Ethernet I/O
EIO-R-200

User's Manual

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Infosystem Technology Corporation, LTD.

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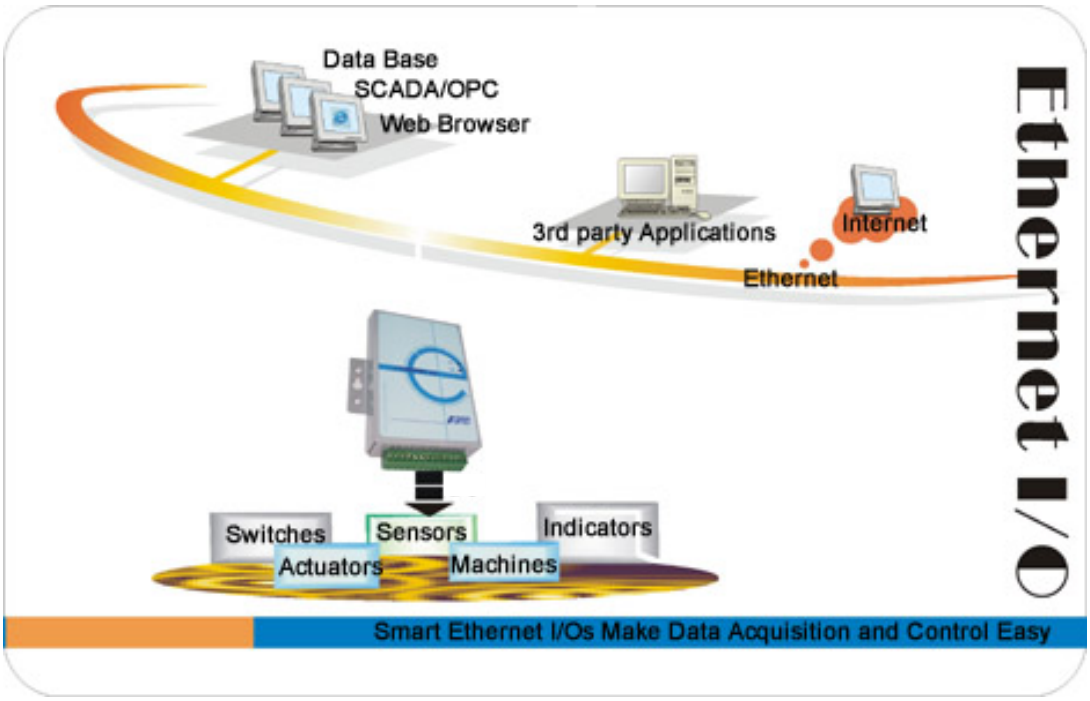
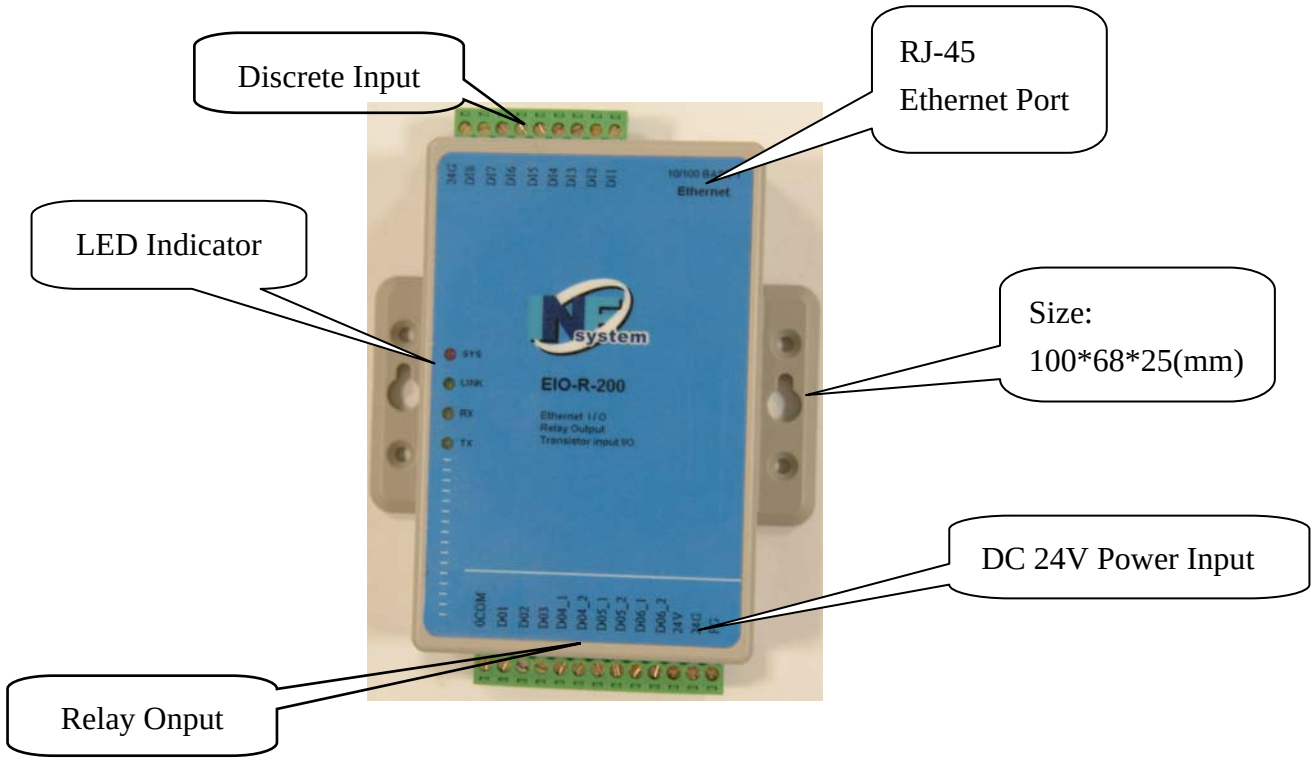
1. Introduction

INFOSYSTEM Ethernet Relay I/O EIO-R-200 is an ideal product to make data acquisition easier through Modbus/TCP protocol on an existing Ethernet network. With Ethernet I/O EIO-R-200 and its related products, the controlling and monitoring of distributed control system can be easily accomplished.



1.1 Features



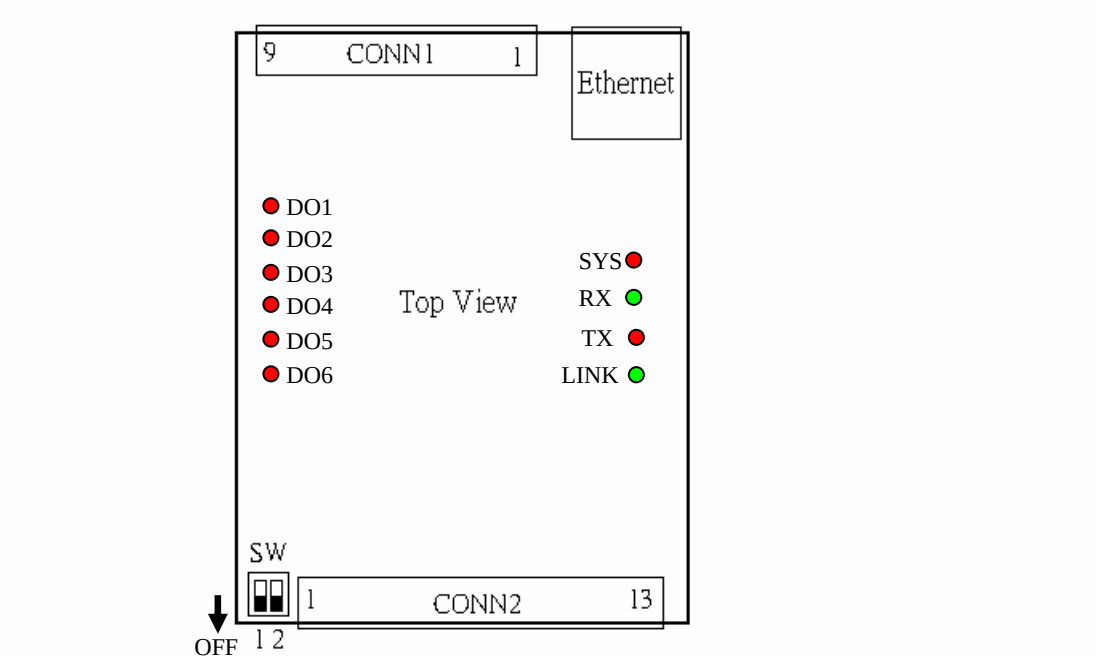
Features:

- Supports ARP, ICMP, TCP, UDP, IP, DHCP, HTTP, Modbus/TCP, and 10Base-T Ethernet standard.
- Supports Web Based interface for fast configuration.
- Supports Modbus/TCP for easy integration with HMI/SCADA or OPC server.
- Supports "Winsock" networking programming and optional "Virtual serial ports" driver for windows application program.

