

## Features:

- ◆ Remote I/O with Modbus TCP or Modbus RTU/ASCII
- ◆ One 10/100 Ethernet port
- ◆ One isolated RS-485 port
- ◆ 16 photo isolated digital input port
- ◆ Isolation voltage 2500Vrms
- ◆ 8 channel relay output port
- ◆ Form A or form B relay with contact rating 30VDC@1A or 125VAC@0.5A
- ◆ Support Web-based I/O control
- ◆ DIN Rail mounting
- ◆ Windows configuration utility included

## Specification:

### Serial port:

RS-485 port  
Protocol: Modbus RTU or ASCII  
Baud rate: 1200 to 460800 bps  
Parity: None, Even, Odd, Space, Mark  
Data bit: 5 to 8  
Stop bit: 1 to 2  
Isolation protection: 2500Vrms

### Ethernet:

10/100 Mbps, RJ45  
Protection: 1500V Magnetic isolation  
Protocol: Modbus TCP

### Serial console port:

RS-232: 115200 baud rate, None flow control, 8 bits data, 1 stop bit

### Isolation digital input:

Channel number: 16  
Photo isolation (AC in): 2500Vrms  
Logical High: 5~24Vdc  
Logical Low: 0~1.5Vdc  
Input resistance: 1.2KOhms @0.5W

### Relay output:

Channel number: 8  
Contact rating: 30VDC@1A or 125VAC@0.5A

**1-Wire port:** Three-pin terminals x3 (Maxim 1-Wire)

**Power:** 9~48 VDC terminal block

**Dimension:** 182x118x35.82mm (WxHxD)

**Operating Temperature:** 0~70°C

**Storage Temperature:** -20~85°C

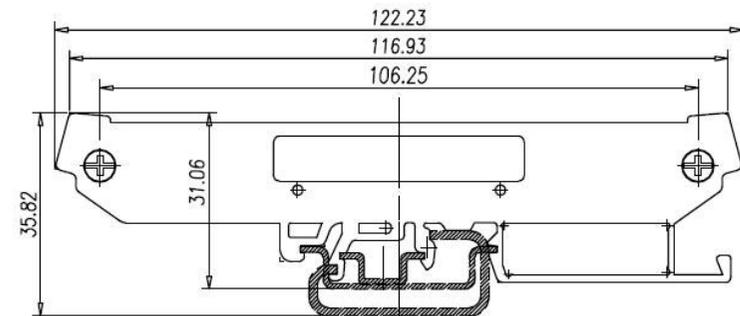
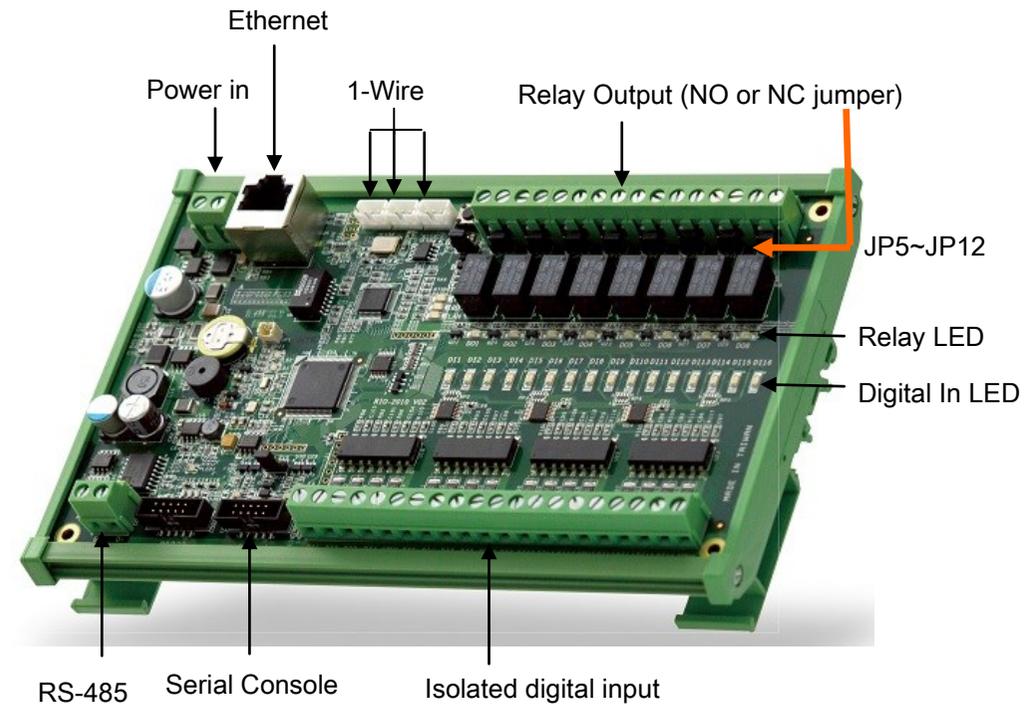
## Packing List

