# ZLAN6042/6002

# Remote IO Controller

# User Manual

Document DI: ZL DUI 20121021.1.0

**Version Information**

The History of the revision to this document:

**History**

| Date | Version | Document ID | Revising content |
|------|---------|-------------|------------------|
| 2012-10-21 | Rev.1 | ZL DUI 20121021.1.0 | First release |
| 2013-8-4 | Rev.2 | ZL DUI 20130804.1.0 | Add v2 content |
| 2014-10-31 | Rev.3 | ZL DUI 20121021.3.0 | Add 6042 control test and usage of two devices connection in pairs |

**Copyright information**

# Contents

# 1.    Summary

ZLAN6042, ZLAN6002, ZLAN6032 Remote IO Controller is an intelligent device developed by Shanghai ZLAN of digital input output and analog quantity input based on Ethernet or RS485. The remote IO controller can conveniently connect to Ethernet and 485 bus to realize accessing TCP connection, RS485 and webpage. ZLAN6042, ZLAN6002, ZLAN6032 are the ideal choices for user realizing remote control and data acquisition.

**ZLAN6042:** Based on Ethernet transmission, support Modbus TCP to Modbus RTU, support virtual serial port, can monitor 4 channels digital input, 2 channels analog quantity input and control 4 channels relay output at the same time. The remote IO control and data acquisition use Modbus TCP protocol or Modbus RTU protocol.

**ZLAN6002:** Base on RS485 transmission, also can monitor 4 channels digital input, 2 channels analog quantity input and control 4 channels relay output at the same time. The remote IO control and data acquisition use Modbus protocol.

**Figure 1 ZLAN6042**

It can be applied to:
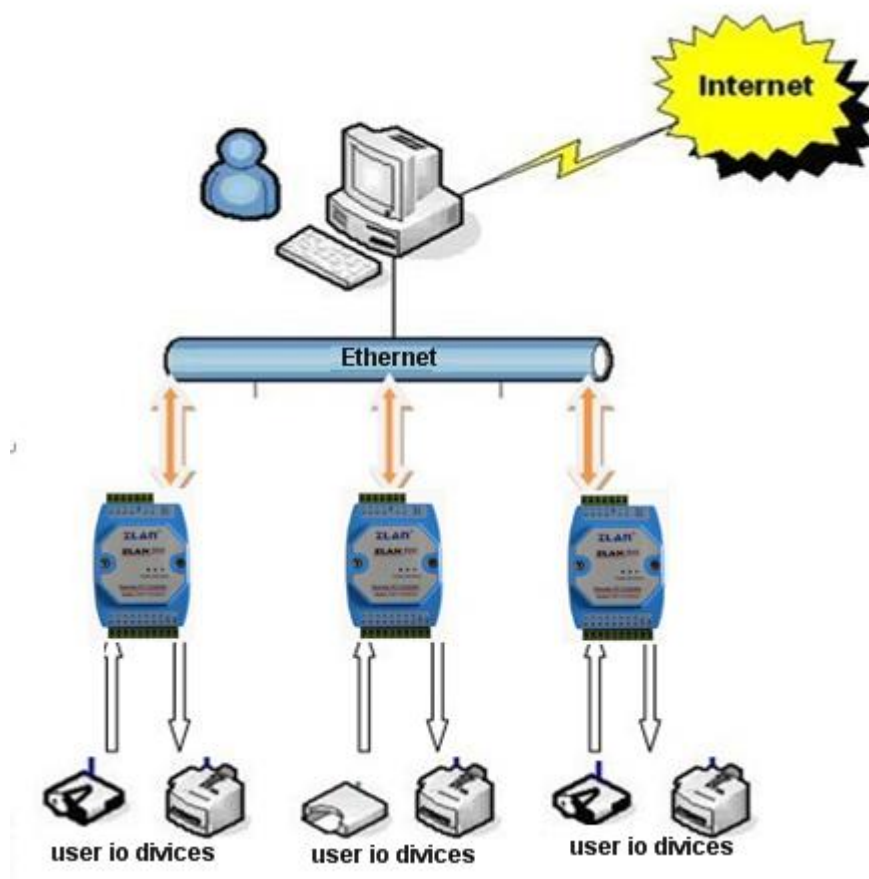
- building/e-guard system/security system;

- industry automation system;

- Intelligent home.

The typical application is showed in Figure 2. User connects IO devices to ZLAN6042 and connects ZLAN6042 to Ethernet. Then the PC software can control the IO devices by Modbus TCP or Modbus RTU through virtual serial port.



**Figure 2 connecting example**

# 2.　Feature

1)  4 Digital input:

- Passive switch (dry node)

- Active power level (wet node, low level voltage is 0~3V; high level voltage is 8~24V, measuring in 24V power)

2) 2 Analog quantity input: different input method corresponding to different sub-models.

- Voltage signal input: 0~5V or 0~10V.

- Current signal input: 4~20mA.

- Resistant input: 0~10k or resistant type temperature/ humidity sensor and so on.

3) 4 digital output.

   Relay output (5A@AC250V/DC 30V)

4) ZLAN6042 is equipped freely with our Windows Virtual Serial & Device Management Tool ZLVirCom. It supports virtual serial and searching device or modifying parameters with ZLVircom.

5) Provide device management library (Window DLL library). It will help user to develop program with VC, VB, Delphi, C++ Builder. User need only use read or write function to communicate with ZLAN6042.

6) ZLAN6042 support DHCP, solve IP management and IP conflict problem.

7) ZLAN6042 support DNS, can realize communication through domain name.

8) ZLAN6042 support 100 TCP connections communicate with network module.

9) ZLAN6042 has high cost performance.

10) ZLAN6042 2KV ESD Ethernet port protection.

# 3.  Technical Parameters

| Figure | |
|---|---|
| Size: | L x W x H =12.2cm×7.2cm×3.4cm |

| Serial Port (ZLAN6002 only) | |
|---|---|
| RS485 port，1200~115200bps(default 9600),8bits、NONE parity、1stop bit | |
| **Software** | |
| App protocol | Modbus RTU / Modbus TCP |
| Physical protocol | Ethernet, RS485 |
| **Relay Transmission Time( Response time)** | |
| ZLAN6042/ ZLAN6002：<30ms | |
| **AI Input Format** | |
| Current: 4~20mA,0~20mA<br><br>Votage: 0~5V，0~10V<br><br>Resister: 0~10K, temperature/humidity sensor | |
| **Power Consumption** | |
| ZLAN6042/ ZLAN6032：<1.8W  <75mA @24V<br><br>ZLAN6002：<1.7W  <70mA@24V | |
| **Environment** | |
| Operation temp. | -40~85℃ |
| Storage temp. | -45~165℃ |
| Humidity: | 5~95% relative |

# 4.   Hardware

ZLAN6042/ZLAN6002 front view are as Figure 1 and Figure 3. ZLAN6042/ZLAN6002 have slide rail slot on the bottom. It can be mounted on slide rail easily.

