



# USB-i485 Converter

## RS485/RS422

INSTRUCTION MANUAL V1.0x G

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### CE Mark

This is a Class A product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures.

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## 1 SAFETY ALERTS

The symbols below are used in the device and throughout this manual to draw the user's attention to important information related to device safety and use.

		
<b>CAUTION</b> Read the manual fully before installing and operating the device.	<b>CAUTION OR HAZARD</b> Risk of electric shock.	<b>ATTENTION</b> Material sensitive to static charge. Check precautions before handling.

All safety recommendations appearing in this manual must be followed to ensure personal safety and prevent damage to the instrument or system. If the instrument is used in a manner other than that specified in this manual, the device's safety protections may not be effective.

## 2 PRESENTATION

The **USB-i485 Converter** is a cost-effective way to convert RS485 or RS422 industrial buses to a USB interface. When connected to a PC USB port the **USB-i485 Converter** is automatically detected and is installed as a native COM port, which is compatible with any existing serial communication application.

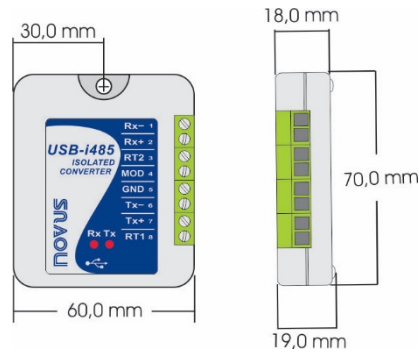
Multiple modules can be installed when using USB hubs thus allowing a hassle-free configuration of a multi serial system without any IRQ or DMA configuration.

1500 Vdc galvanic isolation between the USB port and RS485/RS422 protects the PC from spikes or possible misconnections in the communication bus.

The **USB-i485 Converter** can be configured for four-wire (Full Duplex) RS422 and RS485 or two-wire (Half Duplex) networks. When operating in two-wire RS485 the data transfer control is automatically done by the converter. Two independent and isolated RS485 networks can be supported by one **USB-i485 Converter** thus duplicating the possible number of remote devices.

### 3 DIMENSION

The **USB-i485 Converter** has the following dimensions:



**Fig. 01** – USB-i485 Converter

## 4 USB DRIVER INSTALLATION

The following installation steps may be slightly different depending on your PC configuration and Windows version. Follow the Wizard instructions and use the following steps and figures to select the correct installation options.

### 4.1 WINDOWS

- a) Run the driver file available on our website.
- b) Connect the module to a PC USB port. Windows® will detect the new hardware and will try to install it automatically.
- c) After a few seconds, an installation error message will be displayed on the bottom right corner of the screen. This error has to do with the fact that Windows cannot recognize any device that has not been previously subscribed by Microsoft.
- d) Open the Device Manager screen and search for the "F232R USB UART" device in the "Other Devices" category. Double-click it and click on the "Update Driver..." button.
- e) Choose the "Browse my computer for driver software" option.
- f) Select the "Drivers\Windows". Let the "Include subfolders" selected.
- g) If a window asking whether you want to install this driver pops up, choose to install.
- h) Wait a few more seconds. A window displaying the installation success will be shown.

### 4.2 LINUX

Since version 2.4.20, the necessary driver for the converter to work properly is already included in kernel.

Once you connect the converter to a PC USB port, the following modules should be loaded (they must be in the kernel list of modules):

- `ftdi_sio` (specific driver of the converter);
- `usbserial` (generic driver for USB-Serial conversion);
- `usbcore` (basic driver for USB devices).

### 4.3 MAC

See the documentation on the device page on our website. The *Virtual Driver COM* file provides information about how to perform the installation.

5.1 DETERMINATION

The serial port associated to the **USB-i485 Converter** is automatically determined by the operational system a few instants after the **USB-i485 Converter** connection. The user may easily identify or alter the COM port associated to the **USB-i485 Converter** accessing the *Windows®* "Device Manager":

*Control Panel / System / Hardware / Device Manager / COM & LPT Ports*

It's also possible to open the "Device Manager" executing the following command: "*devmgmt.msc*".

After opening the "*Device Manager*", it's possible to verify which is the Serial Port (COM) associated to the **USB-i485 Converter**. As it can be seen in **Fig. 02**, the **USB-i485 Converter** is associated to COM7.

