SERIAL TO ETHERNET CONVERTER

E-P132-X

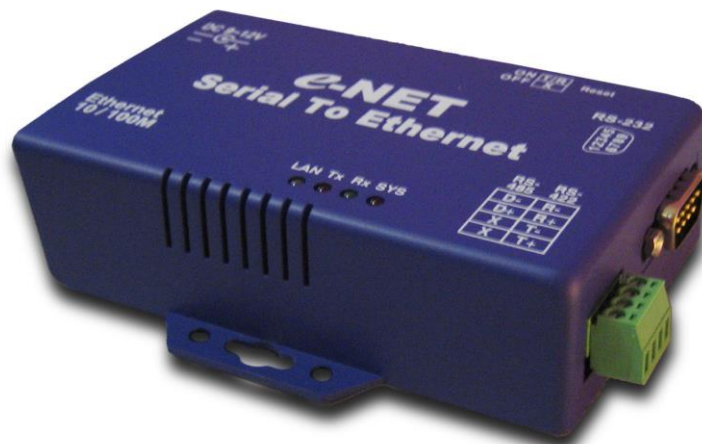# User Manual

Table of Contents

Introduction

E-P132-X TCP/IP converter designed to make your serial devices Internet ready instantly. ARM-7 Series of E-P132-X TCP/IP converter makes the ideal choice for connecting your RS-232 or RS-422/485 serial devices—such as PLCs, meters and sensors to IP-based Ethernet LAN, making possible for your software to access serial devices anywhere and anytime over local LAN or the Internet.

ARM-7 Series converter ensures the compatibility of network software that uses standard network API (Winsock or BSD Sockets) by providing TCP Server Mode, TCP Client Mode and UDP Mode. ARM-7 Series Virtual COM driver, software that works with COM port can be set up to work over 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.

ARM-7 Series converter supports manual configuration via the handy web browser console and many protocols including TCP, IP, UDP, HTTP, DHCP, ICMP and ARP. It is the best solution to network your serial devices.

Overview

E-P132-X TCP/IP converter designed to make your serial devices Internet ready instantly. ARM-7 Series of GDI2000 TCP/IP converter makes the ideal choice for connecting your RS-232 or RS-422/485 serial devices—such as PLCs, meters and sensors to IP-based Ethernet LAN, making possible for your software to access serial devices anywhere and anytime over local LAN or the Internet.

ARM-7 Series converter ensures the compatibility of network software that uses standard network API (Winsock or BSD Sockets) by providing TCP Server Mode, TCP Client Mode and UDP Mode. ARM-7 Series Virtual COM driver, software that works with COM port can be set up to work over 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.

ARM-7 Series converter supports manual configuration via the handy web browser console and many protocols including TCP, IP, UDP, HTTP, DHCP, ICMP and ARP. It is the best solution to network your serial devices.

Package Checklist

ARM-7 product shipped with the following items:
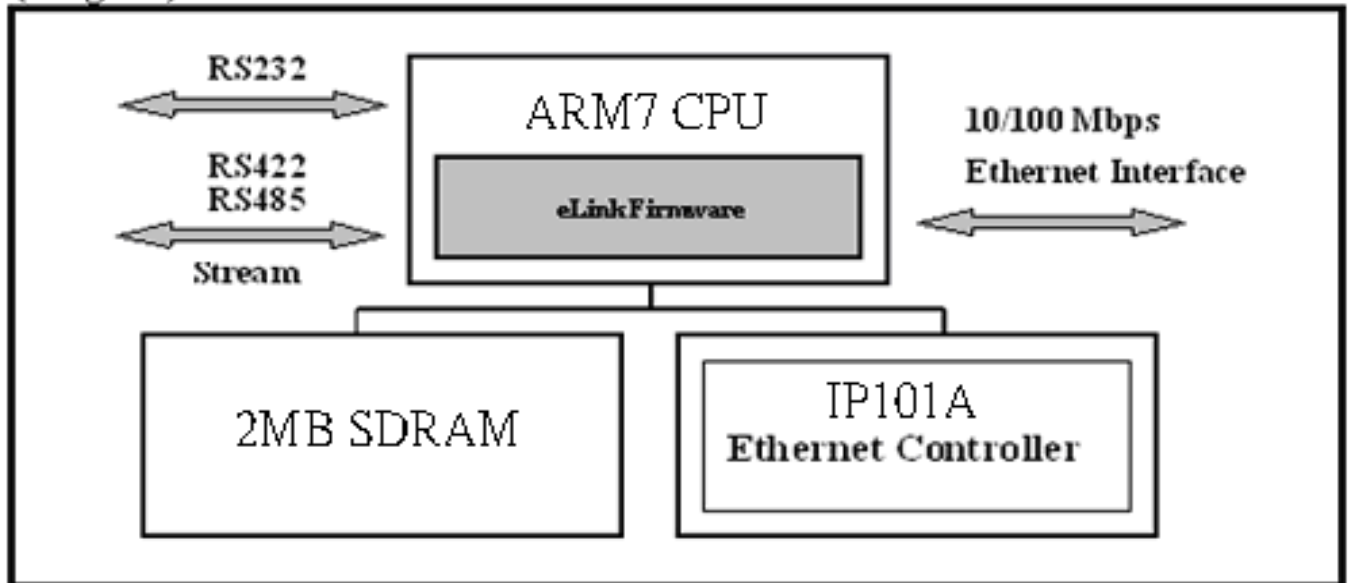
1 unit of E-P132-X TCP/IP converter

1 unit of Power Adaptor (9VDC 500mA)

Documentation & Software CD

NOTE: Notify your sales representative if any of above items missing or
damaged.

Block Diagram

(Diagram)

Low-cost devices usually are equipped with low speed processors and limited memories. In reality, they are neither having capability nor practicality to manage complicated network TCP/IP protocols. ARM-7 Series is low cost while providing high performance network solution by converting data stream between network TCP/IP and popular serial port signals. In stead 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.

Product Features

☐ **Data Conversion between RS-232/422/485 and Ethernet**

Convert serial device (RS-232, RS-422, RS-485) data/signal into TCP/IP packet data/signal and send them out with Ethernet data stream or convert the TCP/IP packet data/signal into serial device data/signal.

☐ **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**

ARM-7 Series can be configured as network server or network client. In client mode, it can be installed in network which protected by NAT router or firewall, without the need of a real IP address.

☐ **Web-based Setup**

Parameters setup based on HTTP protocol by using standard browsers (IE and Netscape). No special software would be required.

☐ **Built-in Security Control**

Protected setup the password to prevent intruders.

☐ **Firmware Remote Update**

Firmware can be updated directly via Ethernet network to keep up with latest network standards.

