connector to serial device requiring power. By default, this feature is disabled; you need to open the metal case and close the jumper (JP2) to enable 5V 150mA power.

JP2 Jumper	Function
Close	Enable the DB9 pin 1 and pin 5 to support a 5V 150mA power for an external device.
Open	Disable the 5V 100mA power (default).

### 3. Serial Port Connector Pinout

#### RS-232 Mode Pinout of 9-pin D-sub Connector (CN2)

The RS-232 serial ports are configured as data terminal equipment (DTE), with a 9-pin D-sub connector. Pin assignments are according to TIA/EIA-574, which formally defines the assignments for a COM port that are found on many personal computers.



**DB9 Male connector pin numbers**

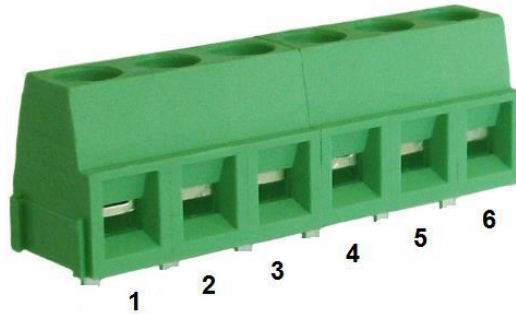
Pin Number	Pin Type	Description	
1	Input	DCD	Data Carrier Detect
2	Input	RxD	Receive Data
3	Output	TxD	Transmit Data
4	Output	DTR	Data Terminal Ready
5	Ground	GND	Signal Ground
6	Input	DSR	Data Set Ready
7	Output	RTS	Request to Send
8	Input	CTS	Clear to Send
9	Input	RI	Ring Indicator

RS-232 pinout for the DB-9 connector

**Note:** The USB-COMi-SI-M only supports RxD, TxD, GND, RTS, CTS signals for RS-232 mode.



### 3.1 RS-232 Mode Pinout of 9-pin Terminal Block (TB1)



Terminal block connector pin numbers

Pin Number	Pin Type	Description	
1	Input	DCD	Data Carrier Detect
2	Input	RxD	Receive Data
3	Output	TxD	Transmit Data
4	Output	DTR	Data Terminal Ready
5	Power	+5V	DC + 5V 150mA
6	Ground	GND	Signal Ground

**Note:** The USB-COMi-SI-M only supports RxD, TxD, GND, RTS, CTS signals for RS-232 mode.

#### RS-422 Mode Pinout

Pin Number	Pin Type	Description	
1	Output	TxD-	Transmit Data, negative polarity
2	Output	TxD+	Transmit Data, positive polarity
3	Input	RxD+	Receive Data, positive polarity
4	Input	RxD_	Receive Data, negative polarity
5	Ground	GND	Signal Ground
6	Output	RTS-	Request to Send, negative polarity
7	Output	RTS+	Request to Send, positive polarity
8	Input	CTS+	Clear to Send, positive polarity
9	Input	CTS-	Clear to Send, negative polarity

### RS-422 Pinout for 6-pin terminal block connector

Pin Number	Pin Type	Description	
1	Output	TxD-	Transmit Data, negative polarity
2	Output	TxD+	Transmit Data, positive polarity
3	Input	RxD+	Receive Data, positive polarity
4	Input	RxD-	Receive Data, negative polarity
5	Power	+5V	DC + 5V 150mA
6	Ground	Ground	Signal Ground

### RS-485 Full-Duplex Mode Pinout for DB-9 Connector

Pin Number	Pin Type	Description	
1	Output	TxD-	Transmit Data, negative polarity
2	Output	TxD+	Transmit Data, positive polarity
3	Input	RxD+	Receive Data, positive polarity
4	Input	RxD-	Receive Data, negative polarity
5	Ground	GND	Signal Ground

### RS-485 Half-Duplex Mode Pinout for DB-9 Connector

Pin Number	Pin Type	Description	
1	Output/input	TxD-	Transmit/Receive Data, negative polarity
2	Output/input	TxD+	Transmit/Receive Data, positive polarity
5	Ground	RxD+	Signal Ground

### RS-485 half-duplex pinout for 6-pin terminal block connector

Pin Number	Pin Type	Description	
1	Output/input	TxD-	Transmit Data, negative polarity
2	Output/input	TxD+	Transmit Data, positive polarity
5	Power	+5V	DC + 5V 150mA
6	Ground	GND	Signal Ground

## 3.2 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 in order to avoid or find errors in data transmission. Failures in cabling are responsible for the vast majority of transmission problems.

