P300M USER'S MANUAL

Contents

1.1 OVERVIEW

P300M serial port server is designed to make your serial devices Internet ready instantly. P300M device server makes it the ideal choice for connecting your RS-232/485 serial devices, such as card readers, payment terminals, LED wall, PLC, sensors, base station monitor devices, etc, to an IP-based Ethernet LAN, making it possible for your software to access serial devices remotely located on a local LAN, even on the Internet.

P300M supports several operation modes, including TCP Server, TCP Client, UDP Server/Client, Pair Connection, ensuring the compatibility of network software that uses a standard network API (Winsock, BSD Sockets). In addition, P300M's Virtual COM/TTY drivers allow you to set up your COM/TTY port software to work over a TCP/IP network in no time. This excellent feature preserves your software investment and lets you enjoy the benefits of networking your serial devices instantly.

1.2 PRODUCT FEATURES

✓ Higher price-performance ratio in its class of RS-232/RS-485 serial port servers.
✓ 32 bits ARM Cortex-M3 CPU.
✓ 3 ports of RS-232, support RTS/CTS，DTR/DSR flow control.
✓ 3 ports of RS-485 with terminal block, easy for field deployment.
✓ ESD 1.5KV protection，lighting stroke protection.
✓ Wide power input voltage ranging from 6 to 36 VDC, Terminal block power with polarity reverse protection.
✓ Run the independently developed Real Time OS optimized for networking traffic.
✓ Support Telnet Server、TCP Server、TCP Client、TCP Client Ext、UDP Server、UDP Client、VCOM Server operation mode. TCP Client and UDP Client modes support DNS server;
✓ Support ModBus RTU Slave, RTU Maskter mode, and RTU Slave supports max 6 connections.
✓ Any two serial ports could be locally connected via TCP Server and TCP client mode.

- ✓ Configuration via WEB/Telnet/serial console.
- ✓ Windows /Linux virtual serial port utility.
- ✓ Upgrading firmware through tftp protocol, greatly improve the maintenance of device at remote field.

1.3 PRODUCT SPECIFICATIONS

Ethernet	10/100Mbps RJ45
RS-232	Port number: 3 Interface: Male DB9 Max baud rate： 912.6Kbps Data： 5,6,7,8 Parity： None, Even, Odd, Space, Mark Stop: 1,2 Flow control： RTS/CTS, DTR/DSR Signal: TxD,RxD,RTS,CTS,DTR,DSR,DCD,GND ESD： 2KV
RS-485	Port number: 3 Interface: 3.81mm terminal block Max baud rate： 230.4 Kbps Data： 5,6,7,8 Parity： None, Even, Odd, Space, Mark Stop: 1,2 Signal: Data+,Data-,GND ESD： 2KV Max slaves： 32
Software	Protocol： IP,TCP,UDP,ICMP,DHCP,TFTP,TELNET,DNS,HTTP Tools： vComMgr virtual serial port tools OS： Windows XP/7/2003, Linux Kernel 2.4.x, 2.6.x, 3.0.x
Mechanical	Aluminum case (1 mm)
Power	6 to36 VDC
Operating temperature	-40C ~ 80°C

Notes: User can only select one of RS-232/RS-485 interfaces to connect your device. WEB console provides the way for configuration, for details please refer to the chapter "Mode Settings".

2.1 CONNECTING TO THE NETWORK

P300M's default IP address is **192.168.1.222**.Please visit http://192.168.1.222 to access P300M. Both user name and password are admin.

2.2 CONNECTING TO THE SERIAL DEVICE

Connect the serial data cable between the P300M and the serial device. User must select RS-232/RS-485 interface via WEB console when the corresponding port is connected to serial device. For details, please refer to the chapter "Mode Settings".

DCD RxD TxD DTR GND

1 2 3 4 5

6 7 8 9

DSR RTS CTS RI

DB9 Male
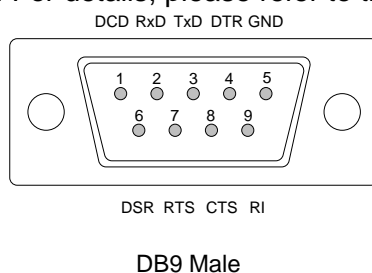
2.3 CONNECTING TO THE POWER

Connect the 6-36 VDC power line with the P300M's terminal block. If the power is properly supplied, all Rx/Tx LEDs will show a blinking green color until the system is ready, at which time the Rx/Tx LEDs will be off.