Product Specifications

- ➢ CPU : 32-bits ARM-7 CPU , 25 MHz

- ➢ RAM : 2 M Bytes SDRAM (1 M x 16Bits)

- ➢ ROM : 128 K Bytes Flash ROM

- ➢ Ethernet

  - ✧ Port Type : RJ-45 Connector

  - ✧ Speed : 10 /100 M bps (Auto Detecting)

  - ✧ Protocol : ARP , IP , ICMP , UDP , TCP , HTTP , DHCP

  - ✧ Mode : TCP Server / TCP Client / UDP

  - ✧ Setup : HTTP Browser Setup (IE & Netscape) , RS-232 Console

  - ✧ Security : Setup Password

  - ✧ Protection : Built-in 1.5KV Magnetic Isolation

- ➢ Serial Port

  - ✧ Port : RS-232 x 1 Port, RS-422/RS-485 x 1 Port

  - ✧ Speed : 300 bps~230.4 K bps

  - ✧ Parity : None , Odd , Even , Mark , Space

  - ✧ Data Bit : 5 , 6 , 7 , 8

  - ✧ Stop Bit : 1 , 2

  - ✧ RS-232 Pins : Rx , Tx , GND , RTS , CTS , DTR , DSR , DCD

  - ✧ RS-422 : Rx+ , Rx- , Tx+ , Tx- (Surge Protect)

- ✧ RS-485 : Data+ , Data- (Surge Protect)

- ✧ Built–in RS-422/RS-485 Terminal Resistor

- ✧ 15KV ESD for all signals

- ✧ Watch Dog Function

- ✧ Power : DC 9 – 12 V , 500mA

➢ Led Lamp : SYS (PWR), LAN, Rx, Tx
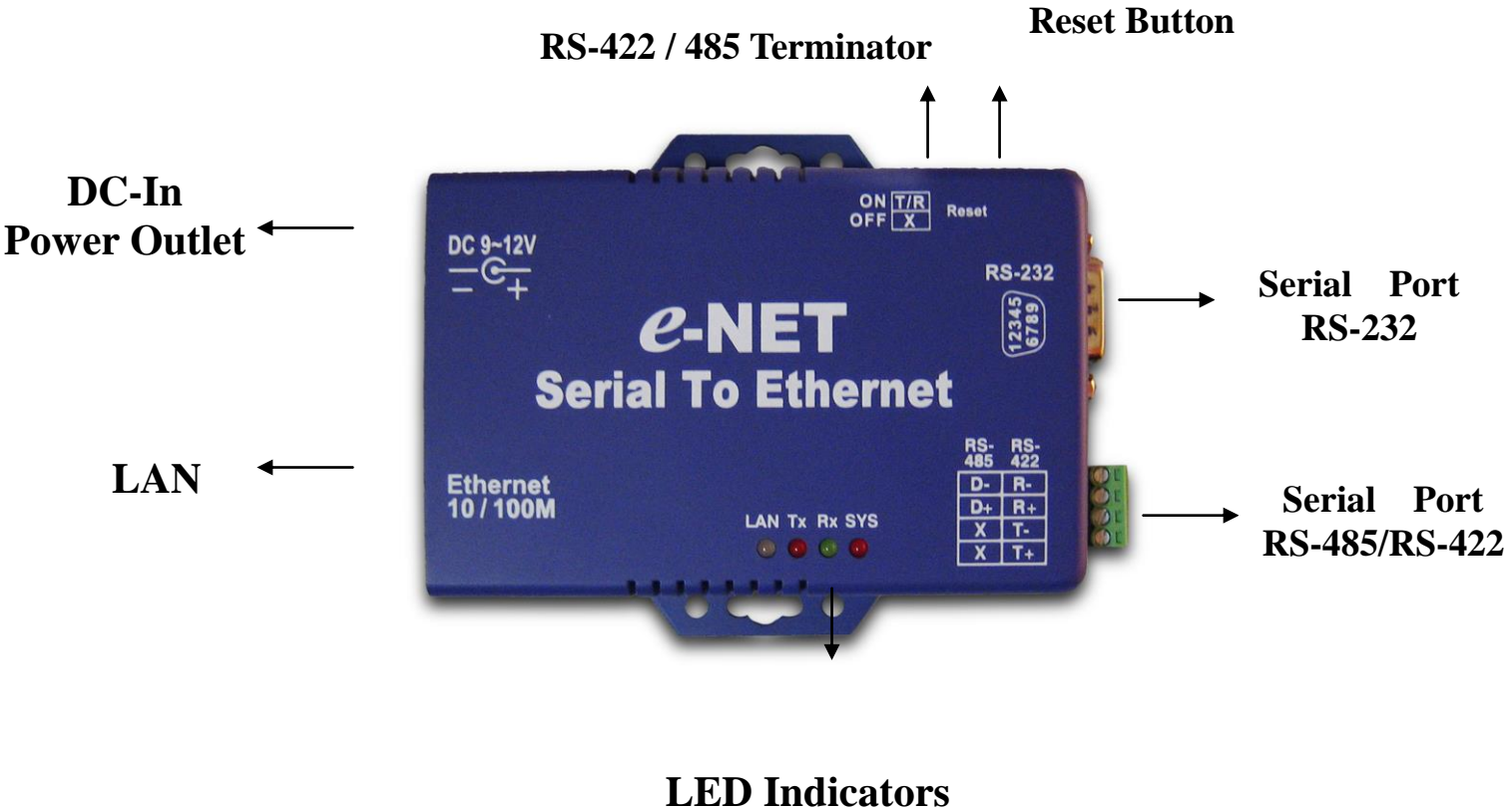
➢ Environment : Operating Temperature: 0℃〜50℃

Storage Temperature : -10℃〜70℃

➢ Dimensions : 110 x 90 x 30 mm (W x D x H)

Weight: 146 gm

Converter Description

Product Panel View

RS-422 / 485 Terminator

Reset Button

**DC-In
Power Outlet**

**Serial Port
RS-232**

LAN

**Serial Port
RS-485/RS-422**

LED Indicators

Left Side

Power Supply

The E-P132-X TCP/IP converter powered by single 9～12V DC(Inner positive/outer negative) power supply and 500mA of current. A suitable power supply adapter part of the packaging. Connect power line to power outlet at left side of E-P132-X TCP/IP converter and put adapter into socket. If power is properly supplied, the "SYS" red color LED will be blinks each time in one second.
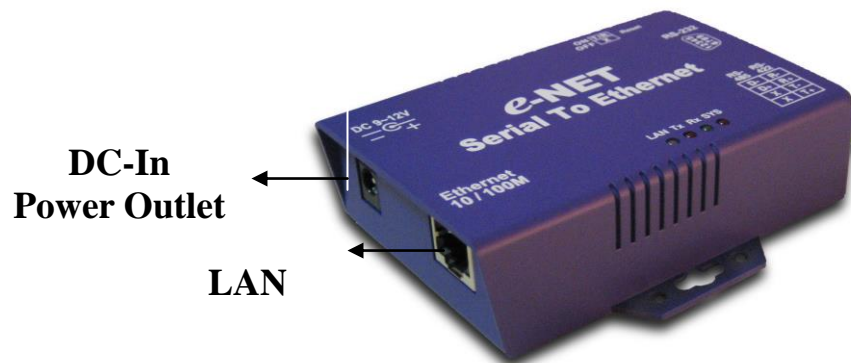
LAN Port

