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User Manual USB-COM ECO

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1. Overview

The VScom USB-COM ECO are serial port adapters, which are connected over USB port. They are industrial strength devices, providing ports operating as RS232connection All devices come in an IP30 metal case, providing option for DIN Rail or wall mounting. All connectors of serial ports and USB are ESD protected.

The supplied drivers for Windows operating systems install the ports into the Windows API, so they appear as the standard Com ports. All applications capable to handle a serial port can control the USB-COM ECO devices in the same way as they control the genuine ports Com1 and Com2 of a PC. On Linux¹ systems the serial ports are installed as `/dev/ttyUSBx`; similar drivers exist for other operating systems.

The driver allows to configure the serial ports for bitrates of up to 3Mbit/s. RS232 operation mode limits the bitrate to 500 kbit/s. Given the theoretical maximum speed, the USB-COM ECO allows generating all bitrates from 185 bps up to 460,800 bps (500 kbps) could be chosen as transmission speed.

The interface to the host PC is USB 2.0, Full Speed or High Speed where required.

2. Introduction

This manual describes the hardware of VScom USB-COM ECO serial port adapters. Also the Windows driver for the USB-COM ECO is described in detail.

2.1. Features

- USB 2.0 High Speed or Full Speed
- Supports RS232
- UART FIFO buffers: 128 Byte
- Max speed 500 kbit/s
- Drivers for WindowsTM operating system
- Supported by Linux, Mac OS X, and Windows CE on several platforms.

¹Generally with Kernel 3.0.0-19 and above

2.2. Product Specifications

All USB-COM ECO models have similar properties. Most important difference is the number of serial ports. The maximum speed is 500 kbit/s.

Host interface	USB 2.0	Full Speed or High Speed
	Connector	Type B
Power	Bus powered	via USB cable
Serial Ports	1, 2, 4, 8	RS232
Signals	RS232	RxD, TxD, RTS, CTS, DTR, DSR, DCD, RI, GND
	RS232 isolated	RxD, TxD, RTS, CTS, GND
Max.	460.8 kbit/s	RS232 (500 kbit/s)
Bitrates Serial configurations	Data bits	7, 8
	Parity	None, Odd, Even, Mark, Space
	Stop bits	1, 2
FIFO size	128 Bytes	At least, for Transmit and Receive each
LED	Data	Transmit/Green and Receive/Orange for each port
	Ready	Green
	Power	Red
Protection	All Connectors ESD protected	

Table 1: Features of VScom USB-COM ECO Series

Specifications differing from this general list are given at each product below.

2.2.1. VScom USB-COM ECO and USB-COM ECO ISO

Serial Ports	1	
Connectors	1×DB9 male	RS232 (4.1)
Power	Bus powered	via USB cable
FIFO size	128 Bytes	Transmit
	384 Bytes	Receive
Dimensions	W×L×H	50×74×22 mm ³

Table 2: Features of VScom USB-COM ECO (Single Port)

On USB-COM ECO ISO the serial port signals are galvanically isolated (2.5 kV) from the internal logic including USB.



Figure 1: VScom USB-COM ECO

This is the single port USB-COM ECO . The USB-COM ECO ISO looks the same.

2.2.2. VScom USB-2COM ECO

Serial Ports	2	
Connectors	2×RJ45	RS232(4.1)
Power	Bus powered	via USB cable
Signals	RS232	RxD, TxD, RTS, CTS, DTR, DSR, DCD, GND
FIFO size	128 Bytes	Transmit
	384 Bytes	Receive
Dimensions	W×L×H	50×74×22 mm ³

Table 3: Features of VScom USB-2COM ECO (Dual Port)

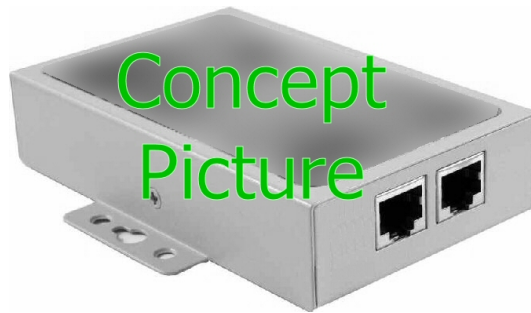


Figure 2: VScom USB-2COM ECO

2.2.3. VScom USB-4COM ECO

Serial Ports	4	
Connectors	4×DB9 male	RS232 (4.1)
Power	Bus powered	via USB cable
FIFO size	2 kBytes	Transmit and Receive
Dimensions	W×L×H	100×110×24 mm ³

Table 4: Features of VScom USB-4COM ECO (Quad Port)

USB-4COM ECO requests 5V@300mA max., so it runs bus powered only.

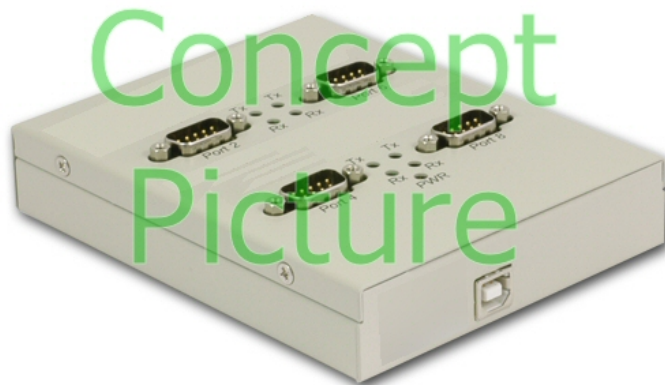


Figure 3: VScom USB-4COM ECO

2.2.4. VScom USB-8COM ECO

Serial Ports	8	
Connectors	8×DB9 male	RS232 (4.1)
Power	Bus powered	via USB cable
FIFO size	2 kBytes	Transmit and Receive
Dimensions	W×L×H	100×110×24 mm ³

Table 5: Features of VScom USB-8COM ECO (Octal Port)

USB-8COM ECO requests 5V@350mA max., it runs bus powered.