**Panel led:**

1) **ACT:** When this light is blue, it indicates data is transmitted between Ethernet and ZLAN6042.

2) **LINK:** When this light is green, it indicates the RJ45 line is plugged in. When this

7

light is blue, it indicates the TCP connection is established.

3)  **POWER:** When this light is on, power is supplied.



**Figure 3 Panel Light**

ZLAN6042/ZLAN6002 the side interfaces are defined as:

| Terminal | Function |
| --- | --- |
| 1 | GND |
| 2 | Power in 24VDC |
| 3 | No. 4 relay pin 1 |
| 4 | No. 4 relay pin 2 |

| 5 | No. 3 relay pin 1 |
|---|---|
| 6 | No. 3 relay pin 1 |
| 7 | No. 2 relay pin 1 |
| 8 | No. 2 relay pin 2 |
| 9 | No. 1 relay pin 1 |
| 10 | No. 1 relay pin 2 |

ZLAN6042/ ZLAN6002 the other side interfaces are:

| Interfaces | Function |
|---|---|
| RJ45 | Ethernet or RS485 |
| 1 | AI 2. |
| 2 | AI 1. |
| 3 | The common ground of AI or DI |
| 4 | DI 4 |
| 5 | DI 3 |
| 6 | DI 2 |
| 7 | DI 1 |

**Note:**

1) If the type is ZLAN6002, The RJ45 is RS485 input, and 485A and 485B corresponding to RJ45 pin 1 and pin 2.

2) There have the following sub-models of different AI input format. The default sub-model is "-V5".

● ZLAN6042-V5, ZLAN6002-V5: Voltage input 0~5V. The maximum value of the

collection when reporting is 1024. So the real voltage is AI/1024 * 5.

- ZLAN6042-V10, ZLAN6002-V10: Voltage input 0~10V. The maximum value of the collection when reporting is 1024. So the real voltage is AI/1024 * 10.

- ZLAN6042-I20, ZLAN6002-I20: Current input 0~20mA. The report shows the resistance value, converted to the current formula: AI/1024 * 25mA.

- ZLAN6042-R10K, ZLAN6002-R10K: resistance input 0~10K, the maximum is 10K.

# 5.    Software/Protocol

ZLAN6042/ZLAN6002 is designed based on Modbus TCP and Modbus RTU, the command and register defined as follow:

| Register Address | No. of DI/DO/AI | Modbus Command | Description | R/W |
|---|---|---|---|---|
| 00001 | 0 | 01 | No. 1 DI | Read Only |
| 00002 | 1 | 01 | No. 2 DI | Read Only |
| 00003 | 2 | 01 | No. 3 DI | Read Only |
| 00004 | 3 | 01 | No. 4 DI | Read Only |
| 00017 | 0 | 01/05 | No. 1 DO | Read/Write |
| 00018 | 1 | 01/05 | No. 2 DO | Read/Write |
| 00019 | 2 | 01/05 | No. 3 DO | Read/Write |
| 00020 | 3 | 01/05 | No. 4 DO | Read/Write |
| 30001 | 0 | 04 | No. 1 AI | Read Only |
| 30002 | 1 | 04 | No. 2 AI | Read Only |

ZLAN6042/ZLAN6002 use MODBUS TCP or RTU to communicate with PC software.

These Modbus command is: read single coil group instruction, force setting single coil instruction, read input register instruction.

### 1) Read single coil group instruction 0x01

| bytes | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
|-------|---------|---------|----------------------|----------------------|----------------------|---------------------|-------------|------------|
| name | address | command | Register addr high | Register addr low | Data len high | Data len low | CRC high | CRC low |

For example: sending-> 01 01 00 00 00 04 3d c9

Return -> 01 01 01 0f 11 8c

### 2) Read input register instruction 0x04

| bytes | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
|-------|---------|---------|----------------------|----------------------|----------------------|---------------------|-------------|------------|
| name | address | command | Register addr high | Register addr low | Data len high | Data len low | CRC high | CRC low |

For example: sending -> 01 04 00 00 00 02 71 cb

Return -> 01 04 04 00 01 00 02 2b 85

### 3) Force setting single coil instruction 0x05

| bytes | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
|-------|---------|---------|----------------------|----------------------|----------------------|---------------------|-------------|------------|
| name | address | command | Register addr high | Register addr low | Data len high | Data len low | CRC high | CRC low |

For example: sending -> 01 05 00 10 ff 00 8d ff

Return -> 01 05 00 10 ff 00 8d ff

# 6.    Function test

## 1) Test software function

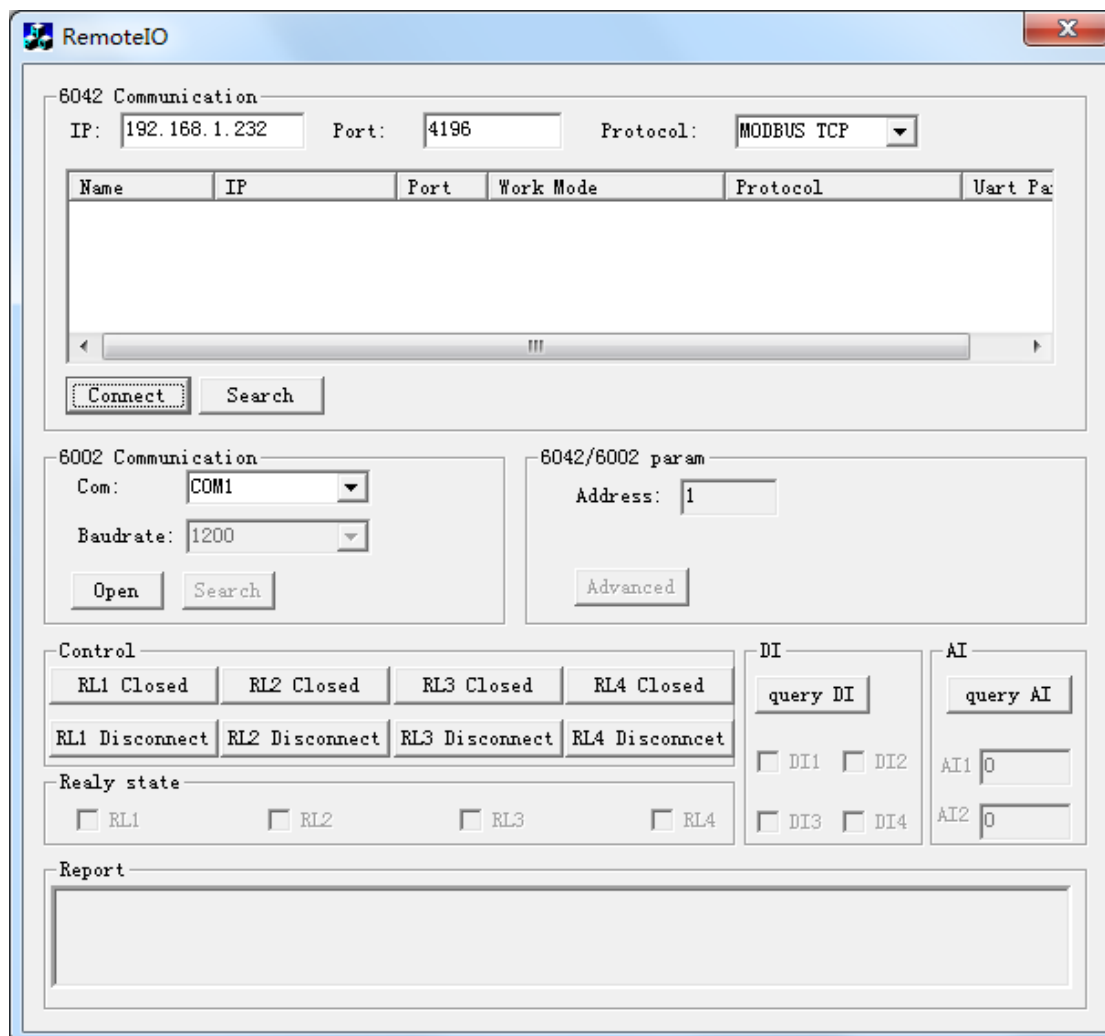RemoteIO software is a software tool for testing and configuring 6002/6042, as FIG 4.



