

# CLIMATE 5000 VRF

Building Management System Gateway Card (Modbus)

BMS-MOD



**BOSCH**

Installation-user manual

6720862468 (16/04)

Before using your air conditioning system, please read this manual carefully and keep it for future reference.

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## 1. Safety precautions

The following contents are stated on the product and the operation manual, including usage, precautions against injury and property loss, and the methods of using the product correctly and safely. After fully understanding the following contents (identifiers and icons), read the text body and observe the following rules.

### ■ Identifier description

| Identifier  | Meaning   |
|---|---|
|  Warning | Means improper handling may lead to personal injury.                    |
|  Caution | Means improper handling may lead to personal injury or property damage. |

### ■ Icon description

| Icon  | Meaning  |
|---|--|
|  | Forbidden  |
|  | It indicates compulsory implementation. The compulsory subject-matter is indicated in the icon or by images or characters aside. |

### Warning

|  |   |   |
|--|---|---|
| <br>Warning | Delegate installation   | Ensure qualified personnel install and maintain the equipment.<br>Improper installation performed by the user without permission may cause fire, electric, shock, personal injury or water leakage. |
|  | <br>Usage<br>Warning | Forbid  |
| Forbid   |   | Do not operate with wet hands or let water enter it.<br>Otherwise, electric shock may occur.  |

## 2. Overview

### 2.1. Instruction

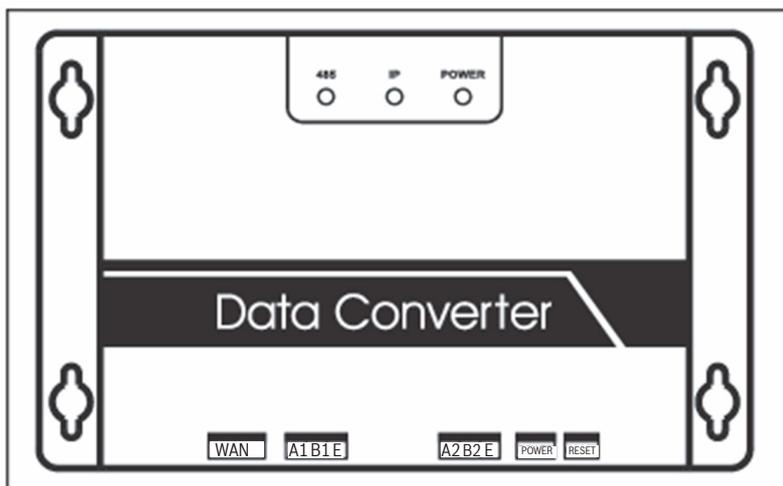


Fig.2.1

WAN terminal Connect to the switch by 5 kinds of network cables to ensure that PC can access to the web page of it.

A1B1E terminal Connect to the indoor/outdoor unit

A2B2E terminal Connect to the terminal serial port.

## 2.2. System Architecture Description

It supports two kinds of outdoor unit with baud rates of 600 and 4800. (For detailed information, please contact our technical support). The addresses of accessed indoor/outdoor units can't repeat.

- 1) When the baud rate of the outdoor unit is 600, 64 indoor units and 4 outdoor units can connect to it at once.
- 2) When the baud rate of the outdoor unit is 4800, 60 indoor (with the address from 4–63) units and 4 outdoor units can connect to it at most.

The upper computer system with Modbus protocol access to terminal A2B2E by RTU or by TCP to connect to modbus gateway. See the connection figure between modbus gateway and air-conditioner system below: Connection through Modbus TCP:

Note:XYE port and K1K2E port connect hand in hand,and then access to A1B1E port.

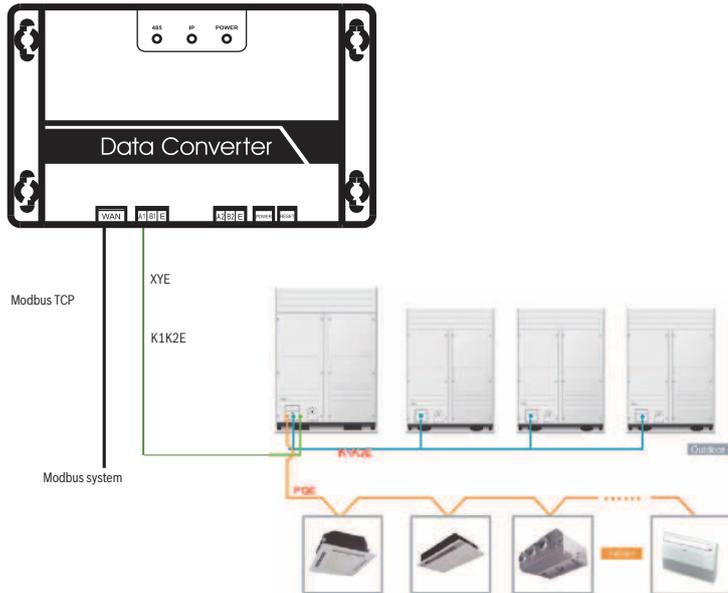


Fig.2.2

Connection through Modbus RTU:

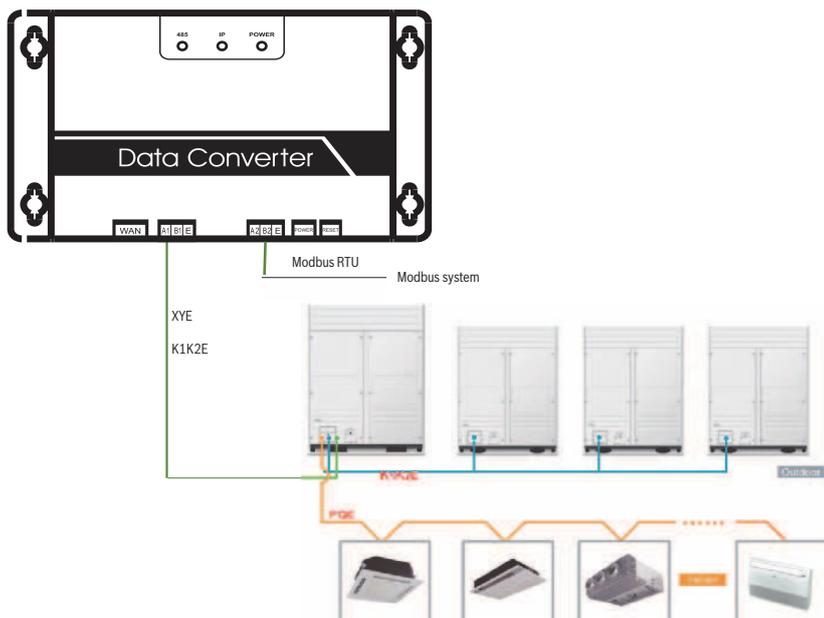


Fig.2.3

### 2.3. Function Code

| Function code | Function name          | Function |
|---------------|------------------------|----------|
| 0x01          | Read Coils             | Read     |
| 0x04          | Read Input Register    | Read     |
| 0x10          | Write Holding Register | Write    |

### 2.4. Abnormal Reply

The master unit sends requests and waits for reply from the slave. When there's no error occurs, the slave will reply normally, but when there's data checking error, the slave won't answer. When the master unit sends wrong data (except for checking error), the slave will answer abnormally.

| Code | Name                  | Meaning   |
|------|-----------------------|---|
| 0x01 | Illegal function code | Function code received by the slave can't be executed.  |
| 0x02 | Illegal data address  | The received data address is not allowed.   |
| 0x03 | Illegal data          | Value in query data field is not allowed by the slave   |
| 0x06 | Slave busy            | The slave is busy with a long-time program command. Ask the master to send messages when the slave is free. |

## 3. Usage Introduction

### 3.1. IP Configuration

The default IP address is 192.168.1.200 when modbus gateway leaves the factory. The PC used for visiting websites must be in the same subnet segment with modbus gateway, which means it should be 192.168.1.xx (xx is from 2 to 254). There are 2 ways to configure IP: static configuration and multi-IP addition

#### 1.1.1. Single IP Configuration

Open protocol dialog, configure the IP address and subnet mask, for example: IP: 192.168.1.211, subnet mask 255.255.255.0

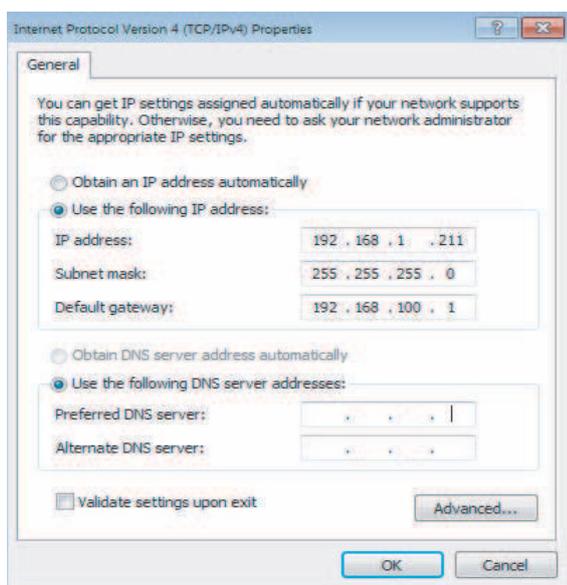


Fig.3.1

After setting, click "OK" button.