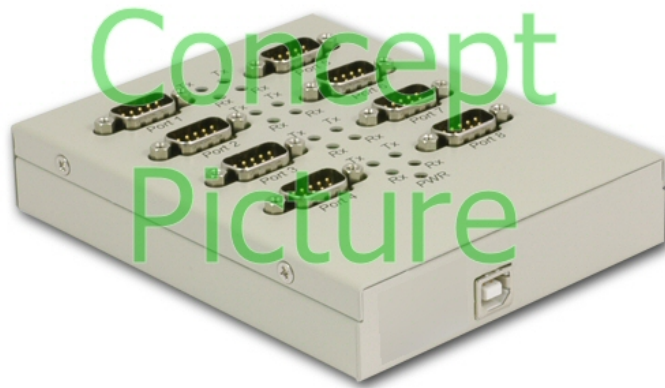


Figure 4: VScom USB-8COM ECO

2.3. Packing List

- USB-xCOM ECO Device
- CD-ROM containing: Drivers, Configuration software utility, User manual
- USB 2.0 High Speed cable
- 4 rubber feet

2.4. About this Manual

This manual describes the hardware of VScom USB-COM ECO models, as well as signal assignments of the serial connectors. The screen shots in here are made on an English language version of Windows 10. It is not difficult to find the appropriate part in any other language version of Windows. The current version of the driver is 2.12.18.

3. The Drivers for Windows

This chapter of the manual documents the drivers for Windows Operating Systems. The driver is the same for all USB-COM ECO available, independent of the model. The USB-COM ECO appear in Windows as several components, depending on the specific model. This can be seen in the Device Manager, while or after installation of the drivers.

- Single and Dual port models appear as a “USB Composite Device” first, which installs USB Serial Converter A and B. These then install one or two serial ports.
- Multiport models with 4 and 8 serial ports first appear as a “Generic USB Hub”, plus USB Composite Devices. These install USB Serial Converter A to D each. The converters then install all the serial ports.
- The models with 4 and 8 serial ports also install an additional virtual serial port, this is later used for configuration by software.

Windows already provides a driver for a USB Hub, and it also handles USB Composite Devices without configuration and help by the user. The specific drivers are required for the USB Serial Adapters, and the USB Serial Ports installed by them.

The manual first describes the process of installing the driver software, followed by instructions for removing the drivers in the unlikely case you wish to do this. After this the configuration of the serial ports is described. There is no option to configure the other drivers installed for the USB-COM ECO, so the options are the same for all different models.

Many USB-COM ECO may be installed simultaneously. In fact the driver does not limit the number of USB-COM ECO installed, Windows does. In Windows the maximum number of serial ports installed is 256, no matter which driver is installed and controls them. The current version of the driver for USB-COM ECO is 2.12.18.

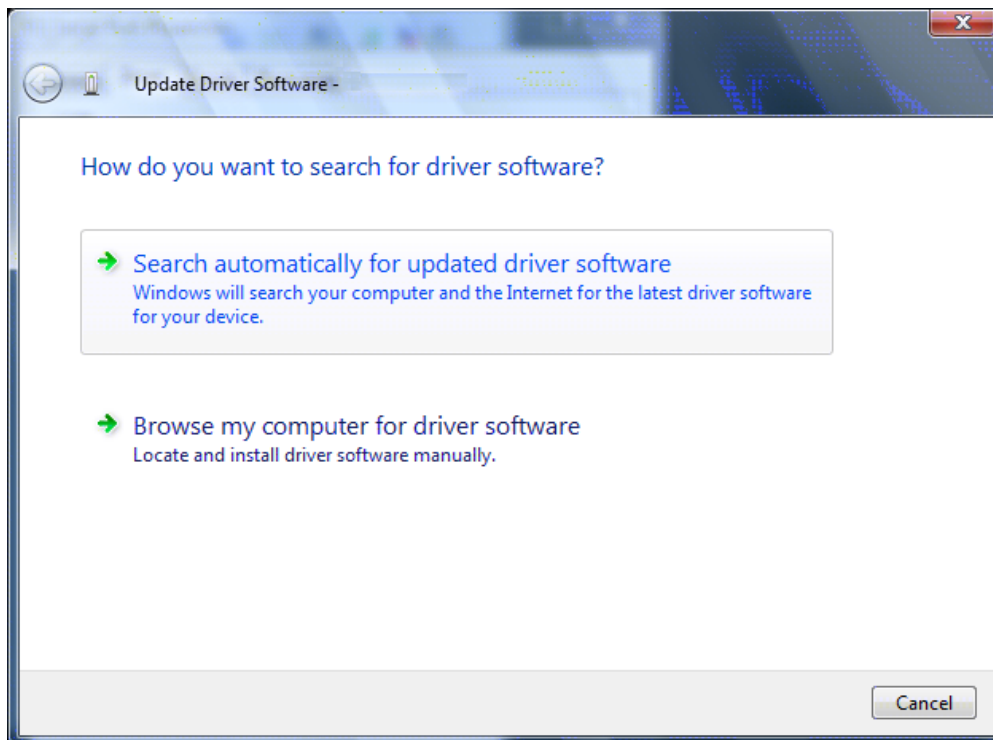
With the current driver version there are two methods of installation. There is the automatic variant, where Windows detects the new hardware as soon as it is connected to the PC. Then Windows contacts to Windows Update and installs the latest version of the drivers. The other way of installation operates offline and uses a Pre-Installation Executable to put the drivers onto the system, *while the hardware is not yet connected to the PC*. Once it is connected later, Windows already knows about the drivers, and installs them without further interaction by the user.

3.1. Install Drivers from Windows Update (Automatic)

This is the easy method of driver installation for USB-COM ECO models. The required steps are very simple. First connect your PC to the network, so it can visit the Windows Update websites provided by Microsoft. Then connect the USB-COM ECO to a USB port of your PC. Windows will detect the new hardware, and contact Windows Update for available and latest drivers.



