USB 2 to 4-Port RS232-422-485 Serial TB Adapter Isolation | Surge

Product Manual

Coolgear, Inc.
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Model Number: USB2-4COMi-Si-TB

Revision History

Revision	Date	Author	Comments
1.0	01/04/2016	Coolgear	Original format
1.1	03/19/2018	Coolgear	New Manual Format

About this document

This product manual outlines installation and features of the USB2-4COMi-Si-TB USB 2 to 4-Port RS232-422-485 Serial TB Adapter Isolation | Surge.

Scope

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

This product is intended for use in numerous industries including but not limited to applications such as; Industry Communication Systems and others.

Product Support

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1. Introduction

The USB2-4COMi-SI-TB USB to quad industrial serial adapter is designed to connect to a USB port on your computer or USB hub, the USB to industrial serial adapter instantly adds four RS-232/422/485 multi-electrical interface serial communication ports to your system. The RS-232 or RS-422/485 port functions as a native Windows COM port, and it is compatible with Windows serial communication applications. The USB2-4COMi-SI-TB supports 3,000 Volt DC optical isolation, 15KV ESD protection, and 600W surge protection for all serial signals.

Chipset	FTDI FT4232H USB 2.0 to quad UART chip
DIMENSIONS	7.57(L)x4.81(W)x.929in(H)
UPC	736983902443
WARRANTY	1 year from date of purchase
COLOR	Black
DOWNSTREAM PORTS	(4) 5-Pin Terminal Block
UPSTREAM PORTS	1 USB Type-B Female Port
SYSTEM REQUIREMENTS	Windows 10, 8.1, 8, 7, Vista, 2003, 2000

1.1 Features

- Supports USB 1.1 and USB 2.0 transfer speeds from 1.5 up to 480 Mbps, automatic link and speed detection.
- Chipset: FTDI FT4232H USB 2.0 to quad UART chip.
- 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.
- Monitor LEDS of TxD, RxD indicating port status
- Supports 3KV optical Isolation, 15KV ESD protection and 600W surge protection.
- AC to DC-12V, 1A switching power supply included.
- Virtual COM port drivers available for Windows 10, 8.1, 8, 7, Vista, 2003, 2000.
- Industrial grade metal case with DIN-rail ears for Din-rail mounting.

2. Specification Table

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, 600W surge protection, and 3000 Volt DC optical isolation for all serial signals
Chipset	FTDI FT4232H USB to quad UART chip

Specification	Data
Operating Temperature:	0°C 60°C (32 to 131°F)
Storage Temperature	-40°C to 85°C
Humidity	0 to 80% RH. Non-condensing
Safety Approvals	CE, FCC

2.1 Pin-out Information

The following information describes the 5-pin screw-lock-type-terminal block connector.

Figure 1

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/Receive 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

3.   Hardware & Power Output

The picture below shows a 2-pin screw-lock-type terminal block connector. It provides a lockable terminal power connector to supply 5V, 500mA power to external devices requiring power.

Figure 2

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

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

3.1   Hardware Setting and Installation

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'll need to open the bottom of the case by removing the protective metal plate to access and set the DIP switch settings to RS-232 mode, or RS422, or RS-485 mode as per the requirements of your application.

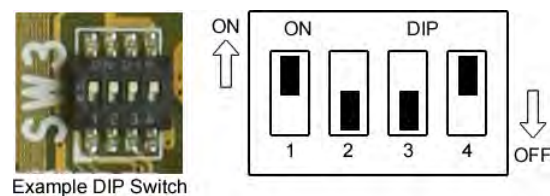The operation mode configuration settings are listed as follows:

Example DIP Switch

Figure 3

	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

4. Enable Termination and Biasing for RS-422/485 Mode

There are four 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'll need to open up the plate located at the bottom of the metal case and set the DIP switches to enable termination and biasing.

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

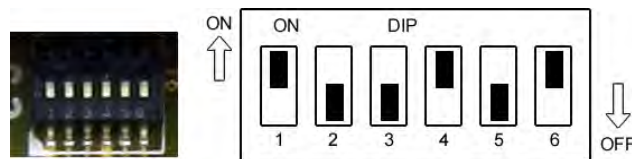**S1 (Port-1), S2 (Port-2), S3 (Port-3), S4 (Port-4)**

Figure 4

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 you cable specification for proper impedance matching.