> **Notes：**
>   **Grounding and wire routing helps limit the effects of noise caused by electromagnetic interference. Run the ground connection from the ground screw to the grounding surface prior to connecting devices.**

2.4 RESET BUTTON

When user forgets password or IP address, and wants to restore the factory settings, the reset button is the simplest way to accomplish that. When P300M powers on, please press reset button for at least 5 seconds, all three Rx/Tx LEDs will blink one by one until the factory settings are restored.

2.5 LED INDICATORS

The top panel has four LED indicators, as described as the following table

ID	Name	Action	Specification
1	COM3 Rx/Tx	Blink	COM3 RS-232/RS-485 is sending or receiving data.
		Off	No data.
2	COM2 Rx/Tx	Blink	COM2 RS-232/RS-485 is sending or receiving data.
		Off	No data.
3	COM1 Rx/Tx	Blink	COM1 RS-232/RS-485 is sending or receiving data.
		Off	No data.
4	PWR	Solid Green	Power on.
		Off	Power off.

LED group specification:

Group	Action	Specification
COM3 Rx/Tx COM2 Rx/Tx COM1 Rx/Tx	Slowly blinking	System is booting, slowly blink for 3 seconds.
	Fast blinking	System is upgrading firmware.
	Solid green	System is at runtime state, and waits fro serial console input at COM1. The Rx/Tx LEDs will be solid green for 3 seconds.
	Blinking one by one	System is restoring factory settings, the reset must be pressed for at least 5 seconds.

3.1 TCP SERVER MODE

In TCP Server mode, the P300M provides a unique IP/Port address on a TCP/IP network, each TCP local port corresponds to a P300M's serial port. The P300M waits passively to be connected by the host computer, allowing the host computer to establish a connection with and get data from the serial device. This operation mode also supports up to 6 simultaneous connections, so that multiple hosts can collect data from the same serial device—at the same time. The data is transparently sent and received by P300M.

3.2 TCP SERVER EXT MODE

The difference with TCP Server mode is that it only supports master/slave mode, TCP client runs as a master and sends command to serial port server, then serial port server sends the command to serial device working as a slave, and waits for the response, for details about response timeout setting, please refer to chapter "Serial Port Settings". After serial port server receives response data, it ONLY sends the data the the TCP client which sends the command, it will not copy the data to other clients.

3.3 TELNET SERVER MODE

Console management is commonly used by connecting to RS-232 ports of routers, switches, and UPS units. Telnet server works similar with TCP Server, except that it parses tenet protocol.

3.4 TCP CLIENT MODE

In TCP Client mode, the P300M can actively establish a TCP connection to a pre-defined host computer before serial data arrives. After the data has been transferred, the P300M will disconnect from the host computer by using the TCP alive check time. The keep-alvie time interval is 10 seconds, and the total timeout is 2 minutes. P300M can also connect to remote host computer via DNS, such as the following settings.

Serial Port	Interface	Operation Mode	Local Port	Server IP	Domain	Server Port
COM1	RS-232 ▾	TCP Client ▾	8001	abc.dyndns.org	6001

3.5 TCP CLIENT EXT MODE

"TCP Client EXT" mode is the extended mode of "TCP Client". When TCP Client connects to remote host computer at Internet, both source IP address and source port may be translated to a public IP and port (NAT). So host computer can't distinguish a serial port through IP and port when this kind of application is encountered.

As soon as TCP client connects to host, P300M will send the following 18 bytes of data for host to detect serial port corresponding to the P300M.

