VSCOM USB PRO Series Industrial I/O Adapters

1. Introduction of Software Configurable & Jumperless Industrial USB to RS-232/422/485 Adapters

The VSCOM USB PRO Series Industrial I/O Adapters are advanced USB to Serial Adapters that connect to 1, 2, 4 or 8 RS-232/422/485 serial devices. The adapters make industrial communication port expansion quick and simple. Connecting to a USB port on your computer or USB hub, the VSCOM USB PRO series Industrial I/O Adapters instantly add RS-232/422/485 ports to your system. By taking advantage of the USB bus, the VSCOM USB PRO Series Industrial I/O Adapters make it easier than ever to add RS-232 /422/485 devices to your system with easy plug-and-play and hot plug features.

Plugging the VSCOM USB PRO Series Industrial I/O Adapters to the USB port, the adapters are automatically detected and installed. There are no IRQ & COM port conflicts, since the ports don't require any additional IRQ, DMA, memory as resources on the system. The RS-232 / 422 / 485 ports function as native Windows COM ports, and are compatible with Windows serial communication applications.

The VSCOM USB PRO Series Industrial I/O Adapters can be set to work in different RS-232/422/485 modes. Each serial port can be configured and set independently to a specific operation mode. All the PRO Series Adapters are designed, in RS-422 mode or RS-485 mode, to provide options to configure termination and biasing of data transmission lines. As per the requirement of your applications, you can enable, or disable Tx ,Rx 120 Ohm termination resistor and Tx, Rx 750 Ohm BISAing resistor conveniently by software.

One of the unique features of VSCOM USB PRO Series is that the products are configured by user-friendly hardware configuration utility program "UsbComCfg". There is no need to open the case of the products and to set jumpers to enable or disable a specific function. You can easily check the status of serial port operation modes of each port by seeing the color of the LEDs and by running the provided utility or any terminal programs.

In this manual, we refer to the products in the series collectively as VSCOM USB PRO Series. The models in the VSCOM USB PRO Series are:

- **USB-COM PRO**   1-port RS-232/422/485 USB1.1 to Serial Adapter
- **USB-2COM PRO**   2-port RS-232/422/485 USB1.1 to Serial Adapter
- **USB2-4COM PRO**   4-port RS-232/422/485 USB2.0 to Serial Adapter
- **USB2-8COM PRO**   8-port RS-232/422/485 USB2.0 to Serial Adapter

2.0 Common Features

USB-COM PRO, USB-2COM PRO, USB2-4COM PRO, USB2-8COM PRO

- Adds high speed RS-232 / 422 / 485 port via USB connection
- 384 byte receive buffer
- 128 byte transmit buffer for high speed data throughput
- Additional I/O or IRQ not required
- Serial transmission speed up to 921.6 Kbps
- Suitable for 4-wire RS-422/485 and 2-wire RS-485 applications
- Auto transmit buffer control for 2-wire RS-485 half-duplex operation
- Tx ,Rx Termination resistors installed on-board and easy enable/disable via software utility or console port
- Tx , Rx BIASing resistors installed on-board and easy enable/disable via software utility or console port
- Easy operation mode change via software utility or console port
- Monitor LEDs of TxD, RxD of each port indicating port status
- Monitor LEDs of mode indicating serial port operation mode
- Virtual COM port drivers available for Windows 2000/XP/2003/Vista/Windows 7.

2.1 Specific Characteristics

2.1.1 USB-COM PRO (1 port)

- Interface :USB1.1 (12 Mbps)
- Serial connector : one DB9 male connector and one 5-pin Terminal Block for easy wiring
- Power Supply: works in USB self power mode (5V, 500mA), no external power supply is needed.

2.1.2 USB-2COM PRO (2 port)

- Interface :USB1.1 (12 Mbps)
- Serial connector : two DB9 male connectors and two 5-pin Terminal Block for easy wiring
- Power Supply: requires an external power adapter (DC5V, 1.6A).

2.1.3 USB2-4COM PRO (4 port)

- Interface :USB2.0 (up to 480 Mbps)
- Serial connector : four DB9 male connectors
- Power Supply: requires an external power adapter (DC5V, 1.6A).

2.1.4 USB2-8COM PRO (8 port)

- Interface :USB2.0 (up to 480 Mbps)
- Serial connector : 8 DB9 male connectors
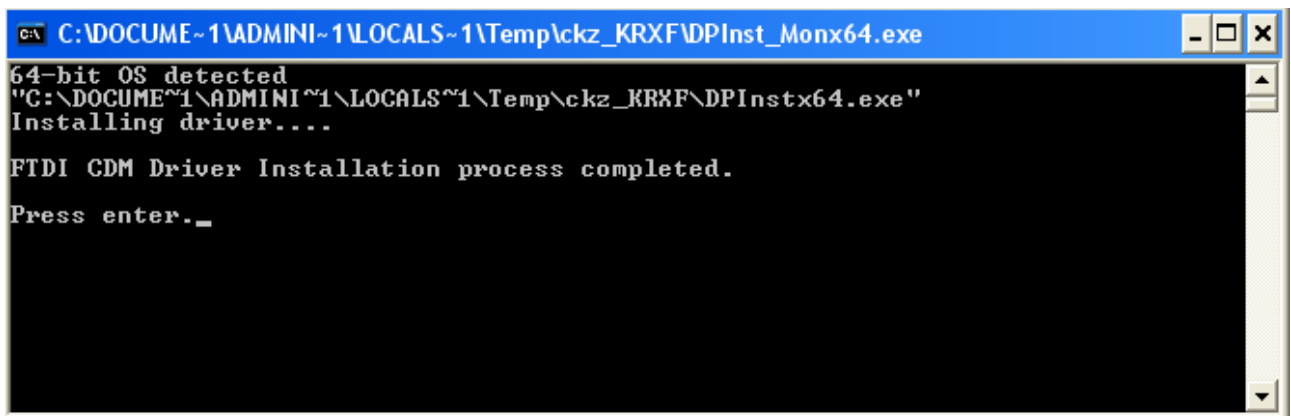- Power Supply : built-in internal switching power supply

Windows 7/ Vista / 2003 / XP / 2000 Driver Installation

You need to have administrator privileges to install any new drivers under Windows 7/ Vista / 2003/ XP / 2000. To install the driver or update the configuration please log onto Windows as "Administrator" or ask your system administrator to install the USB to serial driver.