1. RIO-2010
2. Artilla CD

## Optional accessory

1. CB-RJ2CON-100: Serial Console Cable

## Layout



## Power Connector

Connecting 9~48VDC power line to the Power in terminal block. If the power is properly supplied, the Power LED will keep solid green color and a beep will be heard.

## LED Status

The LED provides the RIO-2010 operation information. The LED status is described as follow:

**Power (PWR) LED:** Power LED keeps ON if power (+9VDC to +48VDC) is correct.

**Ready (RDY) LED:** Ready LED keeps ON when RIO-2010 firmware is ready for operation.

**Link/Act (LAN) LED:** Link and Activity LED will turn ON when the Ethernet cable is connected. When there is network data traffic, this LED will flash.

**LED 1/2/3:** These LED are dual color and they indicates the serial data traffic of RS-485, RS-232 and serial console respectively. The Yellow LED stands for receiving data and Green LED means transmitting data.

**LED DO1/DO8:** These LEDs indicates the DO status. When the coil of relay is energized, the LED will be ON.

**LED DI1/DI16:** These LEDs indicates the DI status. When the input is high, the LED will be ON.

## Jumper setting of relay output (JP5~JP12)

Normal open: when jumper is shorted to 2-3, the terminal ( DOX and COM) is normal open when DO LED is off.

Normal close: when jumper is connect to 1-2, the terminal ( DOX and COM) is normal close when DO LED is off.

COM DOX



1 3

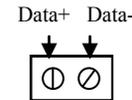
**Note: JP2 and JP4 are designed for factory usage and should be set to position 2-3**

## Serial port connector

### RS-485:

When RIO-2010 is set to Modbus RTU/ASCII mode, use RS-485 to connect to Modbus mater.

COM1: RS-485



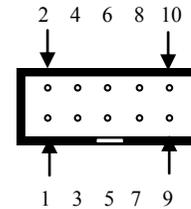
Data+ is pull up to isolated 3.3VDC with 10K Ohm resistor

Data- is pull low to isolated ground

Termination resistor is not included. User can add a termination resistor to pad at position R37 for SMD resistor or dual hole for DIP type resistor

### RS-232 and Console port:

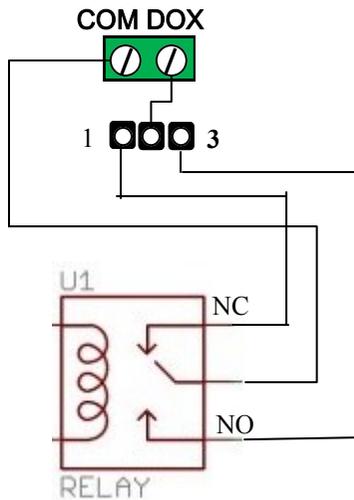
COM2: RS232  
COM3: Console



Pin	COM2	COM3
1	DCD	N/C
2	DSR	N/C
3	RXD	RXD
4	RTS	N/C
5	TXD	TXD
6	CTS	N/C
7	DTR	N/C
8	N/C	N/C
9	GND	GND
10	N/C	N/C

## Relay output connector (J6)

The relay can be configured as Normal Open or Normal Closed by the relay jumpers

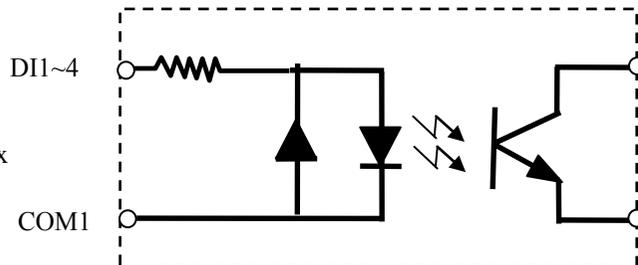


## Digital Input Connector (J5)

The 16 channel isolated input are equipped with 2500 Vrms photo coupler isolator. Four of the channels form a group and share the same common ground. The specification of the isolated input channels are:

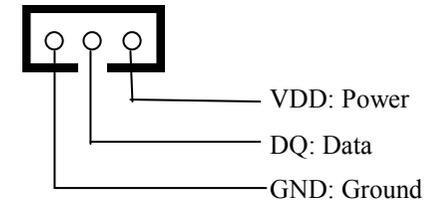
Logical High: 5~24Vdc  
Logical Low: 0~1.5Vdc  
Input resistance: 1.2KOhms @0.5W  
Response time: 20us  
Isolation: 2500Vrms

DIx: Isolated digital input channels  
COMx: common ground of four DIx



## 1-Wire port connector (JP3 JP13 JP14)

1-Wire is a device communications bus system designed by Dallas Semiconductor Corp. It is typically used to communicate with small inexpensive devices such as digital thermometers such as DS18B20 from Maxim and weather instruments. RIO-2010 provides three connectors for 1-Wire device. The pin definition is follow



## Reset button (SW1)

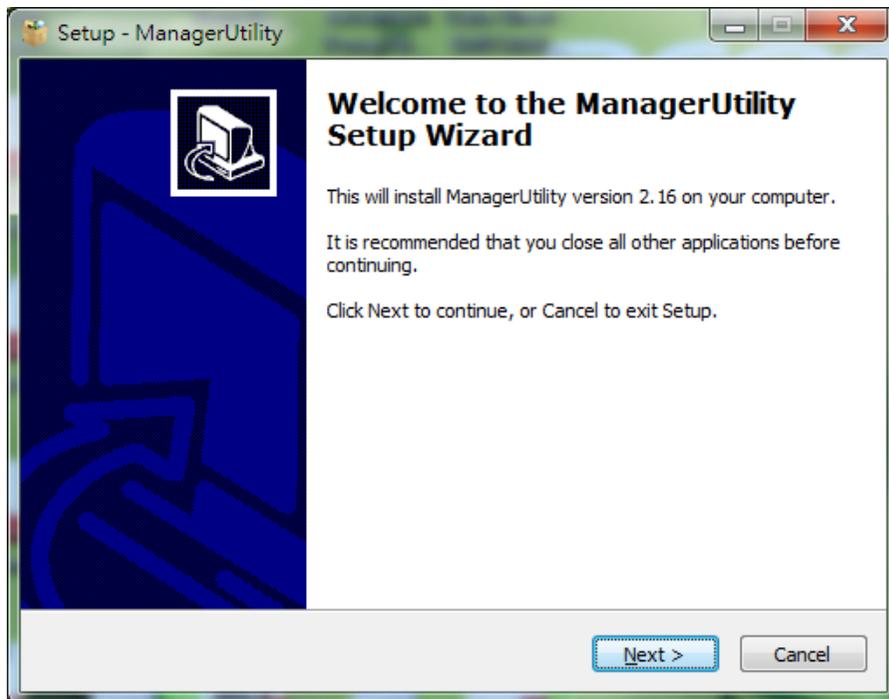
Press the hardware reset button will reset the system.