**Figure 4 Test Software**

Software has 5 parts, the first part is communication set of 6042 remote IO controller, the second is communication set of 6002 remote IO controller, the third part is 6042/6002 control part, the forth part is parameter set, the fifth part is report area.

## 2) Ethernet remote IO 6042

First connect 6042 to LAN via cable, then click "search" button so can search the 6042 devices in LAN, as FIG 5.
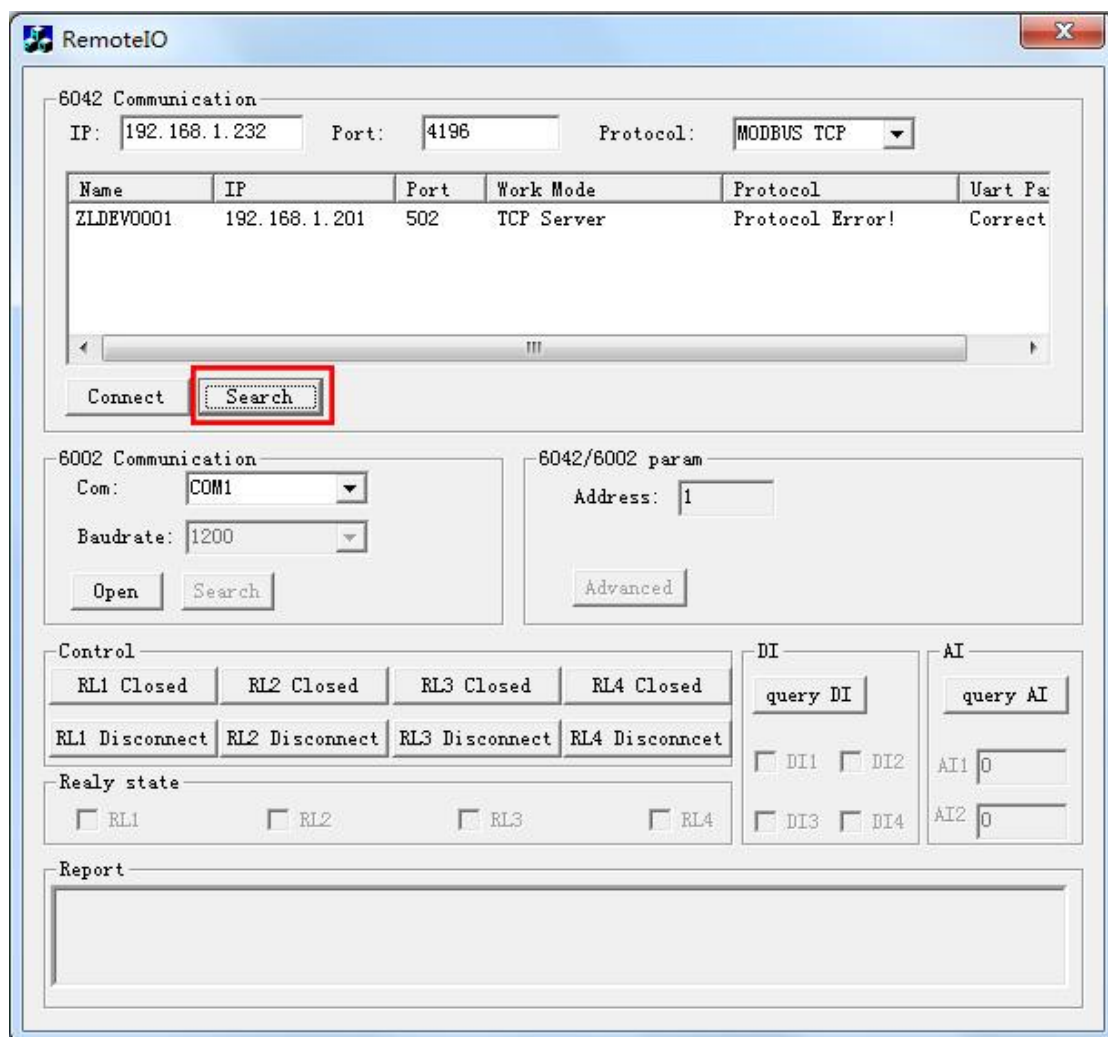
**Figure 5 search**