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4 - Byte 15	Byte 16	Byte 17
0xAA	0xFB	Length	1	Serial Number	Serial Port Number	CRC

Byte 0 Preamble code 0xAA
Byte 1 Preamble code 0xFB
Byte 2 Payload length, it calculates from byte 3 to the byte before CRC. In this case , the payload length is 14。
Byte 3 Command code, it is always 1.
Byte 4-15 SN in ASCII format , the size is 12 bytes.
Byte 16 Serial port number, which starts at 1.
Byte 17 CRC checksum of the whole payload，calculates from byte 3 to the byte before CRC。 The CRC is the two's complement of sum of all bytes in 8 bits. The following code is an example of crc verification in C language.

```
unsigned char crc, length, i, temp;
if((buf[0] != 0xAA) || (buf[1] != 0xFB) || (buf[3] != 1))
{
     /* Return fail code */
     return;
}
len = buf[2];
temp = 0;
for(i = 0; i < len; i++)
{
     temp += buf[3+i];
}
crc = ~temp;
if(crc != buf[17])
{
     /* Return fail code */
     return;
}
/* CRC is correct, do whatever you want to do next. */
```

3.6 UDP SERVER MODE

Compared to TCP communication, UDP is faster and more efficient. UDP Server receives data from UDP client and sends it to serial device.

3.7 UDP CLIENT MODE

UDP Client receives data from serial device and send it to host computer by IP address and port, which are set at web page. The target address could be an IP address, broadcast IP address, network segment IP address, or a domain name. for example, if the target IP address 10.1.1.1-50, it denotes that the serial port server will send the data one by one through UPD to the IP 10.1.1.1 to 10.1.1.50. If the target address is only one host, there is no need to add the subfix -XXX. Be noticed that two consecutive UPD packet interval is about 1 ms, if user wants to send data to 50 hosts,

it will take about 50ms to complete this action. For details, please refer to "Mode Settings".

3.8 VCOM SERVER MODE

Compared to TCP Server mode, VCOM Server mode especially handles RTS/CTS, DTR/DSR flow control and baudrate settings, and it is used with virtual serial port vComMgr utility together. vComMgr runs as a TCP client. The driver establishes a transparent connection between host and serial device by mapping the IP:Port of the P300M's serial port to a local COM/TTY port on the host computer. When the connection is successfully established, and software at host computer opens the virtual serial port, all configurations will be synchronized with serial port server.

3.9 RTU SLAVE MODE

ModBus RTU Slave mode is used to connect to the serial device which runs as RTU Slave. Serial port server runs as a TCP Server.

3.10 RTU MASTER MODE

ModBus RTU Master mode is used to connect to the serial device which runs as RTU Master. Serial port server will connect to the remote TCP Server, which is also called Modbus TCP Slave.

3.11 DISABLED MODE

When the Operation Mode for a particular port is set to Disabled, the port will be disabled. If a serial port is not used, it is recommended that port be configured with Disabled.

User could select web console or serial console to configure P300M. The web console is the most user-friendly way to configure the P300M. Serial console is mainly used to configure P300M's networking.