## Factory default setting

IP Address: 192.168.2.127  
Netmask: 255.255.255.0  
Modbus mode: Modbus TCP  
Port number: 502  
Relay output: Normal open  
Web server: enabled  
Home page: http://192.168.2.127:5003  
Telnet console: telnet 192.168.2.127 5001  
Modbus function support list available in CD

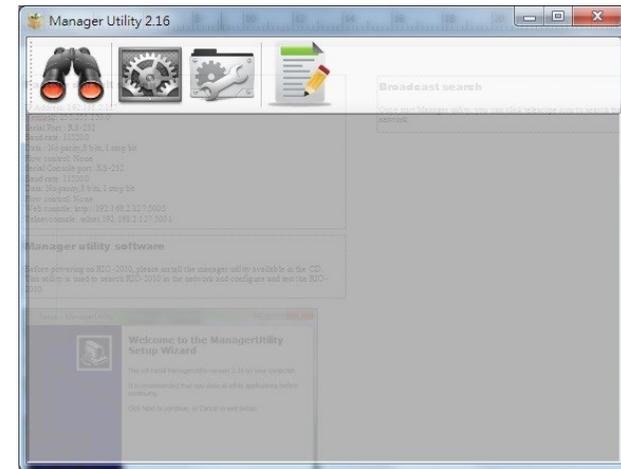
## Manager utility software

Before powering on RIO-2010, please install the manager utility available in the CD. This utility is used to search RIO-2010 in the network and configure and test the RIO-2010.



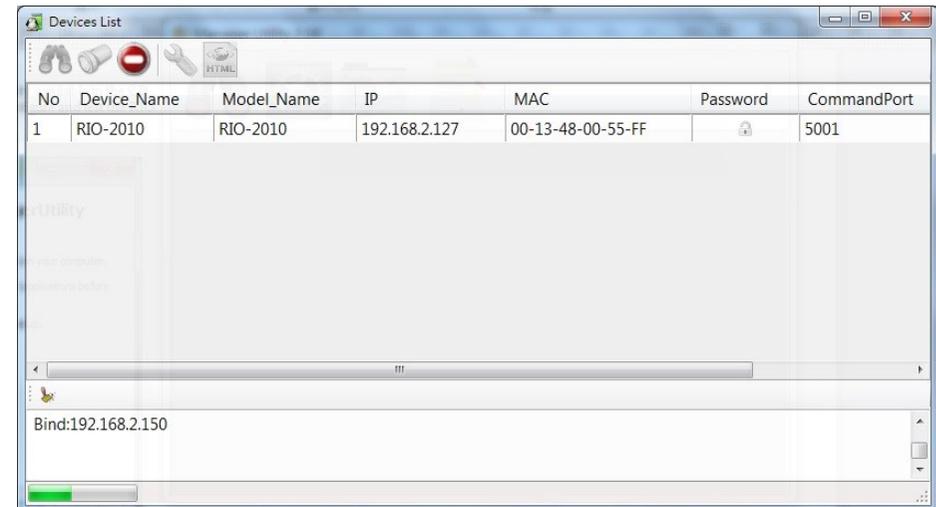
## Broadcast search

Once start Manager utility, you can click telescope icon to search the RIO-2010 in the network.



## Configure RIO-2010

Once RIO-2010 is discovered, Manager will show following information.

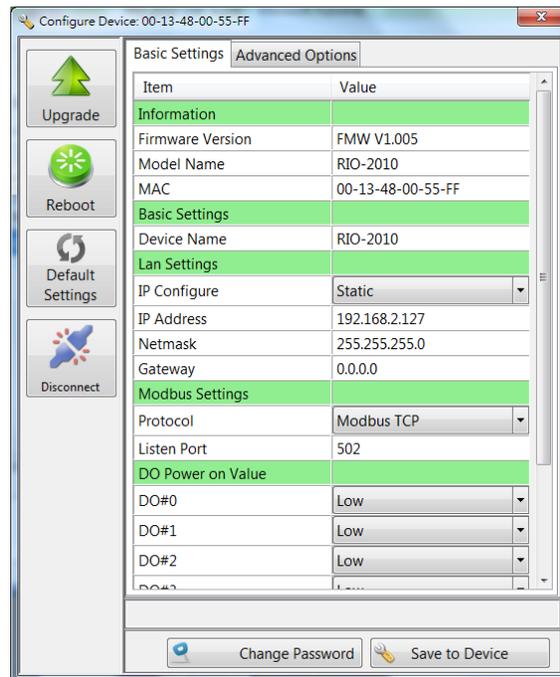


## Basic settings

Click the RIO-2010 will open the windows to configure. The Basic settings allows user to configure following settings:

1. Device name: default RIO-2010
2. Network settings
3. Modbus mode
4. Power on setting on DO

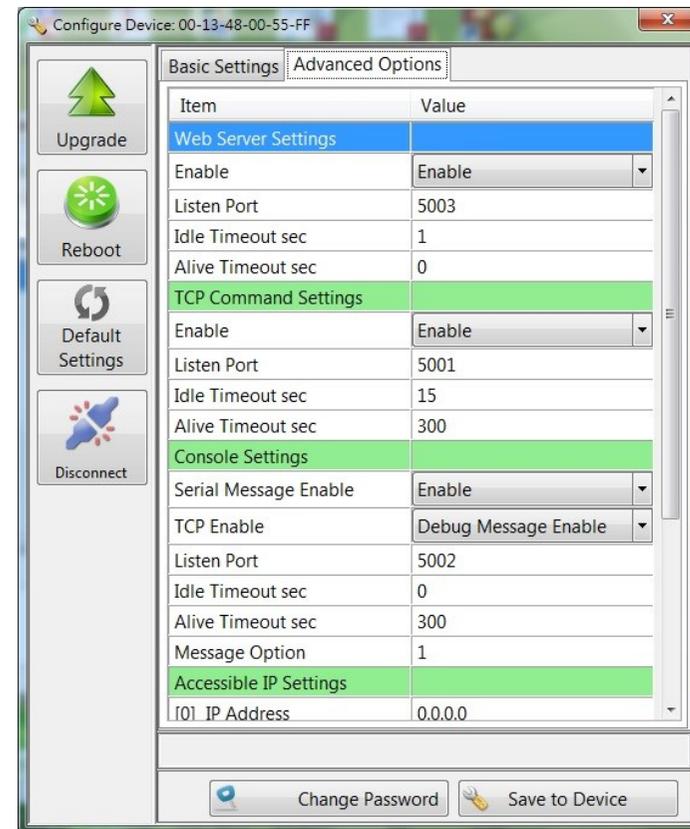
If Modbus mode is set to Modbus RTU or ASCII, RIO-2010 will use RS-485 bus to connect to Modbus master.



## Advanced options

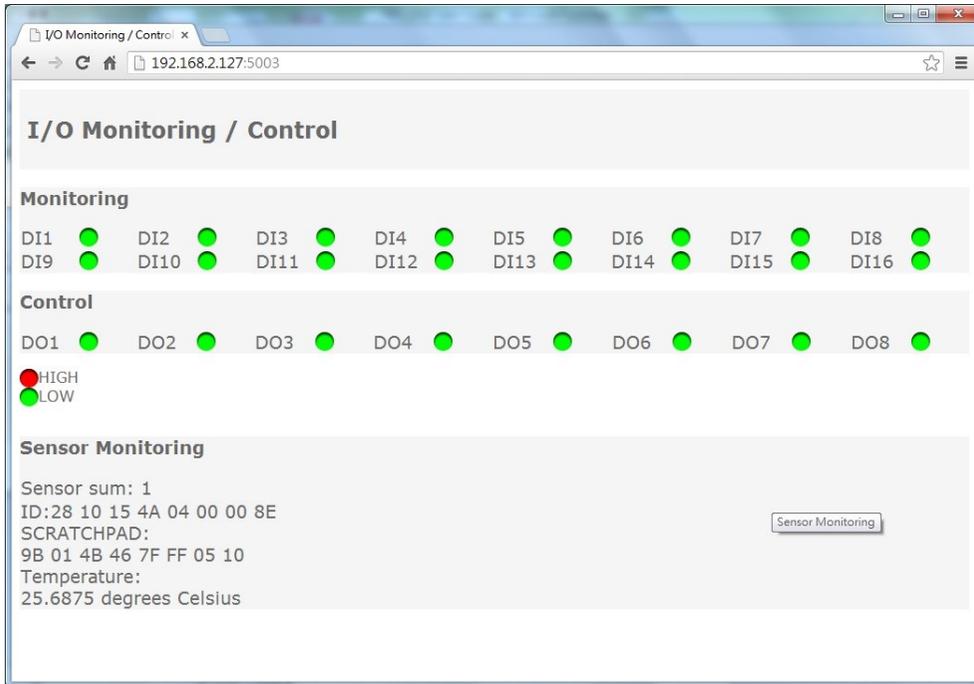
The Advanced options allow user to configure following settings:

1. Web server: Port 5003
2. TCP Command port: refer to the appendix for the command
3. Serial console port
4. Accessible IP address of the Modbus Masters



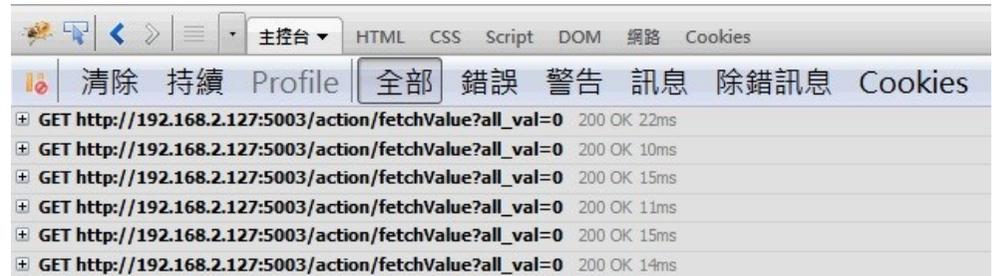
## Web based I/O control

In addition to Modbus TCP, user can also use Web browser to control and monitor the I/O of RIO-2010. The default web page is used to demo how to use web browser to control RIO-2010. Use mouse to click the DO icon can trigger DO on/off. The sensor monitoring demo using 1-Wire interface to read the Maxim thermometer DS18B20. The source of the web page is available in Artilla CD. It demonstrates how to use AJAX to write a dynamic web page to access and control the I/O channels of RIO-2010.

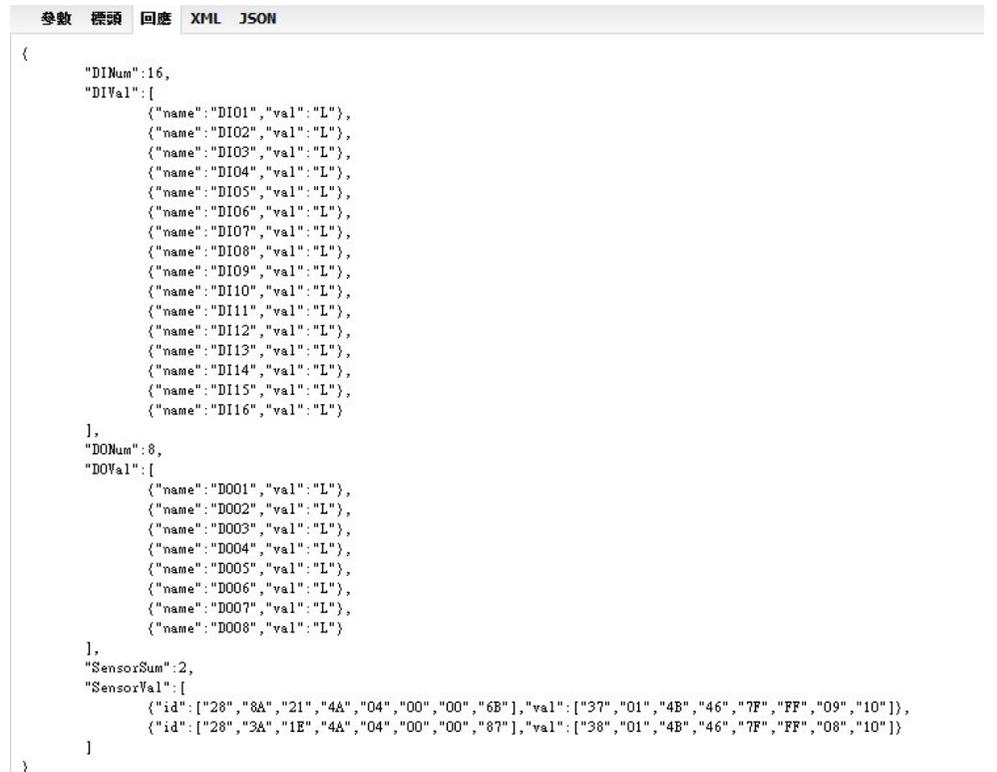


## HTTP GET request

Using *GET URL:/action/fetchValue?all\_val=0* to retrieve DI, DO and sensor data.