You can see some devices in the showing list, the "ZLDEV0001" is 6042, after is IP, Port., Work Mode, Protocol, Uart Parameter. The work mode must be Server Mode, Protocol (Modbus RTU or Modbus TCP) should be same as the one on top right corner., if not same need use ZLVircom to configure. Serial parameter is 115200、8、N、1, or else there will be error prompt. The correct configuration is shown as FIG. 6.
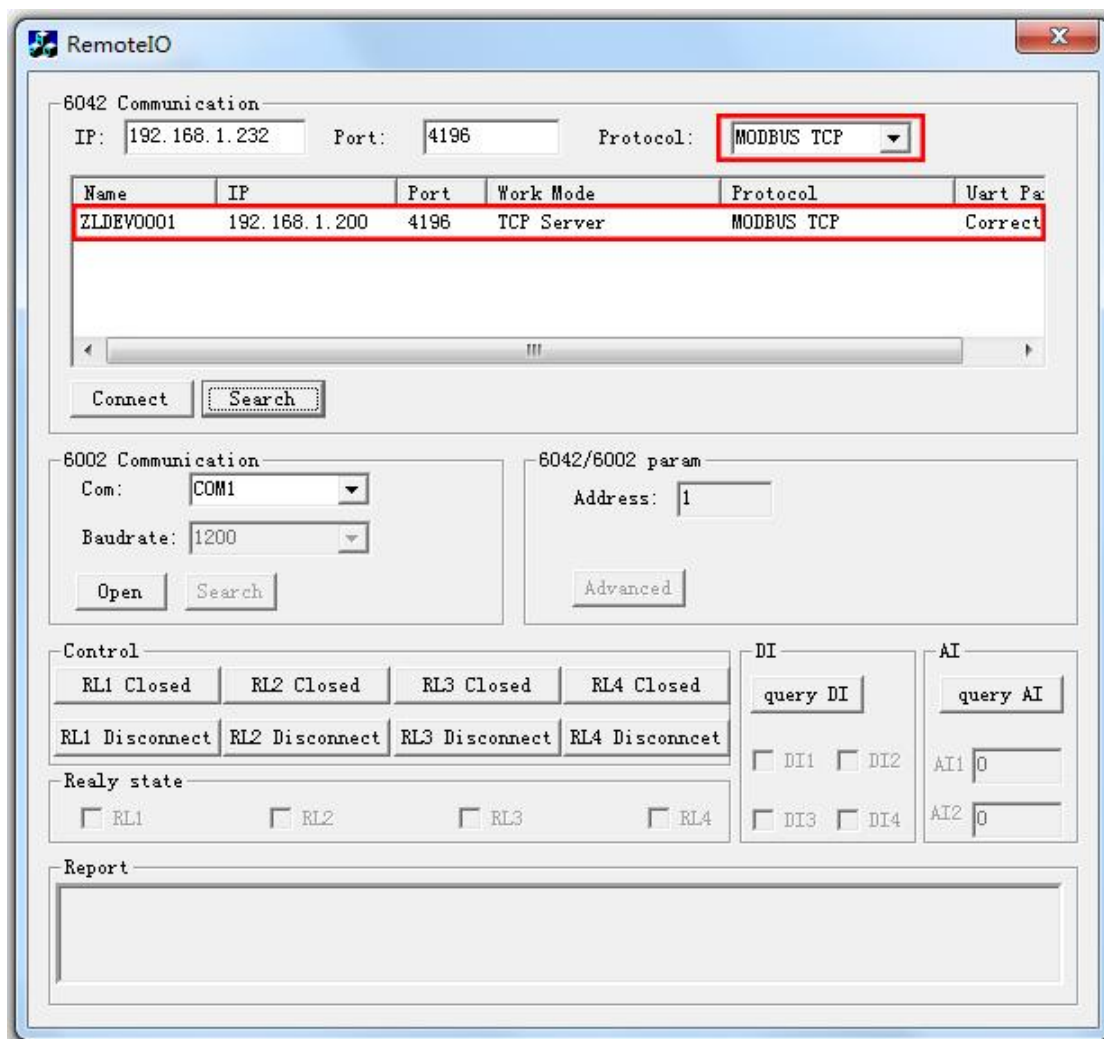
**Figure 6 Correct Configuration**

The IP and Port will be automatically filled after choosing the 6042 device. Click "connect" button will do TCP connection.

The information "TCP Client Connected to" on report area means TCP successfully made. Then the software will automatically detect device address and make "advanced" usable. Next you can test 6042 through buttons in control area.

## 3) 6002 RS485 Control

Connect RS485 wire to 485 port of 6002, open related port No. on RemoteIO, no need to choose baud rate, then click "search", wait the software searching devices. If searched one device there will be "already searched the device" on report area, otherwise shown as FIG. 7 "found no device".
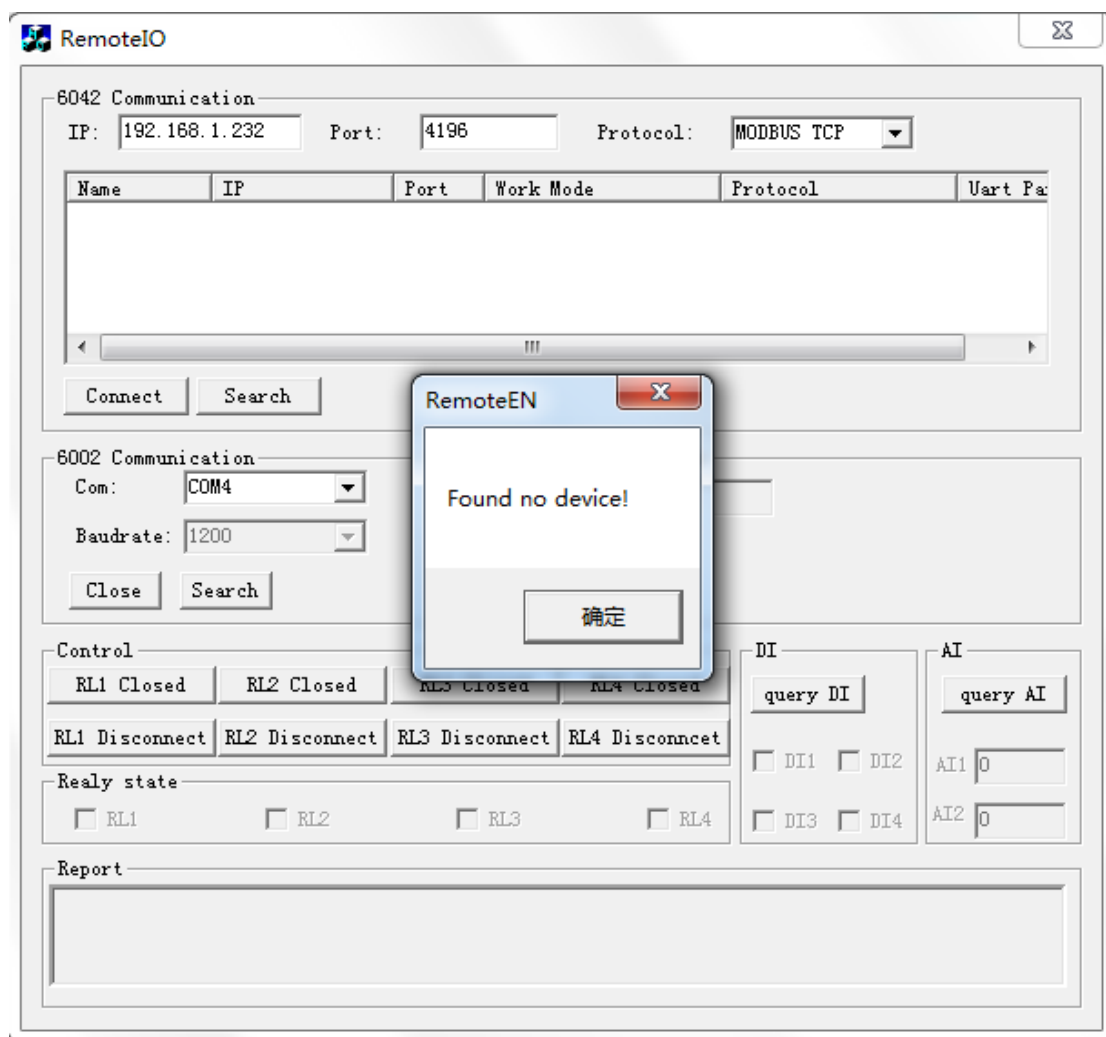
**Figure 7 No searched device**