### 1.1.2. Multi-IP Addition

Configure a static IP address before adding multiple IP.

Open protocol dialog and choose Advanced tab. TCP/IP setting dialog will display like below:

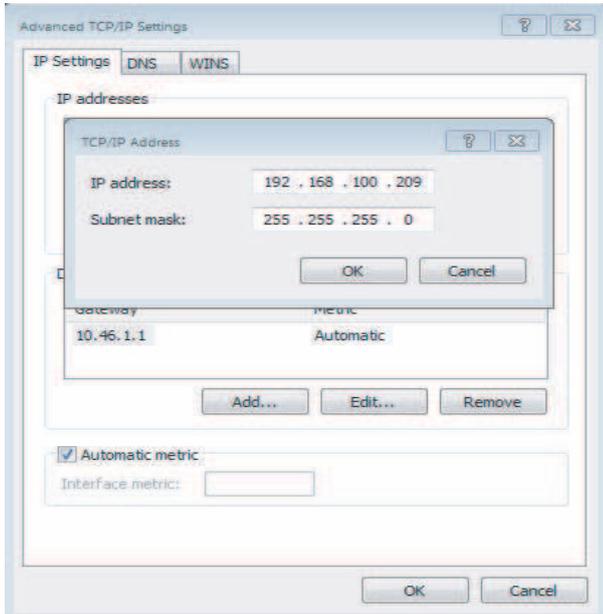


Fig.3.2

Click "Add" in IP address bar to add an IP address which is in the same segment as "192.168.1.200", e.g., IP: 192.168.1.209 subnet mask 255.255.255.0 and click "OK"

### Configuration

Input <http://192.168.1.200> in the address bar in IE (suggest to use IE). Choose "Configuration" when web page of modbus gateway displays, as shown below:

|                       |               |
|-----------------------|---------------|
| Modbus Address        | 1             |
| Modbus Commu. Setting | 9600 None-无校验 |
| IP Address            | 192.168.1.200 |
| Netmask               | 255.255.255.0 |
| Gateway               | 192.168.1.1   |
| Outlet Baudrate       | 600           |

• if outlet baudrate is 600, then support outlet(0~3), in  
 • if outlet baudrate is 4800, then support outlet(0~3), i

Get Setting successful!

Get Setting      Apply Setting

Fig.3.3

Parameters Setting:

| Parameter                     | Description   |
|-------------------------------|---|
| Modbus address                | Modbus ID, to distinguish modbus gateway with multiple Modbus protocols in the same subnet. Don't repeat the address. |
| Modbus communication setting  | Baud rate: suggest 9600<br>Check bit: no checking by default<br>Stop bit: 1StopBit by default                         |
| IP address                    | IP address of modbus gateway, multiple IPs can't be the same.   |
| Subnet Mask                   | Default 255.255.255.0   |
| Gateway                       | Local gateway address   |
| Baud rate of the outdoor unit | Outdoor communication baud rate which is connected to modbus gateway  |

Click "Application Settings" after changing the corresponding parameters. Click "Get Settings" when apply the new settings. Modbus gateway will restart automatically after changing settings, the network will break and reconnect.

### 3.2. Air Conditioner Information Query

Choose "power winding" or "input register" in the web page to read information of the air conditioner unit.

When choose "power winding" it will be like the picture below.