1.2 Specifications

Model / Items	EIO-R-200
Network Interface	10BaseT, RJ-45
Protocol	ARP, ICMP, TCP, UDP, IP, DHCP Client, HTTP, Modbus/TCP Slave,
Reset	Built-in reset key to restore the defaults
Watch Dog Timer	Built-in hardware auto reset function
Discrete I/O	8 points, DC 24V Input/ 6 points, relay 3A Output
Led Indication	SYS x1(Red), LINKx1(Green)
Power Requirement	24VDC, power consumption<1W
Temperature	Operation: 0ºC~+55º C (32ºF~+131ºF) Storage: -20ºC~+70ºC (-4ºF~+158ºF)
Humidity	15% to 95% (non-condensing)
Dimension	100mmx68mmx25mm
Configuration	Web Browser, Windows utility via Ethernet

1.3 LED Indicator and Switch Description



LED Indicator:

LED	Description
SYS	The SYS LED blinks at a rate of 1.5Hz, when CPU is working normally with the module.
RX	Received data.
TX	Transmitted data.
LINK	If ON, the Ethernet connection is activated.
DO1~DO6	The relay outputs1~6.

Switch Description:

Switch	Description
SW1	**OFF:** ModBus RTU (Default)
	ON: ModBus ASCII
SW2	Reserved, must be OFF

2. I/O Specifications and Wiring

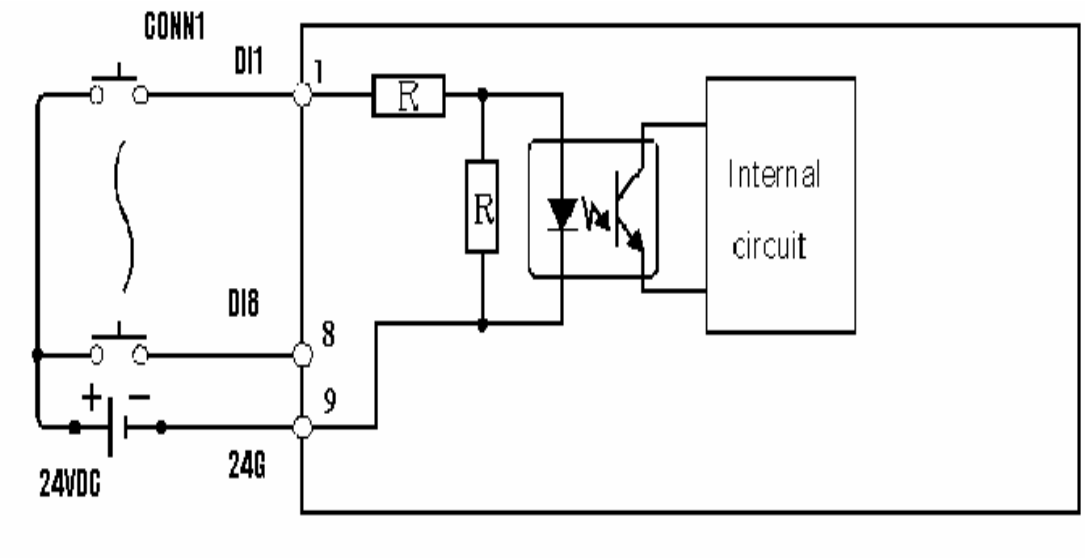
The specifications and I/O wiring diagrams of Ethernet I/O EIO-R-200 are listed here.

2.1 8 points, 24V DC input

a. Specification:

Model / Specification		DIGITAL INPUT
Number of input points		8 points
Insulation method		Photocoupler
Rated input voltage		24V DC
Rated input current		7 mA
Operating voltage range		21.6V DC～26.4V DC
Turn ON state		12VDC/2mA or higher
Turn OFF state		4VDC/1mA or lower
Input impedance		Approx. 3.9 KΩ
Response time	OFF➔ON	8 msec or less (24VDC)
	ON➔OFF	8 msec or less (24VDC)
Common terminal arrangement		8 points/common
Internal current consumption		Max.100 mA (type, all points ON)

b. Equivalent input circuit:

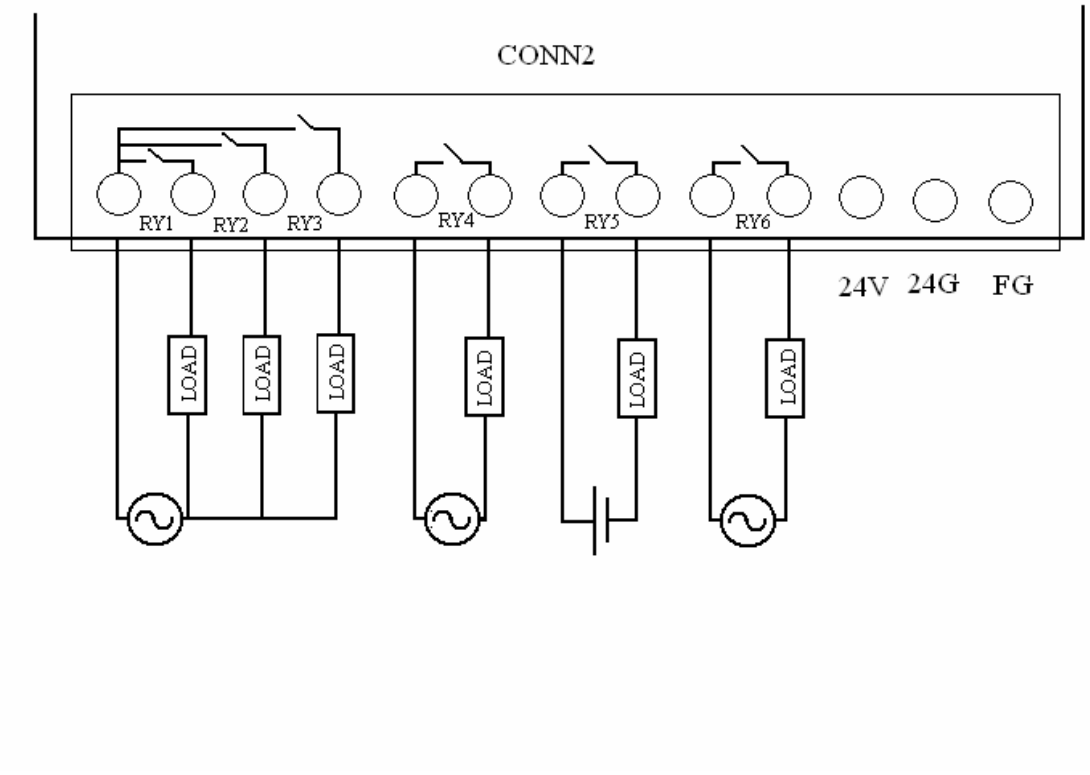


2.2 6 points, Relay Output

a. Specification:

Specification \ Model		**RELAY OUTPUT**
Number of output points		6 points
Insulation method		Photocoupler
Resistive Loading		3A/250VAC or 3A/30VDC
Inductive Loading		1/8HP,125VAC/250VAC
Max. switching frequency		3600 times per hour
Service lift	Mechanical	More than 20 million times
	Electrical	Switching rated voltage/current more than 100,000 times
		250VAC/2A, 30VDC/2A more than 100,000 times
International current consumption		100 mA (type, all points ON)

b. Equivalent input circuit:



3. Modbus Address Mapping

The discrete I/O points of the Ethernet I/O EIO-R-200 can be easily control and monitor through Modbus/TCP protocol. The Modbus address mapping with discrete I/O is described below.

3.1 Modbus Holding Register 40001

The 6-point relay output of the Ethernet I/O EIO-R-200 is mapped with the Modbus holding register "40001". The following table describes the exact bit-mapping for Modbus holding register "40001".

Modbus Holding Register / Digital Output of EIO-R-200	40001
DO-1	Bit 0 (40001:0)
DO-2	Bit 1 (40001:1)
DO-3	Bit 2 (40001:2)
DO-4	Bit 3 (40001:3)
DO-5	Bit 4 (40001:4)
DO-6	Bit 5 (40001:5)

3.2 Modbus Holding Register 40002

The 8-point digital input of the Ethernet I/O EIO-R-200 is mapped with the Modbus holding register "40002". The following table describes the exact bit-mapping for Modbus holding register "40002".