4.1   WEB CONSOLE CONFIGURATION

Please open your web browser and input http://192.168.1.222 , the browser will prompt a dialog box to let you input user name and password; both user name and password are **admin**. The following snapshot shows the page in Google Chrome browser.
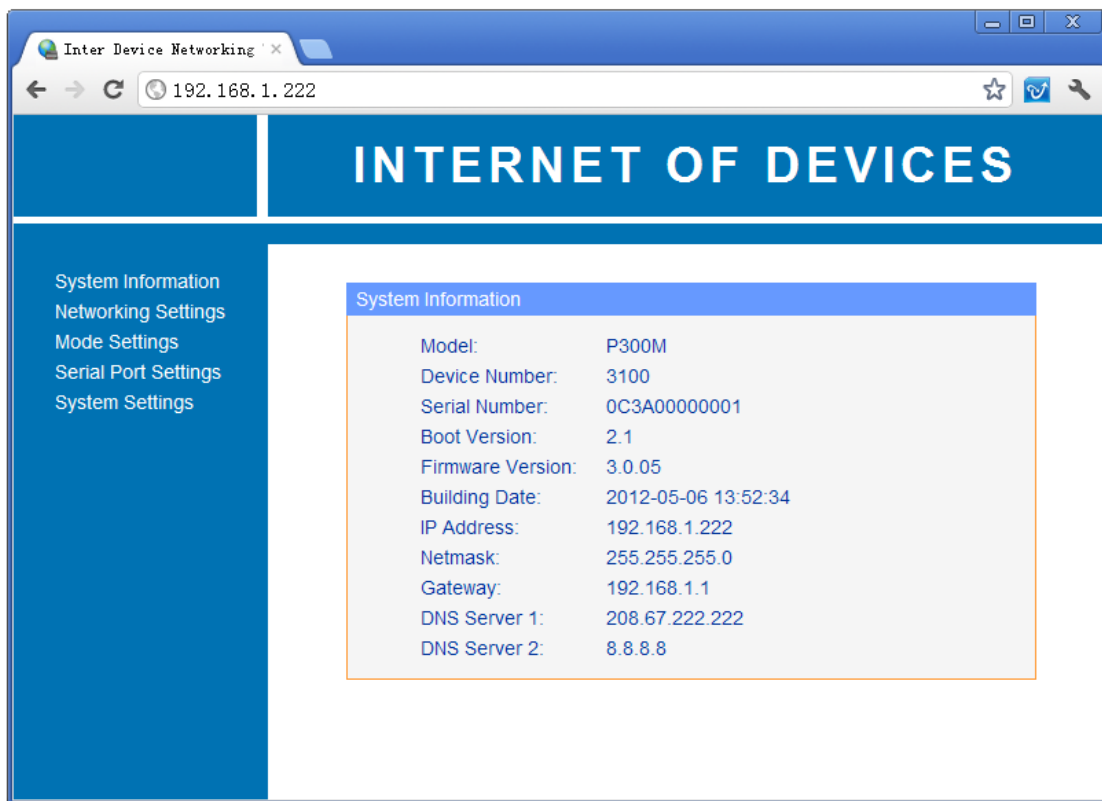
4.1.1   SYSTEM INFORMATION

 "System Information" page shows P300M' s basic settings as the following pictures.

Max Response Time is measured during the communication. It is a very important reference to set Response Timeout at the Serial Port Settings page. This parameter is only valid when the corresponding serial port operates as RTU Slave, RTU Master or TCP Server Ext mode.

4.1.2 NETWORKING SETTINGS

This page configures P300M's networking settings. If you accidently set an invalid IP and reboot the device, you could press reset button for 5 seconds to restore factory settings, or configure the networking via serial console, for more information, please refer to chapter "Serial Console Configuration". If the IP address is retrieved via DHCP(Dynamic IP), the vComMgr utility provides the feature to scan online devices.

Notes:

   The settings in this page take effect after device reboots.

4.1.3 MODE SETTINGS

Each P300M's serial port support RS-232 and RS-485. Before connecting serial device to P300M, user should select the interface and operation mode. The operation modes are specified in details in chapter "Operation Mode".
"Local Port" and "Server Port" are a bit confusing. When operation mode is configured as server mode, P300M will listen at the port and accept incoming connection and

data. When operation mode is configured as client mode, the local port will be bound as source port. Remote host computer may identify the serial port by IP and source port. If local port's value is zero, it means that user would let system automatically generate UPD/TCP source port.

P300M also support connecting to server by DNS when the operation mode is client.

4.1.4 SERIAL PORT SETTINGS

RS-232 baud rate supports 50bps to 921600bps, and RS-485′s max baud rate is 230400bps.Data bits are 5,6,7 and 8. Stop bits are 1 and 2. Parity options are None, Even, Odd, Space and Mark. ""

Flow controls mean hardware flow control. There are NONE, CTS, DSR, DSR/CTS for selection.

- ✧ **NONE**, no flow control. (Factory default)
- ✧ **CTS**, Signal RTS (Request To Send - from P300M) and CTS (Clear To Send - from the Serial Device) are used to control. In most Asynchronous situations, RTS and CTS are constantly on throughout the communication session. In this flow control mode, P300M sends data to serial device only it detects CTS voltage level is high, 3-15VDC.
- ✧ **DSR**, Signal Data Set Ready (DSR) is an indication from Serial Device (i.e., PLC) that it is on. Similarly, DTR indicates to Serial Device that the P300M is on. In this flow control mode, P300M sends data to serial device only it detects DSR voltage level is high, 3-15VDC.
- ✧ **DSR/CTS**, In this flow control mode, P300M sends data to serial device only it detects both DSR and CTS voltage level is high, 3-15VDC.