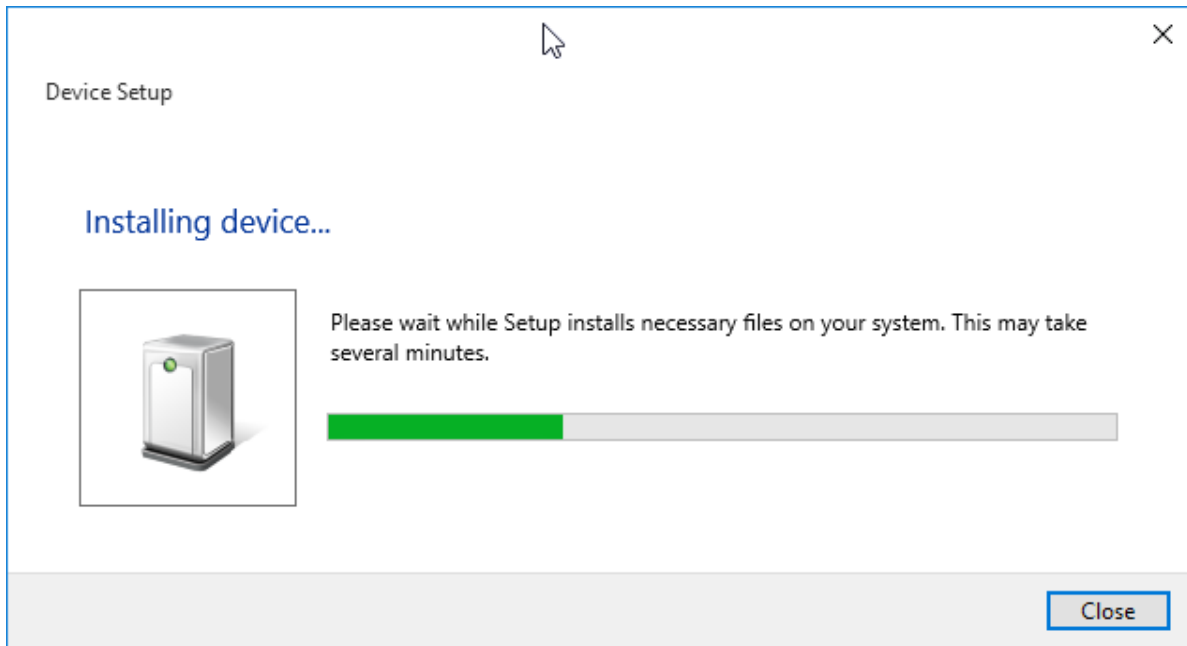
(a) Windows XP



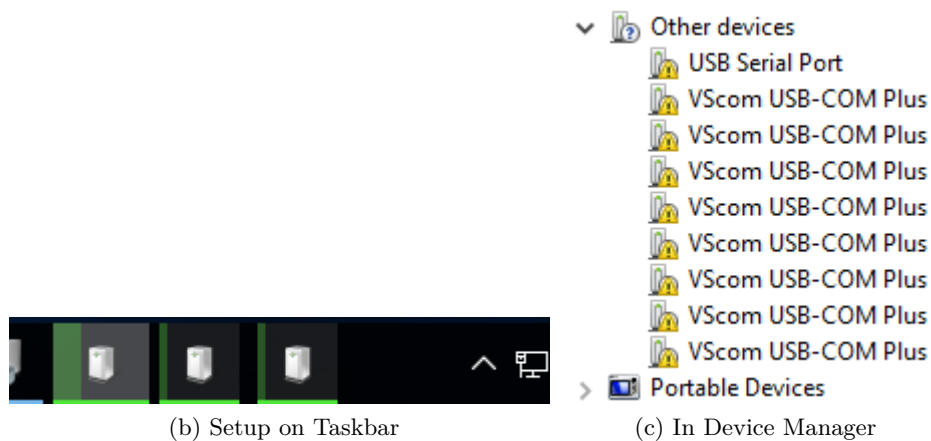
(b) Vista

Figure 5: Confirm Windows Update

On Vista and Windows XP you have to allow the contact to Windows Update. On XP select “Yes, this time only” and proceed, on Vista select “Search automatically...”.



(a) Setup Progress



(b) Setup on Taskbar

(c) In Device Manager

Figure 6: Automatic Installation

The USB Serial Converters and then the USB Serial Ports are installed with these drivers. Depending on the model of USB-COM ECO there are several installation tasks operating in parallel. If the Device Manager is open at this time the serial ports appear in “Other devices” first, before installation in “Ports (COM&LPT)” is finished. No interaction from the user is required in this process.

Note: This is the recommended practice of driver installation. However recently the answers from the servers on Windows Update have been seen as rather slow, so this process may take much too long time. Then it is better to cancel the installation, and use the driver installation by pre-installation executable. If the installed drivers are not the latest version, Windows will update the drivers automatically later.

3.2. Install Drivers by Pre-Installation Executable (Offline)

The driver installation program is usually named like USBCOM-CDM-21214.exe, depending on the version number. This file is found on the driver CD-ROM. Just log on to Windows with Administrator privileges, right-click on the program and select “Run as administrator...”². It is a self-extracting archive, which in turn executes the included installation software. Just follow the steps shown in figures 7 to 11.