Modbus Holding Register / Digital Input of EIO-R-200	40002
DI-1	Bit 0 (40002:0)
DI-2	Bit 1 (40002:1)
DI-3	Bit 2 (40002:2)
DI-4	Bit 3 (40002:3)
DI-5	Bit 4 (40002:4)
DI-6	Bit 5 (40002:5)
DI-7	Bit 6 (40002:6)
DI-8	Bit 7 (40002:7)

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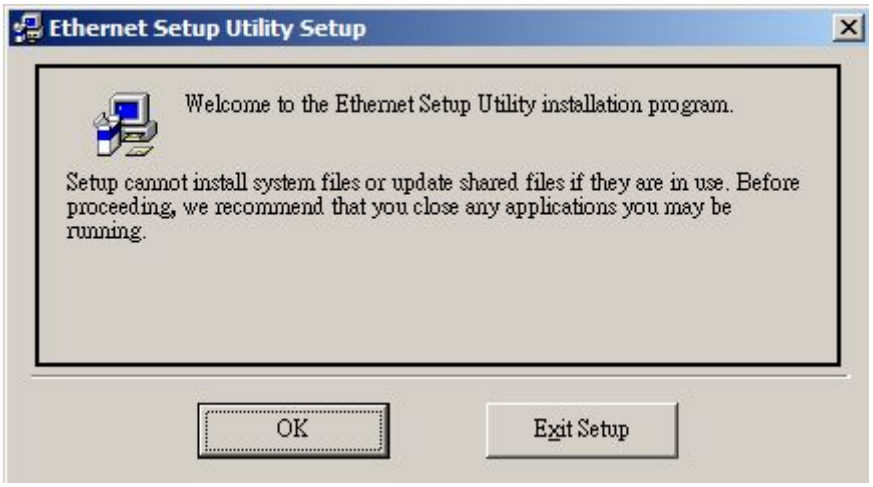
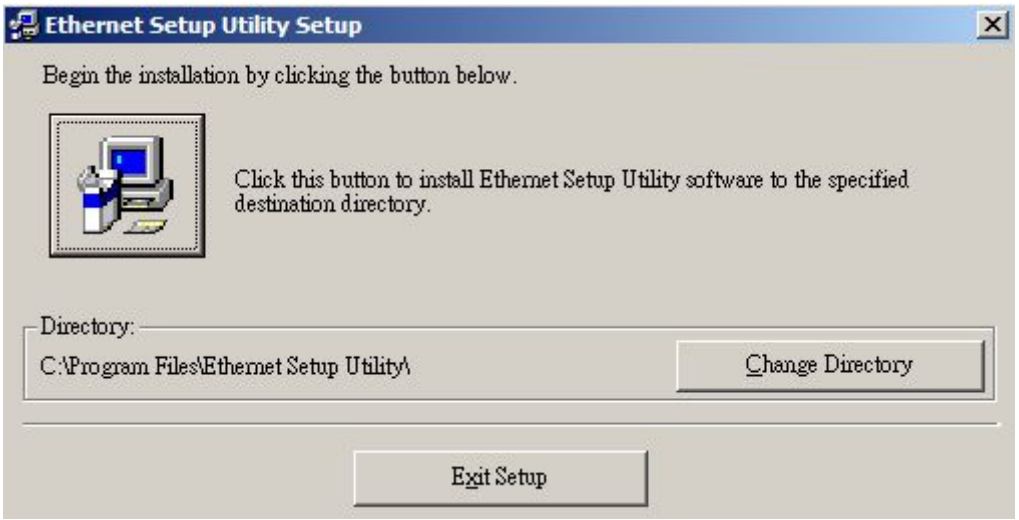
4. Software Installation

(1) The following screen is displayed. Click the **OK** button to proceed with the next step.

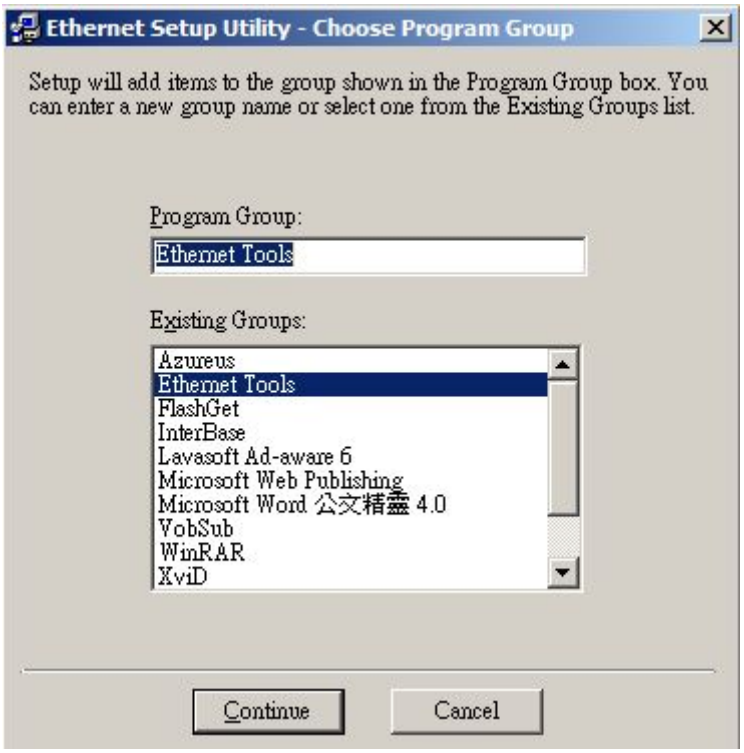


(2) When the following screen is displayed, click on the  button to continue. If you want to use a destination directory different than the default one displayed on the screen, just click on **Change Directory** to locate the desired folder, and then click on  button to continue.



(3) You can change or use the default folder name displayed on the screen and then click on **Continue** to start copying files.

(4)



(5) When the installation is completed successfully, the following screen is displayed, then press the OK button to terminate the installation program.

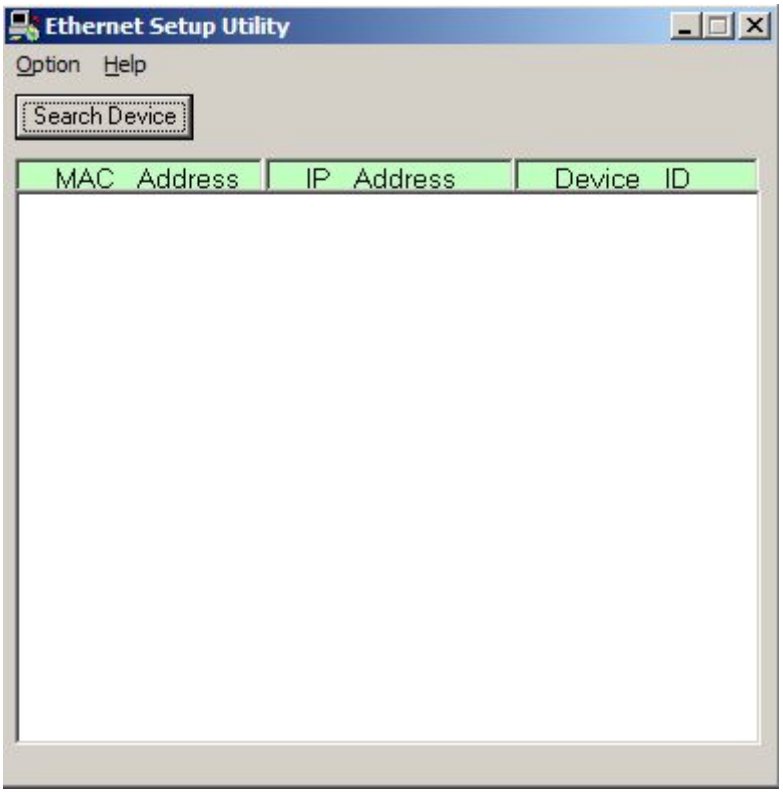
5. Configuring The Ethernet I/O EIO-R-200

There are two methods you can use to configure the Ethernet I/O EIO-R-200. One is configuring with the Ethernet Setup Utility program and the other is configuring with Web Browser. The details are described below.

