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# Operation Manual of EX9132C-RS485

Serial to TCP/IP Converter



Version 1.0.1

21.09.2015

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## 1 Introduction

We provide new ways of connecting legacy serial devices to a Local Area Network (LAN) or Wide Area Network (WAN). TCP/IP converters are designed to operate serial ports over 100M bps Ethernet networks. The data is transmitted via TCP/IP protocol. Therefore, control is available via Ethernet, Intranet and Internet. EX9132C-RS485 converter is packaged in a PVC material case well suited for industrial environments. It provides one serial RS422/RS485 (Auto-Detect) port. The serial port operate in common industrial configuration.

EX9132C-RS485 converter is a low-cost, high performance design. By carefully selecting high quality with competitive prices components in the world, the products made network connectivity possible with affordable cost for virtually all kinds of devices.

EX9132C-RS485 is a serial device server with one serial RS422/RS485 (Auto-Detect) port and it provides one socket connection port. This operation manual will guide you step by step to learn the various functions of the EX9132C-RS485 converter.

The following topics are covered in this chapter:

- Overview
- Block Diagram
- Product Features
- Product Specifications

### 1.1 Overview

**EX9132C-RS485** converter is designed to make your industrial serial devices Internet ready instantly. **ARM Cortex-M3** CPU of EX9132C-RS485 converters makes them the ideal choice for connecting your RS422 or RS485 serial device—such as PLCs, meters, and sensors—to an IP-based Ethernet LAN, making it possible for your software to access serial devices anywhere and anytime over a local LAN or the Internet.

ARM Cortex-M3 CPU Series converters ensure the compatibility of network software that uses a standard network API (Winsock or BSD Sockets) by providing TCP Server Mode, TCP Client Mode, and UDP Mode. Model EX9132C-RS485 provides 1 socket connection for remote management. ARM Cortex-M3 CPU Series Virtual COM driver and software that works with COM port can be set up to work over a TCP/IP network in no time. This excellent feature preserves your software investment and let you enjoy the benefit of networking your serial devices instantly.

ARM-Cortex-M3 CPU series converter supports manual configuration via the handy web browser console and many protocols including TCP, IP, UDP, HTTP, DHCP, ICMP, and ARP. They are the best solution to network your serial devices.

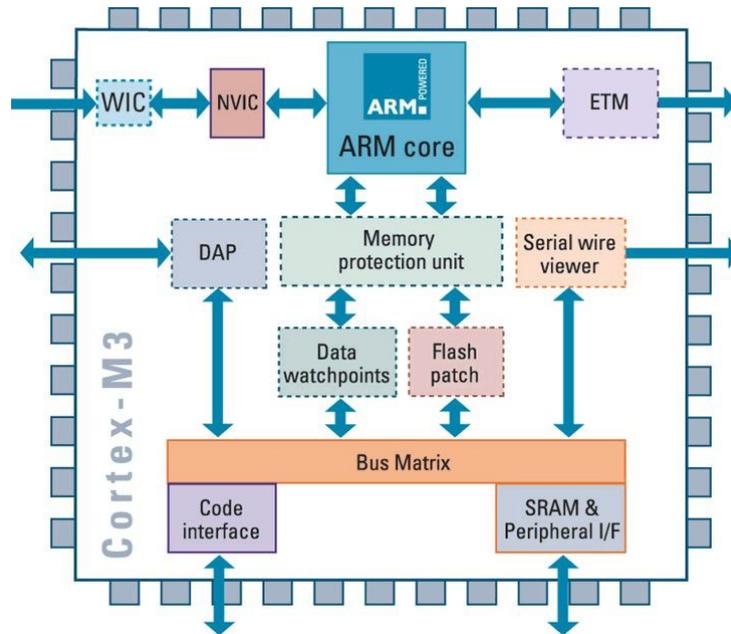
### 1.2 Package Checklist

ARM-Cortex-M3 CPU products are shipped with the following items:

- 1 unit of EX9132C-RS485 converter
- 1 unit of Power Adaptor/Supply(9V/12V/24VDC, 500mA): Optional
- Quick Installation Guide in Documentation & Software CD
- Din Rail Mounting Kit: Optional

NOTE: Please notify your sales representative if any of the above items is missing or damaged.

### 1.3 Block Diagram



Low-cost devices usually are equipped with low speed processors and limited memories. In reality, they have neither the capability nor practicality to manage complicated network TCP/IP protocols. The ARM Cortex™-M3 32-bit processor has been specifically developed to provide a high-performance, low-cost platform for a broad range of applications including microcontrollers, automotive body systems, and industrial control systems, networking by converting data stream between network TCP/IP and popular serial port signals.

Instead of processing TCP/IP packets directly, devices need only deal with those interface signals, which greatly simplifies the complexity of TCP/IP network in linkage. The ARM Cortex-M3 processor provides outstanding computational performance and exceptional system response to interrupt while meeting low cost requirements through small core footprint, industry leading code density enabling smaller memories, reducing pin count, and low power consumption.

The central core of ARM Cortex-M3 processor, based on a 3-stage pipeline Harvard bus architecture, incorporates advanced features including single cycle multiply and hardware divide to deliver an outstanding efficiency of 1.25 DMIPS/MHz. The ARM Cortex-M3 processor also implements the new Thumb®-2 instruction set architecture, which combined with features such as unaligned data storage and atomic bit manipulation delivers 32-bit performance at a cost equivalent to modern 8- and 16-bit devices.

### 1.4 Product Features

- Data Conversion between RS422/RS485 and Ethernet  
EX9132C-RS485 converter device (RS422/RS485 \* 1 port) data/signal into the TCP/IP package data/signal and send them out with the Ethernet Data Stream; or convert the TCP/IP package data/signal into serial device data/signal.
- Socket Communication  
EX9132C-RS485 is provided one socket connection.
- Digital I/O Activating (Optional)  
EX9132C-RS485 provides eight TTL of digital I/O.  
Convert the sensors' statuses (the sensors are connected to the converter) into the TCP/IP package data and

send them out with the Ethernet Data Stream; or use the TCP/IP package data to activate/deactivate the specified digital outputs.

- **Dynamic IP Configuration**  
Support DHCP client mode, simplifying network address configuration and management.
- **Dual LAN Speed**  
Support 10/100 Mbps Ethernet, auto-detected.
- **Server / Client Dual Modes**  
EX9132C-RS485 converter device can be configured as network server or network client. In the client mode, it can be installed in network which is protected by NAT router or firewall without a real IP address.
- **Web-based Setup**  
Parameters setup is based on HTTP protocol by using standard browsers (IE and Netscape). No special software would be required.
- **Built-in Security Control**  
Security protect by login password to prevent intruders.
- **Remote Update**  
Firmware can be updated directly via Ethernet network to keep up with latest network standards.

