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# USB-2-485 Interface Converter

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# Version

Version	Date	Author	Comment
1.00	16-Apr-06	GE	Initial version

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# 1 Introduction

The USB-2-485 device is an USB to RS485 interface converter. It adds a standard 2-wire half-duplex RS485 bus interface to computers with USB interface.

The USB interface of the device is USB 2.0 and USB 1.1 compatible. The RS485 interface supports all common data rates up to 3Mbit/s. No additional power supply is required as the device is powered through the USB bus.

The software supplied with this product can be used with all versions of the Microsoft Windows operating system that supports USB (Windows 98, Windows ME, Windows 2000, Windows XP). Windows 95 and Windows NT4.0 do not support USB and therefore are not supported. A virtual COM port driver is included, that is, the RS485 interface can be accessed as a standard serial COM port e.g. using any terminal program like HyperTerminal (supplied with all versions of Microsoft Windows).

## 2 The USB-2-485 Hardware

### 2.1 Overview

The USB-2-485 device has two connectors, a USB type B connector for connecting the device to a PC and a 9-pin D-SUB male connector for connecting it to a 2-wire half-duplex RS485 bus.

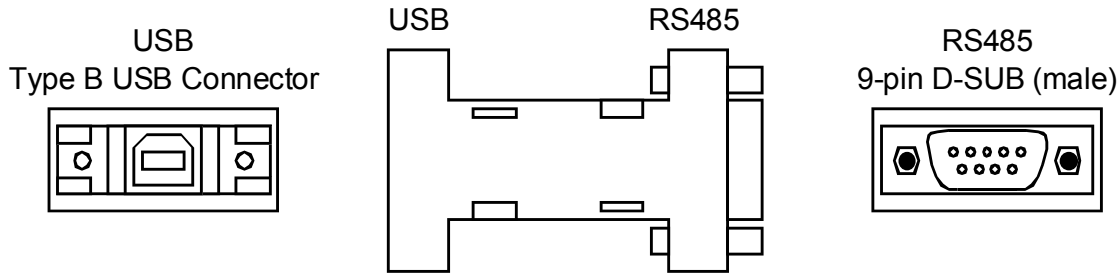


Figure 1: Overview

## 2.2 Connectors

### 2.2.1 USB

The USB interface is a USB 2.0 full speed (12Mbit/s) device interface which is USB 2.0 and USB 1.1 compatible.

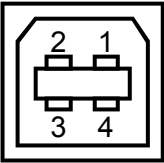
	Pin	Function
	1	$V_{BUS}$ (+5V)
	2	D-
	3	D+
	4	GND

Table 1: USB type B connector, pin assignment

## 2.2.2 RS485

The 2-wire RS485 half-duplex interface of the USB-2-485 device supports all common data rates up to 3Mbit/s. The two differential signals are available on pin 2 and pin 7 of the 9-pin D-SUB connector of the USB-2-485 device (table 2).

Pin	Function
1	
2	RS485- (RS485B)
3	GND
4	
5	
6	
7	RS485+ (RS485A)
8	
9	

Table 2: RS485 9-pin D-SUB male connector, pin assignment

RS485 is a multi-master bus with one master being active at a time. According to ISO8482 up-to 32 masters are supported and line lengths of up-to 500m. With current transceiver technology even more than these 32 devices are possible. For proper operation with longer wires, line termination at both ends of the bus is required. One termination resistor (120 Ohm) is already included with the USB-2-485 device for easier set-up. Please add another 120 Ohm termination resistor at the other end of the bus (Figure 2).