5.1 Configuring With Ethernet Setup Utility Program

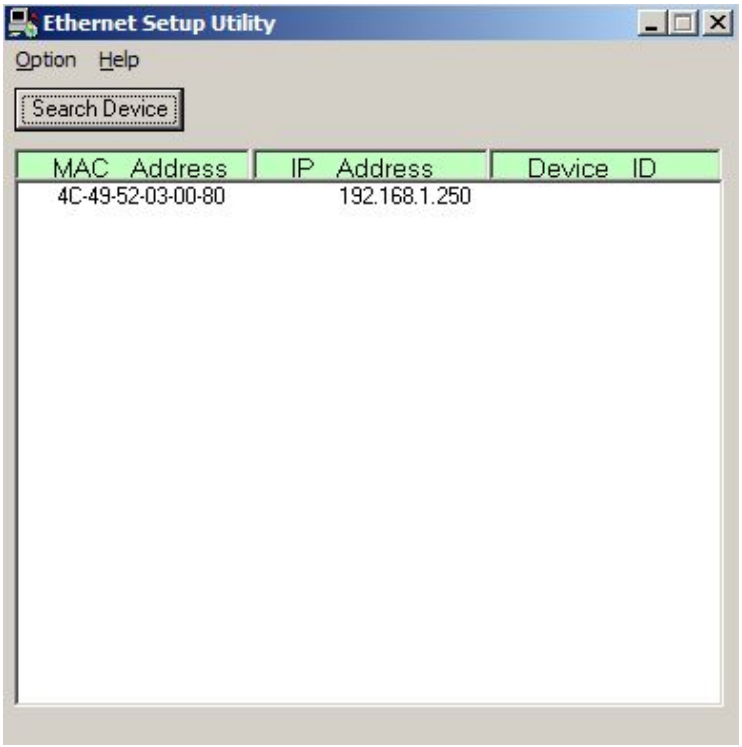
(1) To start Ethernet I/O Setup program, click on **Start ▸ Programs ▸ Ethernet Tools ▸ Ethernet_Setup_Utility**

(2) The Ethernet Setup Utility window is shown as below.

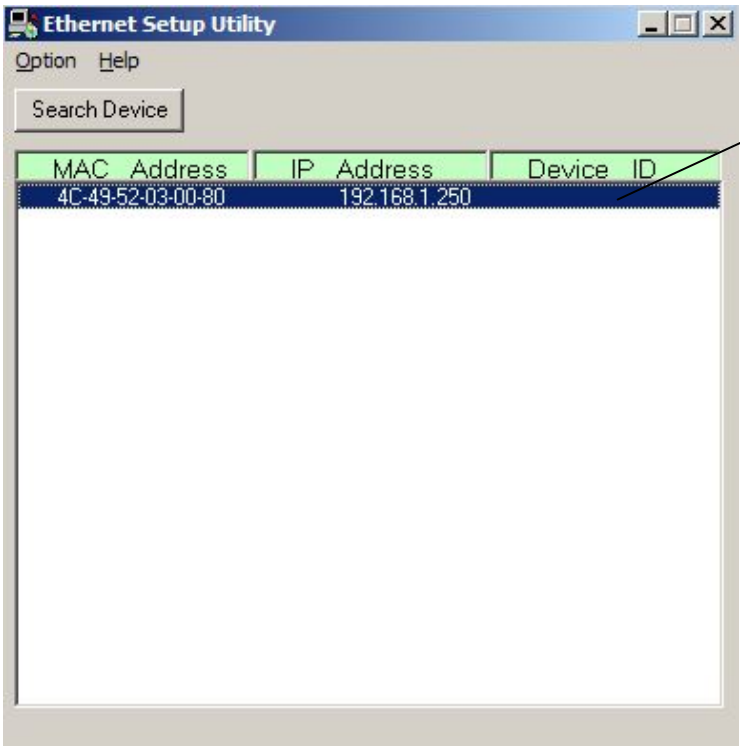


(3) Click on the 

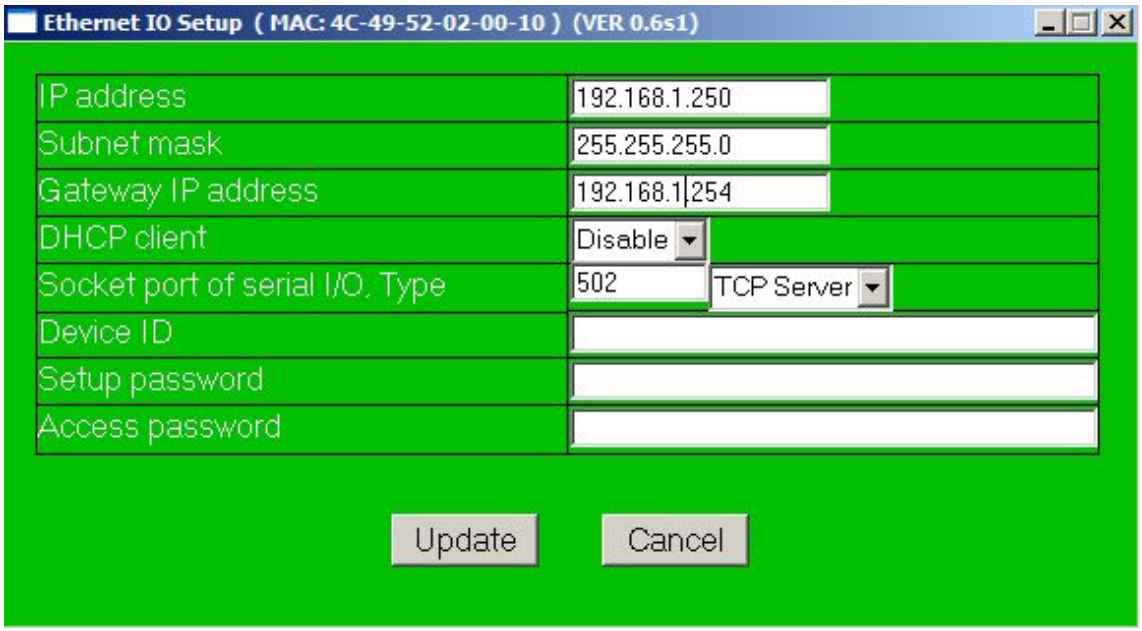
button to search all the Ethernet I/O EIO-R-200 connected in the same subnet using the UDP broadcast protocol. When the search is finished, the information about all Ethernet I/O EIO-R-200s found will be listed in the text box as shown below.



(4) Double click on the desired Ethernet I/O EIO-R-200 whose configuration is to be modified, as shown below.



(5) The following window is displayed after double click on the desired Ethernet I/O EIO-R-200, which allows user to modify the configuration of the selected Ethernet I/O EIO-R-200.



Please refer to the following description for setting up the parameters of the Ethernet I/O EIO-R-200.

- **IP address:**
  The IP address of the Ethernet I/O EIO-R-200 on the TCP/IP network. The default Local IP address is 192.168.1.250. This address should be unique. Ask your network administrator for assistance, if in doubt.

- **Subnet mask:**
  Identifying the network class which the Ethernet I/O EIO-R-200 belongs to. The default Subnet mask is: 255.255.255.0. Ask your network administrator for assistance, if in doubt.

- **Gateway IP address:**
  The IP address of the router. The default Gateway IP address is: 192.168.1.254. Ask your network administrator for assistance, if in doubt.

- **DHCP client:**
  If this option is enabled, that means the IP address, Subnet mask and Gateway IP address of the Ethernet I/O EIO-R-200 are set dynamically by the DHCP

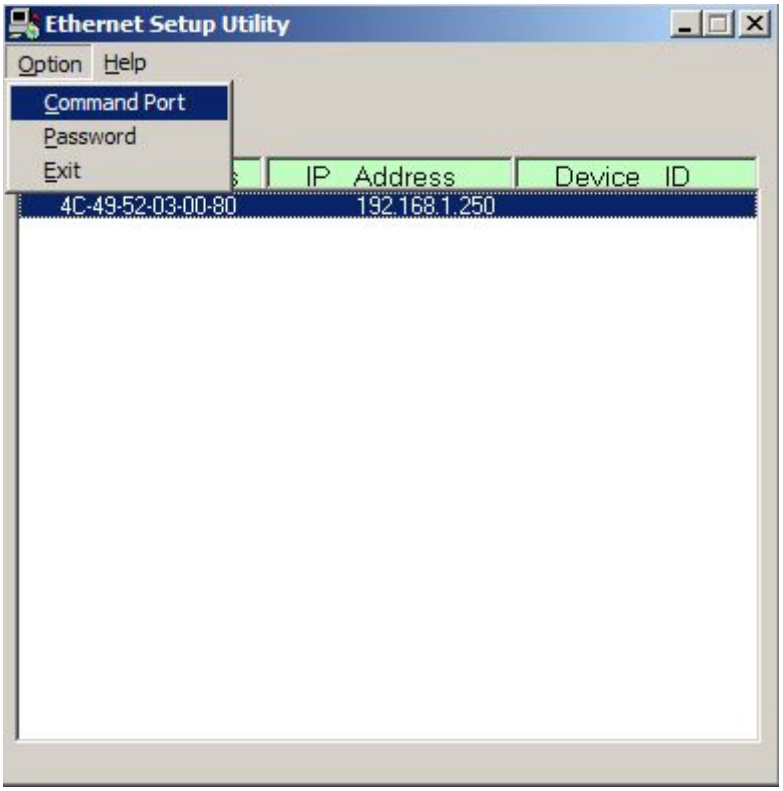
Server. If the setting cannot be got from the DHCP server successfully, the Ethernet I/O EIO-R-200 will use the last setup parameters for its configuration. The possible reason of this case is that the DHCP server is shutdown or not available. Ask your network administrator for assistance, if in doubt.