You need to install driver first, prior to hardware installation. Do not connect the VSCOM USB PRO Series Industrial I/O Adapters to the USB port of your computer, before you finish driver installation.

Please proceed with the following steps to install the driver:

1. Insert the "USB COM Series Driver and Utility" CD into your CD-ROM.
2. The "USB COM Series Driver and Utility CD" dialog box appears.
3. Under "Driver Installation", double click "Windows 7, Vista, 2003, XP, 2000 driver" to install the device driver.
4. The USB COM install program will auto-detect the OS type and install the driver automatically. (Note: in Windows 7 or Vista OS you will find another dialog box, please click on "OK" to confirm the drivers install program).

```
C:\DOCUME~1\ADMINI~1\LOCALS~1\Temp\ckz_KRXF\DPInst_Monx64.exe
64-bit OS detected
"C:\DOCUME~1\ADMINI~1\LOCALS~1\Temp\ckz_KRXF\DPInstx64.exe"
Installing driver....

FTDI CDM Driver Installation process completed.

Press enter._
```

5. After the message "FTDI CDM Driver installation process completed" appears, press "Enter" to complete the driver installation.
6. Plug in the USB PRO Series Adapter to the USB port of your computer. Windows will finish installing the driver files.

3.1 Check Installation

You can now verify the installation has been completed successfully by looking under Device Manager of the System Properties screen. (Go there by Start-Setting-Control Panel-System Properties-Hardware-Device Manager.

The device should have installed as a "USB Serial Port (COMx)" attached to "USB Serial Converter (A/B)".

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3.2 Change COM Port Properties & COM Port Number

This feature is particularly useful for programs, such as HyperTerminal, which only work with COM1 through COM4. Please ensure that you do not change the COM Port Number already in use.

To change the virtual COM port properties:
● Select the "USB Serial Port"
● Click "Properties".
● Select "Port Setting" and "Advanced".
● Click the drop down arrow on COM Port Number, and scroll to the required COM port. Select "OK".
● Return to the Device Manager Screen. You will see that the USB Serial Port installation has been changed to the new COM Port Number.

3.3 Uninstalling Windows 2003/XP/2000 Drivers

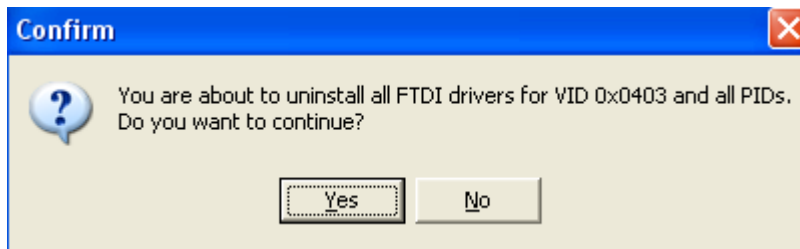Please proceed with the following steps to uninstall the 2003/XP/2000 driver:
1. Insert the "USB COM Series Driver and Utility" CD into your CD-ROM.
2. The "USB COM Series Driver and Utility CD" dialog box appears.
3. Under "Driver Uninstalling", double click "Windows 2003, XP, 2000 driver uninstall" to uninstall the device driver.
4. When following dialog box appears, double click "Clean System" to uninstall the 2003/XP/2000 drivers.
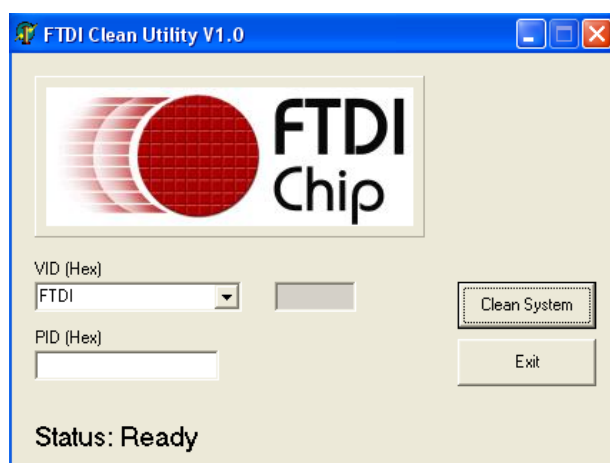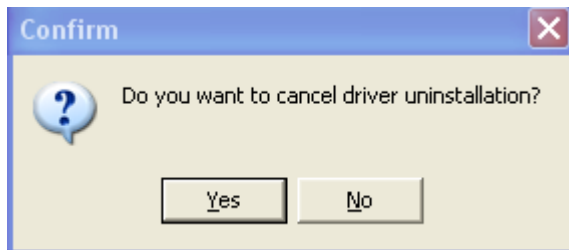

5. You need to disconnect all USB to serial Adapters from your PC, when the message below appears. Double click "OK" to start uninstalling Windows 2003/XP/2000 USB to Serial drivers.

USB PRO Series   Software & Hardware Configurable USB-to-Industrial RS-232/422/485 Adapter
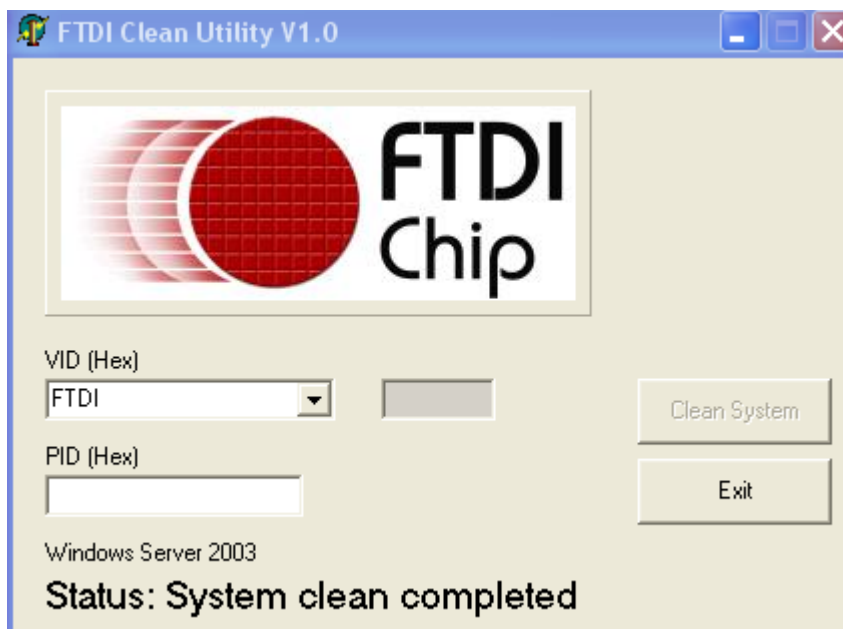
6. Double click "Yes" to confirm it.