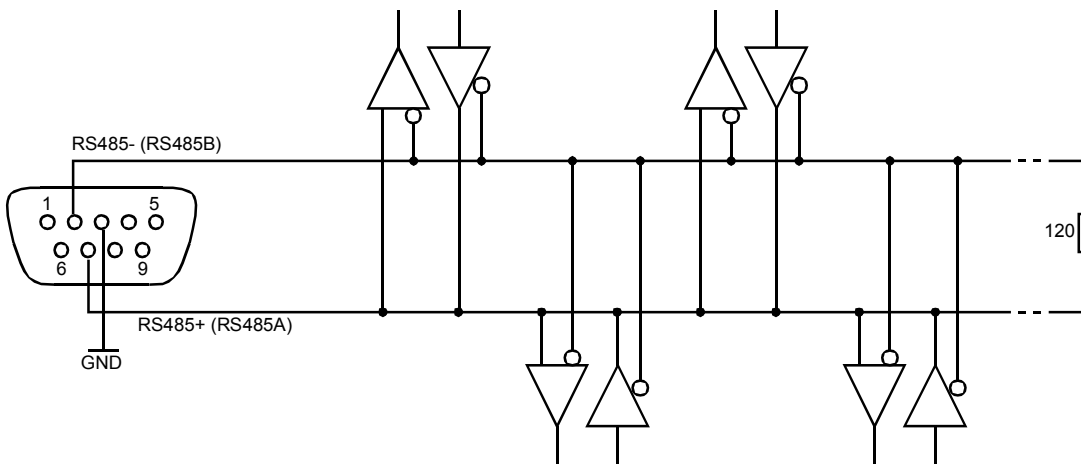


Figure 2: RS485 interface, external bus connection with termination resistor

In order to support multiple-masters, the transmitter of the USB-2-485 is switched off as long as there is no transmission going on. This may lead to an undefined level on the bus in case there is no active transceiver. Therefore, in addition to the 120 Ohm termination resistor, the USB-2-485 includes an additional 1k Ohm resistor from RS485+ (RS485A) to +5V and another 1k Ohm resistor from RS485- (RS485B) to GND (Figure 2). This will always ensure a valid and stable level on the bus. In contrast to the termination resistor, there is no need to add these two resistors also at the other end of the bus. If one of these resistors is not required / desired, they may be removed (please find the location of the resistors in Figure 2).

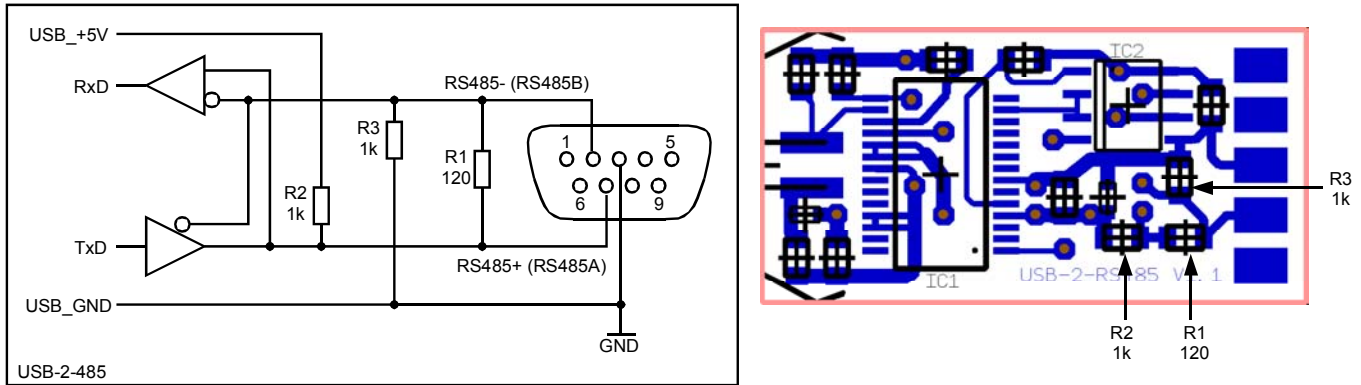


Figure 2: Internal resistor network connected to RS485 interface and location of resistors (pcb top view)

With the USB-2-485 there is no local loopback. That is, the RS485 receiver is switched off as long as the RS485 transmitter is active.