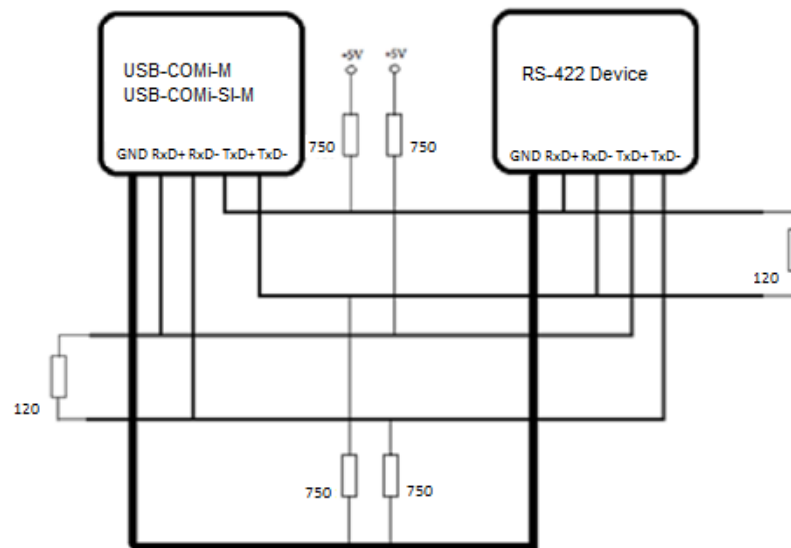
### RS-422 & RS-485 Transmission Technique

The RS-422 and RS-485 use the same balanced transmission method. Signals are not transmitted as voltage on a single wire, 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 somehow. To ensure 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

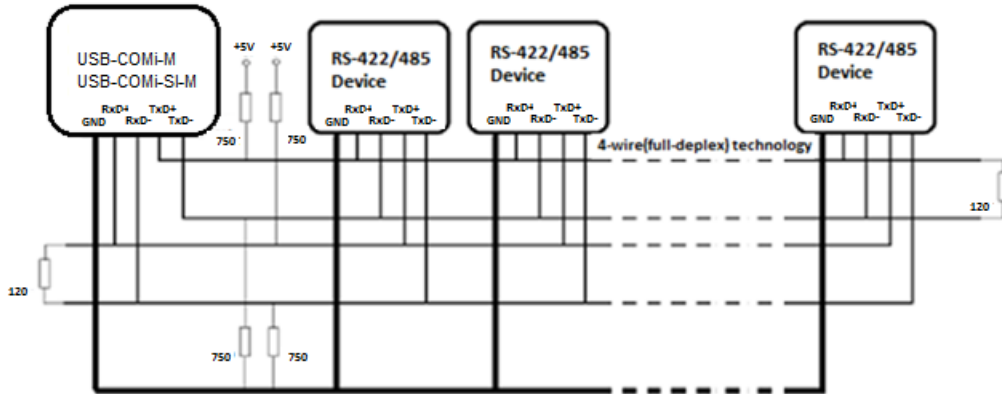
The following diagram shows how RS-422 signals are connected.