You can do simple test in control area to verify the hardware working well.

## 4) Advanced parameter

6002 and 6042 share a dialog box, do not use both models at the same time.

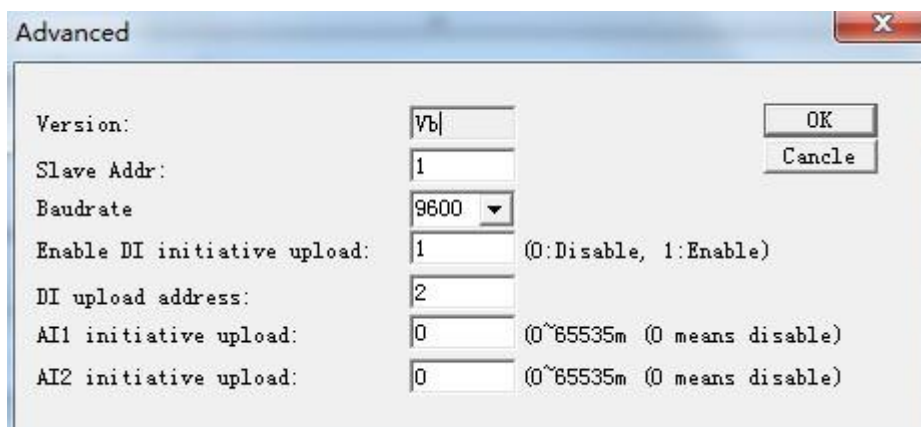Click the "advanced", shown as FIG. 8.

**Figure 8    Advanced Parameter**

Firmware version: the version of the inside 6002 firmware.

Device address: 6002 device slave-station address (Modbus addr.)

Baud rate: 6042

Report address: please refer to next section

Modify the corresponding parameters, click the "Settings" button to complete the changes. Need to restart the device to make it effective.

# 7.    DI Active Reporting

6042 is standard Modbus device, use question and answer form. Some users want active return function, here we introduce the active reporting function of 6042.

As FIG. 9, set "Enable DI initiative upload" to 1, the function open. The reporting address can be set at 0~255, it will be filled to the address field in the feedback instruction. If want original type, set to 0.
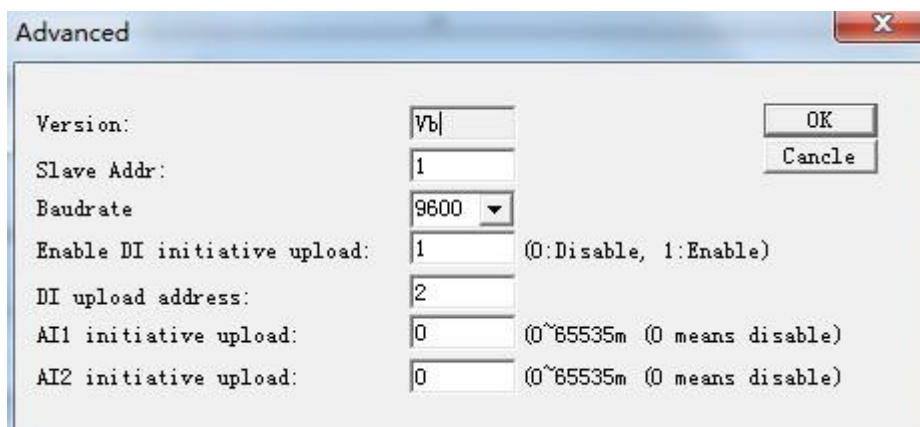
**Figure 9**

# 8.　AI Active Reporting

The AI active reporting function is to make the collected analog value automatically send to host, no need the host to do Modbus instruction query.

It can set reporting time of A1 and A2. Time interval can be selected 2~65535ms. If set to 0 means not open this function. The "Advanced" as FIG 10, the RemoteIO software version must above 2014.12.22, the firmware version must be above V5.
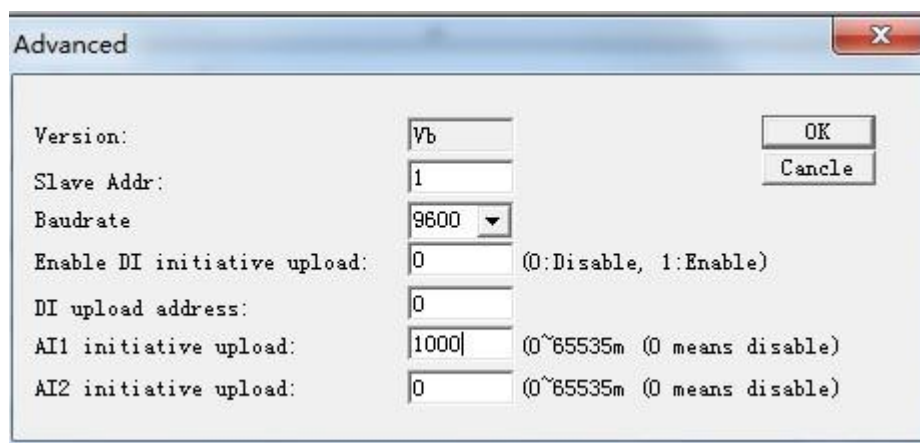


**Figure 10**

Here set reporting time of AI1 & AI2. The resolution of reporting time is 200ms. (1~200ms, 200ms report once; 201~400ms, 400ms report once; and so on)

The data format is same for reporting and returned of Modbus query.