4.1   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.

5. Signal Diagrams

5.1 RS-422 Signals Connected

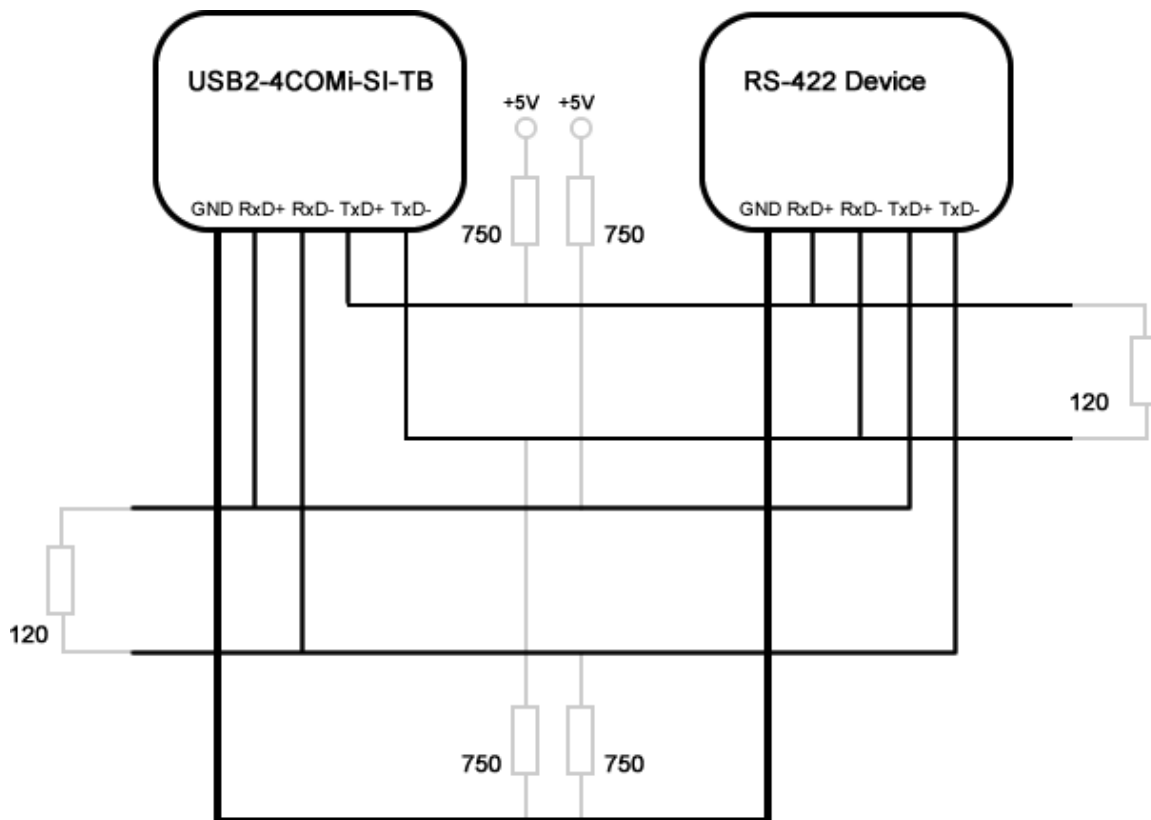The following diagram shows RS-422 signals connected.