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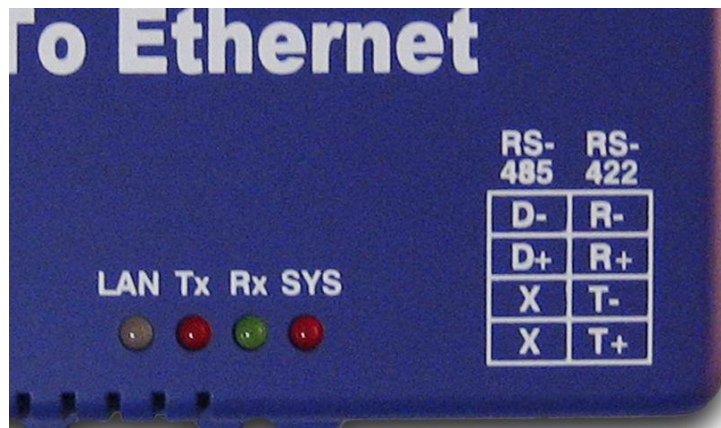
Right Side

RS-232

RS-422 / 485
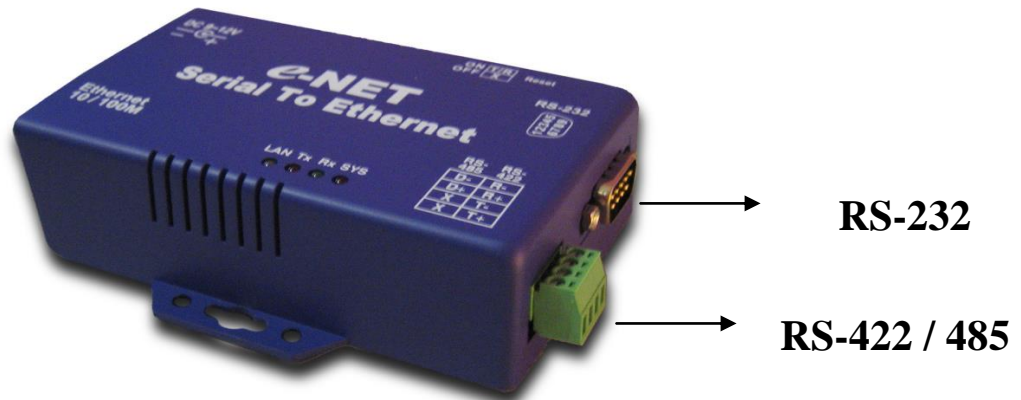
Serial Port of RS-232/RS-422/RS-485

Connect serial data cable between the converter and serial device. Follow the setup procedure to configure the parameters of the converter. (See the following chapters).

LED Indicators

SYS "Red LED": Power indicated

(When power on, LED will flash each time in one second.)

Rx "Green LED": Network signal receiving indicated

(When receive any signal form network LED will flash.)

Tx "Red LED": Network signal transforming indicated

(When transmit any signal to network LED will flash.)

LAN "LED": On-line indicated

(When converter link to LAN then the LED will keep on.)

100M- Green LED、10M- Red LED

Terminator & Reset button

Reset Button　　　　　**Terminator**

Resent Button
Press the button then turn on the power and waiting for 3 seconds.
Converter will reset to factory default.

Terminator
There terminator resistor built in. If switch 1 & 2 are set in "ON" position, 120 Ohm resistor connected between the signals.
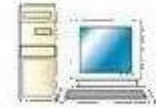
Wiring Architecture
RS-232 Wiring Architecture

RS-232 Wiring

Serial Device	Converter
TX	RX
RX	TX
GND	GND

RS-232 (RTS/CTS) Wriing

Serail Device	Converter
RX	TX
TX	RX
GND —————— GND
RTS	CTS
CTS	RTS

RS-232 (RTS/CTS,DTR/DSR) Wriing

Serail Device	Converter
RX	TX
TX	RX
GND	GND
RTS ————— CTS
CTS	RTS
DTR	DSR
DSR	DTR

RS-422 / RS-485 Wiring Architecture

RS-422 Wiring

Serial Device	Converter
T +	R +
T -	R -

RS-485 Wiring

Serial Device	Converter
D +	D +
D -	D -

RS-485 Wiring

Serial Device	Converter
D +	D +
D -	D -

RS-485 Wiring

Serial Device	Converter
D +	D +
D -	D -

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

For setup proceed the advanced parameters, please use web browser (IE or Netscape) to continue the detailed settings.

Converter Configuration

Initial IP Configuration

When setting up your converter for first time, the first thing you should do configure the IP address. This chapter introduces of method to configure the device server IP address. For more details about network settings, see "Web Console Configuration" in next sub section.

For quick setup of converter, we suggest you to reference "Quick Installation Guide" manual.

The following topics are covered in this chapter:

◎ **Device Management Utility**

◎ **Menu "View"**

◎ **Menu "Config"**

Device Management Utility of ETM

On PC we provide Device Management Utility named ETM.exe which an executable program in Windows 32 bit environments. ETM Setup Tool 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 installed converters and depict the converters status such as IP address, Subnet Mask, MAC Address and Device ID (see Figure 3.1).

If your computer OS is Windows XP version which means "WINDOWS Firewall" function in OS activated. However ETM.exe wouldn't detect the converter IP address, therefore, you have to temperately disable "WINDOWS Firewall" function. After finishing the parameters settings, you can restart "WINDOWS Firewall" function.