### RS-422 & RS-485 4-wire Scheme

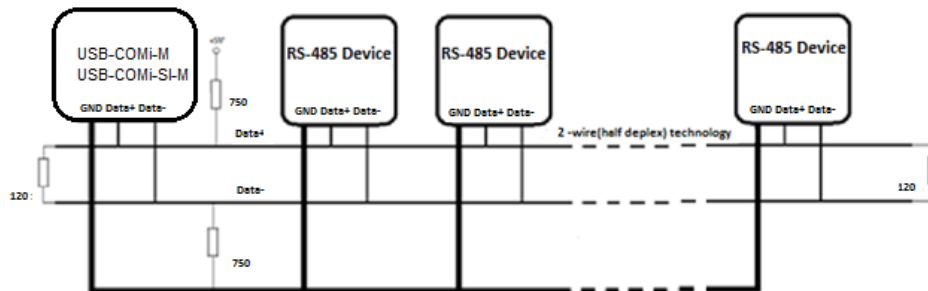
The RS-422 requires dedicated wire pairs for transmit and receive. The transmit wires are used to send data to as many as 10 receivers, as stated in the specifications of RS-422. Since the USB-to-Industrial Single RS-232/422/485 Adapter uses the RS-485's line

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:



## 4. Installing Windows Driver

In most cases, the Windows driver of the USB-to-Industrial Single RS-232/422/485 Adapter will be installed automatically.

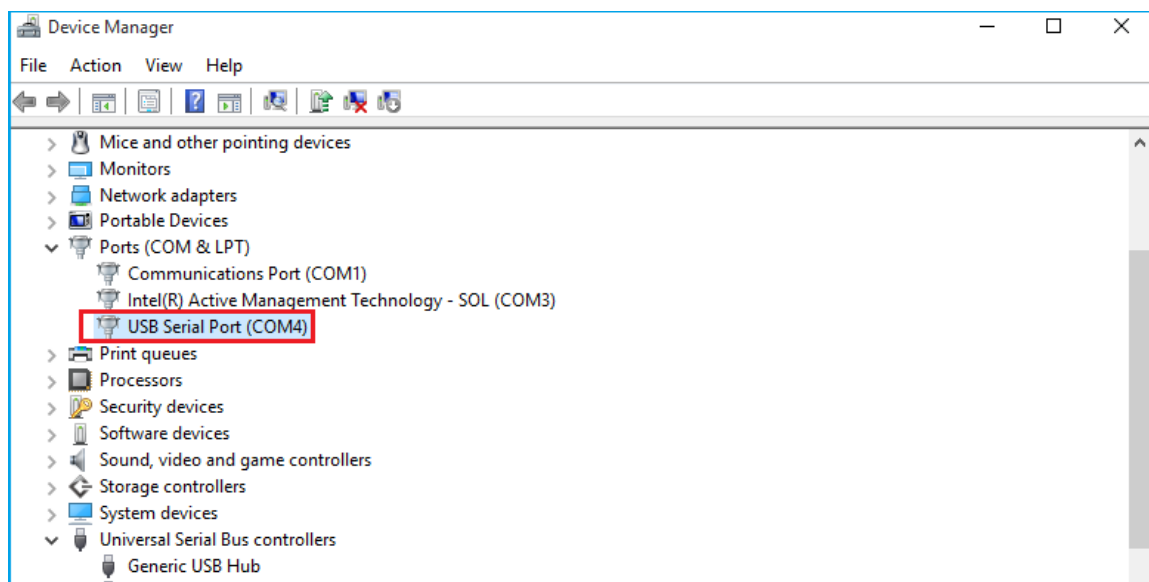
### 4.1.1 Installing in Windows 10, 8.1, 8, 7, Server 2012 and 2008 R2

Connect your computer to Internet and plug USB-to-Industrial Single RS-232/422/485 Adapter to the USB port. The driver will be installed automatically via Internet.

### 4.1.2 Installing in Windows XP, Vista, Server 2003 and 2008

Connect your computer to Internet and plug the USB-to-Industrial Single RS-232/422/485 Adapter 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.

When USB-to-Industrial Single RS-232/422/485 Adapter driver installation is done, you will find “USB Serial Port (COMX)” under “Ports (COM & LPT)” of device manager.