1) **If only A1 or A2 be set, the reporting instruction:**

   a.  No conversion protocol instruction: aa 04 02 xx yy c1 c2

   b.  Conversion protocol is Modbus TCP to RTU instruction: s1 s2 00 00 00 05 aa 04 02 xx yy

aa means device addr., xx yy is reporting AI value, the hexadecimal means voltage value, c1 c2 IS CRS check. S1 s2 is ordinal number of Modbus TCP, generally not handle.

The A1 and A2 upload instructions are the same, so the user should know if it is A1 or A2, because only one in A1 and A2 is allowed to upload. Note that when only A2 is selected, the number of active reporting is shown in the box of the collection of A1 in the RemoteIO program.

2) **If A1 and A2 both be set, the reporting instruction:**

   a.  No conversion protocol instruction: aa 04 04 x1 y1 x2 y2 c1 c2

   b.  Conversion protocol is Modbus TCP to RTU instruction: s1 s2 00 00 00 07 aa 04 04 x1 y1 x2 y2

Here x1 y1 represents the acquisition of A1, x2 y2 represents the acquisition of A2. A1 and A2 are set at the same time, the reporting period is mainly the small period, and the quantity of A1 and A2 is reported simultaneously in the packet.

# 9.   Two used in pairs

Considering the user needs to control the DO output through DI input, however, DI input devices and the DO output devices are far apart, so we can connect two 6042 through the Ethernet network, to realize DI remote control the DO output. DI inputs only control the corresponding DO. For example, DI1 of device 1 control DO1 1 of device 2, DI2 of device 1 control DO2 of device 2, and so on.
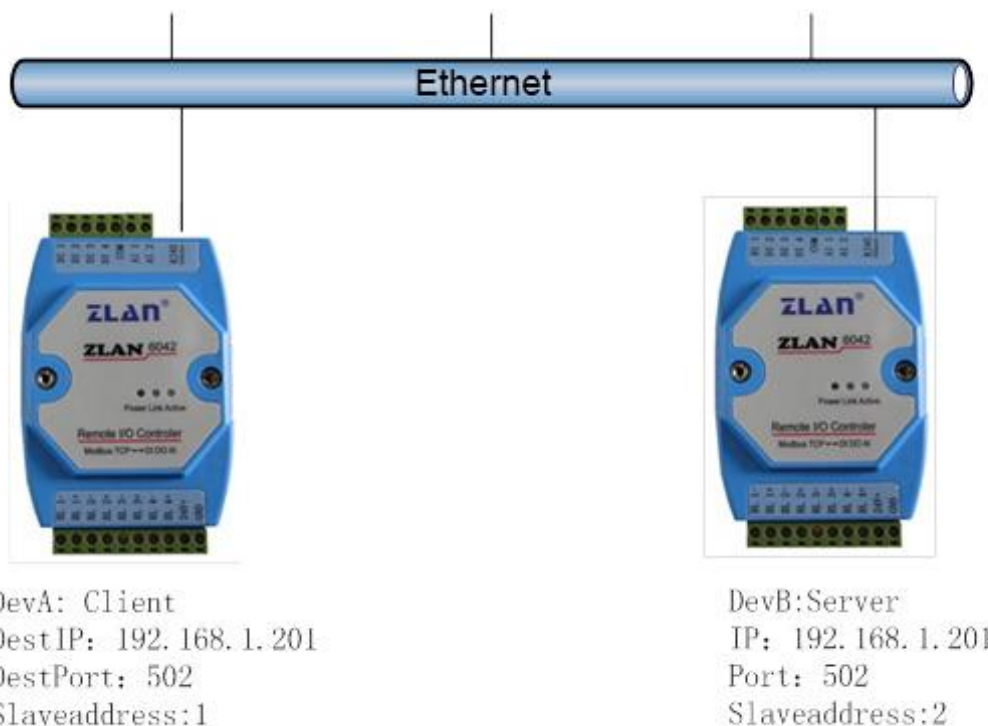
DevA: Client
DestIP: 192.168.1.201
DestPort: 502
Slaveaddress:1

DevB:Server
IP: 192.168.1.201
Port: 502
Slaveaddress:2

**Figure 11 6042 Pairs-connection Control**

As shown in FIG. 11 6042, two 6042 are connected by Ethernet.

First set the two 6042, as shown in figure 14 DevA, here need reporting addr., whether to submit. According to the functional test content in the previous chapter, search and connect device DevA, enter the "advanced", device address is set to 1, " Enable DI initiative upload " fill in the 1 means open this feature, "DI upload address" is the need to control the remote device address of 6042, it set to 2. DevA setup.
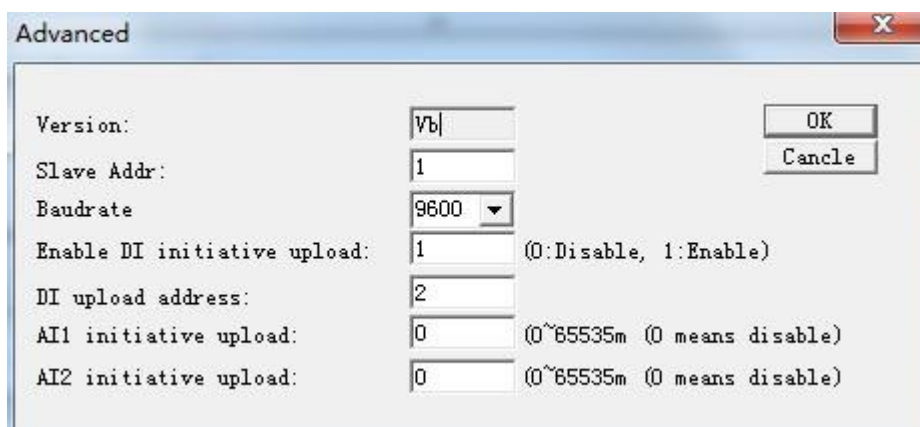


**Figure 12 DevA configuration**

Then, search and connect the device DevB, enter the advanced parameter, set the device address to 2, whether to submit is set to 1, and the report address is 1 (DevA). Following this setting, when DevA's DI changes, a control DO instruction is sent to DevB. Similarly, the DI change of DevB also sends a control instruction to DevA.
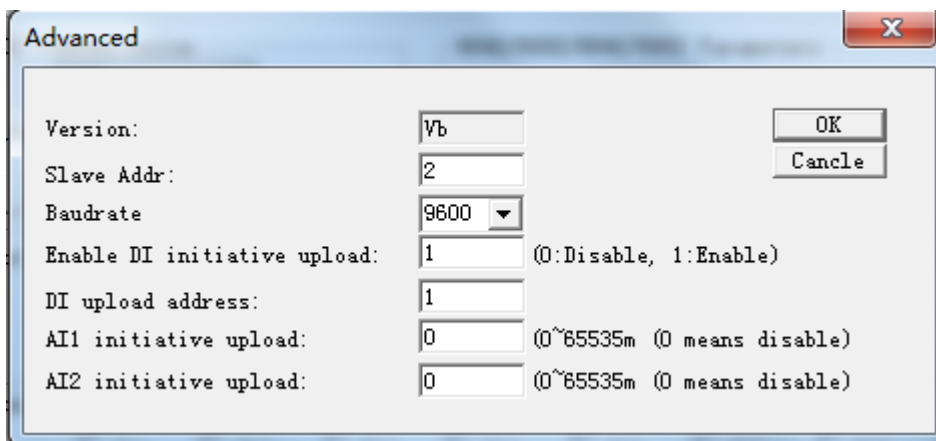