Be noticed that user should connect P300M′s RTS signal to Serial Device′s CTS signal, and P300M′s DSR signal to Serial Device′s DTR signal when flow control is selected. Please refer to the chapter "Connecting to the serial device" for .DB9 signal definition.

RX Timeout: The maximum time allowed elapsing between the arrivals of two bytes on the Serial Port line, in milliseconds. During a Read operation, the time period begins when the first byte is received. If the interval between the arrivals of any two bytes exceeds this amount, the Read operation is completed and any buffered data is sent to TCP/UDP stack. Zero means Read operation returns immediately.

TX Timeout: The maximum time allowed elapsing between the arrivals of two bytes on the TCP/UDP stack, in milliseconds. During a Write operation, the time period begins when the first byte is received. If the interval between the arrivals of any two bytes exceeds this amount, the Write operation is completed and any buffered data is written to serial port line. Zero means Writing buffered data immediately.

Response Timeout: The original Modbus protocol was not designed for simultaneous requests or simultaneous masters, so only one request on the network can be handled at a time. When a master sends a request to a slave, no other communication may be initiated until after the slave responds. The Modbus protocol specifies that masters use a response timeout function to identify when a slave is nonresponsive due to device or line failure. This function allows a master to give up on a request if no response is received within a certain amount of time.

We provide a simple way to set Response Timeout. Our serial port server will measure each response time and save the max one, which is displayed at the System Information page. So when user starts the serial port server at the first time, we suggest that let Master/Slave communicate for a long time and observe the max response time, here say 156ms, so 180ms is a good Response Timeout to be set, extra 24ms is reserved to reduce risk.

4.1.5 SYSTEM SETTINGS

This chapter specifies how to set language, reboot device, restore factory settings, etc.

4.1.5.1 LANGUAGE SETTINGS

P300M currently supports two languages, Simplified Chinese and English. After saving the selected language, please refresh the page, or press F5 button to make the browser load the new language.

4.1.5.2 REBOOT DEVICE

Press the "Reboot Device" to reboot the system.

4.1.5.3 RESTORE FACTORY SETTINGS
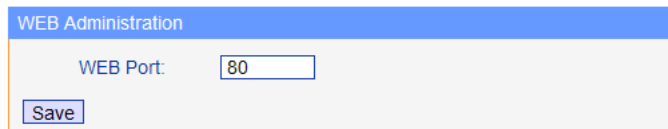
Press the "Restore Factory Settings" button to load default settings. Be noticed that the previous settings will be lost after this operation.

4.1.5.4 WEB ADMINISTRATION

For security reason, user may need to change http server's port. After port is changed, you should reboot the system, and then input http://192.168.1.222:XXXX in your web browser. XXXX is the new port.
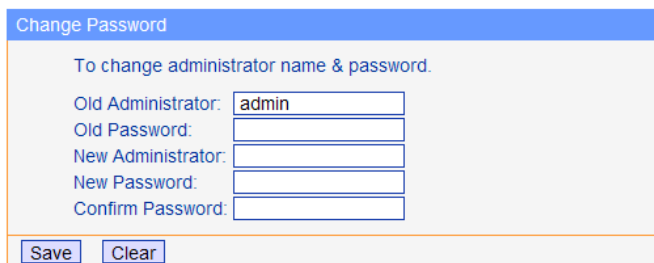

4.1.5.5 CHANGE PASSWORD

Input New Administrator and new Password to change.