7. Click "No" to proceed.

8. When the message "Status: System clean completed" appears, double click "Exit" to complete the USB to serial drivers uninstall.

9. Press "Start" button and select "Control Panel".

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10. Open the Add or Remove program.
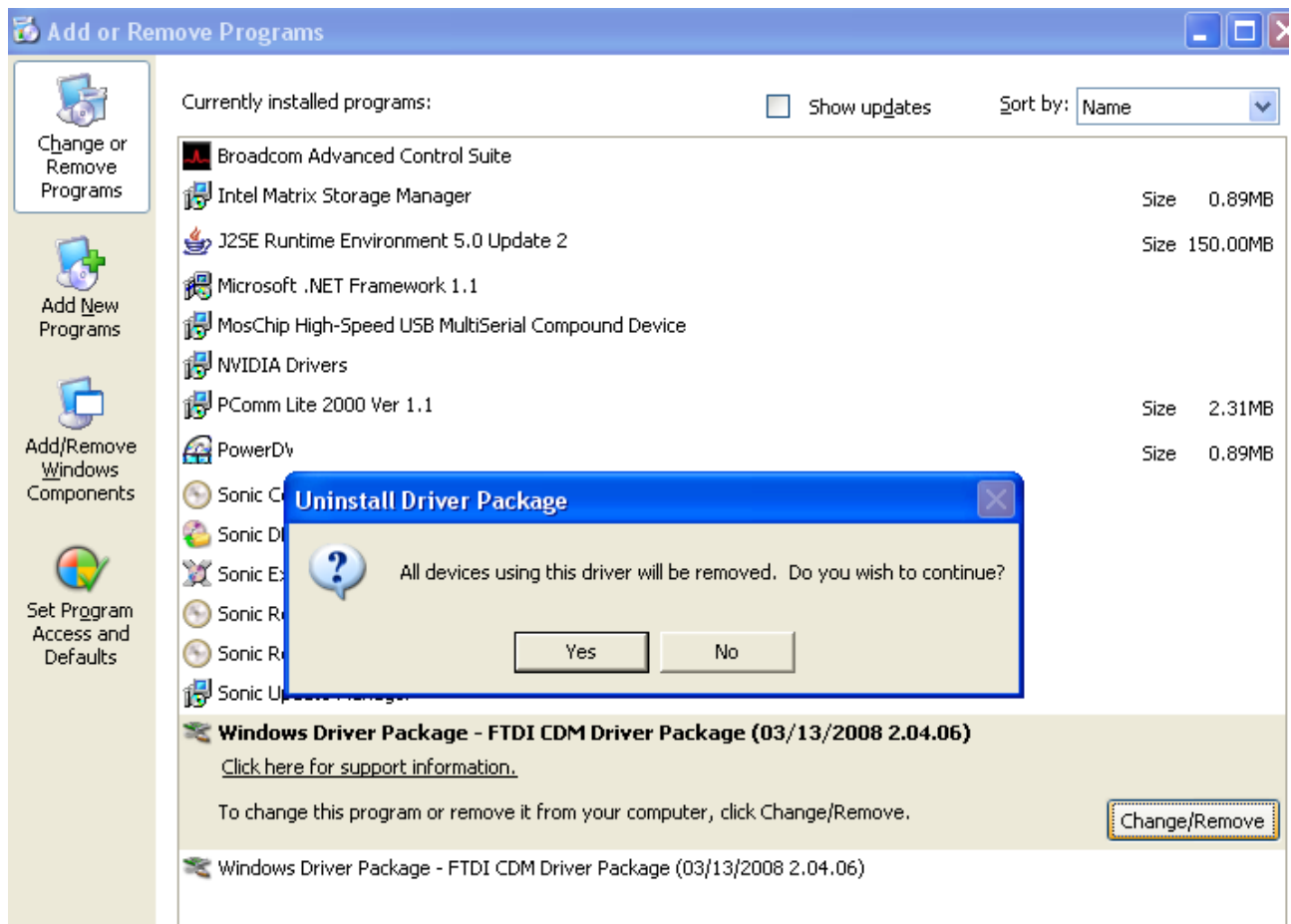
11. Remove the first "Windows Driver Package – FTDI CDM Driver Package (…)".

12. Click "Chang/Remove" and "Yes" to remove the first Windows Driver Package.

13. Remove the second "Windows Driver Package – FTDI CDM Driver Package (…)".

14. Click "Chang/Remove" and "Yes" to remove the second Windows Driver Package.

15. Reboot the computer to complete the driver uninstall.

3.4 Uninstalling Windows 7 or Vista Drivers

Windows 7 and Vista have many new security features. You need to proceed with the following steps to uninstall the Vista driver:

1. The USB to serial devices must connect to the PC.

2. Press "Start" button and select "Control Panel".

3. Select "Classic View" from the top left hand corner and then "System" from the list.

4. Select "Device Manager" from the top left hand corner.
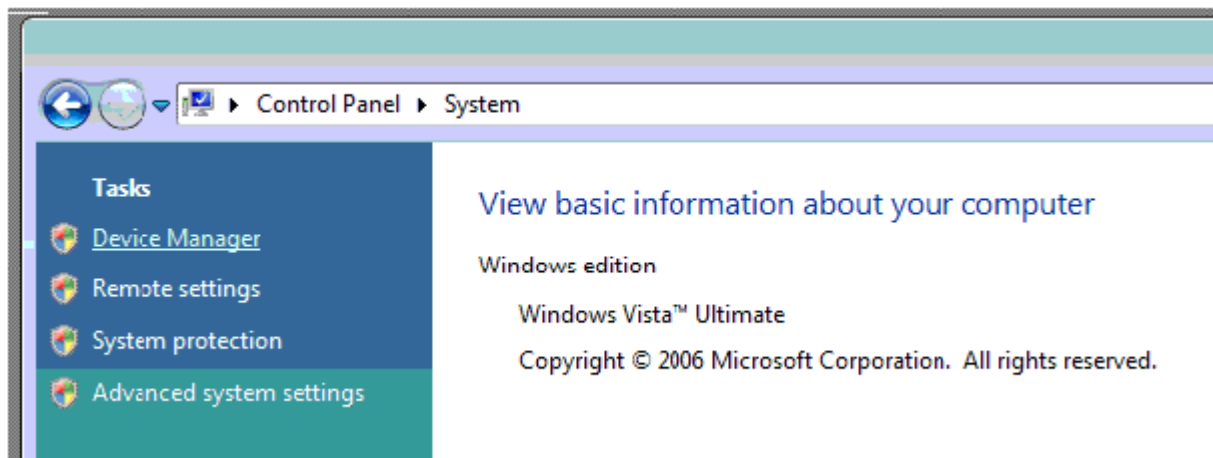
5. Locate your Device under the Ports (COM & LTP) section and right click on it to bring up the menu shown.
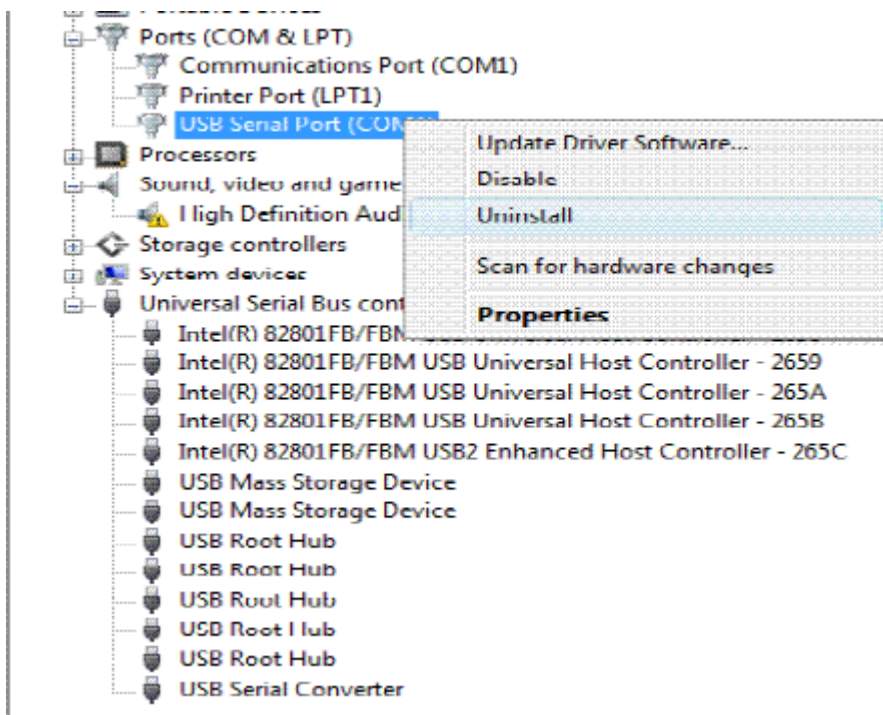
6. **Select uninstall and be sure to click the box for "Delete the driver software for this device" in the next window and press "OK".**
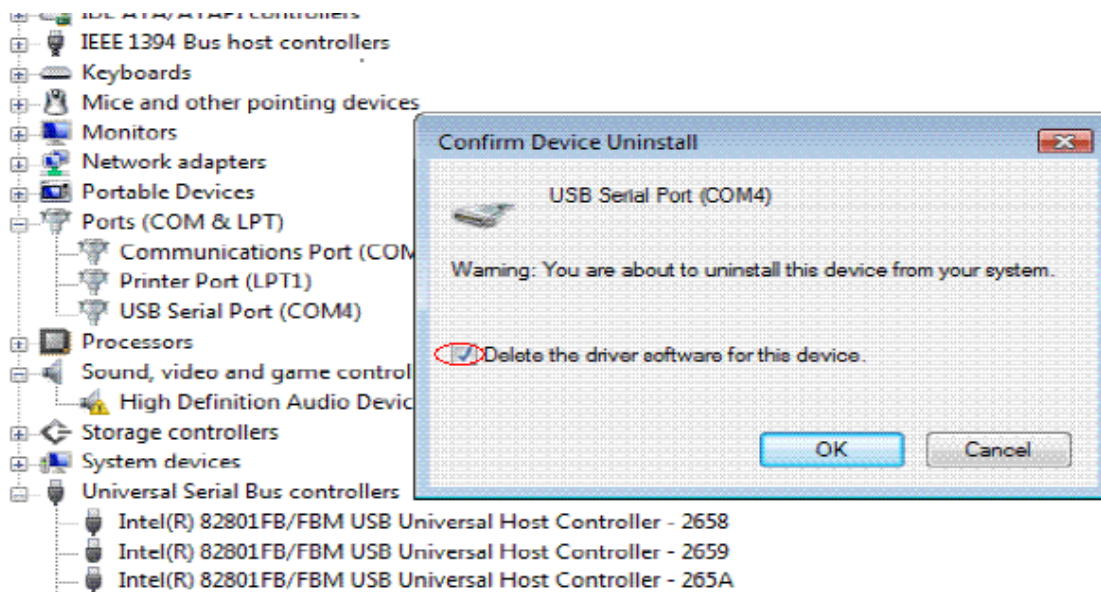
Note: if you have more than one USB Serial Port (COMx) installed in your PC, you need to repeat from step 5 to step 6 to delete the driver software for each port.

7. **Locate your Device under the Universal Serial Bus Controllers section, and right click on it to bring up the menu shown.**

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8. Select uninstall and be sure to click the box for "Delete the driver software for this device" in the next window and press "OK".