Due to nature of broadcast UDP packets, ETM has following characteristics:
▢ Broadcast packets aren't limited by subnet. If even IP address of converters and computer running ETM do not belong to same subnet, it still works fine.
▢ Broadcast packets can not pass routers. ETM can only be used to monitor devices with computer running ETM in same segment of local area network.
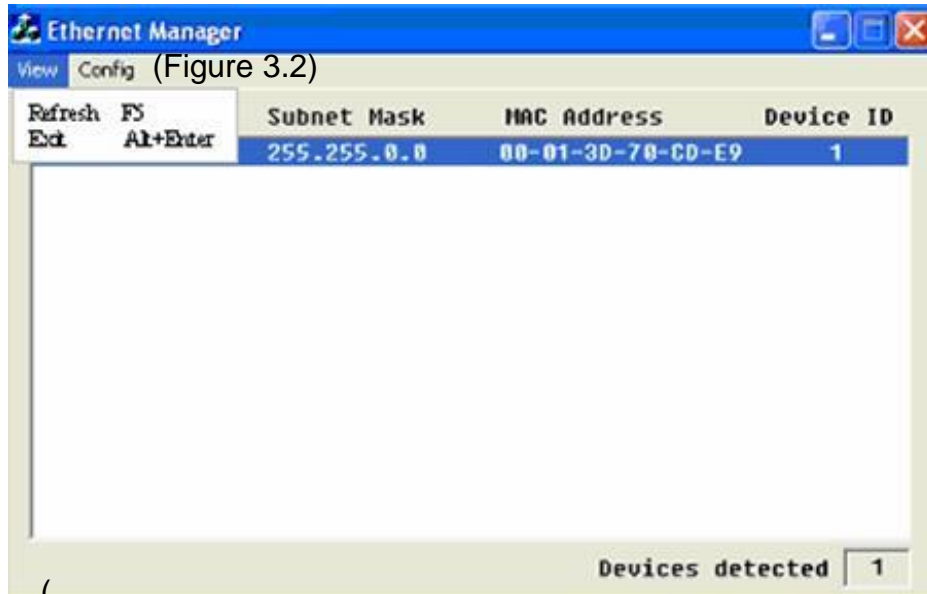
Menu "View"

◻ View -> Refresh   F5

Refresh the status. ETM will send another query to get updated information.
(See the Figure 3.2.)

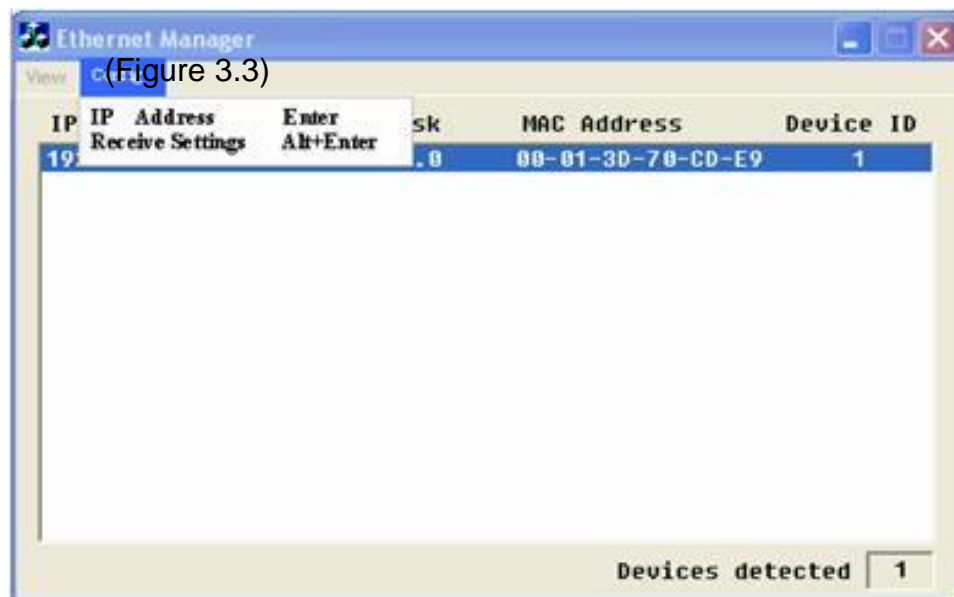Note: Always run the "View-> Refresh" after any data change.

(Figure 3.2)

View -> Exit Alt+F4

Exit from the program (see Figure 3.2).
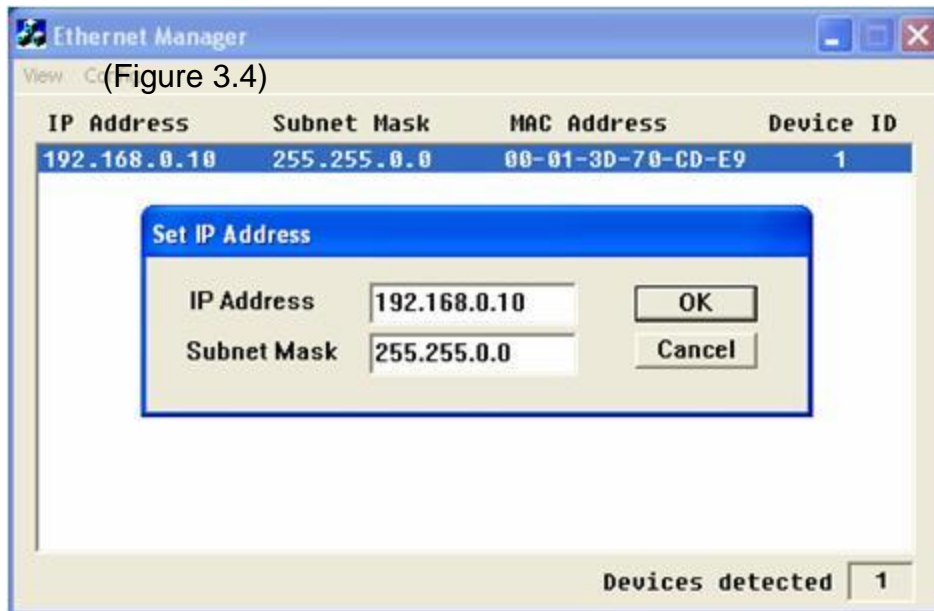
Menu "Config"

Config -> IP Address (see Figure 3.3)

(Figure3.3)

Press ENTER or select [IP Address] in the [Config] menu, a dialog will be shown (see Figure 3.4).

Note: Because ETM uses broadcast UDP packets for sake of security, it allows configuration **only when setup the device password is empty**.

(Figure 3.4)

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

When you **press [Ok]** button, IP address will be refreshed in 2~3 seconds. (See the Figure 3.5.)

(Figure 3.5)

Web Console Configuration

In addition of 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 converter as easy as surfing on WWW, no special software will be required. **Press [Alt] + [Enter] or select [Device Settings] in the [Config] menu will open a new window in browser to login the device**. Alternatively, if IP address of converter already known, you can connect to converter directly by providing IP address in URL field of browser.

The following topics are covered in this chapter:

◎ **Controller Status**
- **The Login Page**
- **Field Description**

◎**Controller Setup**
- **The Setup Page**
- **Field Description**

◎**Controller Updated**

◎**Factory Default Setting**

Controller Status

The Login Page

For Setup of E-P132-X TCP/IP converter 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 IP address of device directly, to enter "Controller Status" page, please follow the steps below.

▢ Open your browser. This chapter will use IE as example.

▢ In browser URL field, type IP address of converter directly and press ENTER. (The IP address what you set using Device Management Utility.)