**Figure 13 DevB configuration**

Configure the DevA and DevB parameters to establish the TCP connection. DevB works in server mode, sets work IP and port, DevA as client mode, sets up DevA's destination IP and port as DevB's IP and port. For specific Settings, please refer to the <guide to the use of ZLAN networking products>.

# 10.  How to use

## 1) How to use ZLAN6042

Here we introduce how to use ZLAN6042 by using the software named modbus poll.

There are 2 methods to communicate with 6042: virtual serial port and Modbus TCP. When use Modbus TCP, the modbus poll act as Modbus master and query register of 6042. Note user must set APP protocol of 6042 to "Modbus TCP to RTU" for this method. When use the seconde method, Modbus poll open a virtusl serial port(eg. COM5) created by zlvircom.exe. And communicate use Modbus RTU. For more information of parameter config of 6042 or virtual serial port please refer to <User manual of net link product>.
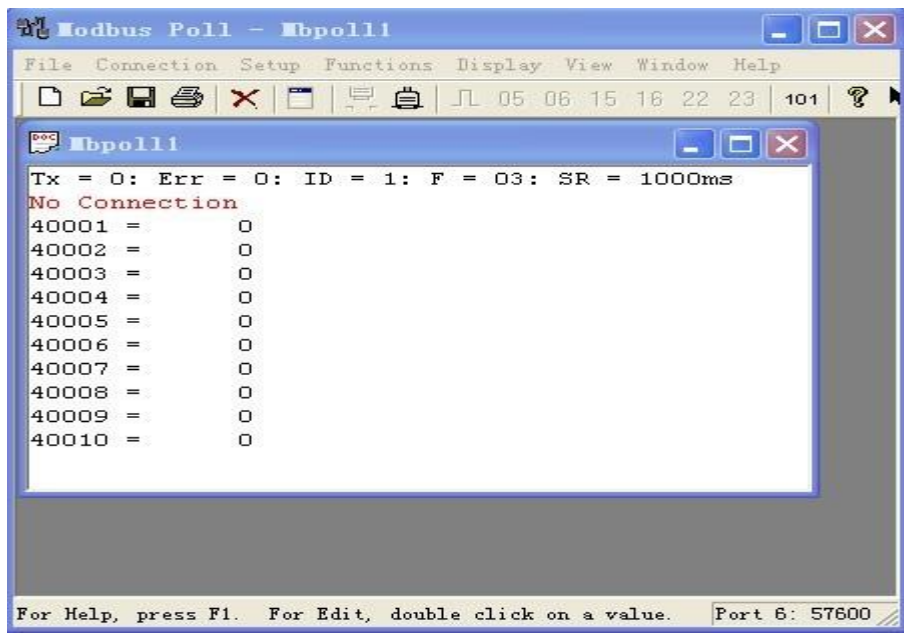
Open modbus poll software as FIG 14:



**Figure 14**

Then press SETUP, and config a new polling name POLL1 to read DI as Figure 15:



**Figure 15**

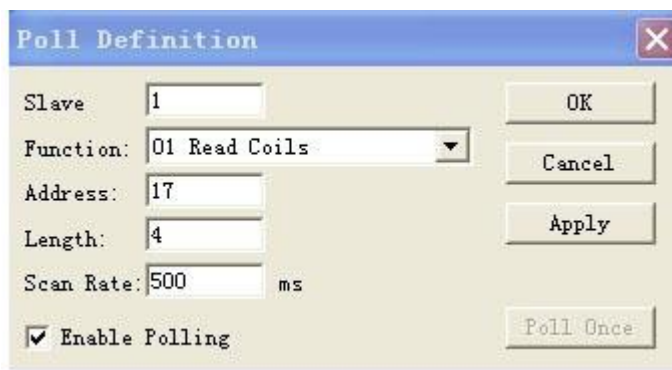Then config a new POLL2 to read DO as Figure 16:

**Figure 16**

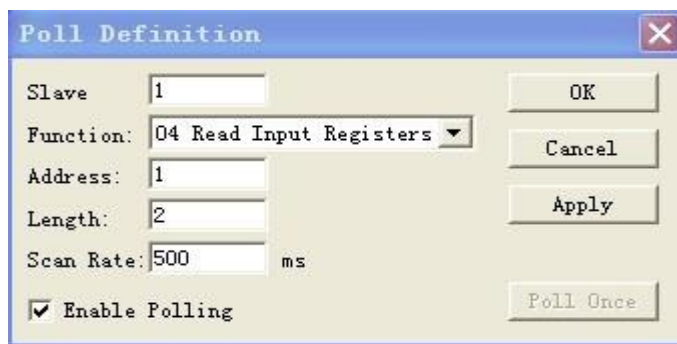Then config a new POLL3 to read AI as Figuere 17:



**Figure 17**

After all that config, then see following as Figure 18:
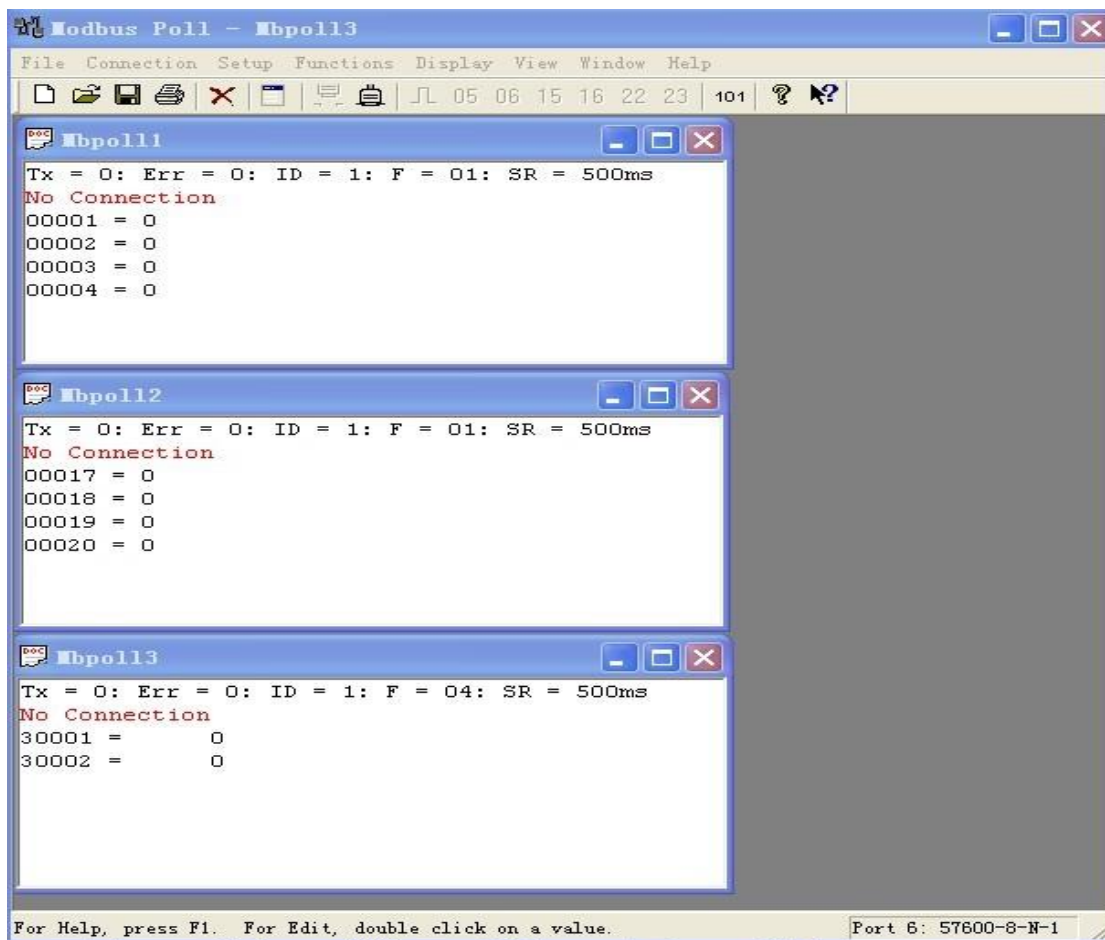
**Figure 18**

Following we show how to use virtual serial port method.,Config connection as Figure

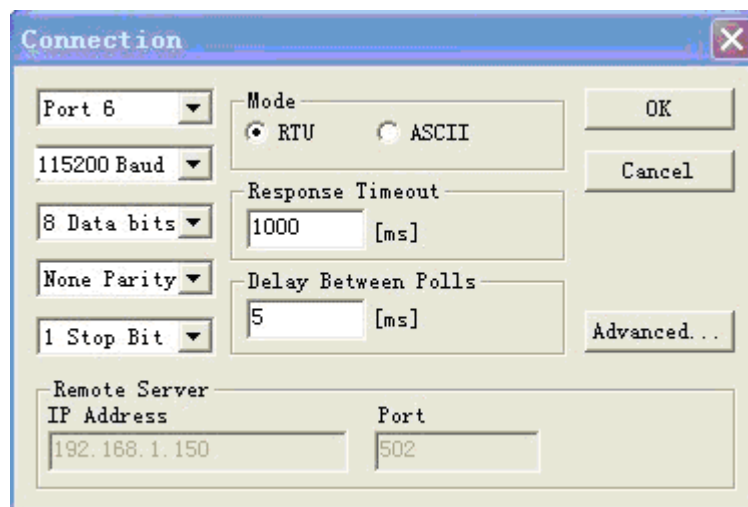19. Then press OK to open the COM6 to communicate with 6042。



**Figure 19**

Following we show the Modbus TCP method. Config connection as Figure 20，press OK to start tcp connection with 6042.
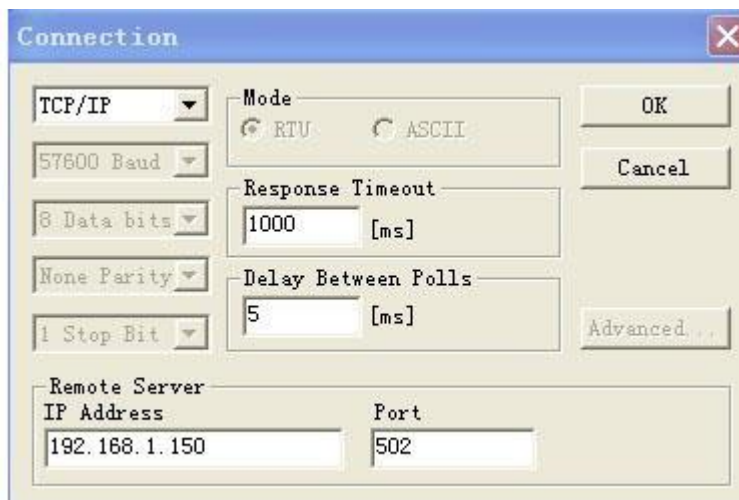


**Figure 20**

## 2) How to use ZLAN6002

The method to use ZLAN6002 is much familiar to virtual serial port method of ZLAN6042. The only difference is when in 6002 the serial port is real serial port, and in 6042 the serial port is virtual serial port. You may need a RS232 to RS485 convertor to connect between you PC real serial port and 6002 RS485 port.

Note that RJ45 is modified for RS485 connection. Also RJ45 can also be changed to RS232, RS422 wiring. RJ45 cable line sequence and serial line sequence correspondence table is as follows:

| Interface Type of RJ45 | Cable pin1 | Cable pin2 | Cable pin3 | Cable pin6 |
| --- | --- | --- | --- | --- |
| RS485 | A | B | NC | NC |
| RS232 | NC | RXD | TXD | GND |
| RS422 | 485A | 485B | 422A | 422B |

For the convenience of users ZLAN provides a standard Ethernet port to RS232 cable and Ethernet port to 485 cable. Note the following:

1) If it is ZLAN6002-232: can be equipped with standard ZLAN " Ethernet port to RS232 cable", pay attention that whether ZLAN has short circuit the cable pin5,6.

2) If it is ZLAN6002-485: can be equipped with ZLAN "Ethernet port to 485 cable" + DB9_485_232 adapter board. And the DB9_485_232 adapter board DB9 pin 8 and 9 shorted. After that DB9_485_232 adapter board 1 terminal is 485B, 2 terminal is 485A.

# 11.  Support

Shanghai ZLAN information Co., Ltd.

Address: 12 floor, D building, No. 80 CaoBao road, Xuhui District, Shanghai, China

Phone: 021-64325189

Fax: 021-64325200

Web: http://www.zlmcu.com

Email: support@zlmcu.com