Note: if you have more than one USB Serial Converter installed in your PC, you need to repeat step 7 and step 8 to delete the driver software for all devices.
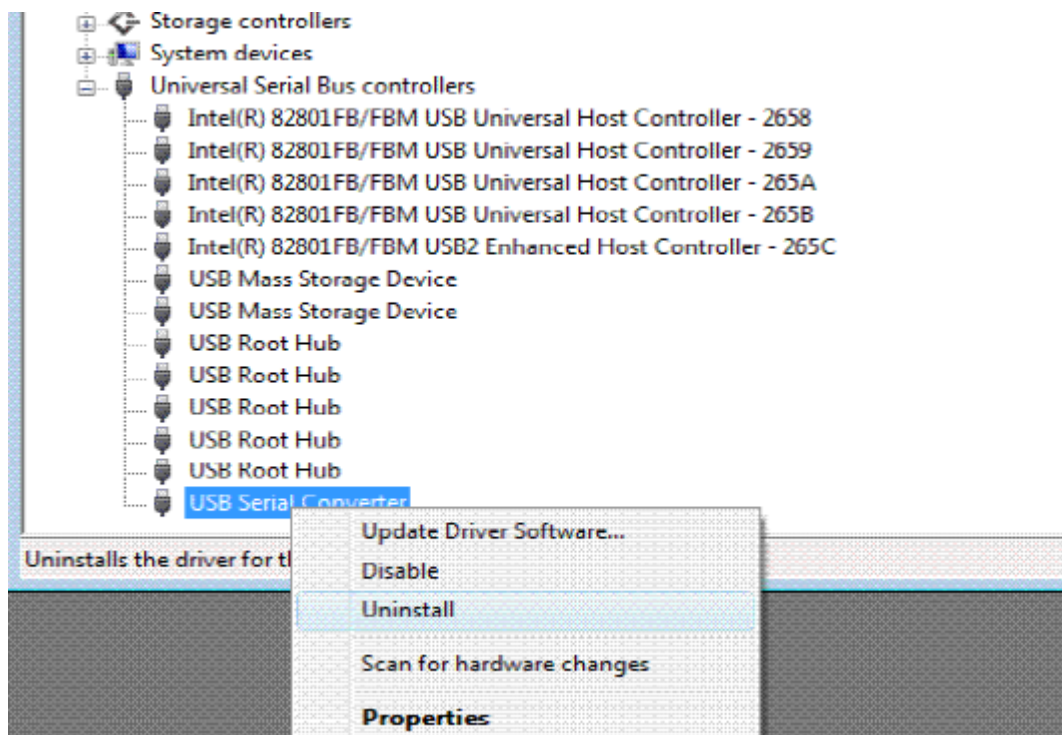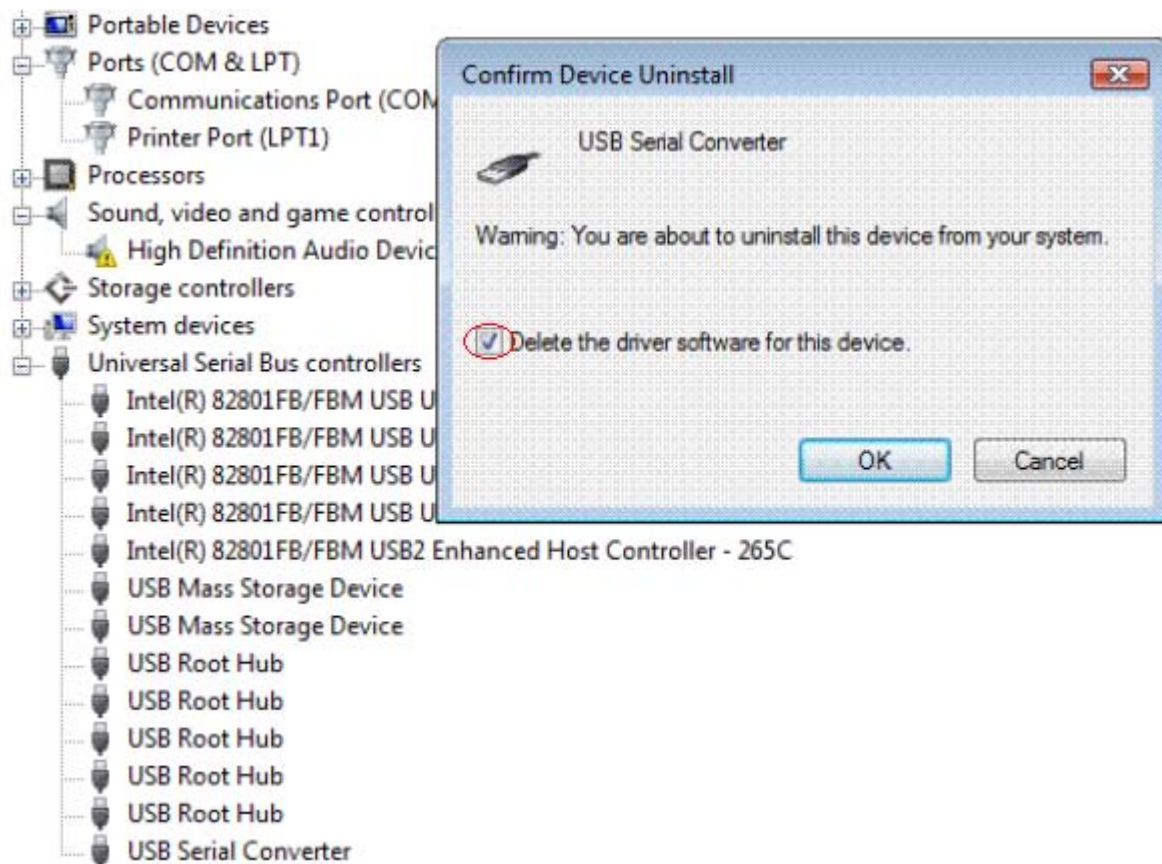
USB PRO Series   Software & Hardware Configurable USB-to-Industrial RS-232/422/485 Adapter

4.0 Hardware Configuration

You can configure the operation mode of serial ports, enable/disable the Tx ,Rx termination resistors, enable/disable Tx, Rx BIASing resistors either via serial console port or by the provided GUI (Graphic User Interface) configuration utility program (UsbComCfg).

You must finish the driver and hardware installation first, before proceeding to hardware configuration. The serial console port and hardware configuration utility program need to work with the first serial port of the VSCOM USB PRO series Industrial I/O Adapters.

4.1 Configure Hardware via Serial Console port

You must find from the "Device Manager" of Windows the first serial port number of your VSCOM USB PRO Industrial I/O Adapter (please refer to section 3.1---Check Installation). Open this serial port with any terminal program (Hyperterminal, or other terminal emulator program), select 38400 bps, 8 Bit, No Parity, 1 stop bit, flow control : none for serial console port. (Note: the default flow control setting of Hyperterminal is "hardware", you need to change to "none" for proper operation).

After opening terminal program for serial console port, you must press the CONFIG button and hold for two seconds until the blue LED will light. Following is an example of the message that will appear, if the product is an USB2-4COM PRO.

[4#1] USB2-4COM PRO v1: please press <ENTER> to activate the menu

4.1.1 Hardware Configuration Main Menu.

Press <Enter> to activate the hardware configuration main menu.
The hardware configuration main menu messages are:

```
 0 - Exit
---------------------------------------------
 1 - Show all port configurations
 2 - Change port configurations
 3 - Default port configurations
 4 - Save port configurations
---------------------------------------------
 5 - Show configuration file
 6 - Upload configuration file
```

Press <0> to exit the hardware configuration main menu and the blue LED will change to dark.