4.1.5.6 UPGRADE FIRMWARE

Upgrading firmware through network greatly improve the maintenance of serial port server at field. Before upgrading firmware, please download firmware file, say R3.0.05.bin, and save it in a directory. Then download the tftp server, we strongly recommend user run tftd32 as tftp server, which is open source. User could visit its website http://tftpd32.jounin.net/ to freely download it. The main UI is as the following. Press the "Browse" button to select the directory where the firmware file is saved, the tftp server is easily setup.
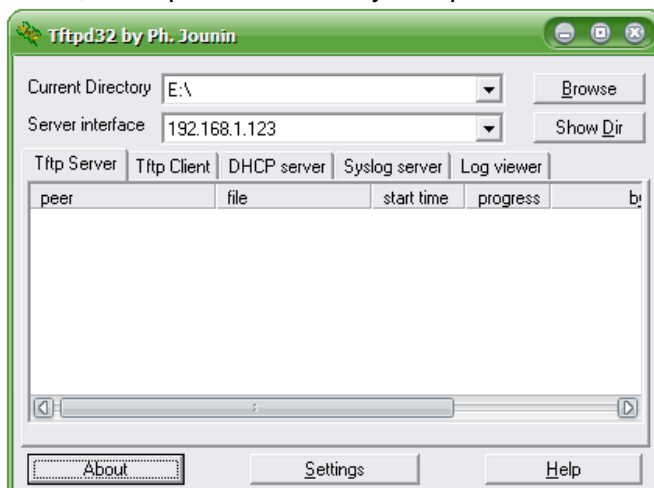
Then input the firmware file name and tftp server IP address in the webpage as the following page, press "Upgrade" button, then P300M will automatically download firmware and upgrade it. In the upgrading process, all three Rx/Tx LEDs will fast blink. After upgrading successfully finish, Rx/Tx LEDs will be solid green for 3 seconds, then

be turned off. The whole process takes about 20 seconds, be patient to wait. Finally click on the ″System Information″ page to check the newly upgraded version.

Upgrade Firmware

|	
TFTP Server:	192.168.1.123
Firmware Name:	P300-FW.bin

Upgrade

Notes:

Don't power off P300M when it is in upgrading process.

The virtual serial port utility vComMgr supports 32 Bits Microsoft Windows series, Windows XP/WIN7/2003 Server, and tty driver supports Linux kernel 2.6.x and 3.0.x.

5.1 INSTALL SOFTWARE

Unzip the vComMgr-2.x.zip and run the Setup.exe to install the utility.
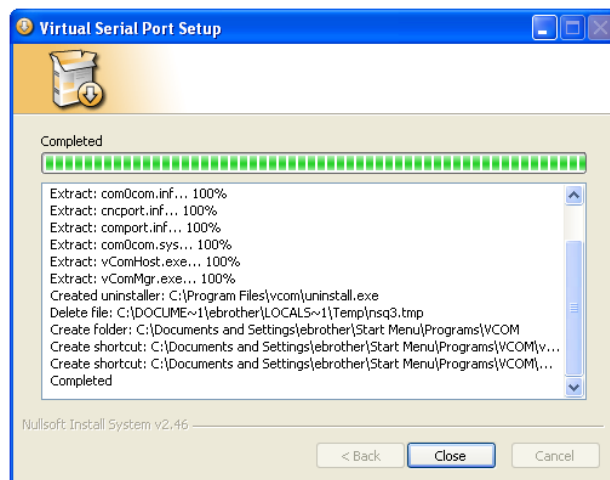
Click on the menu [Start] -> [Programs] -> [vcom] -> [vComMgr], the vComMgr runs as the following.
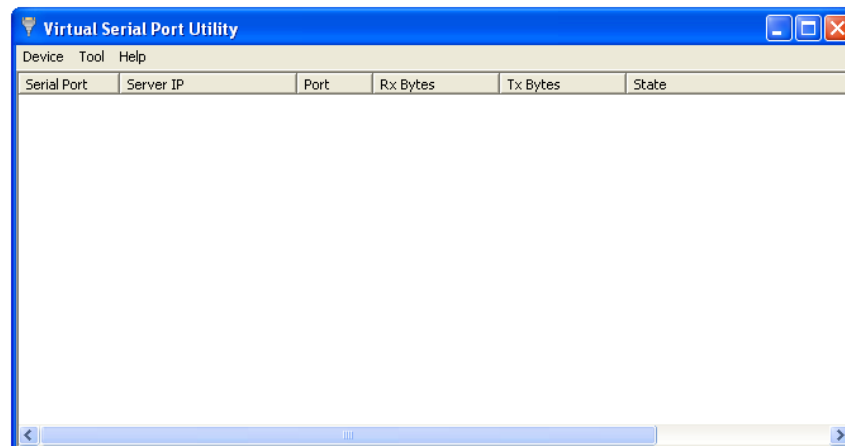
Notes:
vComMgr takes high privilege to install serial port driver, Some free anti-virus software may regard it as virus by mistake. Be aware of the incorrect warning messages.