## 1.5 Product Specifications

- **CPU:** ARM Cortex™-M3 32-bit processor, 50MHz
- **RAM:** 64K Bytes SRAM
- **ROM:** 256K Bytes Flash ROM
- **Ethernet**
  - **Port Type:** RJ-45 Connector
  - **Speed:** 10 /100 M bps (Auto Detect)
  - **Protocol:** ARP, IP, ICMP, UDP, TCP, HTTP, DHCP, ICMP
  - **Mode:** TCP Server/TCP Client/UDP Client / Virtual COM / Pairing
  - **Setup:** HTTP Browser Setup (IE & Netscape)
  - **Security:** Login Password
  - **Protection:** Built-in 1.5KV Magnetic Isolation
- **Serial Port 1:**
  - **Port Type:** RS422/RS485(Auto-Detect)
  - **Connector:** Terminal Block
  - **Speed:** 300 bps-115.2K bps
  - **Parity:** None, Odd, Even, Mark, Space

- Data Bit: 5, 6, 7, 8
- Stop Bit: 1, 2
- Signals:
  - RS422: Rx+, Rx-, Tx+, Tx- (Surge & Over Current Protect)
  - RS485: Data+, Data- (Surge & Over Current Protection)
- Built-in RS422/RS485 Pull High-Low Resistor
- Socket Connection: 1 Connection
- 15KV ESD for all signal
- Watch Dog Function
- Virtual Support Windows 2000 /2003 / XP / Vista / 7 / 10
- Firmware On-line Updated Via Ethernet
- Power: DC 9 - 24V, 500mA (5,5 mm DC Jack / optional: Terminal Block)
- LED Lamp:
  - RX/TX(Green)
  - LINK(Red)
  - SYS (Green)
- Environment:
  - Operating Temperature: +0°C to 70°C
  - Storage Temperature: -10°C to 80°C
- Dimensions: 115 \* 90 \* 27 mm (W \* D \* H)
- Weight: 140 g
- RoHS: Compliant with RoHS
- Regulatory Approvals: FCC, CE
- Warranty: 1 year

## 2 EX9132C-RS485 Description & Installation

### 2.1 Top view



### 2.2 Right Side

Serial I/O Port of RS422/RS485. Connect the serial data cable between the converter device and the serial devices. Follow the parameter setup procedures to configure the converter (see the following chapters).



### 2.3 Power Supply(Left Side)

EX9132C-RS485 TCP/IP converter device is powered by a single 9/12/24VDC (inner positive/outer negative) power supply and 500mA of current. A suitable power supply adapter is part of the packaging. Connect the power line to the power jack at the left side of EX9132C-RS485 TCP/IP converter device and put the adapter into the socket.



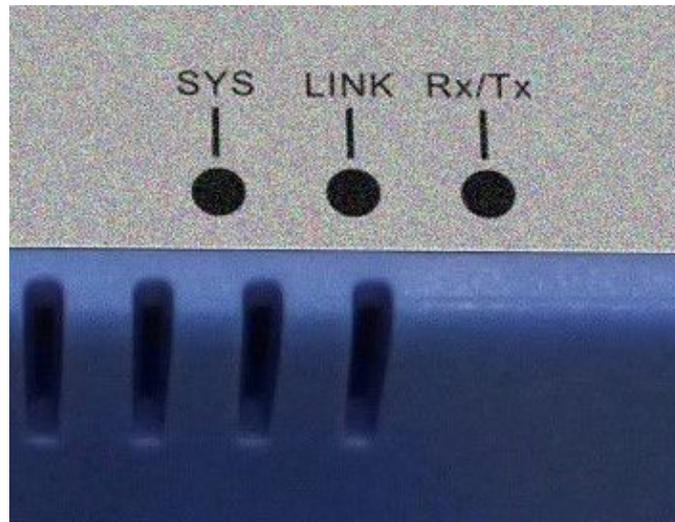
## 2.4 Ethernet LAN Port

The connector for network is the usual RJ45. Simply connect it to your network switch or Hub. When the connection is made, the LAN LED indicator will light up. When data traffic occurs on the network, red DATA LED indicator will blink during data transferring and receiving.

## 2.5 Reset Button

If by any chance, you forget the setup password, or have incorrect settings making EX9132C-RS485 converter inoperable. First, turn on the power. Second, use any point tip to push this button and hold it about 3 seconds All the parameters will be reset to the factory default. But do not over 5 seconds, it will enter update mode

## 2.6 LED Indicators

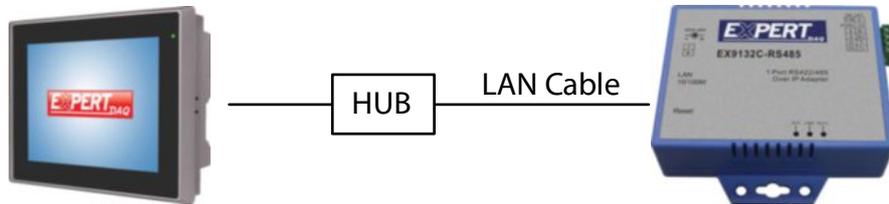


- RX/TX (Green):  
Port data transmitting indicator (When data are sending to the network, the LED will blink.)
- LINK (Red):  
Data Link indicator (When data are Link by the network, the LED will blink.)
- SYS (Green):  
It is a device statuses indicator (When EX9132C-RS485 is operated in normal statuses, the LED will blink once per second.)

## 2.7 Wiring Architecture

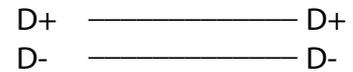
### RS422/RS485 Wiring Architecture

#### RS485 Wiring

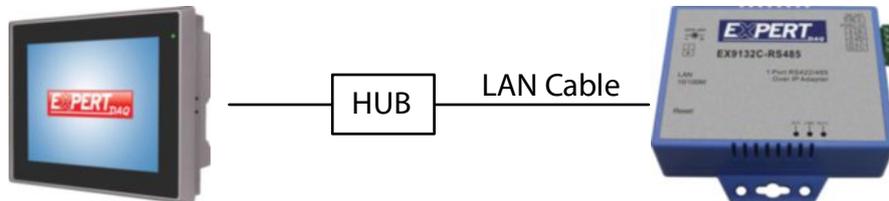


#### EX9132C-RS485

#### Serial Device

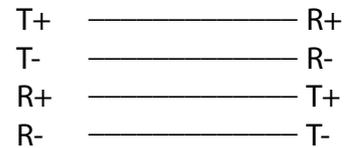


#### RS422 Wiring



#### EX9132C-RS485

#### Serial Device



When you finish the steps mentioned above and the LED indicators are as shown in above diagram, the converter is installed correctly. You can use the Setup Tool "EXBrowser.exe" to setup the IP Address.

To proceed the advanced parameter setup, please use a web browser (IE or Netscape) to continue the detailed settings.

### 3 EX9132C-RS485 Converter Configuration

#### 3.1 Initial IP Configuration

When set up your converter for the first time, the first thing you should do is to configure the IP address. This chapter introduces the method to configure the device server’s IP address. For more details about network settings, please see the Network Settings section in Chapter 4, “Web Console Configuration”.