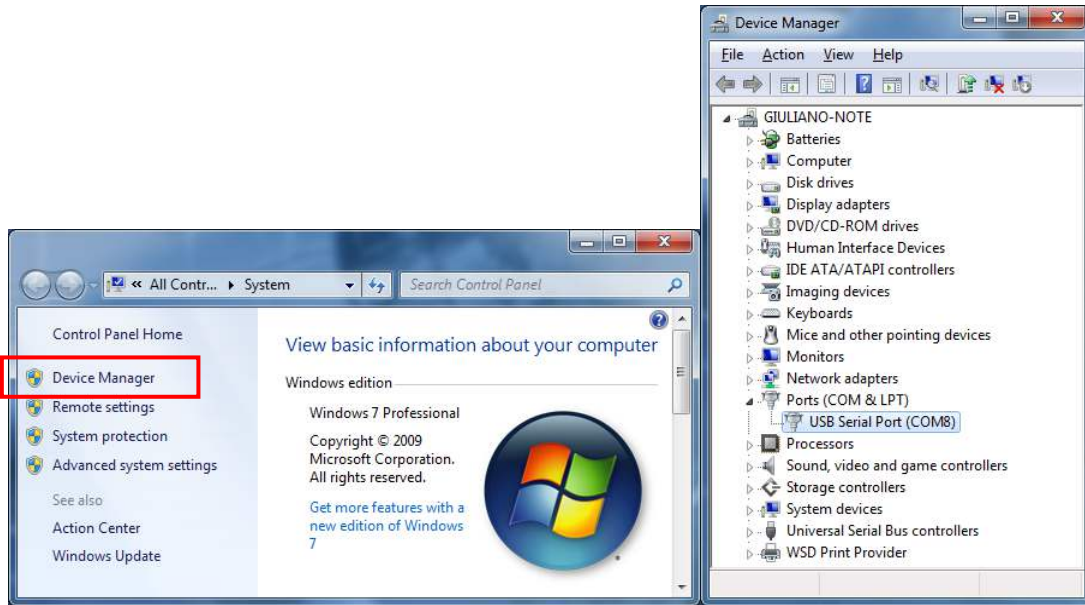


Fig. 02 – COM Port Determination

5.2 SELECTION

In case it's necessary to modify the Serial Port (COM) associated to the **USB-i485 Converter**, select "USB Serial Port (COM X)" where the **USB-i485 Converter** is connected. Access "Action/Properties" and, in the "Port Definitions" tab, click **Advanced**, as shown in **Fig. 03**. In case this tab does not appear, the driver was not installed correctly and the software must be reinstalled.

In the "Advanced definitions for COMX" window, change the parameter "COM Port Number" for the desired COM, as shown in **Fig. 04**. Some serial ports may be marked as "In Use". Only select one of these ports in case you are sure that it is not being used by another peripheral of your computer.

In some situations, the serial ports may be marked as in use even when the associated device is not installed anymore in the computer. In this case, it is safe to associate this port to the **USB-i485 Converter**.