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## 2.3 Technical Data

### 2.3.1 USB

- Connection to USB 1.1 or USB 2.0 hosts possible (a cable is supplied with the device)
- USB full speed device (12MBit/s)
- Bus powered (no extra power supply needed)

### 2.3.2 RS485

- Half duplex communication mode
- No loopback (receiver is switched off while transmitter is active)
- 120 Ohm termination resistor
- Pull-up resistor (1k Ohm between RS485+ and +5V) and pull-down resistor (1k Ohm between RS485- and GND) will ensure a valid signal level on the RS485 bus even if there is no active transmitter

### 2.3.3 Housing

- Compact, metalized standard housing (know as 9 pin Sub-D adapter housing)
- Dimensions: 68mm x 33mm x 17mm (length x width x height)

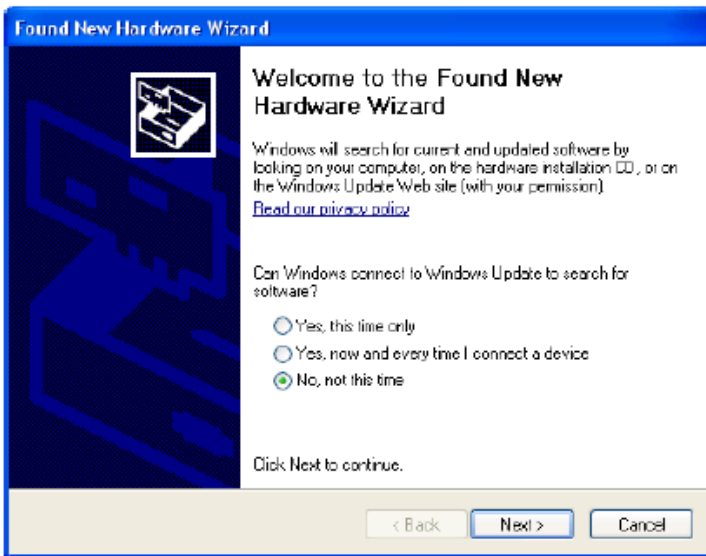


## 3 Software Installation

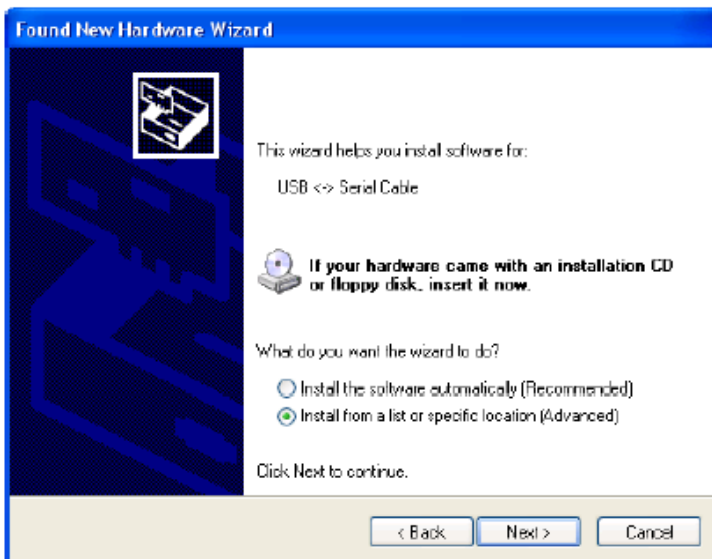
The USB-2-485 is hot-pluggable. There is no need to power-off the PC while plugging in or removing the USB-2-485 device. When you plug in the USB-2-485 device for the first time you will be prompted for a suitable device driver. Please note that you have to be logged in with administrator privileges in order to be able to install the device driver on Windows 2000 or Windows XP systems.

The device driver installation process will be shown here for Windows XP systems only, but, the required steps will be similar for other Windows operating systems, too.

After connecting the USB-2-485 to a spare USB port on your PC the “Found New Hardware Wizard” will be started.

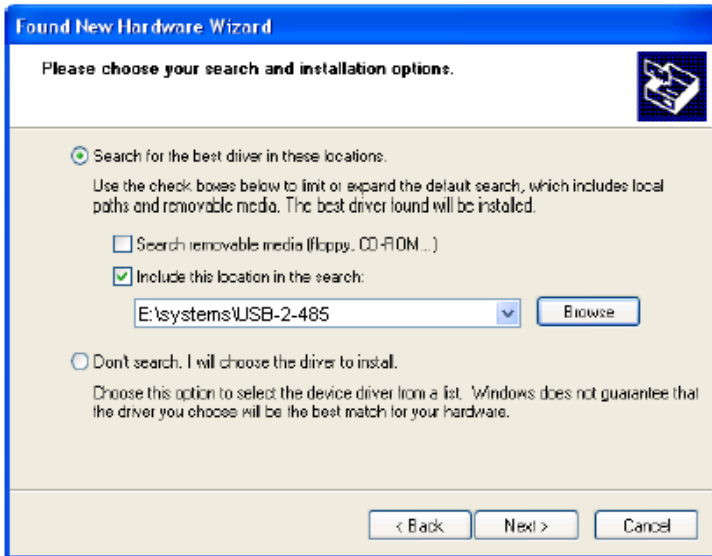


Select “No, not this time” and continue. Within the next window (shown below) select “Install from a list or specific location (Advanced)” as shown below and continue:

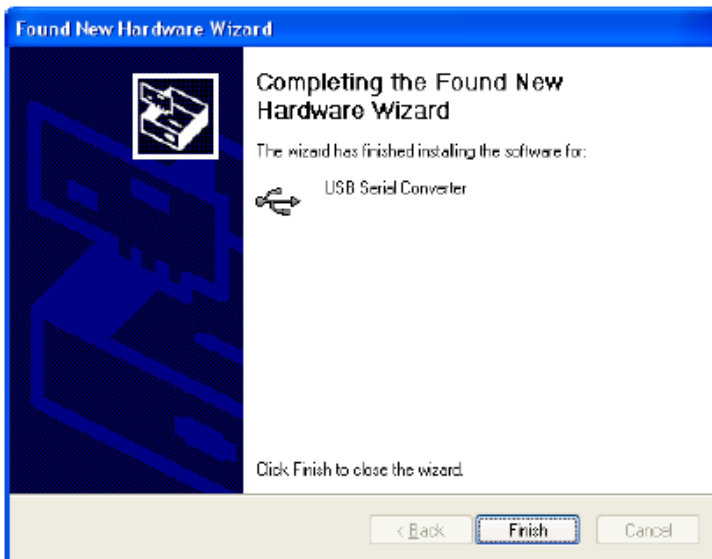


A dedicated driver for the USB-2-485 can be found on the CD (TMC Technical Library) supplied with certain versions of the USB-2-485 device or can be downloaded from our web-site ([www.trinamic.com](http://www.trinamic.com)).

On the CD the driver files are located in the sub-directory “\systems\USB-2-485”. Please add this path as shown below and continue:

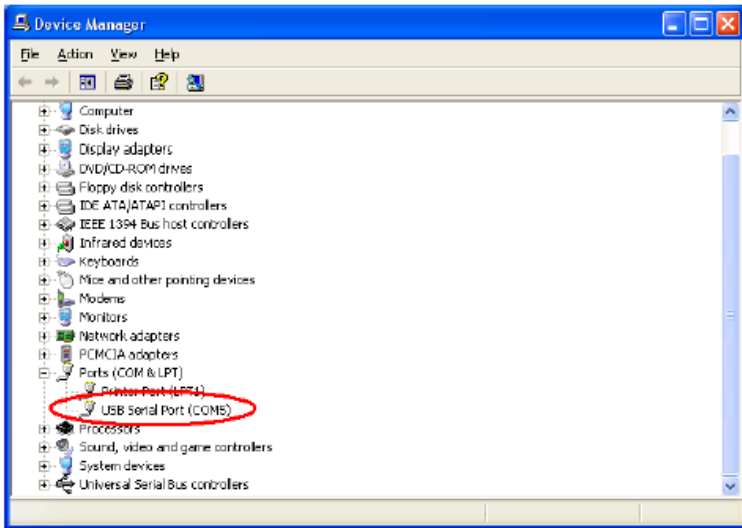


If Windows XP is configured to warn when unsigned drivers are about to be installed a warning will be displayed. Please click on “Continue Anyway”. The necessary files will then be copied and driver installation should finish with the following screen:



Click on “Finish” and the “Found New Hardware Wizard” will continue with the installation of the COM port emulation driver. The procedure will be the same as the one explained above.

After successfully installing the driver open the device manager (located in "Control panel\System", select the "Hardware" tab and click "Device Manager"). The new device will appear as an additional COM port with the label "USB serial port":



Now, you can access your USB-2-485 device as a standard COM port. E.g. you may use the terminal program HyperTerminal supplied with Windows in order to send and receive data over the RS485 interface.