The following topics are covered in this chapter:

- Device Management Utility of EXBrowser
- EXBrowser “View”
- EXBrowser “Modify IP”
- EXBrowser “Modify MAC”

#### 3.2 Device Management Utility of EXBrowser

On PC we provide a Device Management Utility named “EXBrowser.exe” which is an executable program in Windows 32-bit environments. EXBrowser setup tool is used to detect and setup the installed converters. It uses UDP broadcast packets to query and configure converters on the network.

When you activate the tool, it will detect the existence of the installed converters and depict the converters’ status such as IP address, Subnet Mask, MAC Address, and Device ID (see Figure 4.1). The Setup Tool only can setup one converter at a time. Thus if there are more than one converter on the network, please shut down or disconnect other converters. Otherwise the EXBrowser.exe can not detect the converter.

Due to the nature of broadcast UDP packets, EXBrowser has following characteristics:

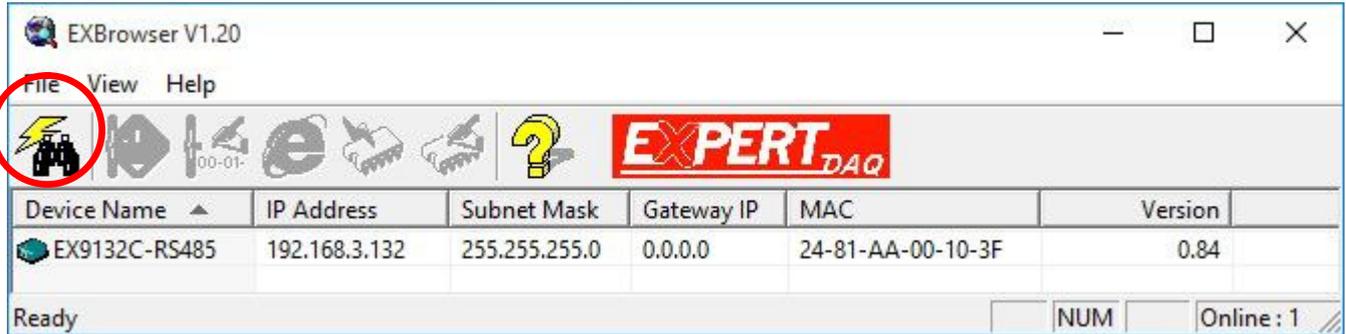
- Broadcast packets are not limited by subnet. Even if the IP address of the converters and the computer running EXBrowser that do not belong to the same subnet, it still works fine.
- Broadcast packets can not pass routers. EXBrowser can only be used to monitor devices with computer running EXBrowser in the same segment of local area network.



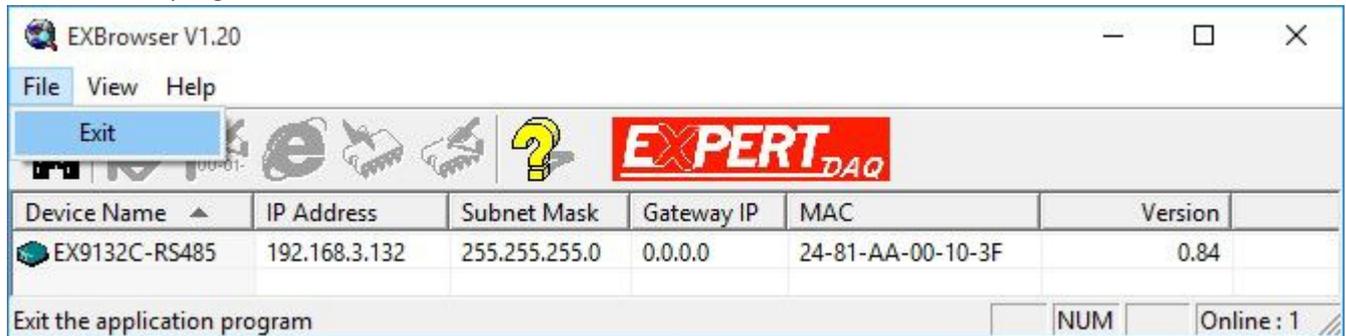
#### 3.3 EXBrowser “View”

- View -> Refresh  
There are two ways for refreshing the status of existing devices. You may select the item “View” to refresh the status of existing devices on LAN. Another is to click the icon as red color remark as below. EXBrowser will send another query to get updated information.

Note: Always run the “Refresh” after any data change.