▢ The "Controller Status" page will be shown (see Figure 3.6).
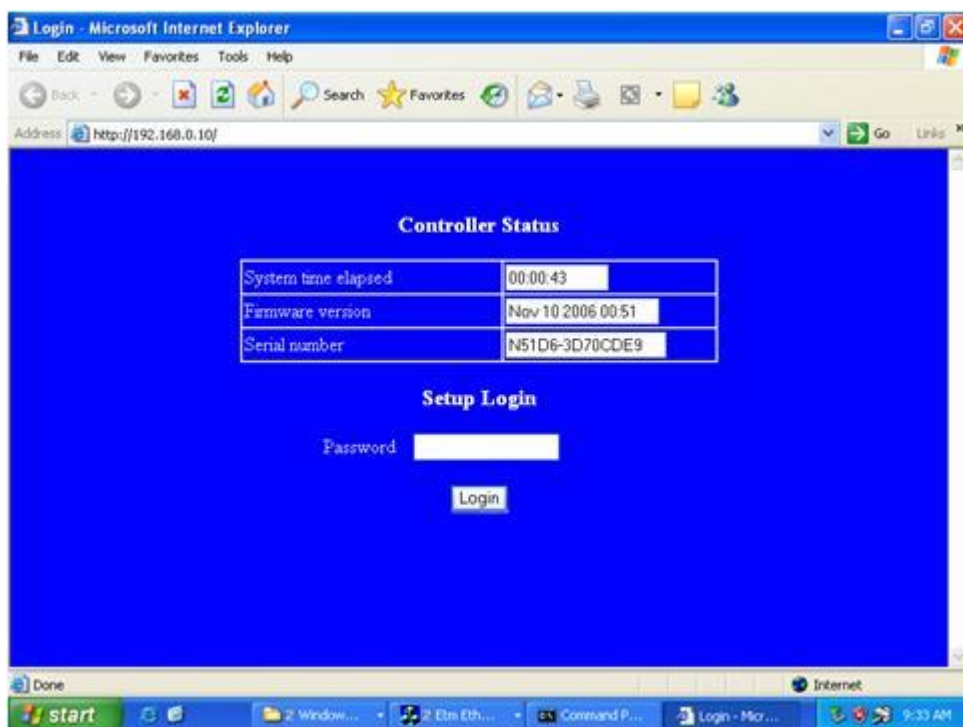
(Figure 3.6)

Field Description

❑ **System time elapsed**

The time elapsed since start in this device [Day Hour: Minute: Second] format. This information can be useful identifying reliability of system.

❑ **Firmware version**

Converter firmware identified by date code. This information will be required looking for technical support.

❑ **Serial number**

Converter consisted "Type Number (5 digits) and unique MAC (Media Access Control) address used by Ethernet in hex format, 8 digits.

❑ **Password (Setup Login)**

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

E-P132-X TCP/IP converter uses the same password protection mechanism commonly used 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, if you supply a correct password, login will not proceed. This prevents intruder from finding the password by computer generated program.

Controller Setup

□ The Setup Page

Type the correct password in "Password" field and click the [Login] button in "Controller Status" page, then "Controller Setup" page will appear (see the Figure 3.7).

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

(Figure 3.7)

❑ Field Description

❑ IP Address

The IP address of E-P132-X TCP/IP converter by separated 4 digits, don't let conflict with other devices on network.

If DHCP client mode enabled and there is DHCP server on the network, this field will be assigned by DHCP server automatically.

❑ Subnet mask

Subnet mask of network E-P132-X TCP/IP converter connected to "255.255.255.0" usually used for the small network, "255.255.0.0" for larger network by separated 4 digits.'

If your IP address provide by ISP or internal network administrator, please inquire information and type correctly.

If DHCP client mode enabled and there is DHCP server on the network, this field will be assigned by DHCP server automatically.

❑ Gateway address

Gateway or Router IP address. 'Gateway' is device which connects local network to external network. If you need communicate with other networks or your device owns real IP address on internet, please inquire information and type correctly. If there is no gateway on network, just leave as "0.0.0.0".

If DHCP client mode enabled and there is DHCP server on the network, this field will be assigned by DHCP server automatically.

Network link speed

The Physical Ethernet of speed link. "Auto" means the speed automatically selected by the converter. You can also specify "10Mbps" or "100Mbps" to match speed of HUB.

DHCP client

DHCP client mode could be enabled/disabled statues. If DHCP enabled, there should be DHCP server on the network. If DHCP disabled [IP address], [Subnet mask] and [Gateway address] should be manually assigned.

Socket port of HTTP setup

The socket port used conduct to setup browser. Normally, HTTP protocol use TCP port "80" for communication. If the field changed to "81", the port "80" will be reserved for user own Web.

To enter setup browser page, "http://x.x.x.x:81" should be typed for socket port "81" and "http://x.x.x.x" for socket port "80", where "x.x.x.x" the converter IP address.

Destination IP address

The server IP address and socket port would be connected in TCP Client and UDP mode for a certain server IP address.

Destination socket port

The server socket port would be connected in TCP Client and UDP mode for certain socket port.

Connection

The connection can be selected in 2 modes.
"Auto function for connect Automatic of converter"
"Manual function for program control of converter"

TCP socket inactive timeout imput

We add mechanism - "inactive timeout" to identify whether the socket active or dead. If there is no any data transferred (send / receive) within defined timeout period (1 to 99 minutes), then it probably a dead socket and the socket will be closed automatically, thus a new connection can be accepted again. The timeout period can be set by users to fit different kinds of application.

Packet mode of serial input

Packet mode could be in enabled/disabled mode. If packet mode enabled, data input from UART will be deferred until input buffer full or converter detects 10-character packet gap and no more character arrived. The block waiting time extended to avoid the splitting of complete packet.

Device ID

User assigned ID number for converter. Available ID is "0 ~ 65535".

Report device ID when connected

In TCP mode, if this parameter enabled every time when the socket connected, E-P132-X TCP/IP converter will immediately report device ID in the following formats:

Serial #1	nnnnnA[LF][CR]
Serial #2	nnnnnB[LF][CR]
Digital I/O	nnnnnC[LF][CR]

The total 8 bytes length, where "nnnnn" assigned 5-digit device ID by the user; [LF] is decimal 10; [CR] is decimal 13.

Setup password

Administration password used to login "Controller Setup" page. It may be empty or up to 15 long characters.

❑ Serial Port 1

The first serial port of E-P132-X series is RS-232.

❑ Socket port

❑ Port number

A socket port assigned for serial port. It's 16-bit numbers, ranging from 1 to 65535. Because the numbers below 1000 are used for specific purposes (e.g. 80 for HTTP protocol), we suggest you use the numbers larger than 1000. Generally the port number 4660 is used for the serial communication. However you should specify different port number for each serial port.

❑ Socket type

TCP Server: TCP protocol, open passive to be connected from TCP clients.
TCP Client: TCP protocol, open active to connect TCP server.
UDP Client: UDP protocol, connectionless.