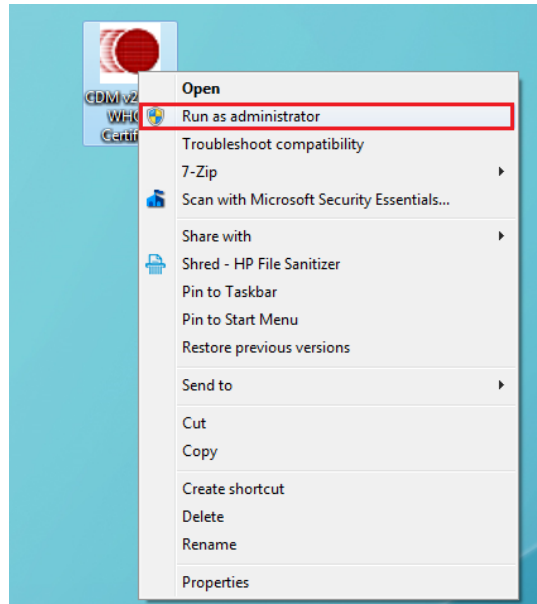


## 4.2 Pre-Installing Windows Driver

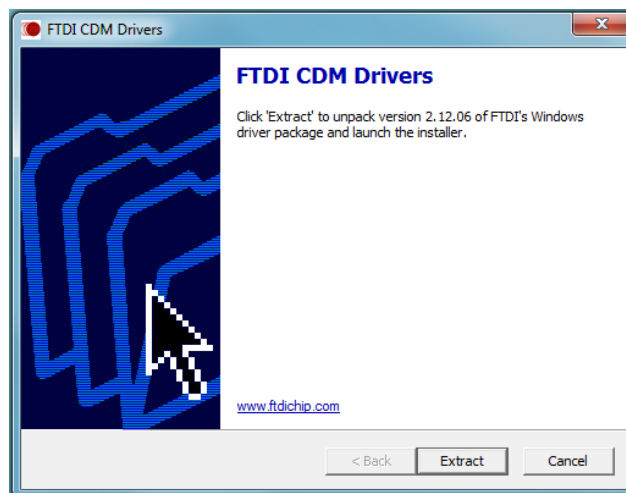
The Windows driver is also available as a setup program (CDMvX.XX.XX WHQL Certified.exe) to pre-install Windows driver into your PC. Run the pre-install setup program before plugging the USB-to-Industrial Single RS-232/422/485 Adapter into the PC. You can download the setup program (CDMvX.XX.XX WHQL Certified.exe) from:

<http://www.ftdichip.com/FTDrivers.htm>

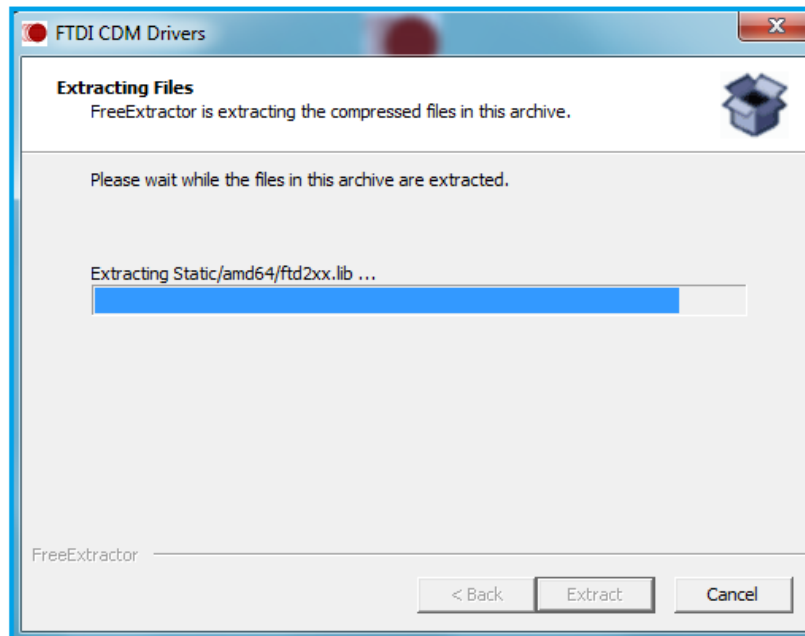
After downloading the driver setup program right click it and select “Run as administrator”