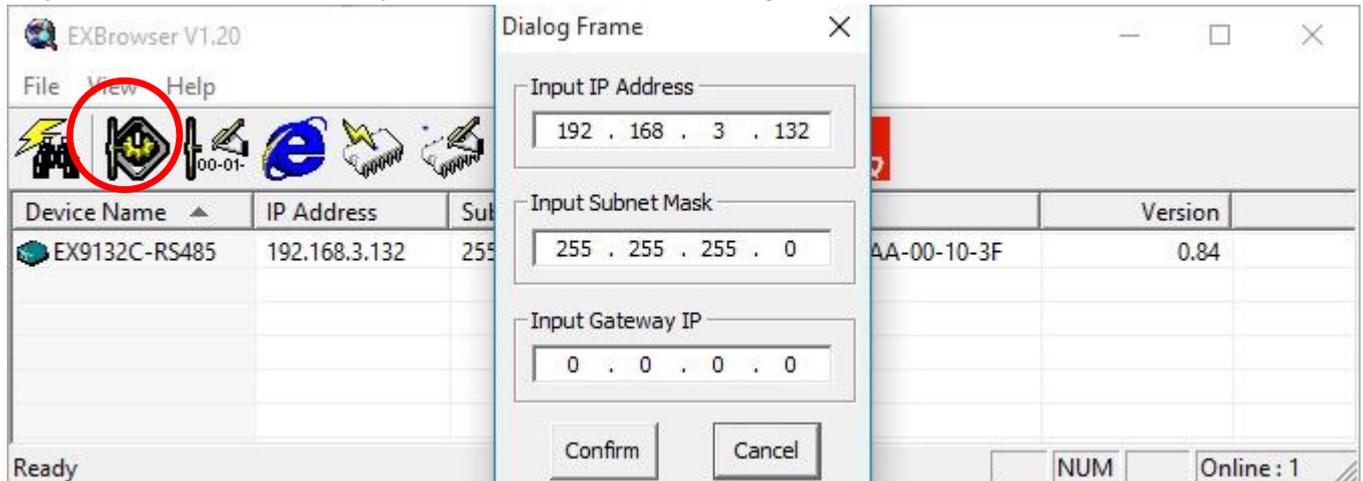


- File -> Exit Alt+F4  
Exit from the program



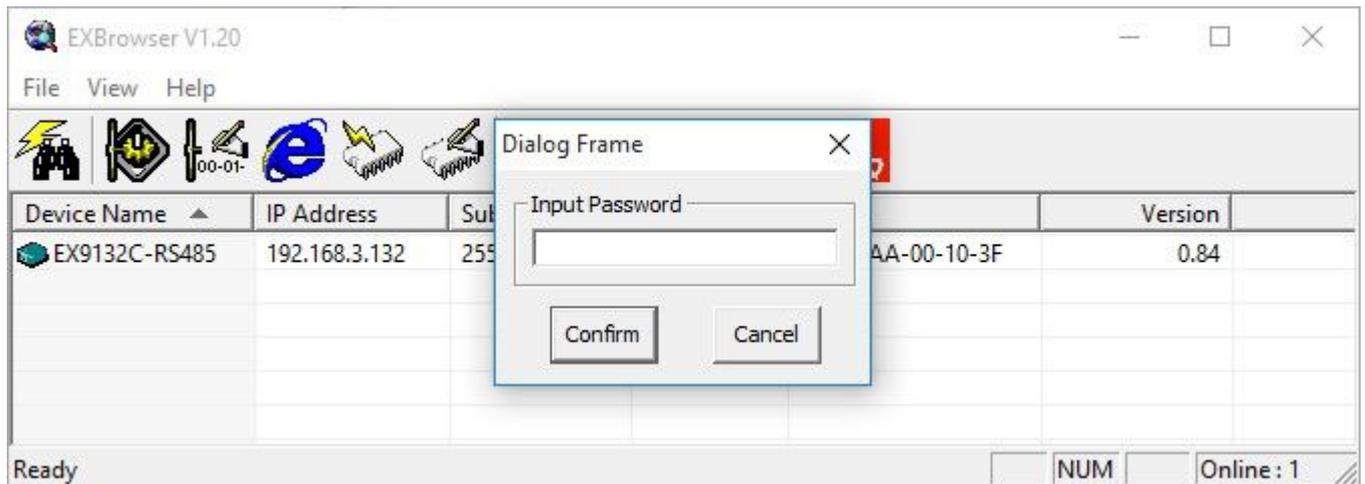
### 3.4 EXBrowser “Modify IP”

- Modify IP -> Dialog Frame  
To click the device on the existing devices list in the EXBrowser table and then the function bar will be enable. To press second icon of “Modify IP” on function bar and a dialog frame table will be shown

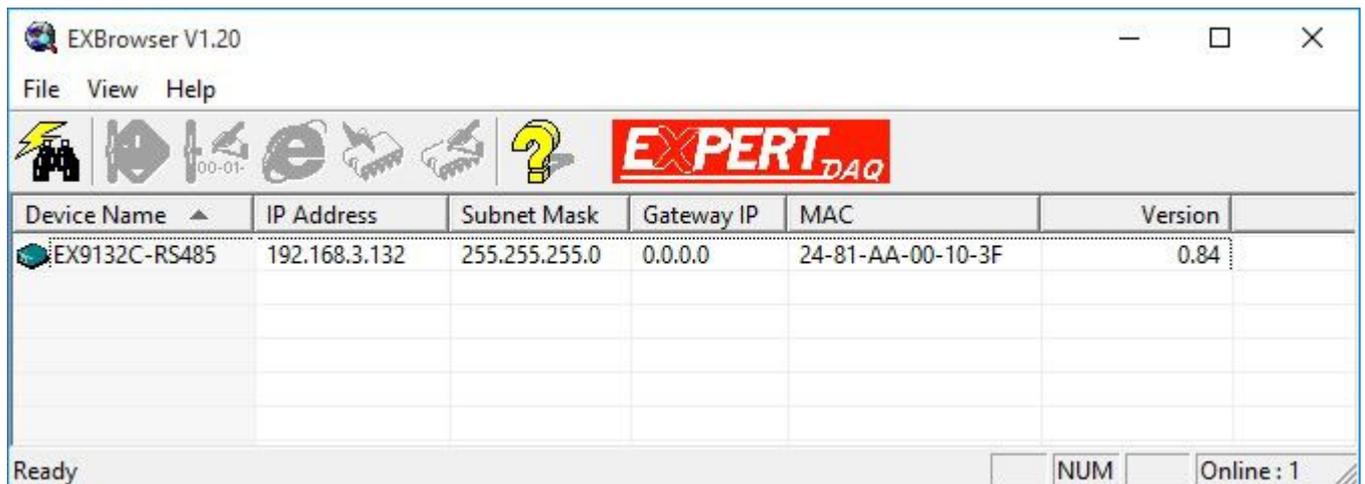


Assign an IP Address with the same Subnet Mask of your computer, avoiding any IP conflict with other network devices.

When you press “Confirm” button, the IP address will be refreshed in 2~3 seconds.



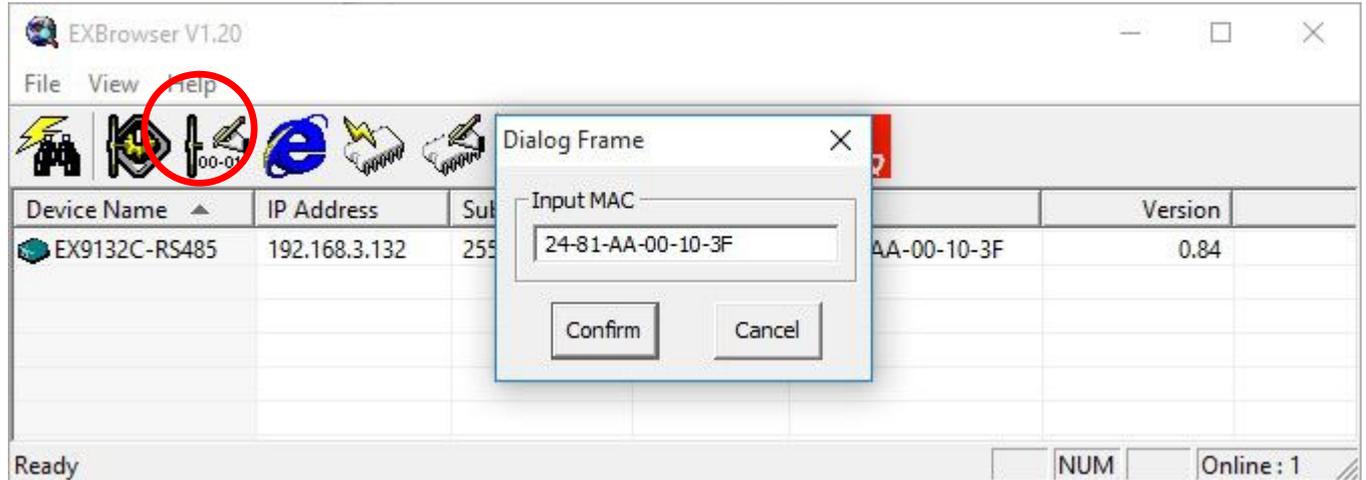
After click “Confirm” button and then “Input Password” request will be pop-up on screen (see Figure 4.5). Please simply press “Confirm” button and the new device’s IP will be changed and save in table, if you changed it.