❑ Interface

RS232: TxD, RxD for data stream, no flow control.
RS232 (RTS/CTS): TxD, RxD for data stream, RTS/CTS for flow control.
RS232 (RTS/CTS, DTR/DSR): TxD, RxD for data stream, RTS/CTS for flow control. DTR for socket status, DSR for control socket open/close.

❑ Baud rate, parity, data bits, stop bits

Baud Rate: 300 ~ 230400 bps
Parity: None, Even, Odd
Data Bits: 5, 6, 7, 8
Stop Bit: 1 or 2

❑ Serial Port 2

The second serial port is RS-422/485.

◻ Socket port

◻ Port number

A socket port assigned for serial port. It is 16-bit numbers, ranging from 1 to 65535. Because numbers below 1000 are used for specific purposes (e.g. 80 is for HTTP protocol), we suggest you use the numbers larger than 1000. Generally port number 4660 is used for serial communication. However you should specify different port number for each serial port.

◻ Socket type

TCP Server: TCP protocol, open passive to be connected from TCP clients.
TCP Client: TCP protocol, open active to connect TCP server.
UDP Client: UDP protocol, connectionless.

◻ Interface

RS485 (Half duplex): Half duplex RS-485 interface, RTS for driver enable/disable.
RS422 (Full duplex): Full duplex RS-422 interface.

◻ Baud rate, parity, data bits, stop bits

Baud Rate: 300 ~ 230400 bps
Parity: None, Even, Odd
Data Bits: 5, 6, 7, 8
Stop Bit: 1 or 2

Controller Updated

Press "Update" Button After you finish the detailed parameter setting. The converter will save all parameters into internal non-volatile memory and then reboot (see Figure 3.8). It takes about 5 seconds to complete the whole process and new login page will be presented (see Figure 3.1).
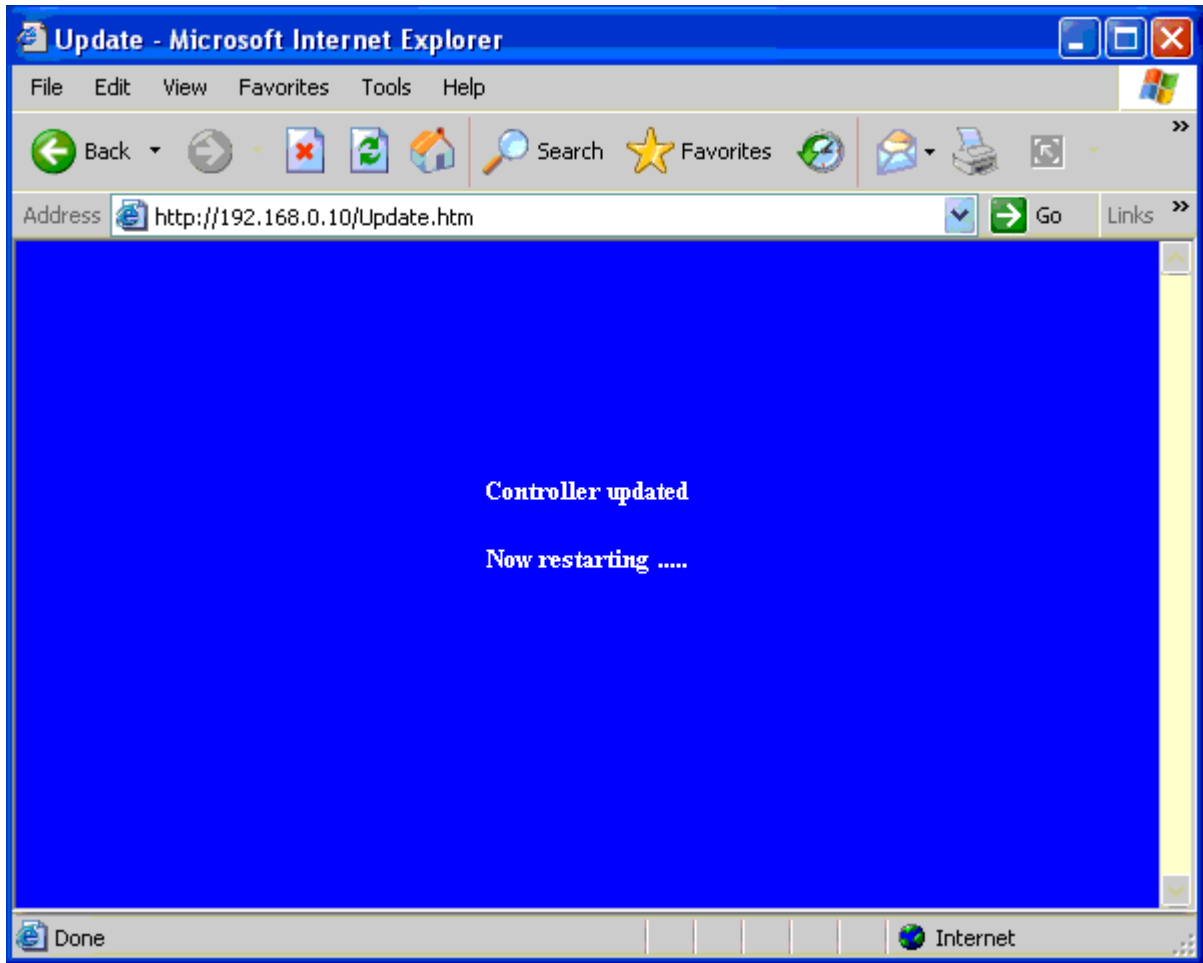
(Figure 3..8)

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

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

Factory Default Setting

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

A:

1. Turn off the power of converter.
2. Press the reset button of converter.
3. Turn on the power of converter and wait for 3 seconds.
4. The password will reset to the factory default (empty).

B:

1. Log in the web page.
2. Press the reset button of converter.
3. Select the update button.
4. After Tx & Rx light flashing then unclasp the reset button.
5. The password will reset to the factory default (empty).
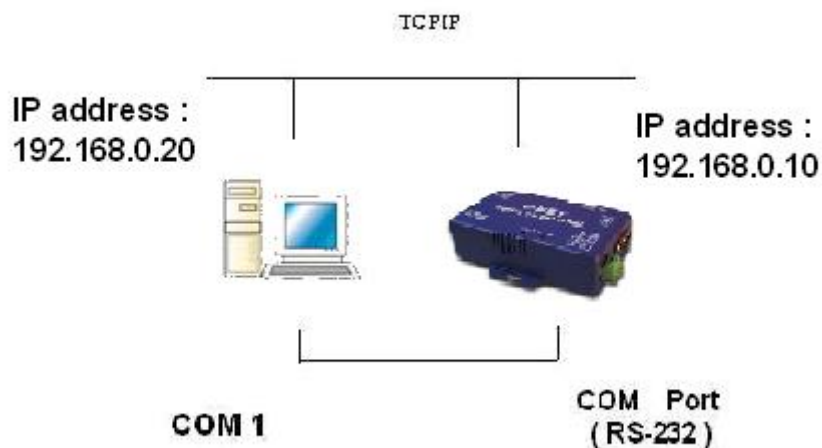
Self-Testing

After completing the wiring and parameter setting, we should verify if setting correct or not. This chapter will introduce how to use a single computer to test if converter behaves well.