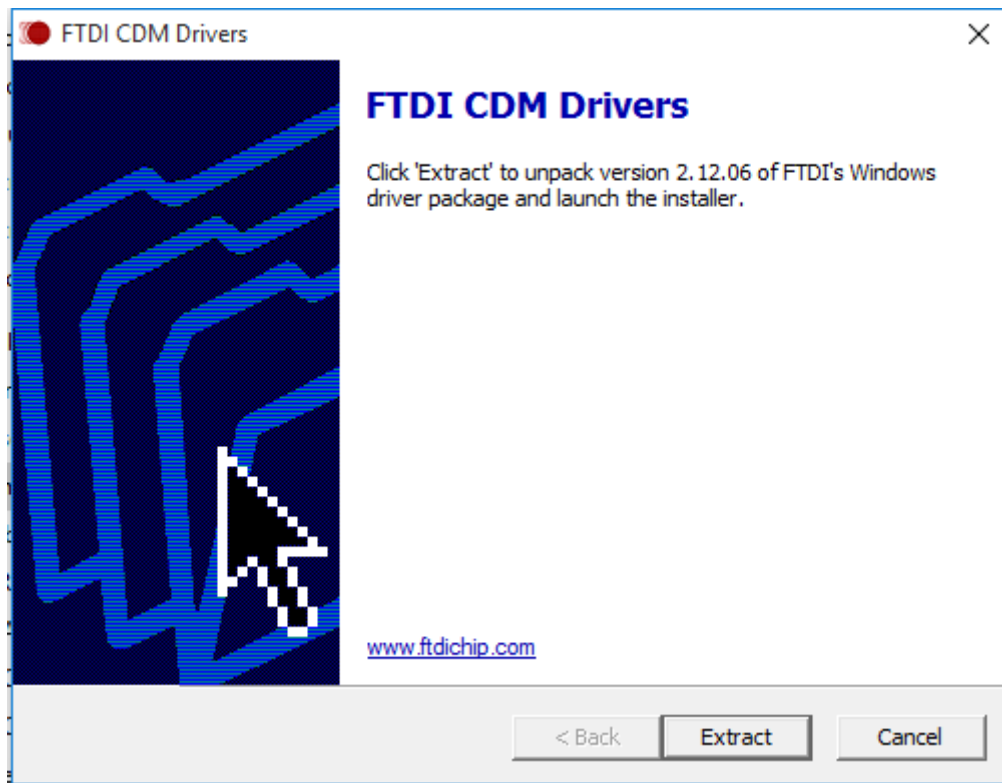


Figure 7: Extract to temporary Space

²On Windows XP just double click

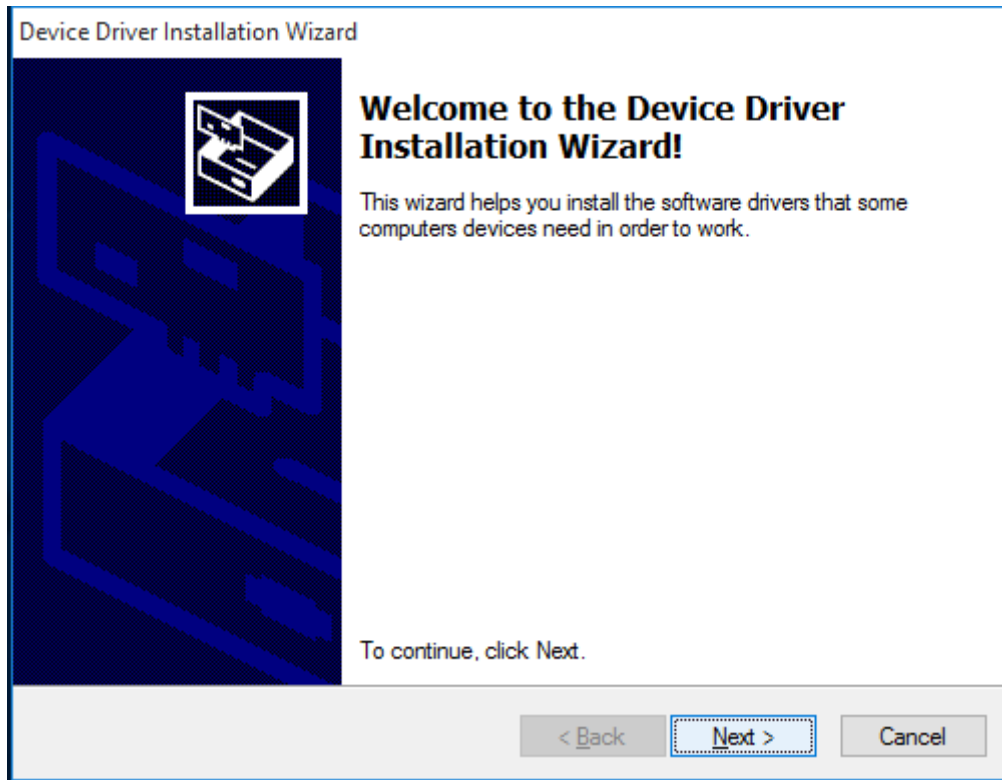


Figure 8: Start Installation

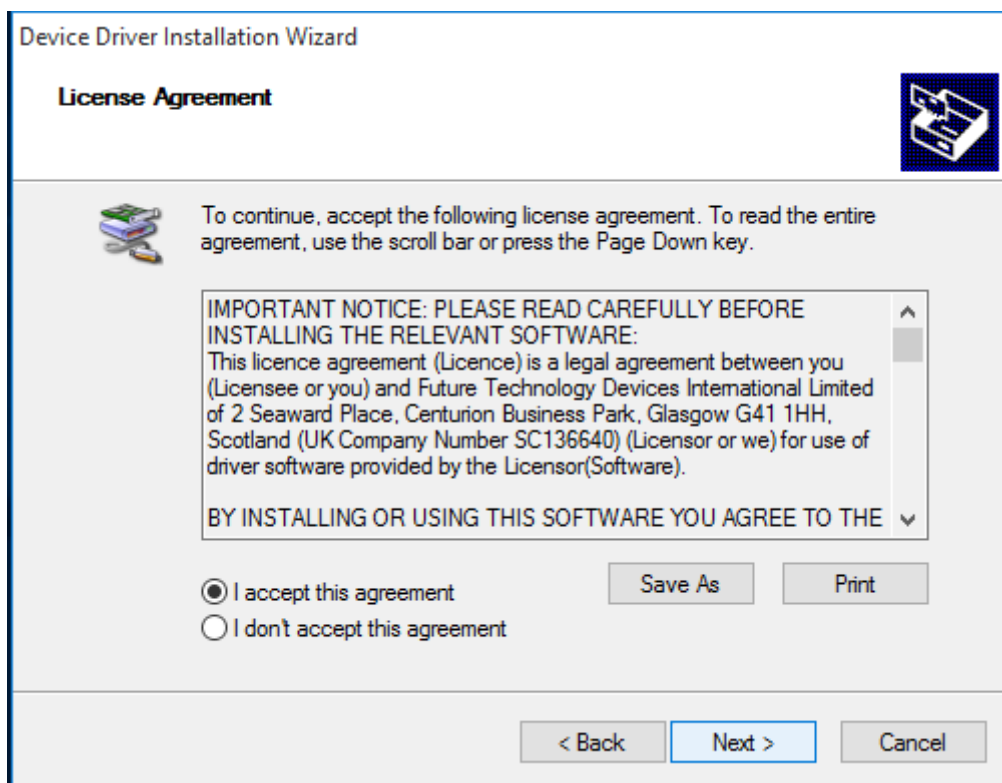


Figure 9: Confirm License conditions

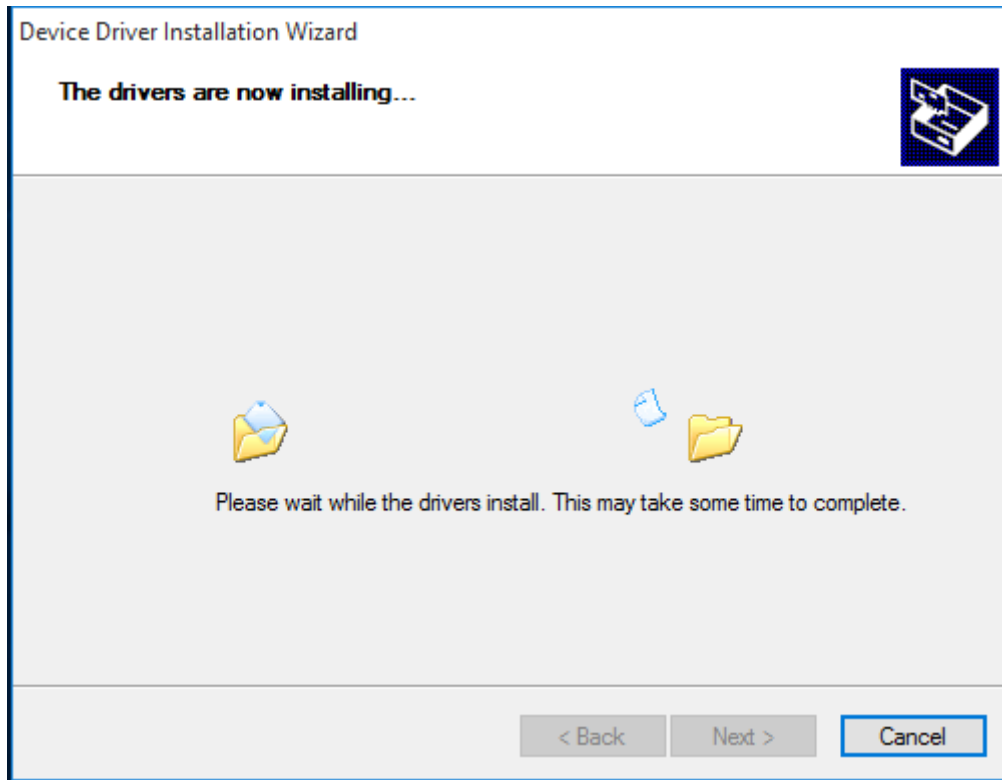


Figure 10: Copy Files and Install Drivers

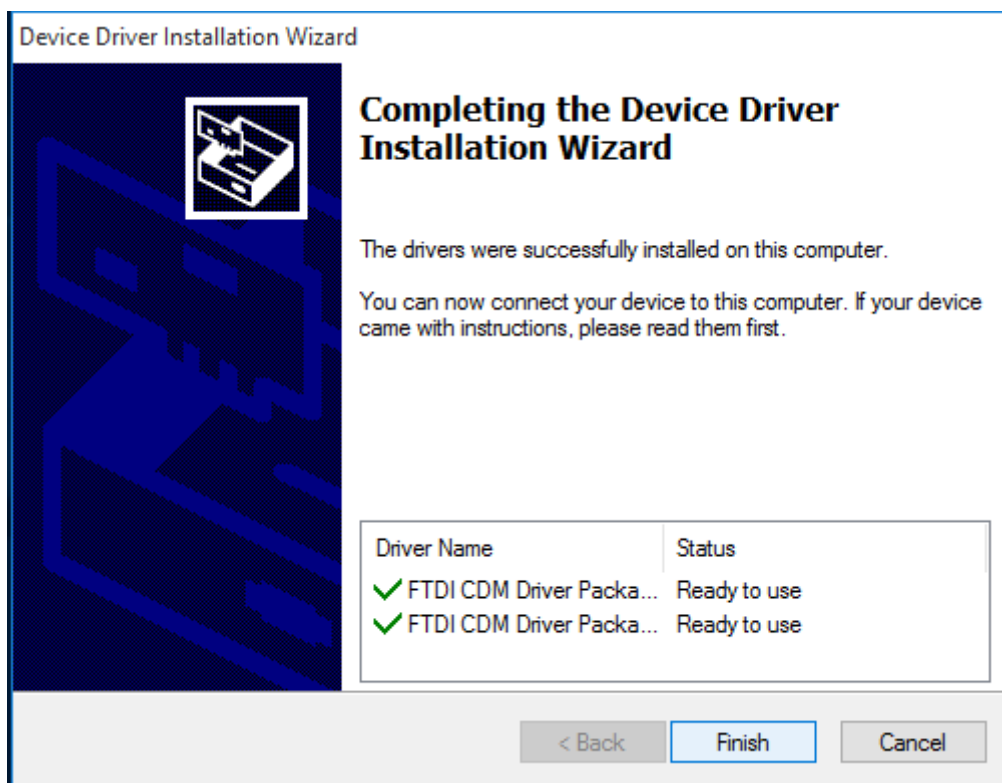



Figure 11: Installation finished

The result of this process³ is a Windows system which has the USB-COM ECO added as known hardware. Now connect your USB-COM ECO to a USB port on your PC. Windows detects the new hardware, and attempts to install the drivers. On Vista or Windows XP it probably offers the option to search the Internet for more recent drivers (fig. 5), just say “No, not this time” to this question. In the next steps select the Automatic option, and click on Next and Finish as requested. Windows knows about the drivers, and installs all components and serial ports without further interaction.

3.2.1. Check Installation of the Drivers

Open the Device Manager, and see if all serial ports are available in the “Ports” Device class. Open the properties of each serial port.

3.2.2. Uninstall Drivers

First disconnect all USB-COM ECO from your system. On the CD-ROM you’ll find the CDMuninstallerGUI.exe. Right-Click on this, and select “Run as administrator...”. 