### 3.5 EXBrowser “Modify MAC”

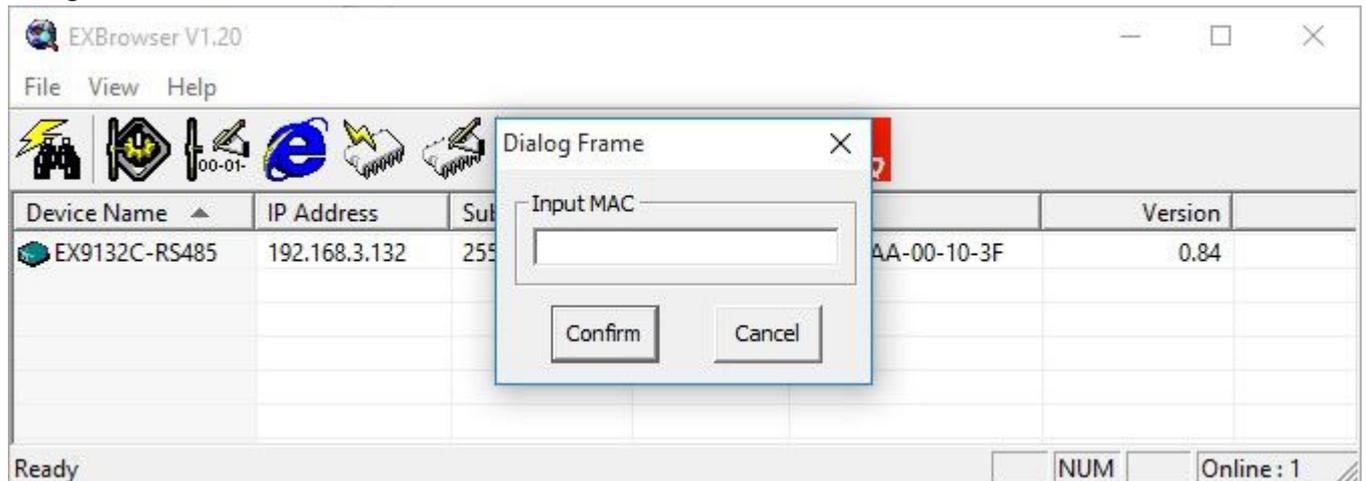
- Modify MAC -> Dialog Frame  
To click the device on the existing devices list in the EXBrowser table and then the function bar will be enabled.

To press Third icon of “Modify MAC” on function bar and a dialog frame table will be shown



- Input Password -> Dialog Frame

After click “Confirm” button and then “Input Password” request will be pop-up on screen (see Figure 4.8). Please simply press “Confirm” button and the new device’s MAC will be changed and save in table, if you changed it.



### 3.6 Web Browser Configuration

The following topics are covered in this chapter:

- Serial To Ethernet Converter Setup
  - Login Setting
  - Login Setting Page Field Description
  - Parameter Setting
  - Parameter Setting Page Field Description

#### 3.6.1 Login Setting

In addition to basic IP address and subnet mask, specific device settings can be set through HTTP protocol with popular browsers, e.g. Internet Explorer, Netscape, etc. Setup of the converters is as easy as surfing on WWW, no special software will be required.

Setup converter device is as easy as surfing on WWW; no special software will be required. Popular Browsers, such as IE, or Netscape, can easily do the setup process. In the browser URL field, set the IP address of device directly, to enter the “Login Setting” page, please follow the steps below.

- Open your browser. This chapter will use IE as an example.
- In the browser URL field, type the IP address of the converter directly and press ENTER. (The IP address is what you set using the Device Management Utility as EXBrowser.)
- To press fourth icon of “Web Browser” on function bar and a “Login Setting” Screen will be shown (see Figure 4.9) to login into the device.

Alternatively, if the IP address of the converter is already known, you can connect to the converter directly by providing its IP address in the URL field of browsers.



### 3.6.2 Login Setting Page Field Description

- **System time elapsed**  
The time elapsed since start of this device in [Day Hour: Minute: Second] format. This information can be useful in identifying the reliability of system.
- **Firmware version**  
Converter firmware is identified by date code. This information will be required looking for technical support.
- **Serial number**  
It is a product serial number code in the converter device and has been provided by factory.
- **Ethernet MAC Address**  
Converter is a unique MAC (Media Access Control) address used by Ethernet.

- Password

This field is the administration password for authentication. Factory default is “empty”. However, it is not recommended to leave it empty in field operation. If you could not login, it means you have to key in the password. If you do not know the password you can turn off the power and then use any point tip to push “Reset” button and hold it to turn on the power at the same time for 5 seconds. The password will be reset to the factory default.

Converter device uses the same password protection mechanism commonly used in Windows NT or UNIX. If there are more than “3 consecutive failures” in password check during login, the login function will be disabled for “15 minutes”. During this 15 minutes period, even if you supply correct password, login will not proceed. This prevents intruders from finding the password by computer generated program.

### 3.7 Parameter Setting Page

- The Parameter Setting Page

Type the correct password in the “Password” field and click the “Confirm” button in the “Login Setting” page, then the “Parameter Setting” page will be shown

Note: If you forget the password or can't login successfully, please contact the manufacturer directly.

**Serial To Ethernet Converter**

**Parameter setting**

IP address	<input type="text" value="192.168.3.132"/>
Subnet mask	<input type="text" value="255.255.255.0"/>
Gateway IP	<input type="text" value="0.0.0.0"/>
Link Modes	Auto detect ▾
DHCP Client	Disable ▾
Auto Reset (No data input)	<input type="text" value="1"/> (1 ~ 255 Minute)
Device Name	<input type="text" value="EX9132C-RS485"/>
Login password	<input type="text"/>
<b>Serial I/O Port</b>	<input type="text" value="0"/>
Local port,Socket mode	<input type="text" value="100"/> TCP Server ▾
Remote IP,Port (TCP Client/UDP)	<input type="text" value="0.0.0.0"/> <input type="text" value="0"/>
Interface	RS485 ▾
Baudrate	9600 ▾
Parity,Data bit,Stop bit	None ▾ 8 ▾ 1 ▾
Force off-line time (No data input)	<input type="text" value="1"/> (1 ~ 255 Minute)
Packet collect time	Tx <input type="text" value="0"/> Rx <input type="text" value="100"/> (mSec)

- Parameter Setting Page Field Description

- IP Address

IP address of the converter, 4 numbers (1-255) separated by '.'. Don't let it conflict with other devices in the network.

If DHCP client mode is enabled and a DHCP server is present in the network, this field will be assigned by DHCP server automatically.

- Subnet mask

Subnet mask of the converter. "255.255.255.0" is used by default. For small networks "255.255.0.0" for larger network, 4 numbers (1-255) separated by '.'.

If your IP address is provided by an ISP or the internal network administrator, please check if the information and type it correct.

If DHCP client mode is enabled and a DHCP server is present in the network, this field will be assigned by DHCP server automatically.

- Gateway address

Gateway or Router IP address. 'Gateway' is a device which connects local network to external network. If you need to communicate with other networks or your device owns a real IP address on the internet, please check if this information and type it correct. If there's no gateway on the network, leave empty or set to "0.0.0.0".