Press <5> to show the hardware configuration file (decimal values)

Press <6> to upload the hardware configuration file (decimal values)

Press <1> to show all port hardware configurations, the message are following:

Port 1: RS232
Port 2: RS422 (BIAS, TxTerm, RxTerm)
Port 3: RS485 auto, 2-wire with Echo (none)
Port 4: RS485 by RTS, 2-wire no Echo (BIAS, TxTerm)

Port 1: RS232
Port 1 is working in RS-232 mode.

Port 2: RS422 (BIAS, TxTerm, RxTerm)
Port 2 is working in RS-422 mode. BIASing resistor and Tx , Rx termination resistors are enabled.

Port 3: RS485 auto, 2-wire with Echo (none)
Port 3 is working in RS-485 half duplex mode with automatic data receive and transmit control. BIASing resistors and termination resistors are disabled.

Port 4: RS485 by RTS, 2-wire no Echo (BIAS, TxTerm)
Port 4 is working in RS-485 half duplex mode. BIASing resistors and Tx termination resistors are enabled. The data receive and transmit control is by RTS signal.

Press <3> to set all ports in default configurations to RS-232 mode.
After press <3> to set all ports to default configurations, you must press <4> to save default port configurations data into EEPROM.

Press <4> to save all configurations data into EEPROM. When the save operation is finished, the screen will show:

OK - values were written to the EEPROM.

4.1.2 Change Port Configuration Menu

Press <2> to change port configurations menu, the message are:

```
  0 - Back
--------------
  1 - Port 1
  2 - Port 2
      .
      .
--------------
  x - All Ports
```

If the adapter is single-port version (USB-COM PRO), "x" is 2; dual-port version (USB-2COM PRO), "x" is 3; quad-port version (USB2-4COM PRO), "x" is 5 and 8-port version (USB2-8COM PRO), "x" is 9. For 16-port version (USB2-16COM PRO), x is 17.

USB PRO Series   Software & Hardware Configurable USB-to-Industrial RS-232/422/485 Adapter

Press <0> to return to hardware configuration main menu.

Press <x> to set all the ports with same hardware configuration.

4.1.3 Port Setting Menu.

Press <1/2/3…> to set the port-1, port-2, port-3, etc.
Hardware configuration and port setting menu options include the following:

```
--------------------------------------------------
 0 - Back
--------------------------------------------------
 1 - RS485 by RTS, 4-wire
 2 - RS485 by RTS, 2-wire no Echo
 3 - RS485 by RTS, 2-wire with Echo
 4 - RS485 auto, 4-wire
 5 - RS485 auto, 2-wire no Echo
 6 - RS485 auto, 2-wire with Echo
 7 - RS422
 8 - RS232
--------------------------------------------------
 9 - BIAS
10 - TxTerm
11 - RxTerm
```

Press <0> back to change port configurations menu.
Press <1> ~ <8> to select operation mode of serial port. the operation modes are :

4.1.4 Operation Mode of Serial Port.

1 - RS485 by RTS, 4-wire--- RS-485 full duplex mode, data receive and transmit control by RTS signal.

2 - RS485 by RTS, 2-wire no Echo --- RS-485 half duplex mode, data receive and transmit control by RTS, no transmit data echo.

3 - RS485 by RTS, 2-wire with Echo--- RS-485 half duplex mode, data receive and transmit control by RTS signal with transmit data echo.

4 - RS485 auto, 4-wire--- RS-485 full duplex mode with automatic data receive and transmit control.

5 - RS485 auto, 2-wire no Echo--- RS-485 half duplex mode with automatic data receive and transmit control, no transmit data echo.

6 - RS485 auto, 2-wire with Echo--- RS-485 half duplex mode with automatic data receive and transmit control, transmit data echo.

7 - RS422   --- RS-422 mode
8 - RS232   --- RS-232 mode

4.1.5 BIASing and Termination Resistor.

Press <9> to enable Tx, Rx BIASing resistors. If the BIASing resistors are already enabled, you can press <9> to disable it.
When Tx ,Rx BIASing resistors are enabled, the TxD+(data+) and RxD+ will pull-up with 750 Ohm resistors. The TxD-(data-) and RxD- will also pull-down with 750 Ohm resistors.

Press <10> to enable the Tx termination resistor. If the termination resistor is already enabled, you can press <10> to disable it.
When Tx Termination resistor is enabled, a 120 Ohm termination resistor will be added between the TxD+ (data+) and TxD- (data-).

Press <11> to enable the Rx termination resistor. If the termination resistor is already enabled, you can press <11> to disable it.
When Tx termination resistors is enabled, a 120 Ohm termination resistor will be added between the RxD+ and RxD-.

4.1.6 Completion of Serial Port Configuration Setting

After finishing the hardware configuration setting of serial port, press <0> twice to return to the hardware configuration main menu.

0 - Exit
----
 1 - Show all port configurations
 2 - Change port configurations
 3 - Default port configurations
 4 - Save port configurations
----
 5 - Show configuration file
 6 - Upload configuration file

Press <4> to save all configurations data into EEPROM. When save operation is finished, press <0> to exit the hardware configuration main menu. Now, the blue LED changes to dark again. You exit the configuration mode and in the normal operation mode now.

4.2 Configure Hardware via GUI Utility Program

You must finish the driver and hardware installation first, before proceeding to hardware configuration. The GUI hardware configuration utility program needs to work with the first serial port of the VSCOM USB PRO series Industrial I/O Adapters.