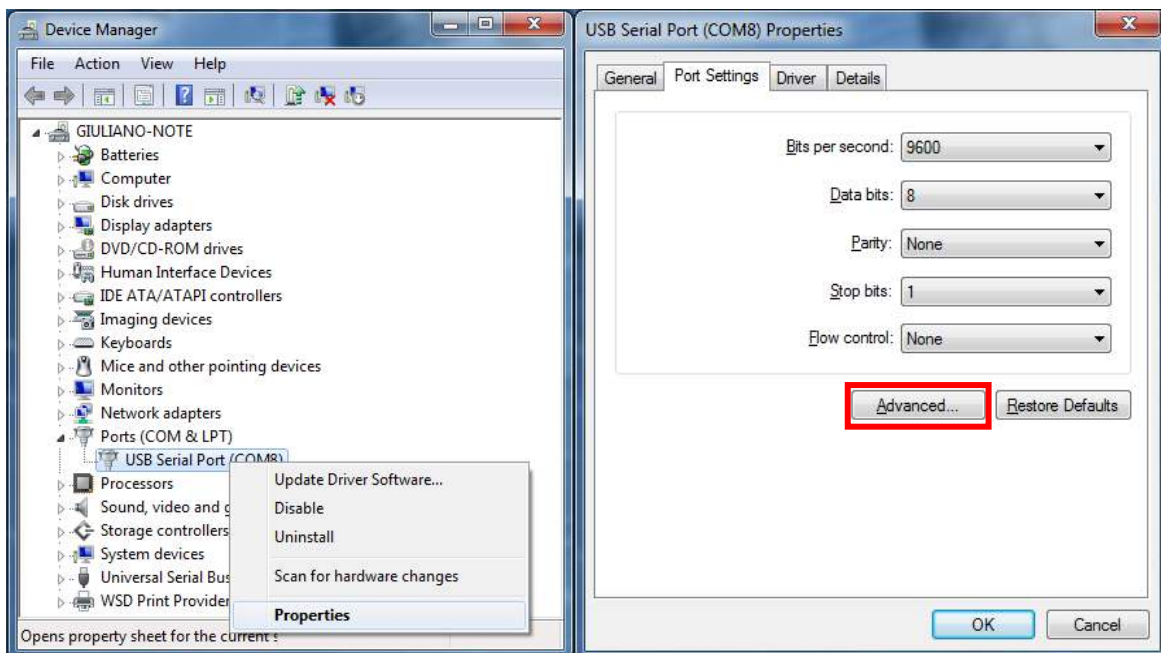


Fig. 03 - Accessing the COM port advanced configuration

### 5.3 IMPORTANT RECOMMENDATION

To improve the communication of the USB interface, it is recommended the configuration of a Latency Timer. This parameter may be modified accessing "Advanced definitions for COMX" window, as shown in **Fig. 03**.

Later it's possible to verify, as shown in **Fig. 04**, the "Latency Timer (ms)", which must be altered to **4**.

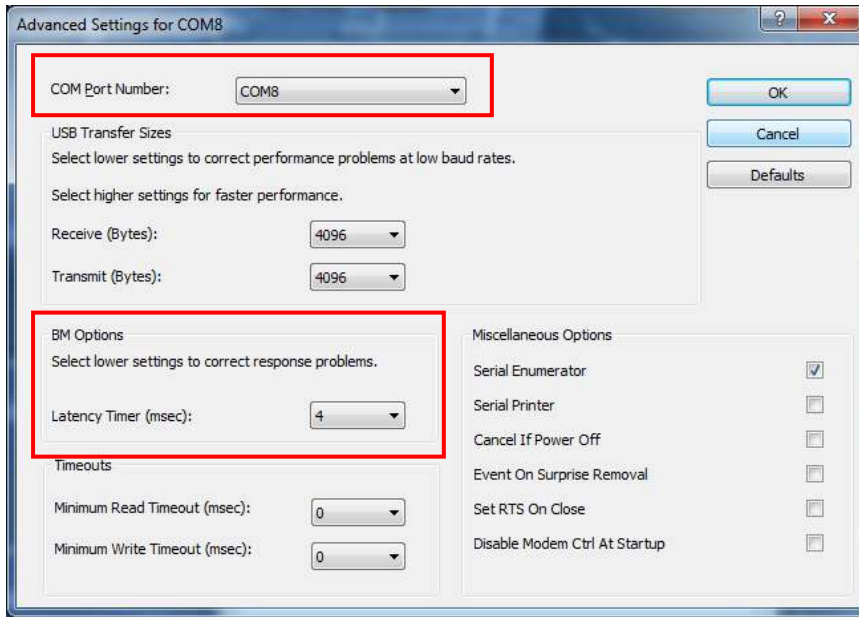


Fig. 04 - Advanced definitions for COM



## 6 CONNECTIONS

The appropriate connection to the **USB-i485 Converter** depends on the type of serial network: RS422, 2-wire RS485 or 4-wire RS485. The following figure shows a description of all **USB-i485 Converter** connection terminals.