If DHCP client mode is enabled and a DHCP server is present in the network, this field will be assigned by DHCP server automatically.

- DHCP client

DHCP client mode can be enabled/disabled. If DHCP is enabled, there has to be a DHCP server in the network. If DHCP is disabled IP address, Subnet mask, and Gateway address have to be assigned manually.

- Auto Reset

Auto Reset will reboot the device if it has been disconnected or no data is transmitting for a certain time (1 - 255 minute).

- Device Name

Device name can be a string of up to 15 characters.

- Login Password

For security and management issues, you may set the "Login Password". This administration password is used to log into the converter. It may be empty or a string of up to 15 characters.

- Serial I/O Port 1 (RS422/RS485)

This converter provides one RS422/RS485 port for connecting the serial devices.

- Local Port / Socket Mode / Remote IP & Port

This converter provides 1 socket port for the serial connection.

- Port number

Socket port assigned for the serial port. It's a 16-bit number in the ranging from 1 to 65535. The numbers below 1000 are reserved for special protocols (e.g. 80 is for HTTP protocol), we suggest to use a number larger than 1000. By default 4660 is used for the serial communication. However it is possible to use any other number for each serial port.

- Socket type
  - TCP Server: TCP protocol, passive open, to be connected from the TCP clients.
  - TCP Client: TCP protocol, active open, connect to the TCP server specified below.
  - UDP Client: UDP protocol, connectionless.
- Remote IP address  
Server IP address of the TCP Server or UDP Client (in TCP Server mode leave empty or set to "0.0.0.0").
- Remote socket port  
Port of the TCP Server or UDP Client (in TCP Server mode leave empty or set to 0).
- Interface of serial I/O  
Interface of serial I/O is automatically detecting RS422 or RS485 (Auto Detect function). It just depends on the connected serial devices.
- Baudrate  
Baud Rate: 300, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400 bps
- Parity, Data bits, Stop bit  
Parity: None, Odd, Even, Space, Mark.  
Data Bits: 5, 6, 7, 8.  
Stop Bit: 1, 2.
- Force off-line time  
Force off-line time will close the socket port if no data is transmitting for a certain time (1 - 255 minute).
- Packet Collect Time  
The converter will buffer data on the serial port (Rx and Tx) until a specified time (Packet Collect Time: 1 - 999 milliseconds) no data will be transferred or the buffer is full. Then the data will be sent in one packet.

### 3.8 Controller Updated

Press “Update”] Button after finish the detailed parameter setting. The converter will save all parameters into internal non-volatile memory and then reboot. It takes about 5 seconds to complete the whole process, and a new login page will be presented.



You can re-login and check if all parameters have been correctly saved. If everything is ok, you can close the browser now.

Note: If the domain of the converter is different from that of the computer running the browser, the login page won't appear unless the converter's "Gateway Address" has been correctly set.

### 3.9 Factory Default Setting

If you forget the setup password or have incorrect settings making the converter inoperable, there are two ways to reset the setting and the following procedures can be used to reset all settings to factory default:

Please turn on the power and then use any point tip to push "Reset" button for 5 seconds. The password will be reset to the factory default as "empty".

## 4 Setting Verification

After complete the wiring and parameter setting, we should verify if the setting is correct. This chapter will introduce how to use a single computer to test if the converter behaves well.

The operating system can be Windows 95, 98, ME, XP, 2000, Vista, 7, 8, 10. The “Hyper Terminal” utility should be installed on your PC (see Figure 5.1). It can be found in your Windows installation CD.

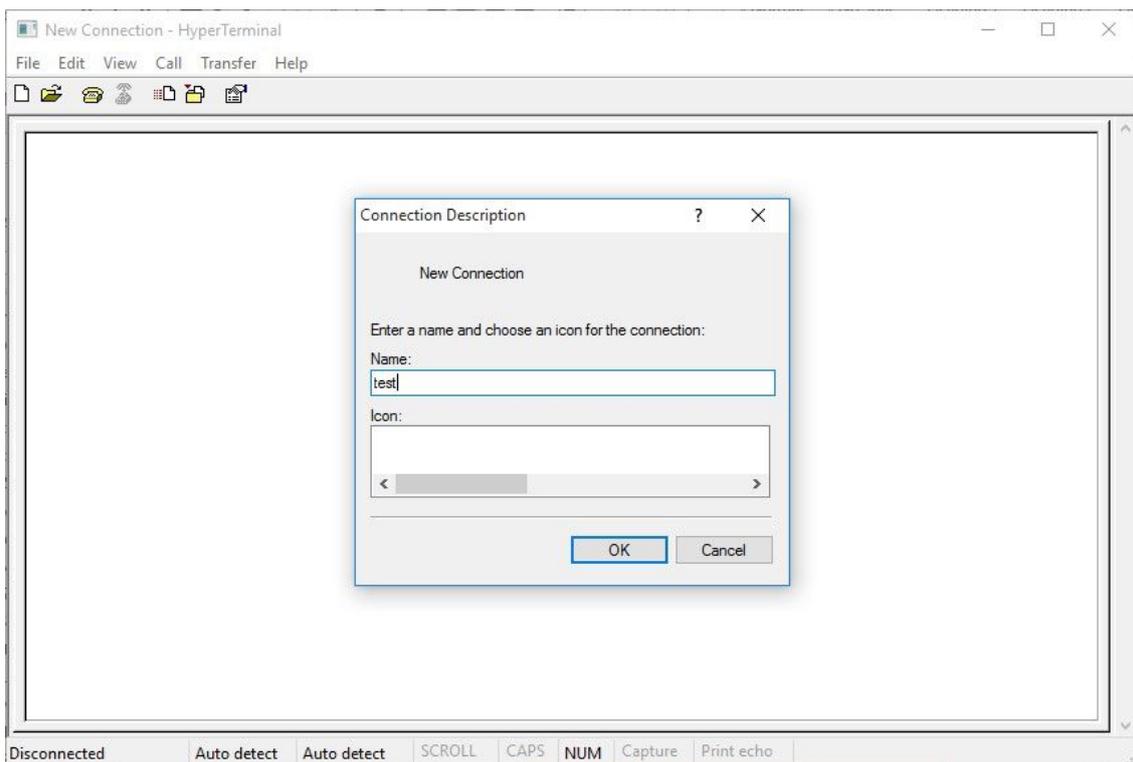
The wiring architecture is similar to “RS232 Wiring” in chapter 3, and the “Serial Device” is replaced by the PC’s COM 1. The same PC also plays the roll of the Remote Host.