## 5.2 VIRTUAL SERIAL PORT CONFIGURATION

5.2.1 ADD SERIAL PORT

Before add a virtual serial port, please set the corresponding P300M′s serial port operation mode with "VCOM Server" as the following.

Serial Port	Interface	Operation Mode	Local Port	Server IP	Domain	Server Port
COM1	RS-232 ▾	VCOM Server ▾	8001	0.0.0.0		6001

vComMgr maps the serial port server′s port to local serial port through IP address and port. "Server IP" not only supports IP address, but also supports DNS.
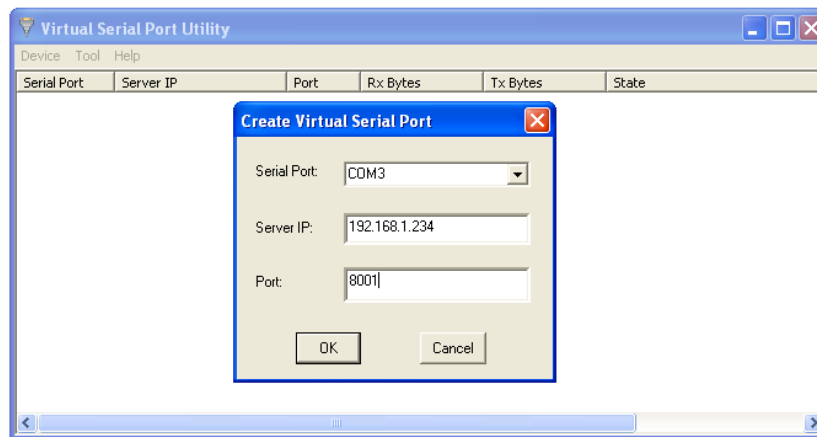