Please proceed with the following steps to run the GUI hardware configuration program:

1. **Press the CONFIG button for two seconds until the blue LED will light.**

2. **Insert the "USB COM Series Driver and Utility" CD into your CD-ROM.**

3. **The "USB COM Series Driver and Utility CD" dialog box appears.**

4. **Under "Hardware Configuration Utility", double click "UsbComCfg" to run the GUI hardware configuration utility program.**

5. **When following message appears, select the product model detected under "Devices:", and then choose the port number under "Ports" to start the serial port hardware configuration.**

USB PRO Series   Software & Hardware Configurable USB-to-Industrial RS-232/422/485 Adapter
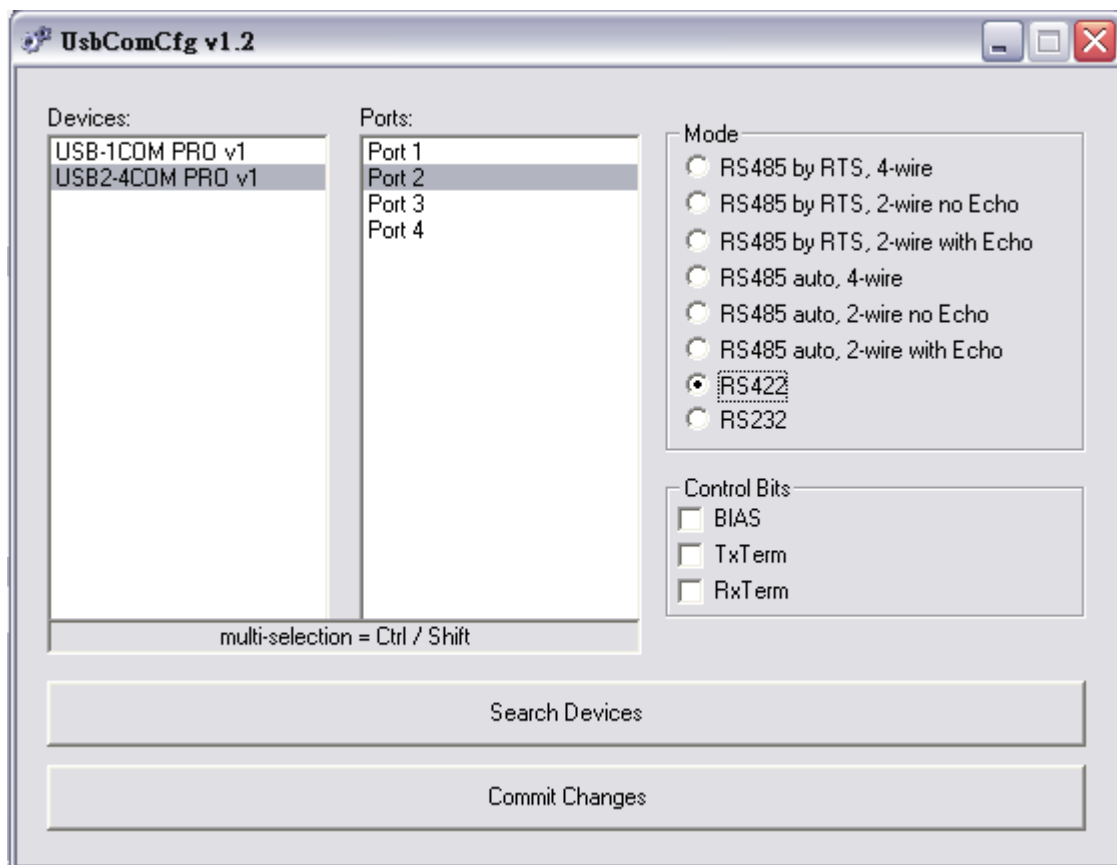
6.   Under "Mode", you can select operation mode of serial port. For detail information of operation mode, please refer to section 4.1.4.

7.   Under "Control Bits", you can enable or disable BIASing and termination resistors. This option is only available when the serial port is set to RS-422 and RS-485 mode.

7.1 Click "BIAS" to enable Tx ,Rx BIASing resistors.
If the BIASing resistors are already enabled, click "BIAS" again the BIASing resistors will be disabled.

When Tx ,Rx BIASing resistors are enabled, the TxD+ (data+) and RxD+ will pull-up with 750 Ohm resistors, and the TxD-(data-) and RxD- will also pull-down with 750 Ohm resistors.

7.2 Click "TxTerm" to enable the Tx termination resistor.
If the termination resistor is already enabled, click "TxTerm" again the Tx termination resistor will be disabled.

When Tx termination resistors are enabled, a 120 Ohm termination resistor will be added between the TxD+ (data+) and TxD- (data-).

7.3 Click "RxTerm" to enable the Rx Termination resistor.
If the termination resistor already enabled, click "RxTerm" again the Rx termination resistor will be disabled.

When Rx termination resistors are enabled, a 120 Ohm Termination resistor will be added between the RxD+ and RxD-.

8.   Wen you finish the hardware configuration setting, double click "Commit Change" to save all configuration data into EEPROM. Press the CONFIG button to exit the hardware configuration setting. The blue LED will change to dark. You are in normal operation mode now.

9.   When a new VSCOM USB PRO Series Industrial I/O Adapter is attach to system, please double click the "Search Devices" to re-start hardware configuration setting for this device.

5.0   LED Indicators

The VSCOM USB PRO Series Industrial I/O Adapters are designed with monitor LEDs of TxD & RxD indicating serial port data transmit and receive status, and with Operation Mode LEDs indicating serial port operation mode of RS-232/422/485.

5.1 Operation Mode and Mode LED Color

Operation Mode	Mode LED Color
RS-232	Red
RS-422	Green
RS-485 auto,2-Wire with echo	Orange
RS-485 auto,2-Wire no echo	Orange
RS-485 auto ,4-Wire	Orange
RS-485 by RTS,2-Wire with echo	Orange
RS-485 by RTS,2-Wire no echo	Orange
RS-485 by RTS,4-Wire	Orange

For detailed information of operation mode, please refer to section 4.1.4.

6.0   Signal Pin-outs and Wiring

6.1.1 RS-232 Signal Pin-outs of DB-9 Male

Pin 1	DCD
Pin 2	RxD
Pin 3	TxD
Pin 4	DTR
Pin 5	GND
Pin 6	DSR
Pin 7	RTS
Pin 8	CTS
Pin 9	RI

6.1.2 RS-232 Signal Pin-outs of 5-Pin Terminal Block

Pin 1	DCD
Pin 2	RxD
Pin 3	TxD
Pin 4	DTR
Pin 5	GND

Only USB-COM PRO and USB-2COM PRO offer 5-pin terminal block.

6.2.1 RS-422 Signal Pin-outs of DB-9 Male

Pin 1	TxD- (A)
Pin 2	TxD+(B)
Pin 3	RxD+(B)
Pin 4	RxD-(A)
Pin 5	GND
Pin 6	RTS- (A)
Pin 7	RTS+(B)
Pin 8	CTS+(B)
Pin 9	CTS- (A)

6.2.2 RS-422 Signal Pin-outs of 5-Pin Terminal Block

Pin 1	TxD- (A)
Pin 2	TxD+(B)
Pin 3	RxD+(B)
Pin 4	RxD-(A)
Pin 5	GND

Only USB-COM PRO and USB-2COM PRO offer 5-pin terminal block.