The following topics are covered in this chapter:

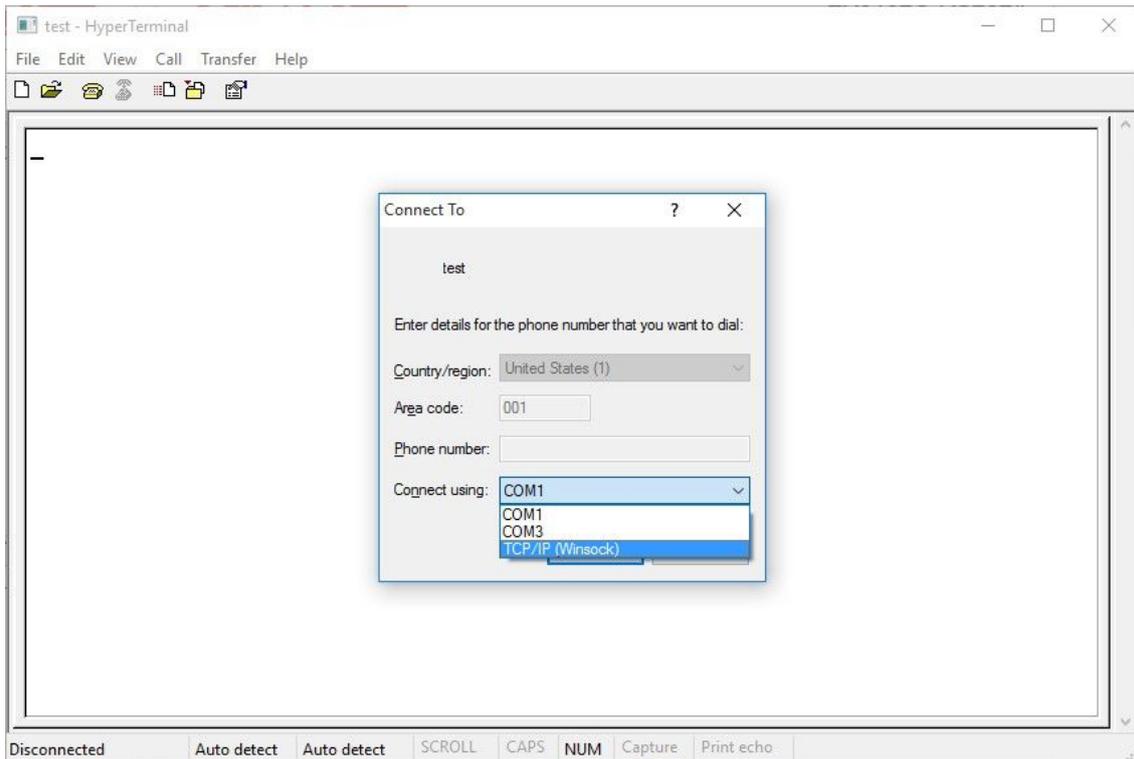
- Hyper Terminal for TCP/IP WinSock
- Hyper Terminal for COM Port
- Data Transmission

### 4.1 Hyper Terminal for TCP/IP WinSock

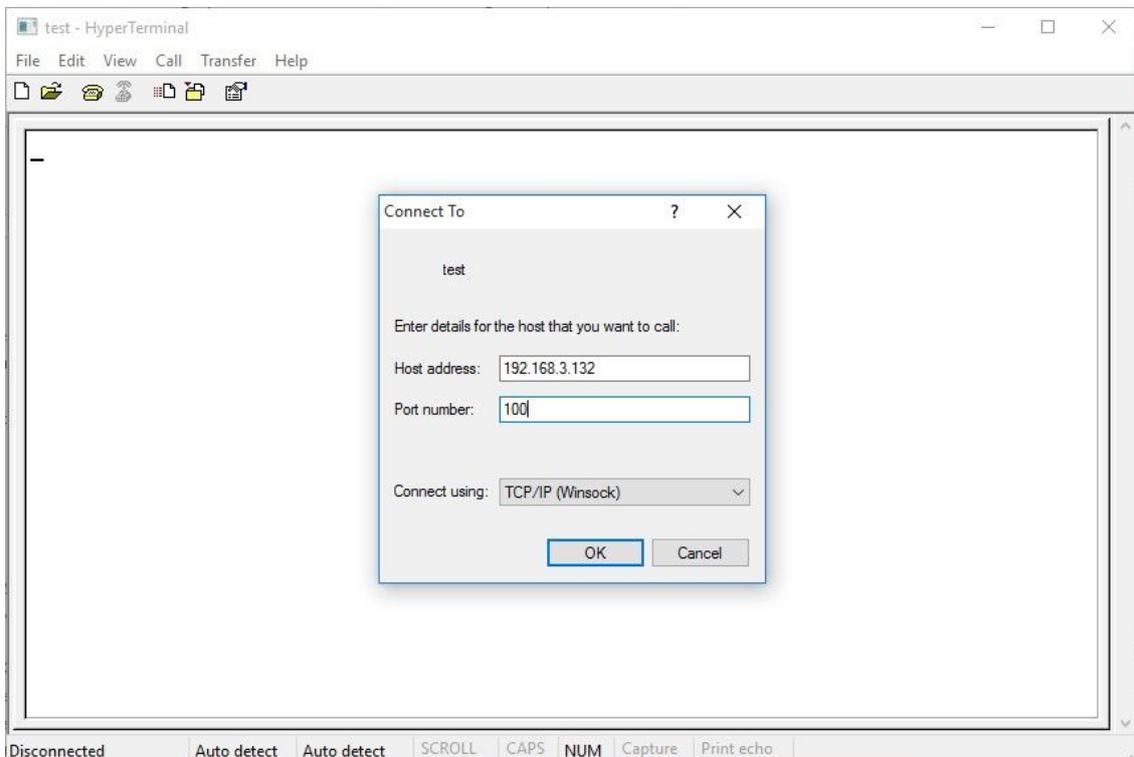
Initiate a Hyper Terminal from the Start Menu in Windows (see Figure 5.1), give a terminal name, choose an icon, and press “OK” button.