The operating system can be Windows 95, 98, ME, XP, 2000. The "Hyper Terminal" utility should be installed on your PC (see Figure 4.1). It can be found in your Windows installation CD.

The wiring architecture similar to "RS-232 Wiring" in chapter 2 and "Serial Device" replaced by PC's COM 1. The same PC also plays roll of Remote Host.

The following topics are covered in this chapter:

◎ **Hyper Terminal for TCP/IP WinSock**

◎ **Hyper Terminal for COM Port**

◎ **Data Transmission**

Hyper Terminal for TCP/IP WinSock

Initiate Hyper Terminal from Start Menu in Windows (see Figure 4.1), give terminal name, choose an icon and press "OK" button (see Figure 4.2).
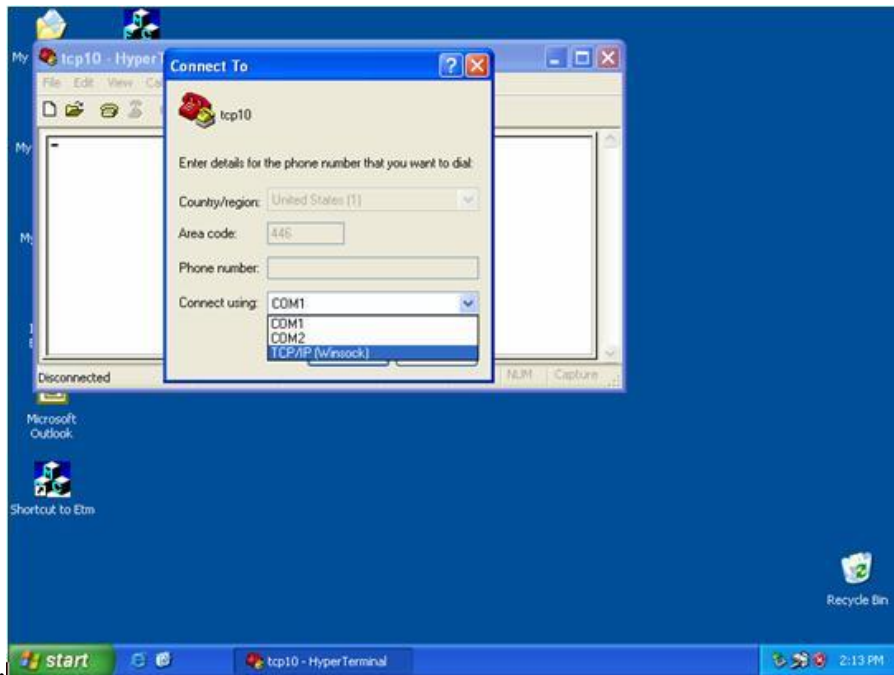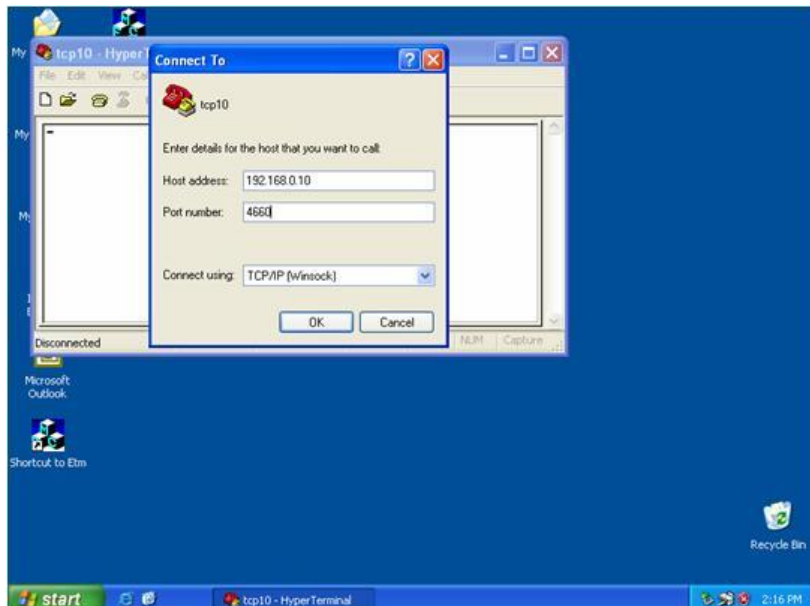

(Figure 4.1)
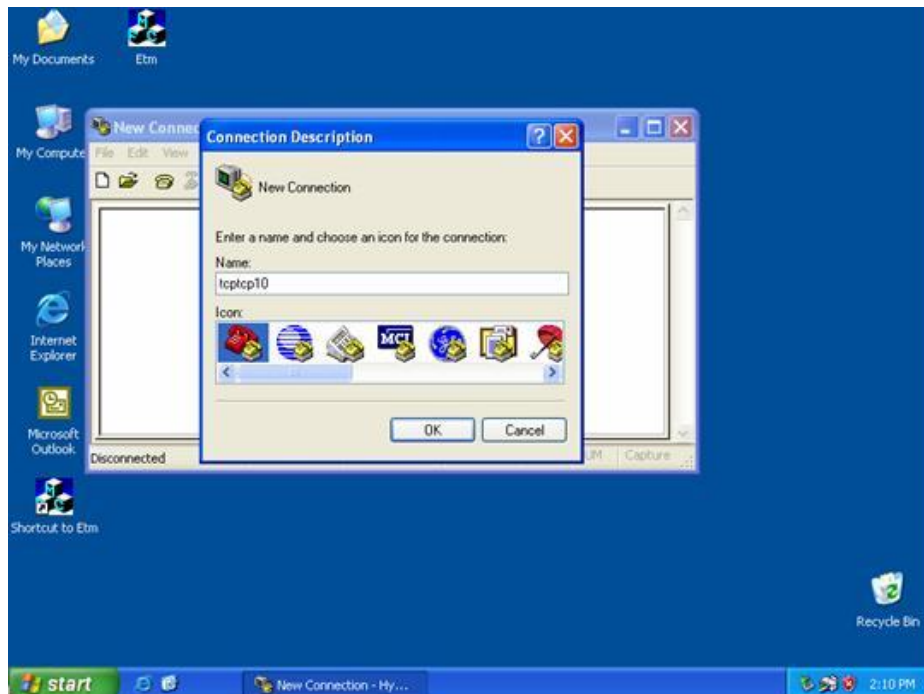
(Figure 4.2)

Select "TCP/IP (Winsock)" option at the "Connect using:" field (see Figure 4.3).