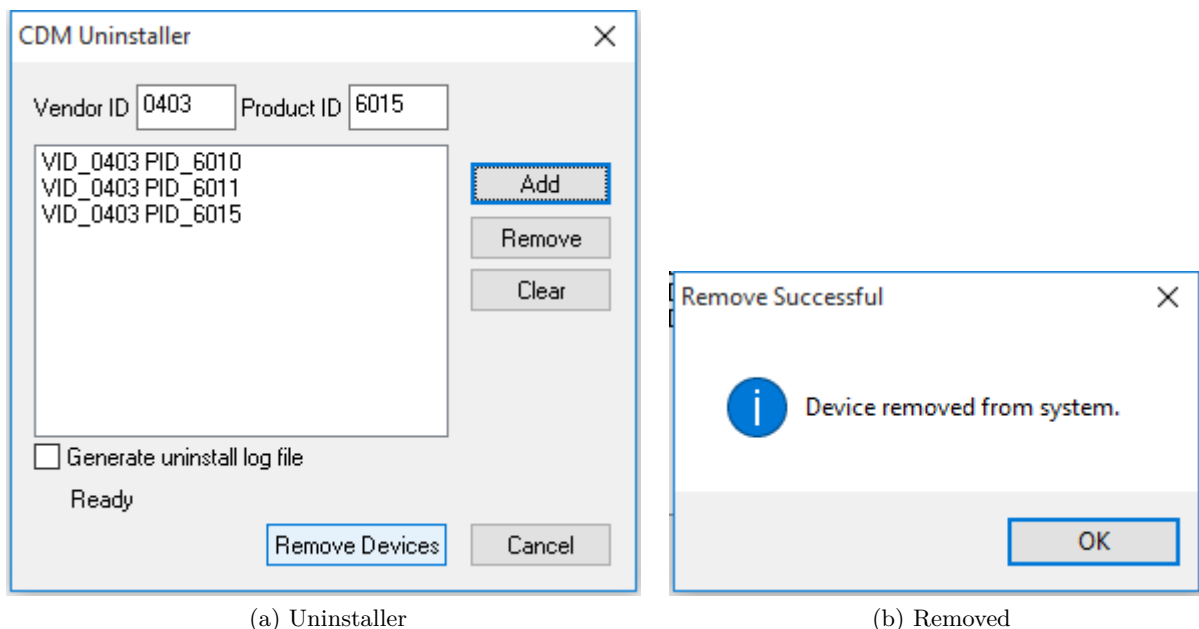


Figure 12: Uninstall Drivers

Change the value in “Product ID” to the values of 6010, 6011 and 6015. For each value click on the “Add” button, so the window looks as above. Then click on “Remove Devices”. The process shows some “removed” messages. Ignore any messages for failures. These may happen when no product with one of the given Product ID is available. This is no problem, just continue. And finally close the program.

This procedure not only removes all entries of USB-COM ECO from the Device Manager, in the final step also the driver files are removed from the hard disk. As a result reconnecting a USB-COM ECO causes Windows to start the search for drivers again.

³To have this installation perform really quick, disconnect the PC from any network prior to installation and connection of the USB-COM ECO device.

3.3. Configure the Serial Ports

Open the Device Manager. In the Device Manager open the device class of “Ports (COM & LPT)”⁴. In this class you’ll see all the entries of “USB Serial Port”. Now open the properties of the serial port to configure.

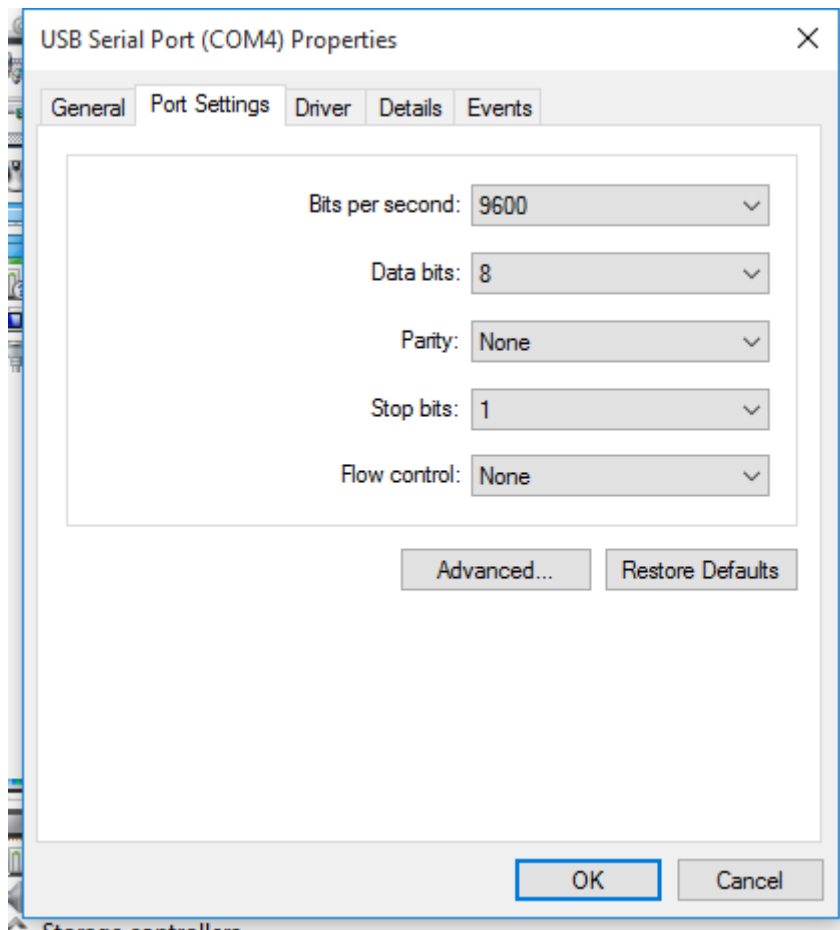


Figure 13: USB Serial Port Properties

Click on the button named “Advanced...” to see the special configuration options. They are available via the panel in figure 14.