- **Socket port of serial I/O, Type:**
  The local port number of the Ethernet I/O EIO-R-200 to be contacted by other devices. The default port number is 502, which is reserved for Modbus/TCP protocol that Ethernet I/O EIO-R-200 supports only. And default communication mode for the Ethernet I/O EIO-R-200 is TCP Server, which made Ethernet I/O EIO-R-200 operate at the Passive or the TCP listen mode to receive TCP connection requests from the remote client device.

- **Setup password:**
  This password protects the Setup window of the Ethernet I/O EIO-R-200 from unauthorized entry. To erase an existing password, just leave the Setup password text box blank.

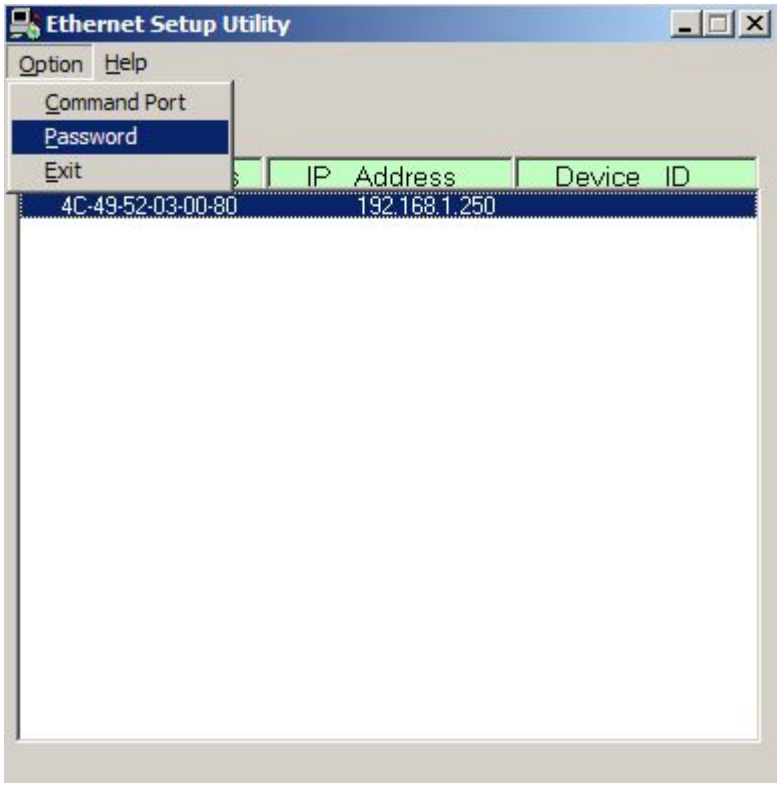
- **Access password:**
  If this password is configured, the remote host needs to send this access password one second periodically to the Check Status Port of the Ethernet I/O EIO-R-200, otherwise the data transfer request will not be accepted by the Ethernet I/O EIO-R-200. To erase an existing password, just leave the Access password text box blank.

(6) User must ensure the command port number that the Ethernet I/O EIO-R-200 Setup program used is the same as the **Command Port** parameter which has been configured in the Ethernet setup Utility window. To verify this, click on **Option ▸ Command Port** as shown below.

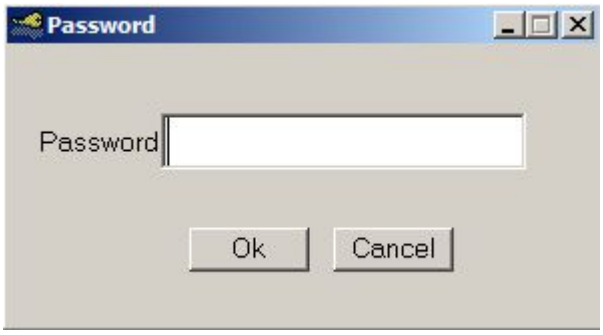


Next, when the Command Port window opens, input the command port number that is the same as the one which has been set in the setup window, and then click on **OK**.

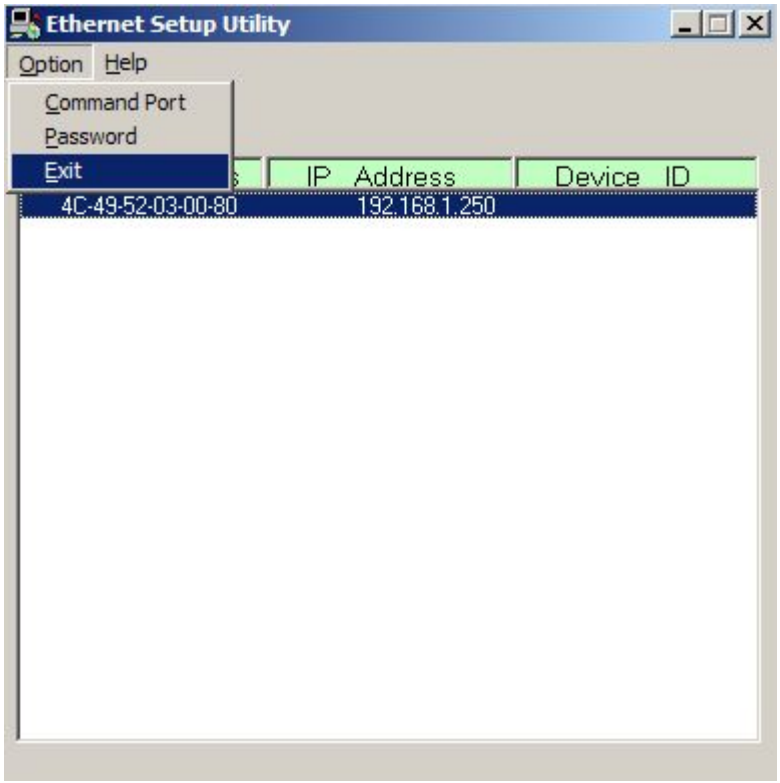
(7) User needs to use the right password to enter the Ethernet setup Utility window if password protection is enabled. Click on **Option** ▸ **Password** as shown below.



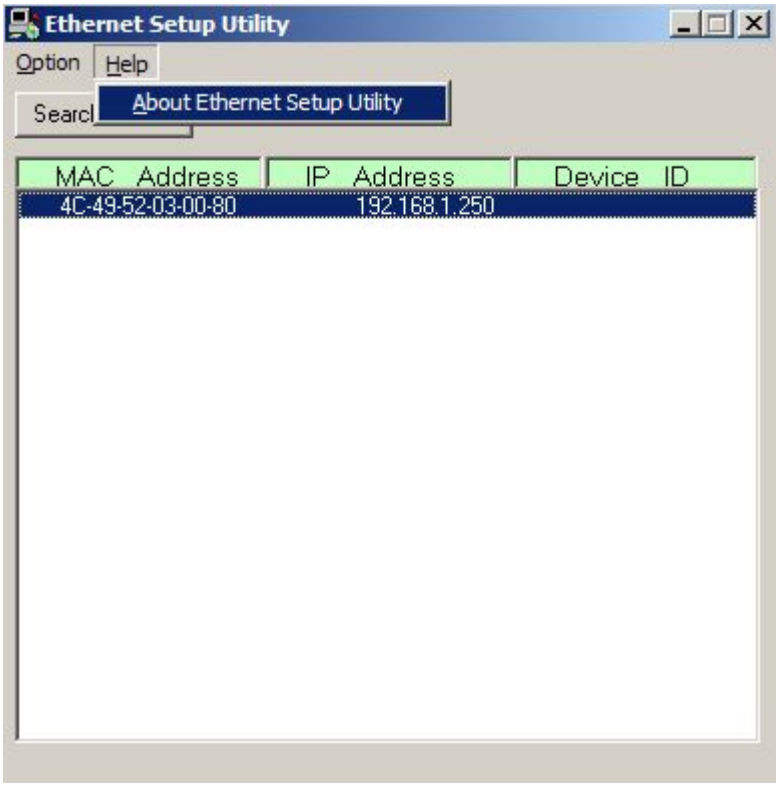
When the Password window opens, input the correct password that is the same as the one which has been set in the setup window, and then click on **OK**.