| Coil Outputs |             |                                  | Input Registers |                     |                                  |    | Airconditione |    |    |    |       |    |
|--------------|-------------|----------------------------------|-----------------|---------------------|----------------------------------|----|---------------|----|----|----|-------|----|
| 0            | 1           | 2                                | 3               | 4                   | 5                                | 6  | 7             | 8  | 9  | 10 | 11    | 12 |
| 20           | 21          | 22                               | 23              | 24                  | 25                               | 26 | 27            | 28 | 29 | 30 | 31    | 32 |
| 40           | 41          | 42                               | 43              | 44                  | 45                               | 46 | 47            | 48 | 49 | 50 | 51    | 52 |
| 60           | 61          | 62                               | 63              | Indoor#0:COOL-MODE  |                                  |    |               |    |    |    | Outle |    |
| 1            | FAN-MODE    | <input type="radio"/>            | 28              | Change Aire         | <input type="radio"/>            | 5  |               |    |    |    |       |    |
| 2            | DEHUMM-MODE | <input type="radio"/>            | 29              | Cleaner             | <input type="radio"/>            | 5  |               |    |    |    |       |    |
| 3            | HEAT-MODE   | <input type="radio"/>            | 30              | Humad               | <input type="radio"/>            | 5  |               |    |    |    |       |    |
| 4            | COOL-MODE   | <input checked="" type="radio"/> | 31              | Add Oxygen          | <input type="radio"/>            | 5  |               |    |    |    |       |    |
| 5            | AUTO-MODE   | <input type="radio"/>            | 32              | Dryer               | <input type="radio"/>            | 5  |               |    |    |    |       |    |
| 6            | MODE-LOCK   | <input type="radio"/>            | 33              | Horizontal Sway     | <input type="radio"/>            | 5  |               |    |    |    |       |    |
| 7            | --          | <input type="radio"/>            | 34              | Add Water           | <input type="radio"/>            | 6  |               |    |    |    |       |    |
| 8            | ON/OFF      | <input checked="" type="radio"/> | 35              | Pump                | <input checked="" type="radio"/> | 6  |               |    |    |    |       |    |
| 9            | HIGH-FAN    | <input checked="" type="radio"/> | 36              | --                  | <input type="radio"/>            | 6  |               |    |    |    |       |    |
| 10           | MEDIUM-FAN  | <input type="radio"/>            | 37              | LOCK COOL           | <input type="radio"/>            | 6  |               |    |    |    |       |    |
| 11           | LOW-FAN     | <input type="radio"/>            | 38              | LOCK HEAT           | <input type="radio"/>            | 6  |               |    |    |    |       |    |
| 12           | BREEZE-FAN  | <input type="radio"/>            | 39              | LOCK-CENTER-CTRL    | <input type="radio"/>            | 6  |               |    |    |    |       |    |
| 13           | --          | <input type="radio"/>            | 40              | LOCK-REMOTE-CTRL    | <input type="radio"/>            | 6  |               |    |    |    |       |    |
| 14           | --          | <input type="radio"/>            | 41              | E0 Phase Error      | <input type="radio"/>            | 6  |               |    |    |    |       |    |
| 15           | --          | <input type="radio"/>            | 42              | E1 Commu. Error     | <input type="radio"/>            | 6  |               |    |    |    |       |    |
| 16           | AUTO-FAN    | <input type="radio"/>            | 43              | E2 T1 Sensor Error  | <input type="radio"/>            | 6  |               |    |    |    |       |    |
| 17           | COMP        | <input checked="" type="radio"/> | 44              | E3 T2A Sensor Error | <input type="radio"/>            | 6  |               |    |    |    |       |    |

Fig.3.4

When click the address number of the indoor or outdoor unit, it will show corresponding operation information of the air conditioner. The chosen device will display in the red frame.

When click "input register", the interface will be like this:

| Coil Outputs |                      |    |          | Input Registers           |       |      |    | Airoondit |      |    |    |   |
|--------------|----------------------|----|----------|---------------------------|-------|------|----|-----------|------|----|----|---|
| 0            | 1                    | 2  | 3        | 4                         | 5     | 6    | 7  | 8         | 9    | 10 | 11 |   |
| 20           | 21                   | 22 | 23       | 24                        | 25    | 26   | 27 | 28        | 29   | 30 | 31 |   |
| 40           | 41                   | 42 | 43       | 44                        | 45    | 46   | 47 | 48        | 49   | 50 | 51 |   |
| 60           | 61                   | 62 | 63       | <b>Indoor#0:COOL-MODE</b> |       |      |    |           |      |    |    | 0 |
| 30001        | SystemStatus         |    | 0/0000   |                           | 30017 |      |    | 30018     | OUTL |    |    |   |
| 30002        | UnitStyle-1          |    | 224/00E0 |                           | 30018 | OUTL |    | 30019     | AC   |    |    |   |
| 30003        | UnitStyle-2          |    | 20/0014  |                           | 30019 | AC   |    | 30020     | AC1  |    |    |   |
| 30004        | SET TEMP. Ts         |    | 17/0011  |                           | 30020 | AC1  |    | 30021     | AC3  |    |    |   |
| 30005        | ROOM TEMP. T1        |    | 90/005A  |                           | 30021 | AC3  |    | 30022     | AC4  |    |    |   |
| 30006        | EVAPORATOR-TEMP. T2A |    | 90/005A  |                           | 30022 | AC4  |    | 30023     | OUT  |    |    |   |
| 30007        | EVAPORATOR-TEMP. T2B |    | 90/005A  |                           | 30023 | OUT  |    | 30024     | OU   |    |    |   |
| 30008        | CONDENSER TEMP. T3   |    | 255/00FF |                           | 30024 | OU   |    | 30025     | AC   |    |    |   |
| 30009        | ---                  |    | 0/0000   |                           | 30025 | AC   |    | 30026     | AC   |    |    |   |
| 30010        | ---                  |    | 0/0000   |                           | 30026 | AC   |    | 30027     | AC   |    |    |   |
| 30011        | TIMER-ON             |    | 0/0000   |                           | 30027 | AC   |    | 30028     | AC   |    |    |   |
| 30012        | TIMER-OFF            |    | 0/0000   |                           | 30028 | AC   |    | 30029     | A    |    |    |   |
| 30013        | POWER                |    | 8/0008   |                           | 30029 | A    |    | 30030     | A    |    |    |   |
| 30014        | ---                  |    | 0/0000   |                           | 30030 | A    |    | 30031     | A    |    |    |   |
| 30015        | ---                  |    | 0/0000   |                           | 30031 | A    |    | 30032     | A    |    |    |   |
| 30016        | ERROR STATUS         |    | 0/0000   |                           | 30032 | A    |    |           |      |    |    |   |