(Figure 4.3)

After pressed "OK" button, Figure 4.4 appears. Enter converter IP address (e.g. 192.168.0.10) at the "Host address:" field and set Socket port number for Serial Port 1 at "Port number" field (e.g. 4660). (The Socket type of the Serial Port 1 should be "TCP Server".)
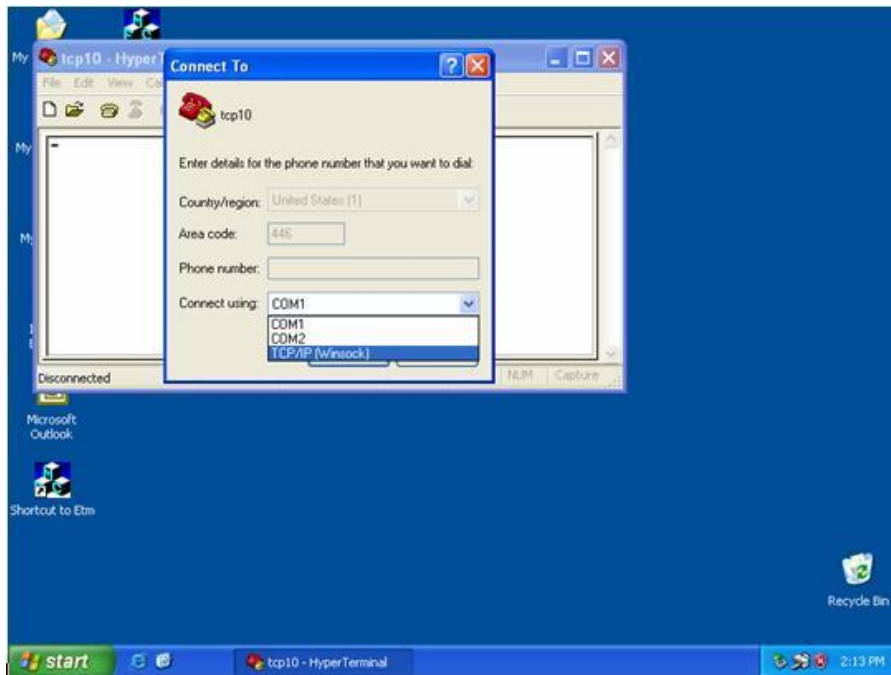

(Figure 4.4)

After pressed "OK" button, Figure 4.5 appears. If Hyper Terminal connects with converter successfully, the time clock at "left lower" corner "to connected the hh:mm:ss" will start counting.
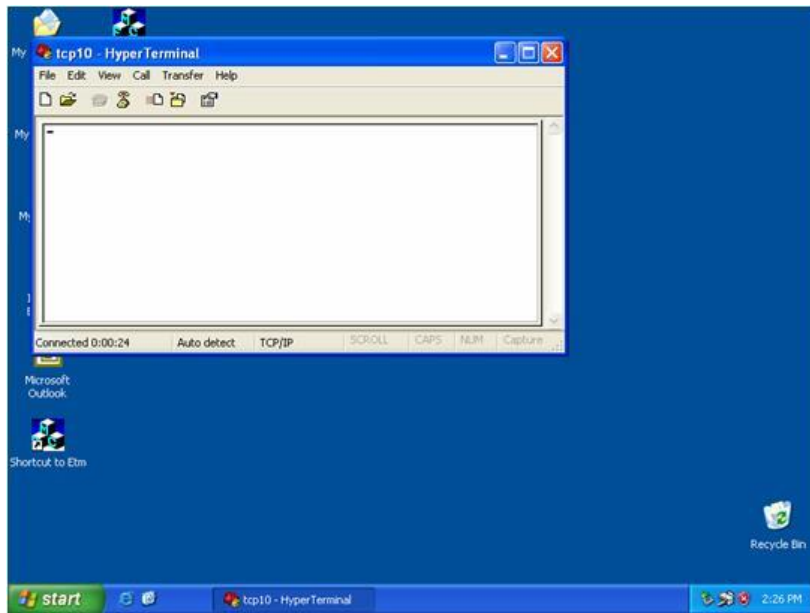
(Figure 4.5)

Hyper Terminal for COM Port

Initiate another Hyper Terminal as COM Port Terminal (in Figure 4.3, select COM 1 or other COM port instead of "TCP/IP (Winsock)"). To set COM port Properties same as Serial Port of converter (9600.N.8.1).

(Figure 4.3)

Data Transmission

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

Append FAQ

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

A. Please check

1. Power properly plugged to the converter. (Please refer "SYS' LED)

2. Network cable properly connected between converter and Hub. (Please refer LAN LED)

3. Close the Windows or antivirus program firewall.
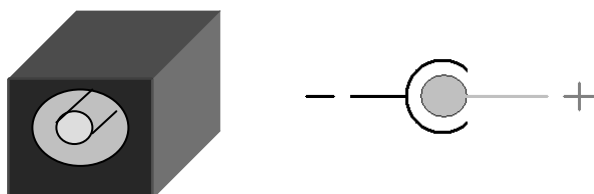(Please refer Device Management Utility of ETM)

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

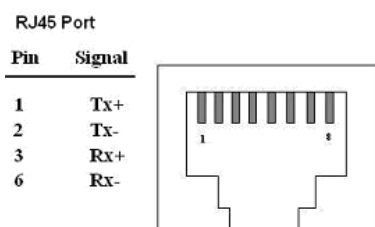A. Please check if network domain of your PC is the same as converter.
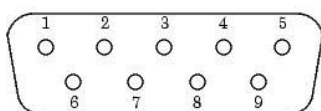
Appendix B

Pin outs and Cable Wiring

◻ **DC Power outlet**

◻ **RJ-45 Pin Assignment**

RJ45 Port

Pin	Signal
1	Tx+
2	Tx-
3	Rx+
6	Rx-

◻ **RS-232 Pin Assignment**

The pin assignment scheme for 9-pin male connector on DTE is given below.

PIN 1 : DCD   PIN 2 : RXD   PIN 3 : TXD   PIN 4 : DTR
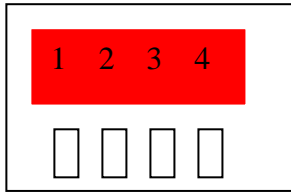
PIN 5 : GND   PIN 6 : DSR   PIN 7 : RTS   PIN 8 : CTS

PIN 9 : X

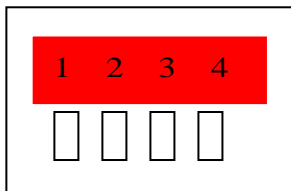### ❑ RS-422 Pin Assignment

The pin assignment scheme for given 4-pin of RS-422 below.

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

❑ RS-485 Pin Assignment

The pin assignment scheme for given 4-pin of RS-485 below.

PIN 1 : X   PIN 2 : X   PIN 3 : D+   PIN 4 : D-