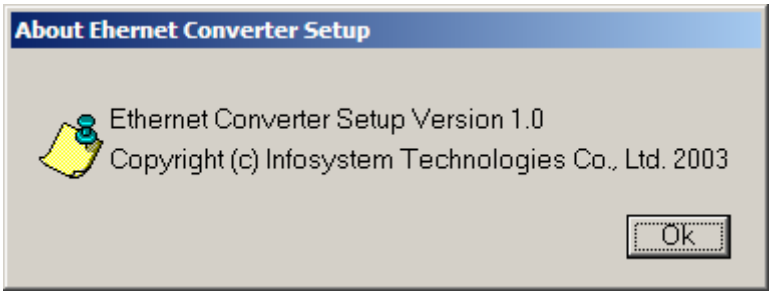
(8) To exit the Ethernet setup Utility program, click on **Option ▸ Exit** as shown below.



(9) To show the information about Ethernet I/O Setup program, click on **Help ▸ About Ethernet Setup Utility** as shown below.

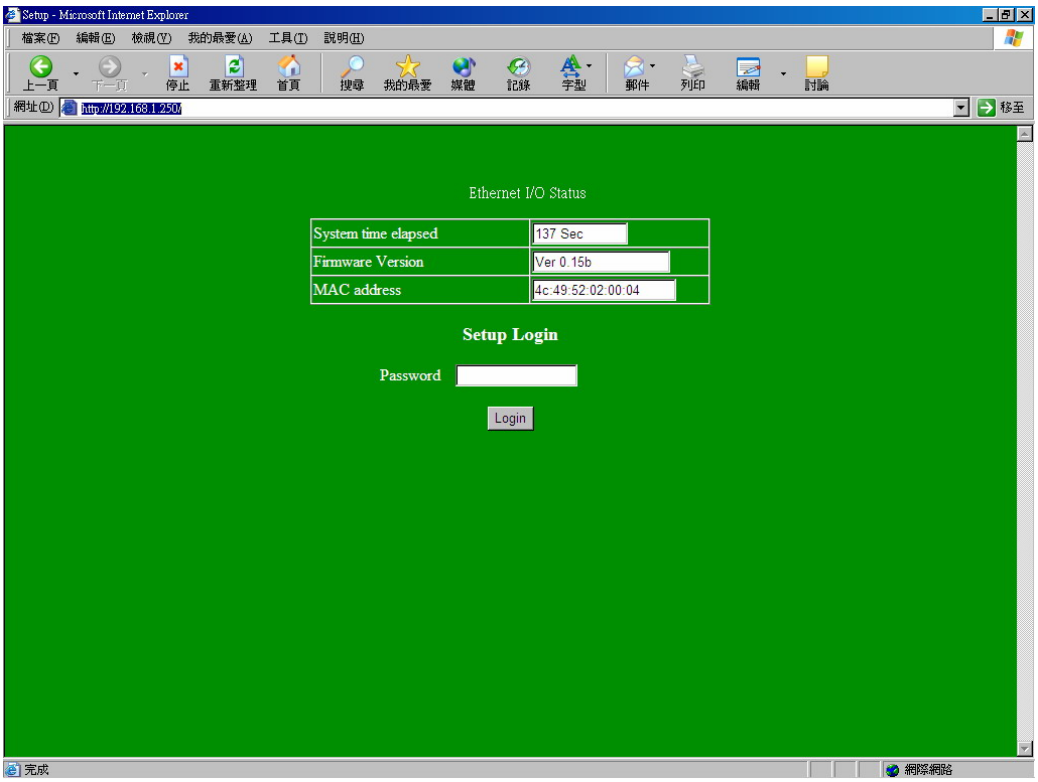


And the "About Ethernet setup Utility" window opens, view the description shown on the screen, and then click on **OK**.