The response data in JSON format (GETResponse) as follow and the GETResponse.txt is also available in CD



DI and DO val "H" or "L" means logic high or low of the digital input and output  
SensorVal is the raw data from 1-wire including ID and Value in hex format

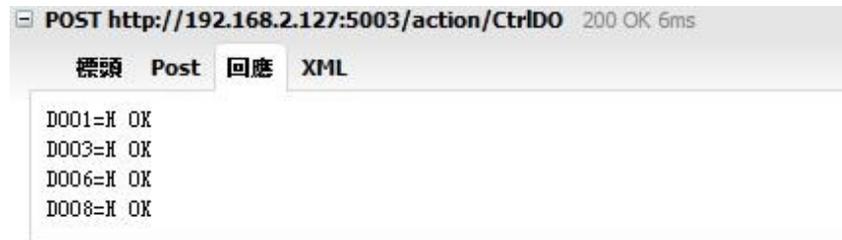
## HTTP POST request

Use POST request to set the output of relay.

**POST URL:***action/CtrlDO*

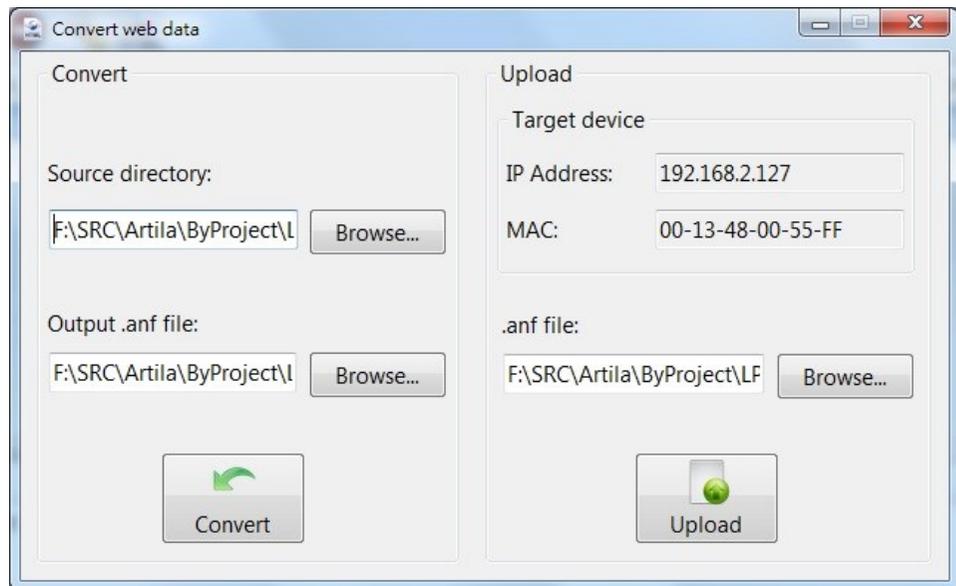


D001=H sets relay 1 to be energized.  
The web server will response



## Convert HTML file to anf binary

User can customize web page to control RIO-2010. Once ready, you can use Manager utility to convert the web files to binary file (.anf) to upload to RIO-2010. First to create a folder to save all the Web files and then click the HTML icon to convert web data to .anf file and upload to RIO-2010. The default web files is available in the Artila CD.



## Command Line Interface

RIO-2010 supports Command Line Interface (CLI) configuration. Users can use CLI in Telnet console port and serial console to write their own manager utility software. Make sure the Command option is Enable in TCP Command Setting and Serial Console setting.

The Command format is

```
[G/S]:Command=Parameter{carriage return}
```

For example

***G:ip\_ip=***

Will get the ip address

***S;ip\_ip=192.168.2.127***

All command are terminated by a carriage return (0x0d).

```
G:ip_ip=  
A:ip_ip=192.168.2.127  
G:txt_dn=  
A:txt_dn=Aport-212
```

Remember to save and reboot the RIO-2010 by command

***S;save=1 & reboot=1***

Please refer to Appendix A for the Command list.