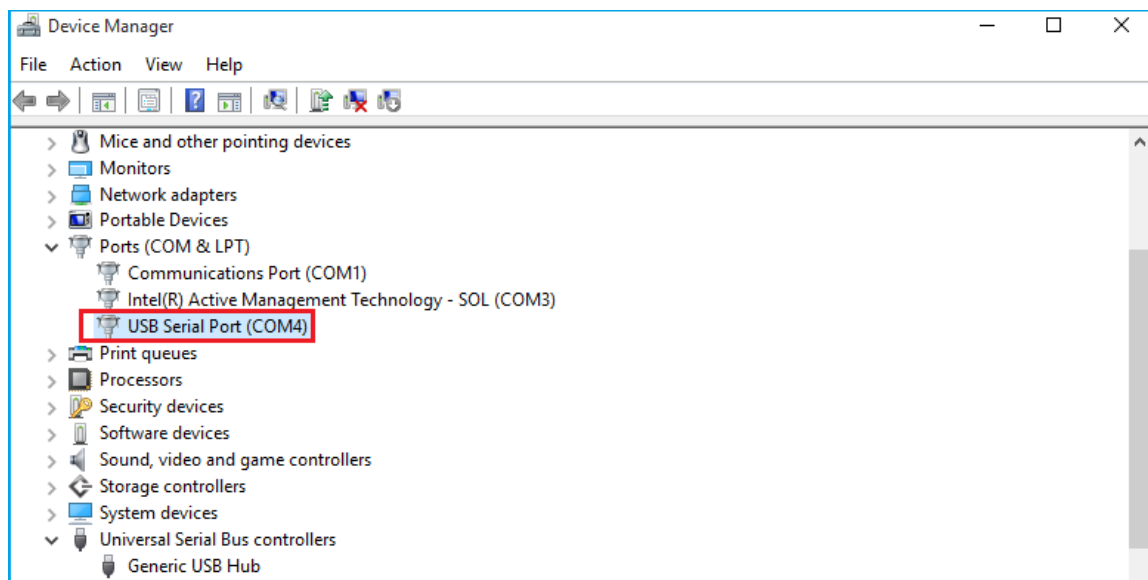
Press the “Extract” button



The driver will now be automatically installed.



Whenever the USB-to-Industrial Single RS-232/422/485 Adapter is plugged into the PC, the Windows driver will be installed and listed in device manager.



### 4.3 Uninstalling Windows Driver

The program CDMuninstallerGUI.exe is used to remove installed drivers from the user's system and clean them from the Windows registry. You can download this program (CDMUninstaller\_vX.X.zip) from:

[http://www.ftdichip.com/Support/Utilities\\_htm#CDMUninstaller](http://www.ftdichip.com/Support/Utilities_htm#CDMUninstaller)

## Supported Operating Systems

The 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-to-Industrial Single RS-232/422/485 Adapter uses the FTDI default Vendor ID (0x0403). Depending on the specific model of USB-COMi-M/USB-COMi-SI-M, the valid Product IDs may be: 0x6001, 0x6010 or 0x6011...etc.



To remove a device, it must be added into the device window. They must all 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 removing a device, 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.



## 5. Notes, Tips, and Warnings

### Note

**Note:** In the most common situations, a 120 Ohm termination resistor of TxD (S4 is ON) is required in a RS485 Half Duplex configuration. Otherwise it is rarely used. Reference section 2.1

**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. Reference section 2.1

**Note:** if you have more than one USB Serial Port (COMx) installed in your PC, you need to repeat from step 5 to step 6 to delete the driver software for each port. Reference section 4.1

### Tip

N/A

### Warning

N/A

### Safety

- Read the entire Product Manual before implementing this product for your application. This manual 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](mailto:support@coolgear.com).

## 6. Supporting References

Document	Link
Website Product Page	<a href="https://www.coolgear.com/product/usb-to-optical-isolated-rs-422485-industrial-adapter">https://www.coolgear.com/product/usb-to-optical-isolated-rs-422485-industrial-adapter</a>

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