⁴“Anschlüsse (COM und LPT)” in einem deutschen Windows

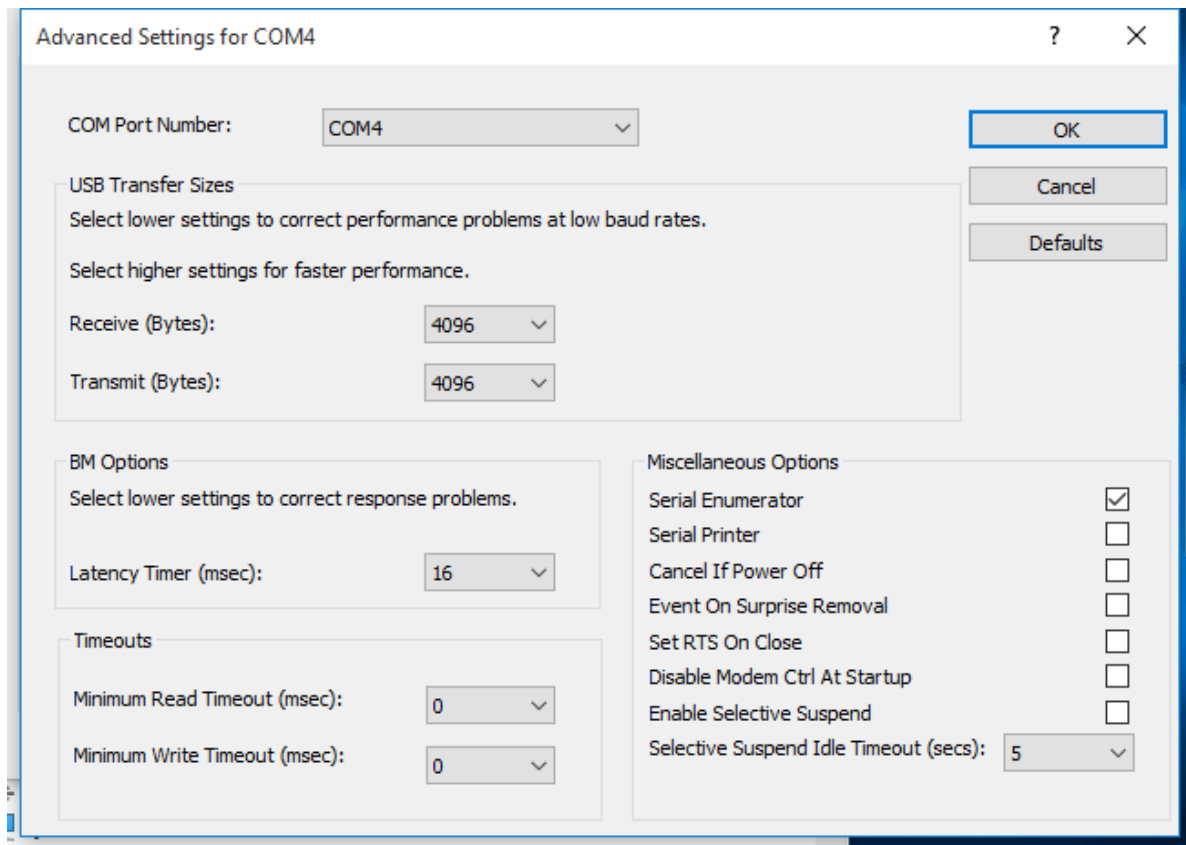


Figure 14: Advanced port options

3.3.1. Rename the Serial Port

The option “COM Port Number” on top of the advanced settings allows to rename the port. You may select any free port number. It is Windows which refuses a change, if the new port name is already occupied.

3.3.2. Enable faster Responses

The section named “BM Options” is in the middle of the left part. The parameter “Latency Timer” can be reduced to 1 millisecond, if there are problems with certain applications. The default value is 16, to reduce the USB protocol overhead and bandwidth usage. Usually the serial port buffers incoming data for up to 16 ms, or until 62 bytes of data are received. When either of the criteria becomes true, the data is sent to the Host PC. Then the application software will recognize the received data. If only a small amount of data is received, or the last part of the transmission does not trigger the 62 byte limit, this causes a short delay in receiving the data. As the consequence the application can not operate on the data very early.

Usually this is not a problem, but with certain serial protocols this can cause strange effects. So a reduction to 1 ms is appropriate then, faster reactions are not possible. This is caused by the protocol structure of USB, not by the serial port.

3.3.3. Miscellaneous Options

In the lower right corner of the Advanced Options (figure 14) are some rarely changed options.

3.3.3.1. Serial Enumerator This option is enabled by default. When the driver is started, Windows tries to detect hardware attached to the serial port. There may be a mouse or a modem. Most often the attached device is neither of that, so it is not a problem to disable this option. Further some devices permanently send data to the Host, without special requests. Windows may falsely recognize such devices as a serial mouse. This causes your pointer to randomly jump over the screen. Disabling the option prevents this.

3.3.3.2. Serial Printer When flow control like RTS/CTS stops data from being sent to the serial port for a sufficient time, this will cause an error event for the application. However if the attached serial device is a printer, sometimes this will halt for paper feed, especially for manual interaction. This will cause the data flow to stop for a significant long time.

Enabling this option causes such errors never to be reported to the application. So printing will never cause erroneous error messages.

3.3.3.3. Cancel if Power Off Instead of a regular shut down the computer can be sent into sleep or hibernate mode. In this situation neither the serial port nor the driver can perform any requests. In rare situations this can cause problems.

Enabling this option dumps any open requests for driver or hardware, if the computer is powered off by any Suspend state.

3.3.3.4. Event On Surprise Removal Usually this option is disabled because software does not use it. When it is enabled, application software can request to be notified if the hardware of the serial port is removed from the system while it is in use. So instead of claiming a malfunction of the attached serial device it can correctly report the removal of the port.

3.3.3.5. Set RTS On Close Usually the signal RTS is disabled when the port gets closed. However some kind of serial hardware may require a permanently active RTS for correct operation. Otherwise there may be error messages when the port is opened again to use the device.

Enabling this option causes the RTS to stay active even when the application closes the serial port.

3.3.3.6. Disable Modem Ctrl At Startup Usually on startup the modem control signals RTS and DTR follow the behavior of standard ports (i.e. Com1). Due to the longer timing compared to built-in serial ports a very short enable or disable pulse on the control signals may become a comparably long pulse on the USB serial port. Such a long pulse can cause external hardware to malfunction. By correct configuration of the serial port application software can avoid that problem. However since it does not appear on Com1, most software does not care about that. This option will help to “heal” such problem.

Note that if the "Serial Enumerator" option is enabled, in the enumeration sequence Windows causes the control signals to change. So if it is necessary to select "Disable Modem Ctrl At Startup", it is likely that "Serial Enumerator" should be disabled too.

3.4. USB-COM Plus Configurator

To configure all parameters (see section 3.3) of the serial ports will be a clumsy work. To do this in a more easy way there is a special tool to perform this for a collection of ports all at once. This is the USB-COM Plus Configurator.