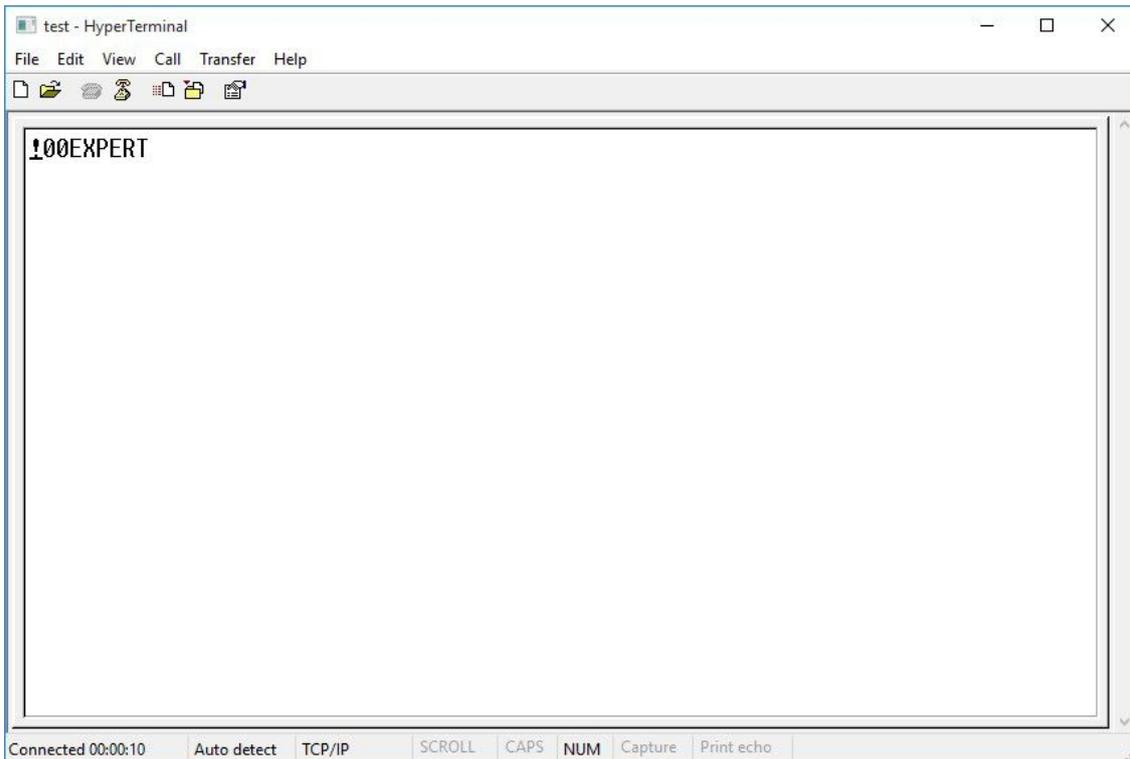
Select “TCP/IP (Winsock)” option at the “Connect using:” field.



After "OK" button is pressed, Figure 5.4 appears. Enter the converter's IP address (e.g. 192.168.123.10) at the "Host address:" field, and the Socket port number set for the Serial Port at the "Port number:" field (e.g 4660). (The Socket type of the Serial Port should be "TCP Server".)

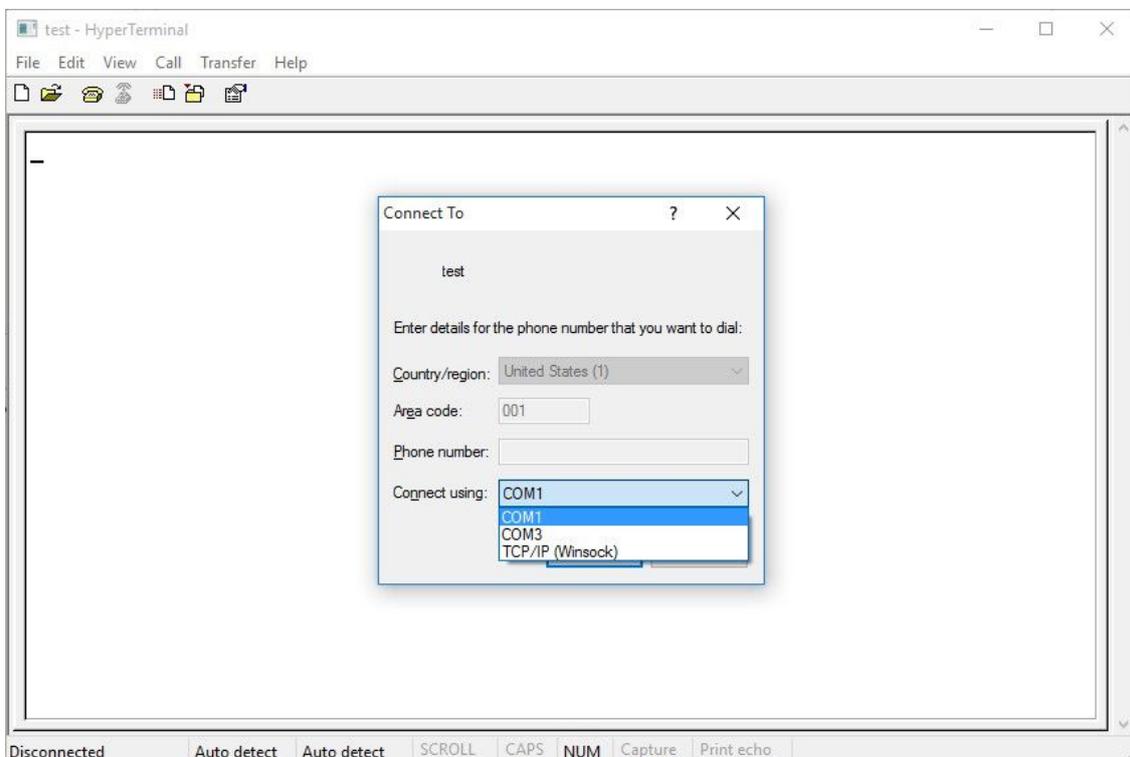


After "OK" button is pressed, Figure 5.5 appears. If the Hyper Terminal connects with the converter successfully, the time clock at the left lower corner "Connected hh:mm:ss" will start counting.



### 4.2 Hyper Terminal for COM Port

Initiate another Hyper Terminal as a COM Port Terminal (in Figure 5.3, select COM 1 or other COM port instead of "TCP/IP (Winsock)"). Set the COM port Properties to be the same as those set for the Serial Port of the converter.



## 4.3 Data Transmission

When all steps described above are finished, type any texts on the COM Port Terminal and check if the texts are also displayed on the TCP/IP Winsock Terminal. Alternatively, check if the characters typed on the TCP/IP Winsock Terminal are also displayed on the COM Port Terminal. If yes, then all settings are correct and the converter can operate properly.

## 5 Appendix A FAQ

Q. Why can't the EXBrowser.exe detect the converter on the network?

A. Please check

- if the power is properly plugged to the converter.
- if the network cable is properly connected between the converter and the Hub.

Please refer to the "Hardware Installation" steps in Chapter 3.

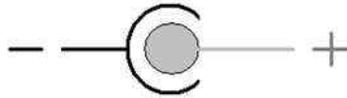
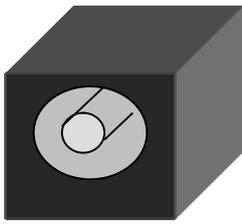
Q. Why can't I use IE to setup the converter?

A. Please check if the network domain of your PC is the same as that of the converter.

### Appendix B

#### Pin outs and Cable Wiring

- DC-In Jack



- RJ-45 Pin Assignment

PIN 1: TX+

PIN 2: TX-

PIN 3: RX+

PIN 6: RX-



- RS422 Pin Assignment

The pin assignment scheme for a 4-pin RS422 is given below.

PIN 1: R-      PIN 2: R+      PIN 3: T-      PIN 4: T+

- RS422 Wiring Diagram

Serial Device	EX9132C-RS485
T-	1 R-
T+	2 R+
R-	3 T-
R+	4 T+

- RS422 Pin Assignment

The pin assignment scheme for a 4-pin RS422 is given below.

PIN 3: D-      PIN 4: D+

- RS485 Wiring Diagram

Serial Device	EX9132C-RS485
D+	3 D+
D-	4 D-