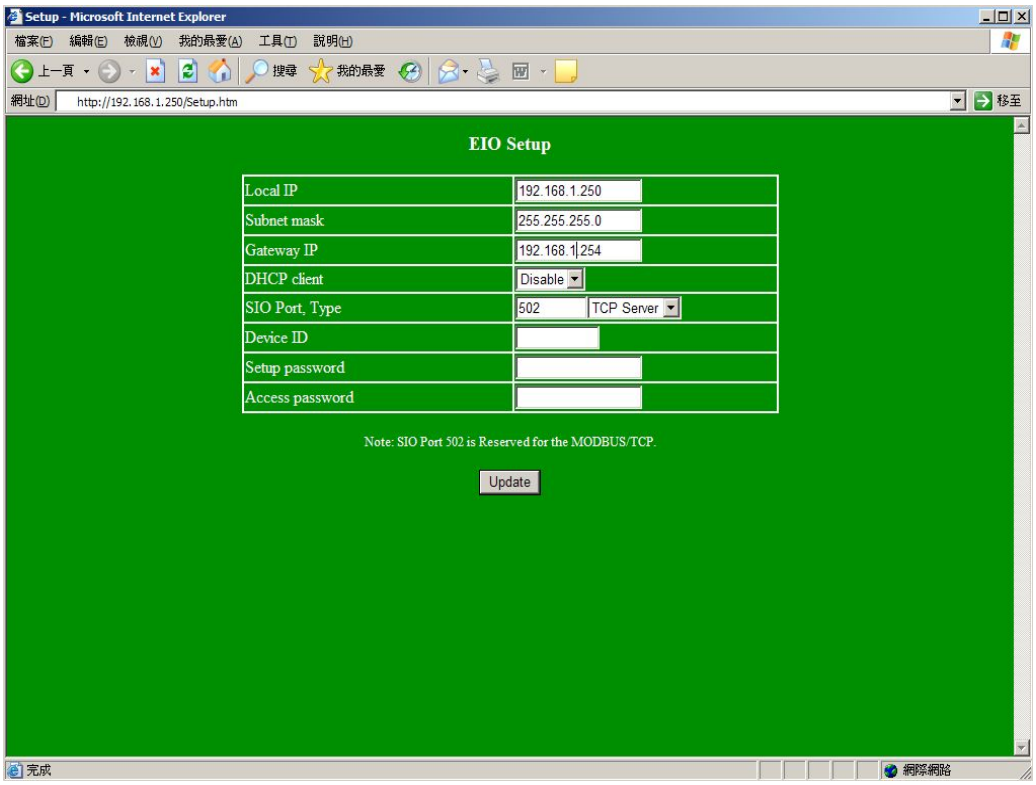


5.2 Configuring With Web Browser

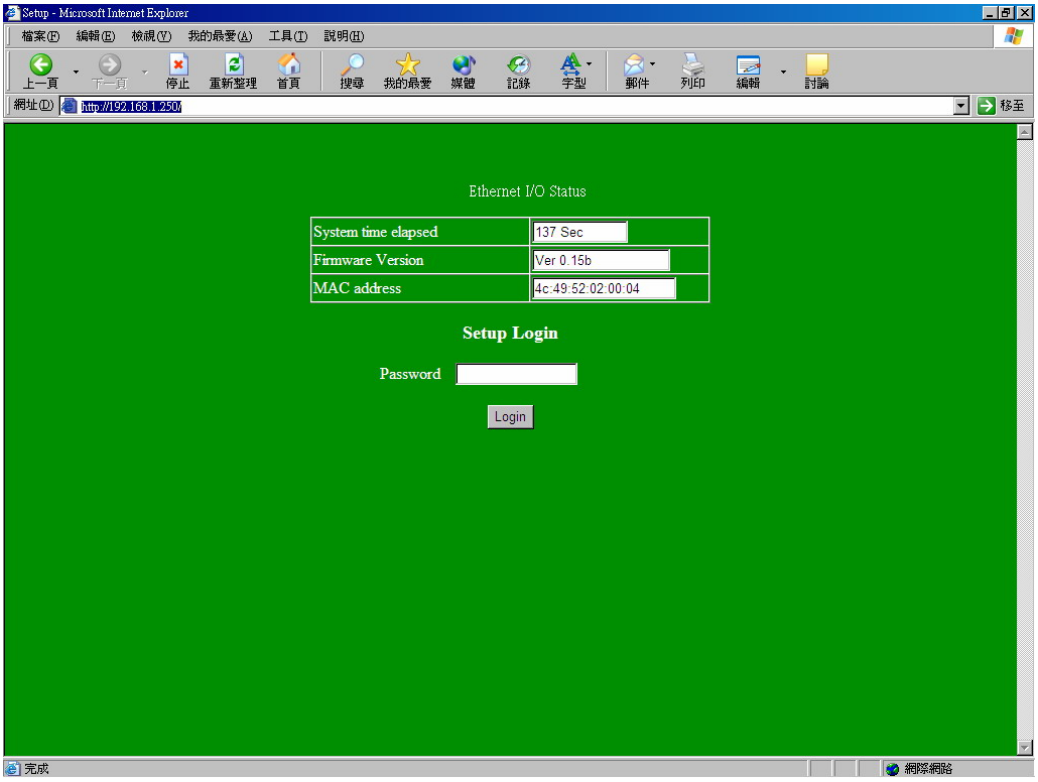
(1) Start web browser and search the web site using the address: http://192.168.1.250, which is the default IP address of the Ethernet I/O EIO-R-200. The web page is shown as below. Click Login button to go into the configuration web page. Remember to key-in the password if authorized entry is required before you click Login button.



(2) The configuration web page is shown below. Please refer to **5.1** for how to setup the related parameters of the Ethernet I/O EIO-R-200. After setting the parameters, press the Update button to store the modified configuration.



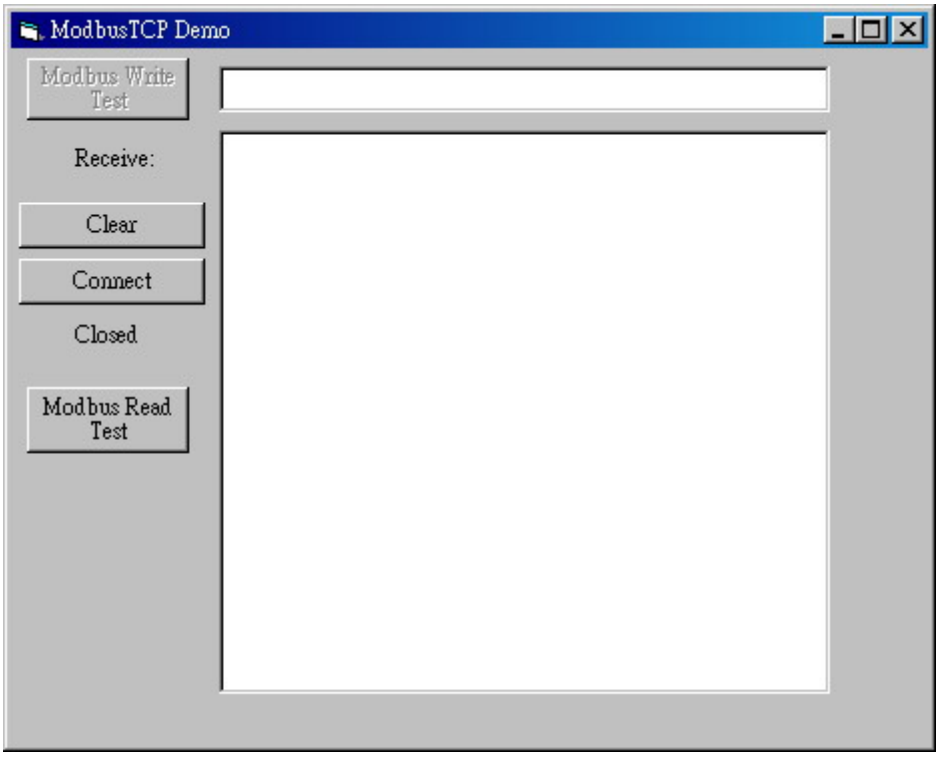
(3) Now, the Ethernet I/O EIO-R-200 has been updated and the browser refresh to the login web page again.



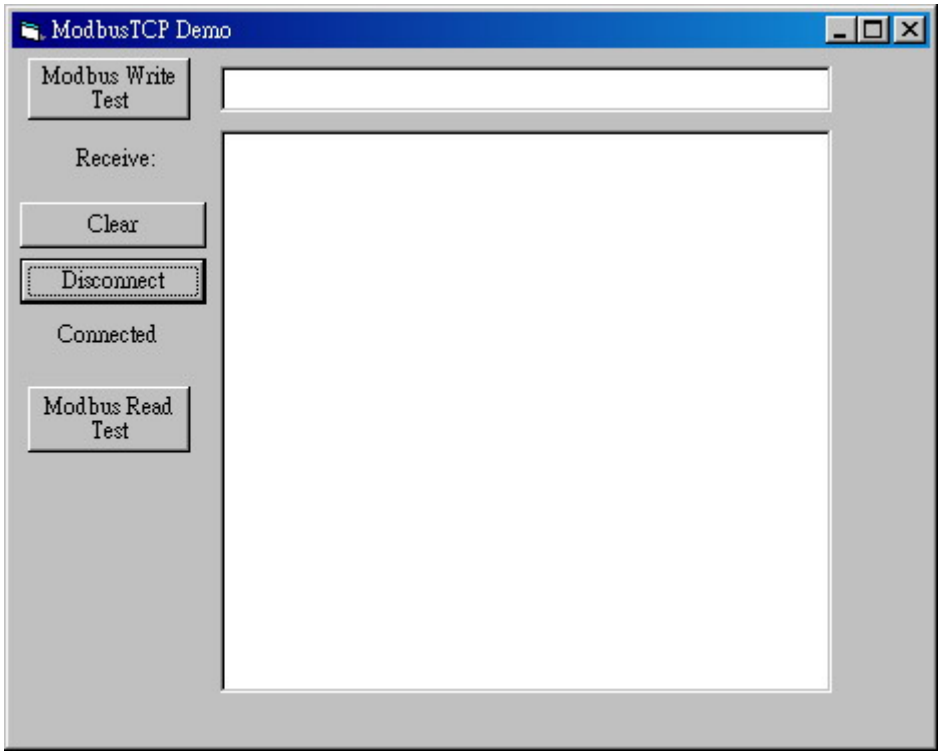
6. How to Read/Write Data From/To The Ethernet I/O EIO-R-200 Using Sample Program

The sample Visual Basic program project called ModbusTCP.vbp located in \Sample Code\ directory within the software CD came with the Ethernet I/O EIO-R-200 teaches you how to develop your own application for reading/writing data from/to the Ethernet I/O EIO-R-200 using Visual Basic development environment. The sample source code is included, which can be your reference when coding.

6.1 Execute the ModbusTCP Demo.exe application located in the same directory with ModbusTCP.vbp, and the main window is shown as below.



6.2 Click on Connect button to establish the connection with the desired Ethernet I/O EIO-R-200. Please refer to the sample source code for how to setup the IP address of the Ethernet I/O EIO-R-200 you want to connect with. When the connection is established, the following window is displayed.



The description of the read command button:

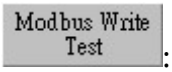
Modbus Read Test: Read discrete I/O status form the desired Ethernet I/O EIO-R-200.

Please refer to the following sample source code for how to retrieve data using Modbus/TCP protocol.