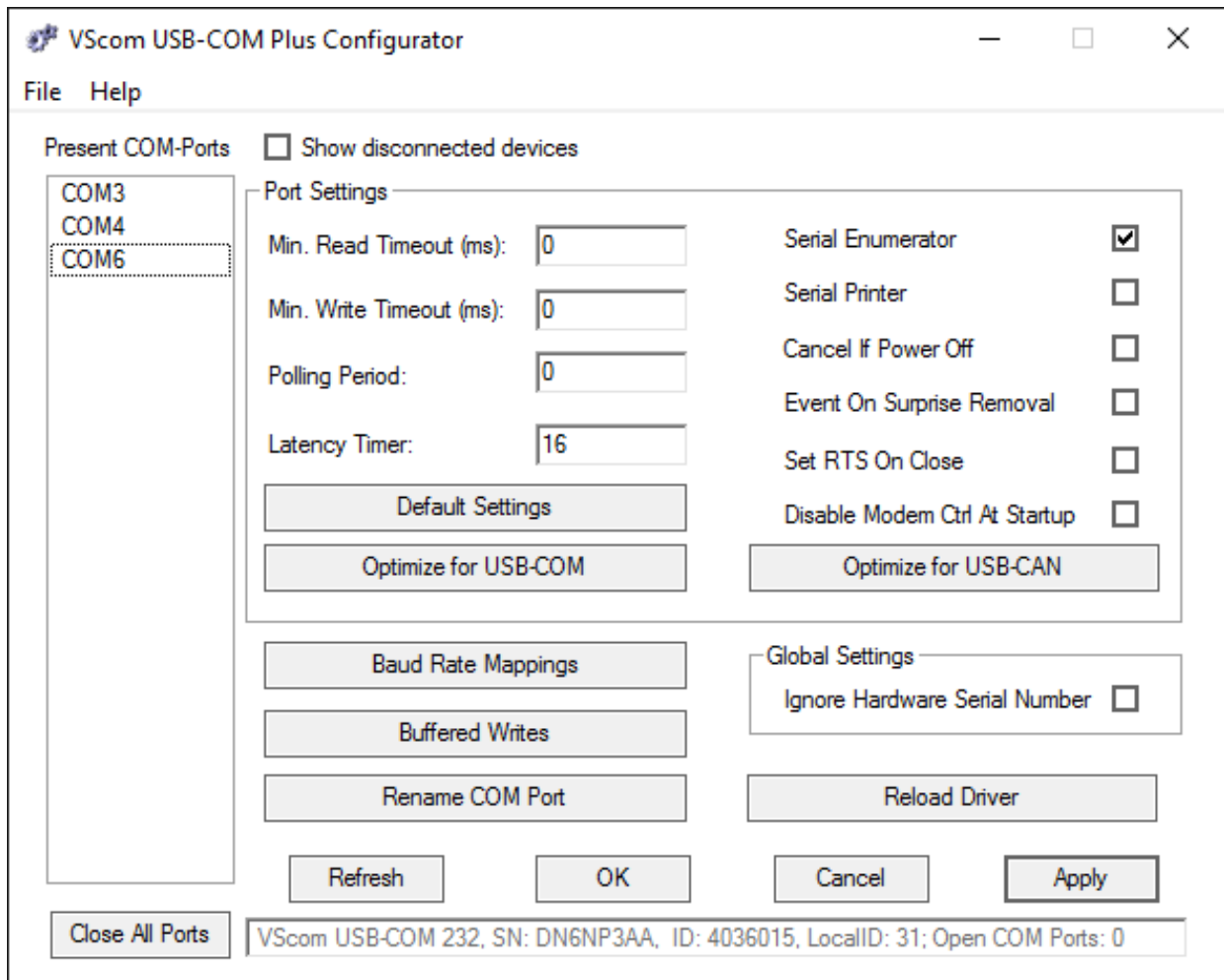


Figure 15: Driver Configurator

In the left list the user selects the COM Ports to configure, multi-select options are available. Aside from the individual parameters in the top area, there is one button for "Default Settings", and a convenient to "Optimize for USB-COM". This configures for best practice parameters, based on experiences.

3.5. Optimizing Data Throughput

Roughly speaking, the USB allows one operation between Host PC and attached USB device per millisecond. This is the basic reason why the Latency (see 3.3.2) can't be shorter than 1 ms. But there is a second effect causing slow transmissions.

Many software sends the data to the driver byte-by-byte. This is not a problem with built-in ports like Com1. Except for extreme high transmission rates the operation time of the driver is much shorter than the serial transmission time. So when the second and following byte are sent to the driver, the previous bytes did not completely leave the PC and its buffers. The serial port does not run out of data.

This is different with USB serial ports. No matter how fast the byte is transmitted over the USB cable (12 Mbit/s or 480Mbit/s), it takes 1 ms to send the next byte. Calculated the other way this is 1000 byte per second, which is equivalent to 9600 bit/s. The user feels the transmission as sluggish. Raising the serial speed does not help, since this is not the problem.

However it requires nearly the same millisecond to send one byte or more. So if the application sends complete buffers instead byte-by-byte, the driver can send more than one byte per millisecond. This way the USB serial port is permanently fed with work to send.

4. Connector Definitions

All the VScom USB-COM ECO devices provide the today standard DSub9 male connector for the signals of the serial ports.

The signal assignment for RS232 on DB9⁵ male connectors is defined by the term "RS232" already. Below is the signal definition for the connectors used by the USB-COM ECO.

4.1. DB9 male

Pin	RS232
1	DCD
2	RxD
3	TxD
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	RI

Table 6: DSub-9 male Connector

Signal RI is not available on USB-2COM ECO.

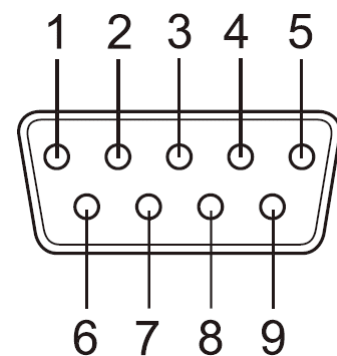


Figure 16: DB9 male Connector

⁵Technically correct is DE9

4.2. RJ45 for RS232

Pin	RS232
1	DCD
2	RxD
3	DTR
4	GND
5	DSR
6	TxD
7	RTS
8	CTS

Table 7: RJ45 Connector

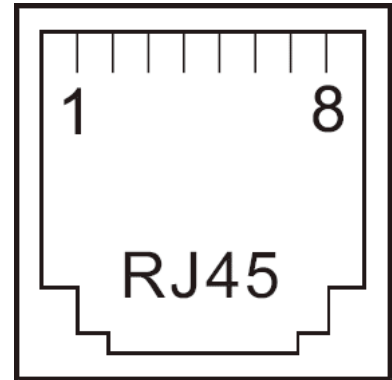


Figure 17: RJ45 Connector

A. History

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