Figure 5

5.2 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 industrial serial adapter uses RS-485 line driver technology, up to 32 receivers are possible. The following diagram shows RS-422 and RS-485 4-wire scheme:
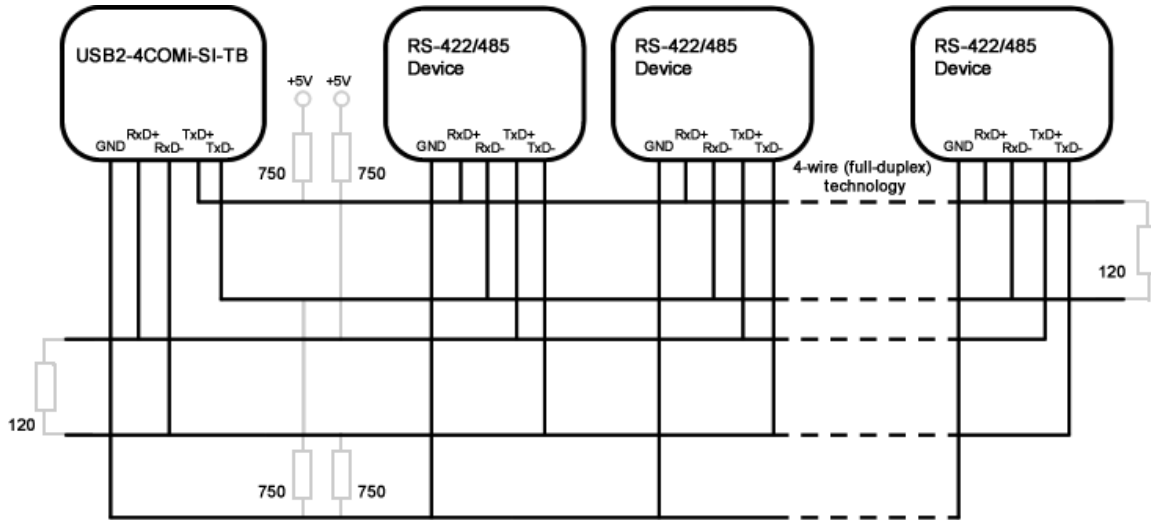
Figure 6

5.3 RS-485 2-Wire Scheme

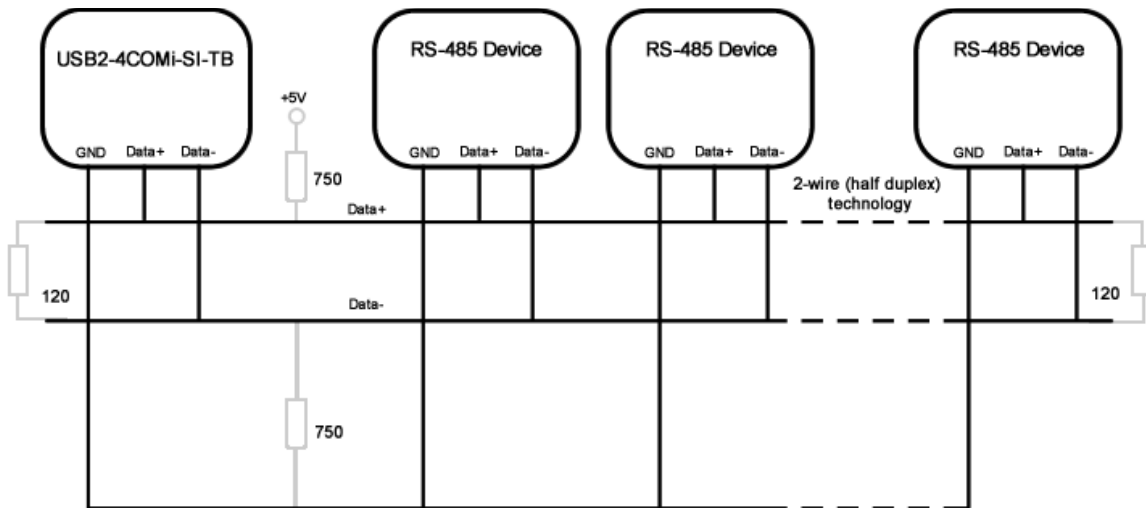The following diagram shows RS-485 2-Wire Scheme:

Figure 7

6. Installing Windows Drivers

Windows Update

In most cases, the Windows driver of the USB quad 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 industrial serial adapter to the USB port. The driver will be installed automatically via Internet.

Install in Windows Server 2003 and 2008

Connect you computer to the Internet and plug the USB quad industrial serial adapter into 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 are automatically found, then the following procedure should be followed.

Firstly, download the latest Windows driver of the USB quad industrial serial adapter 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 that "Device Manager" on Windows, press the "Start" button and select "Control Panel" (right click "Start" button for Windows 10, 8.1)

7. Notes, Tips, Warnings, and Safety

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 you cable specification for proper impedance matching. Reference section 4

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.

8.   Supporting References

Document	Link
Website Product Page	https://www.coolgear.com/product/usb-2-4-port-rs232-422-485-serial-tb-adapter-isolation-surge