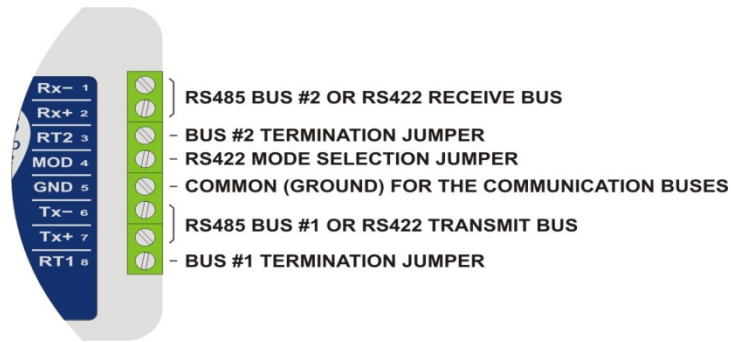


Fig. 05 – Device Connections

A shielded twisted-pairs cable is recommended for wiring the communication bus from the converter to all network devices. The shield should be grounded and/or connected to the common terminals of all devices. The minimum recommended wire gauge is 24 AWG (0,2 mm<sup>2</sup>).



**Use of a wire connecting all devices common terminals is highly recommended. Damage of the networked devices may result if this recommendation is not followed.**

RS485 or RS422 devices from different vendors or of different models may identify the communication terminals using distinct notation. The following table shows some of this notations and its equivalence to the **USB-i485 Converter**.

USB-i485 CONNECTION IDENTIFICATION	Rx+ ou Tx+	Rx- ou Tx-
POPULAR RS485 AND RS422 CONNECTION IDENTIFICATION	D	$\bar{D}$
	D1	D0
	B	A
	D+	D-

Table 01 – Identification

### 6.1 HALF-DUPLEX RS485 HALF-DUPLEX (2 WIRES)

To set this mode of operation, the MOD terminal (pin 4) must be left unconnected.

This is the usual RS485 connection. A single twisted pair is used for data transmission and reception. Multiple RS485 devices are connected in a single bus, as shown in the next figure. Devices from different vendors may use different names for the data signal terminals.

In the following figure, different identification schemes are presented for each device, with the proper connection to the **USB-i485 Converter**. RS485 devices can be connected to either bus 1 or 2.

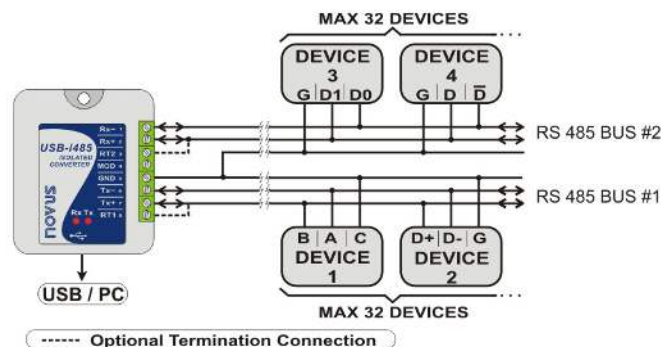


Fig. 06 – Half-Duplex RS485 (2 wires)

The common terminal (GND – pin 5) must be connected to the corresponding terminals of all network devices, to ensure the same potential in all devices. If a common wire is not connected to all devices, all must be properly grounded according to the manufacturer recommendation. For the **USB-i485 Converter**, the proper grounding terminal is pin 5 (GND).

The need to install termination resistors depends on the total length of the communication bus and the communication speed (Baud Rate). The **USB-i485 Converter** has built-in termination resistors, which can be installed by wiring terminals RT1 (8) or RT2 (3) as shown in dashed lines in the last figure.

For additional information in grounding, common wire and termination resistors, read the document *RS485 & RS422 Basic*, available on our website [www.novusautomation.com](http://www.novusautomation.com) for download.

## 6.2 FULL-DUPLEX RS485 FULL-DUPLEX (4 WIRES)

To set this mode of operation, the MOD terminal (pin 4) must be connected to terminal GND (pin 5).

In this mode two pairs of wires are used. Data from the **USB-i485 Converter** to the networked devices are transmitted through one pair, and the other pair carries data from the devices to the **USB-i485 Converter**. Multiple devices are connected as shown in the next figure.