Be noticed that the serial port driver will be installed twice. The installation process is identical as the following.
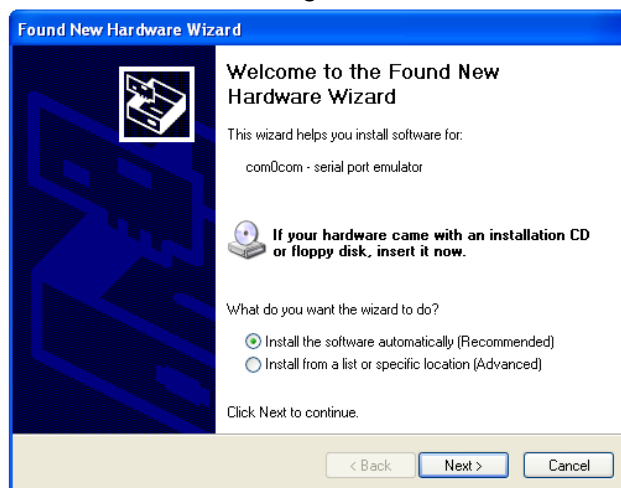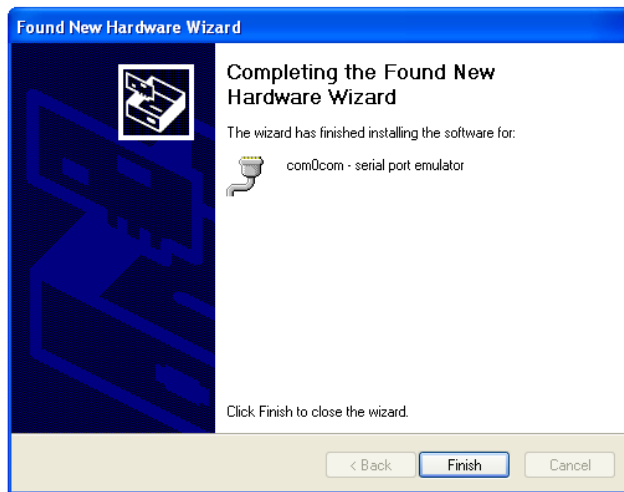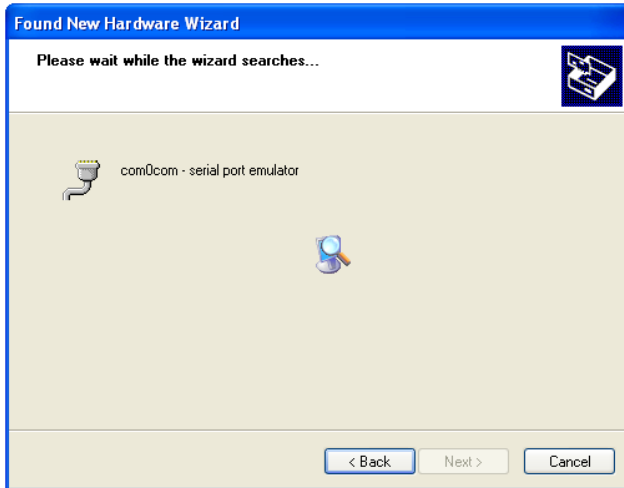
After the driver is installed, vComMgr will automatically connect to P300M. Each time host computer starts up, the connection will be established. The virtual serial port works only the connection state is "connected". vComMgr supports adding a max number of **128** virtual serial ports.
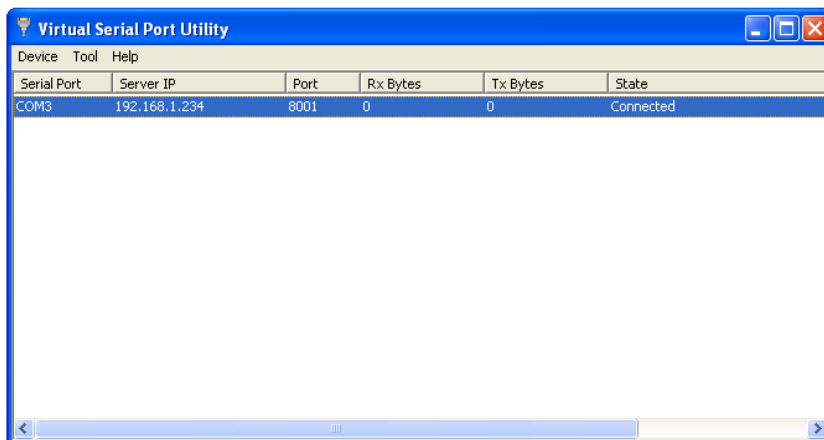
When installing serial port driver at WIN7, the system may prompt a "Windows Security" warning, be sure to select installing the driver. The warning dialogue box may be prompted four times, do as the same way.

> **Notes:**
> **To make all VCOM work correctly, it is strongly recommended to reboot host computer when installing multiple virtual serial ports.**

5.2.2 DELETE SERIAL PORT

Before deleting VCOM, please make sure that no application is opening the serial port, then select [Device] -> [Delete VCOM] menu to delete the virtual serial port, the whole process may take several seconds, please be patient to wait.

5.2.3 START CONNECTION

Start connecting to serial port server when the connection is previously stopped.

5.2.4 STOP CONNECTION

Stop the connection. When host computer starts next time, the connection will be also at the stop state.

5.2.5 RESTART CONNECTION

Restart the connection to serial port server.

5.2.6 RESTART ALL CONNECTIONS

Restart all connections in the list table.

5.2.7 CLEAR COUNTERS

Clear RX and TX counters.

5.3 TOOLS

5.3.1 MONITOR DATA

Select the serial port to be monitored, then press the menu [Tool] -> [Monitor Traffic], a dialogue box will we displayed as the following. This tool is very useful to debug and trace the communication between application and serial device.

5.3.2 SCAN ONLINE DEVICES

Compare with the traditional online devices scanning, the following feature to scan online devices could cross different subnets.