Sample source code (Read):

```
Private Sub Modbus_Read_Click()
    Dim command(1 To 12) As Byte

    'Next do the Read command Test


    command(1) = 0          'Modus TCP Header
    command(2) = 0          'Modus TCP Header
    command(3) = 0          'Modus TCP Header
    command(4) = 0          'Modus TCP Header
    command(5) = 0          'Modus TCP Header
    command(6) = 6          'Modus TCP Packet Length
    command(7) = 1          'Device ID
    command(8) = 3          'Command, Read
    command(9) = 156        'Start Address High Byte, the address start at 40001
    command(10) = 65        'Start Address low Byte, the address start at 40001
    command(11) = 0         'Read Data Length, High byte
    command(12) = 64        'Read Data Lenght, Low byte

    WinSock.SendData command 'send the command to the Ethernet I/O

    'Need wait for and confirm the read command reply from the Ethernet I/O
End Sub
```

The description of the write command button:



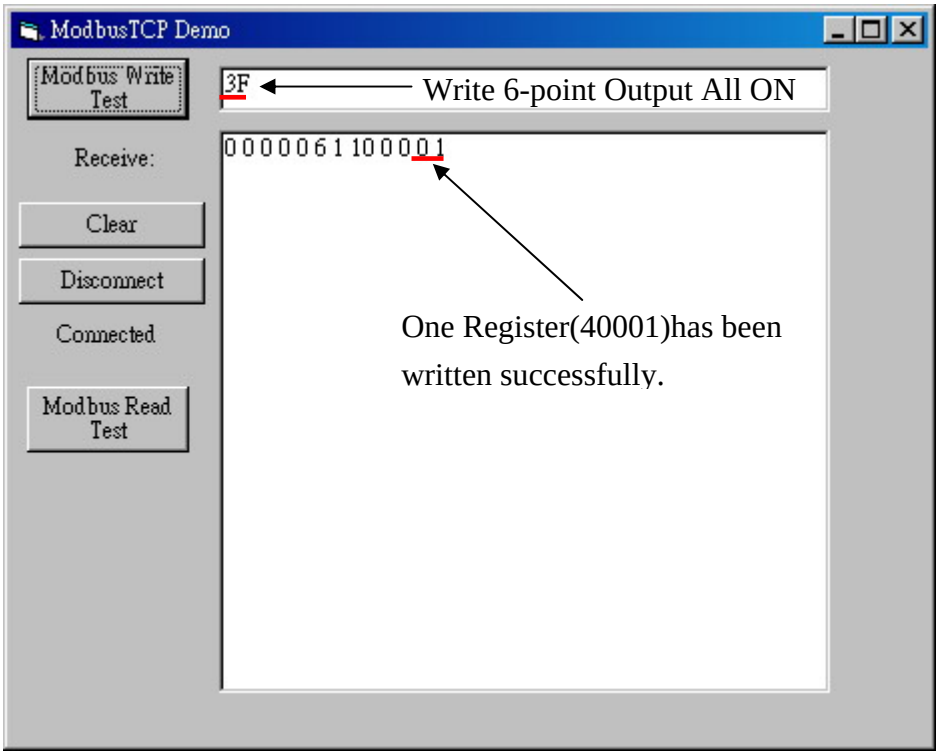
: Write output command to the desired Ethernet I/O EIO-R-200. Please refer to the following sample source code for how to write data using Modbus/TCP protocol.

Sample source code (Write):

```
Private Sub Modbus_Write_Click()
    Dim command_w(1 To 15) As Byte

    Rem Do Write test

    'WinSock.RemoteHost = "255.255.255.255" Comment out for TCP test

    'int test1[]= {0x00,0x00,0x00,0x00,0x00,0x06,0x01,0x03,0x00,0x00,0x00,0x64};
    If TxtSend.Text <> "" Then
        write_value = CLng("&H" & TxtSend.Text)

        command_w(1) = 0        'Modus TCP Header
        command_w(2) = 0        'Modus TCP Header
        command_w(3) = 0        'Modus TCP Header
        command_w(4) = 0        'Modus TCP Header
        command_w(5) = 0        'Modus TCP Header
        command_w(6) = 9        'Modus TCP Packet Length
        command_w(7) = 1        'Device ID
        command_w(8) = &H10     'Command, write
        command_w(9) = 156      'Start Address High Byte
        command_w(10) = 65      'Start Address Low Byte
        command_w(11) = 0       'Write Length High Byte
        command_w(12) = 2       'Write Length Low Byte
        command_w(13) = 2       'Byte Count
        command_w(14) = 0       'Data High Byte
        If write_value <= &HFF Then
            command_w(15) = write_value       'Data Low Byte
            WinSock.SendData command_w  ' Send the command to the target
        End If
    End If

End Sub
```

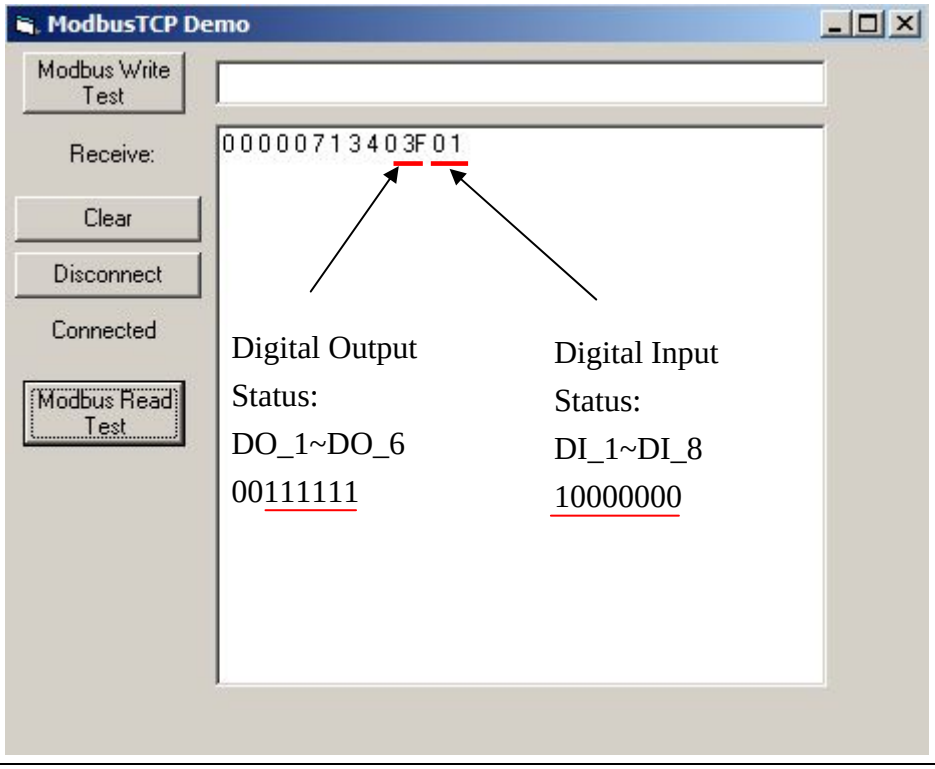
6.3 Click on 

button, the response message may be shown in the following text box.



6.4 Click on 

button, the response message may be shown in the following text box.



7. Appendix 1: Command Mode Support

- **Use the command mode to set up the Ethernet I/O EIO-R-200, it needs an application software to handle these actions.**

  - *Command 'X' for Broadcast*

    'X' or 'x' Command

    ▪Syntax : 'X'<magic code>

    ・Magic code = 99.130.83.99

    ▪Return : 'AX'<MAC Address>'/'<IP Address>'/'<Device ID>

    ▪Example :

    ・Send out: 'X 99.130.83.99'

    ・Return : 'AX0.128.200.255.251.242/192.168.1.100/ABC'

  - *Command 'G' for getting Status*

    'G' or 'g' Command

    ▪Purpose: Get the all parameters of the Web Server

    ▪Syntax: 'G'<MAC address>'/'<IP>'/'<Setup Password>

    ▪Return : All parameters of the Web Server

    ▪Example:

    ・Send out: 'G 0.128.200.255.251.242/192.168.1.100/12345678'

    ・Return: 'CG' for Cancel or 'AG'<All Messages>

  - *Command 'S' for Web Server Parameters Setting*

    'S' or 's' Command

    ▪Purpose: Set the Parameters of the Web Server

    ▪Syntax: 'S'<MAC Address>'/'<IP>'/'<Setup Password>'/'<Parameter>'/'<Value>

    ▪Return: 'A' for Accept or 'C' for cancel

    ▪Example:

    ・Send Out: S

  - *Command 'R' for restart*

    'R' or 'r' Command

    ▪Purpose: Restart the Web Server

    ▪Syntax: 'R'<MAC address>'/'<IP>'/'<Setup Password>

    ▪Return: 'AR' for accept or 'CR' for cancel

    ▪Example:

    ・Send out : 'R 0.128.200.255.251.242/192.168.1.100/12345678'

    ・Return : 'AR' or 'CR'

- *Command 'M' for MAC address Setting*

  'M' Command, not for the User

  ▪Purpose: Set the MAC address of the Web Server

  ▪Format: 'M' <Old MAC Address>/<New MAC Address>/ <Factory Password>

  ▪Return: 'AM' for accept or 'CM' for cancel

- *Command 'I' for IP setting*

  'I' Command, not for User. User should use the 'S' Command for setting IP address.

  ▪Purpose : Set the IP address by LAN broadcast

  ▪Syntax: 'I' <MAC Address>/<New IP>/ <Factory Password>

  ▪Return: 'AI' for accept or 'CI' for cancel