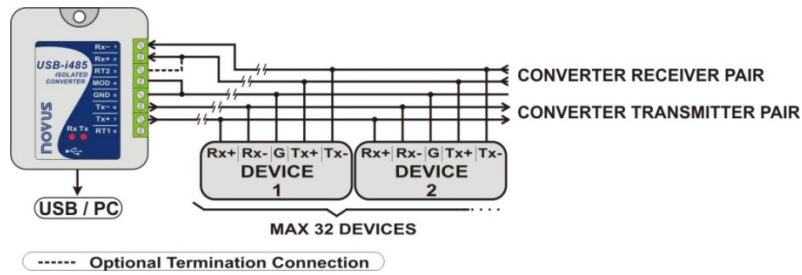


Fig. 07 – Full-Duplex RS485 (4 wires)

The common terminal (GND – pin 4) must be connected to the corresponding terminals of all network devices, to ensure the same potential in all devices. If a common wire is not connected to all devices, all must be properly grounded according to the manufacturer recommendation. For the **USB-i485 Converter**, the proper grounding terminal is pin 5 (GND).

The need to install termination resistors depends on the total length of the communication bus and the communication speed (baud rate). The **USB-i485 Converter** has a built-in termination resistor, which can be installed by wiring terminal RT2 (3) as shown in dashed lines in the last figure.

For additional information in grounding, common wire and termination resistors, read the document *RS485 & RS422 Basic*, available on our website [www.novusautomation.com](http://www.novusautomation.com) for download.

## 6.3 RS422

Full-Duplex RS485 specification supersedes RS422. The same connection instructions shown for Full-Duplex RS485 apply for RS422 connection.

## 7 CONFLICTS WITH OTHER USB DEVICES UNDER WINDOWS

Installation of the USB driver for the USB-i485 converter may result in conflicts with existing USB devices in the computer (mouse or other Serial/USB devices, for example). In this case, follow the procedure below to restore functionality of the affected device:

Go to the Windows Control Panel and open the **USB-i485 Converter** properties in:

**Control Panel / System / Hardware / Device Manager / Ports (COM & LPT)**

Select the desired "USB Serial Port" device, click with the right mouse button and select "Properties". Select "Port Settings" and click on the "Advanced..." button. Uncheck the "Serial Enumerator" option:



Fig. 08 – Serial Enumerator

## 8 TECHNICAL SPECIFICATIONS

<b>Computer Interface</b>	USB V1.1 Plug and Play
<b>Operational system virtual serial port driver</b>	Windows: Windows 10, 8, 7, Vista, XP, Server 2008, Server 2003, 98, ME, 2000, CE; MAC; Linux 2.4.20 or above.
<b>Field Interfaces</b>	RS485 Half Duplex (dual buses); RS485 Full Duplex; RS422.
<b>Data Rate</b>	From 300 bps to 250 kbps.
<b>Maximum RS485/RS422 cable length</b>	1200 m
<b>Maximum number of devices in the RS485 network</b>	Maximum number of devices in the RS485 network (unit load devices – 12 k $\Omega$ ): <ul style="list-style-type: none"> <li>• Half Duplex: 2 x 32 devices;</li> <li>• Full Duplex: 32 devices.</li> </ul>
<b>Power</b>	From the USB port. Consumption: <100 mA.
<b>Isolation</b>	1500 Vcc (1 minute) from USB interface and the RS485/RS422 interface.
<b>RS485/RS422 bus protection</b>	$\pm$ 60 Vcc, 15 kV ESD
<b>USB Connection</b>	Mini-B connector. A 1.5 m cable with plugs mini-B and A is provided with the device.
<b>RS485/422 Connector</b>	Screw terminal type accepting 1.5 mm <sup>2</sup> (16 AWG) wires.
<b>Operating Environment</b>	0 to 50 °C, 10 to 90 % relative humidity, non-condensing.
<b>Communication protocol</b>	Jumper selected RS485 / RS422.
<b>Flow Control</b>	Automatic flow control for RS485 Half Duplex.
<b>Internal Terminating Resistors</b>	120 Ohms internal resistors termination enabled by jumpers.
<b>LEDs</b>	Transmission and reception of data.
<b>ABS Housing</b>	70 x 60 x 18 mm.
<b>Certifications</b>	CE

Table 02 – Technical Specifications

## 9 WARRANTY

Warranty conditions are available on our website [www.novusautomation.com](http://www.novusautomation.com).