USB PRO Series   Software & Hardware Configurable USB-to-Industrial RS-232/422/485 Adapter

6.2.3 RS-422 Signal Wiring

● **Point-to-Point 4 Wire Full Duplex**

      USBx-xCOM PRO   **RS-422 Device**

Pin	Signal		Signal
2	TxD+(B)	←→	RxD+ (B)
1	TxD- (A)	←→	RxD- (A)
3	RxD+ (B)	←→	TxD+(B)
4	RxD- (A)	←→	TxD- (A)
5	GND	←→	GND

● **RS-422 with Handshaking**

      USBx-xCOM PRO   **RS-422 Device**

Pin	Signal		Signal
2	TxD+(B)	←→	RxD+ (B)
1	TxD- (A)	←→	RxD- (A)
3	RxD+ (B)	←→	TxD+(B)
4	RxD- (A)	←→	TxD- (A)
5	GND	←→	GND
7	RTS+(B)	←→	CTS+(B)
6	RTS- (A)	←→	CTS- (A)
8	CTS+(B)	←→	RTS+(B)
9	CTS- (A)	←→	RTS- (A)

USB PRO Series   Software & Hardware Configurable USB-to-Industrial RS-232/422/485 Adapter
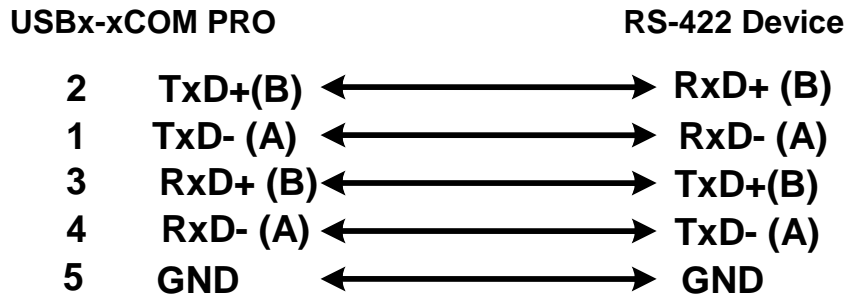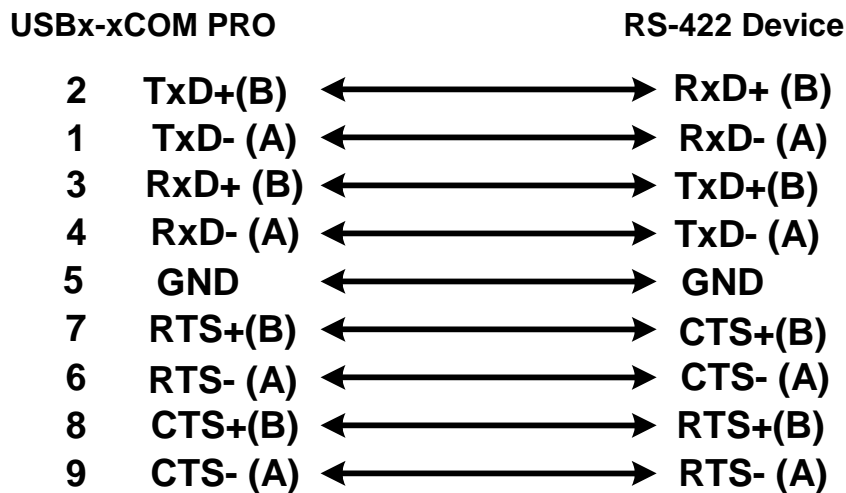
6.3.1 RS-485 4 Wire (Full duplex) Signal Pin-outs of DB-9 Male

Pin 1	TxD- (A)
Pin 2	TxD+(B)
Pin 3	RxD+(B)
Pin 4	RxD-(A)
Pin 5	GND

6.3.2 RS-485 4 Wire (Full duplex) Signal Pin-outs of 5-pin Terminal Block

Pin 1	TxD- (A)
Pin 2	TxD+(B)
Pin 3	RxD+(B)
Pin 4	RxD-(A)
Pin 5	GND

Only USB-COM PRO and USB-2COM PRO offer 5-pin terminal block.

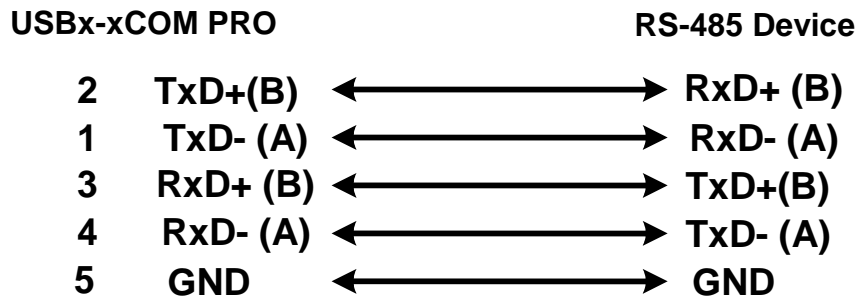# 6.3.3 RS-485 2 Wire (Half duplex) Signal Pin-outs of DB-9 Male

Pin 1	Data- (A)
Pin 2	Data+(B)
Pin 5	GND

6.3.4 RS-485 2 Wire (Half duplex) Signal Pin-outs of 5-pin Terminal Block

Pin 1	Data- (A)
Pin 2	Data+(B)
Pin 5	GND

Only USB-COM PRO and USB-2COM PRO offer 5-pin terminal block.

USB PRO Series   Software & Hardware Configurable USB-to-Industrial RS-232/422/485 Adapter

6.3.5 RS-485 Signal Wiring

● Point-to-Point 4 Wire Full Duplex

USBx-xCOM PRO   **RS-485 Device**

USBx-xCOM PRO			RS-485 Device
2	TxD+(B)	⟷	RxD+ (B)
1	TxD- (A)	⟷	RxD- (A)
3	RxD+ (B)	⟷	TxD+(B)
4	RxD- (A)	⟷	TxD- (A)
5	GND	⟷	GND

● Multidrop RS-485 2-Wire Half-duplex

USBx-xCOM PRO   **RS-485 Device**

2	Data+(B)	Data+(B)
1	Data- (A)	Data- (A)
5	GND	GND

RS-485 Device x
Data+(B)
Data- (A)
GND

USB PRO Series   Software & Hardware Configurable USB-to-Industrial RS-232/422/485 Adapter