Fig.3.5

The first column is the address, second is the content and the third is displayed value, e.g. 17/0011, 17 is decimal display, 0011 is hexadecimal display. Explanation of part of the content:

E.g., outdoor unit on-line state: 1/0001. When No. 0 outdoor unit is on-line, its value is 1/0001(decimalism / hexadecimal), when No.0 outdoor and No. 1 outdoor unit are on-line, its value is 3/0003.

## Air Conditioner Control

When click "Air Conditioner Control" on the web page, it will display like this:

| Airconditioner Control: 0# |                      |                        |      |
|----------------------------|----------------------|------------------------|------|
| RUN MODE                   | COOL                 | HEAT                   | FAN  |
| FAN SPEED                  | HIGH                 | MEDIUM                 | LOW  |
| SET TEMP.                  | 17°C                 | 18°C                   | 19°C |
|                            | 21°C                 | 22°C                   | 23°C |
|                            | 25°C                 | 26°C                   | 27°C |
|                            | 29°C                 | 30°C                   |      |
| System Control             |                      |                        |      |
| MODE                       | COOL, 17°C, LOW FAN  | COOL, 24°C, MEDIUM FAN |      |
| MODE                       | HEAT, 30°C, HIGH FAN | HEAT, 26°C, MEDIUM FAN |      |

Fig.3.6

Single air conditioner control area: control the single air conditioner. Choose a single air conditioner and set mode, fan speed and temperature.

Single control area: to choose a single air conditioner, set mode, fan speed, temperature and click "Apply" to carry out a single controlling function.

Group control area: to choose the corresponding group control button and carry out group controlling. All the indoor units under the control of modbus gateway carry out this operation.

### 3.3. Upper Computer Access

#### 1.1.3. Upper Computer Access Mode

Upper computer system with Modbus protocol port can communicate with modbus gateway through Modbus TCP or Modbus RTU. For detailed information, please refer to Fig. 2.2 and Fig. 2.3.

#### 1.1.4. Access to Debug

Via Modbus Poll software to access debugging. Here is the debug procedure:

##### 1.1.4.1. Install Modbus Poll software

When finish installing Modbus Poll software, the home page will display like this:

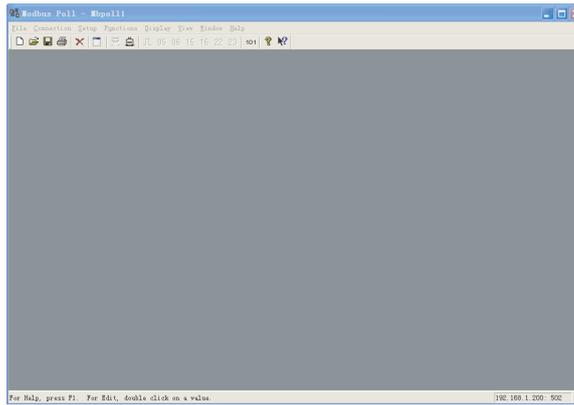


Fig.3.7

**1.1.4.2. Connect Modbus Gateway**

There're 2 connection ways: Modbus TCP and Modbus RTU

1) Choose "Connection"->"Connection" in figure 3.7, and then chose TCP/IP in the pop-up window:

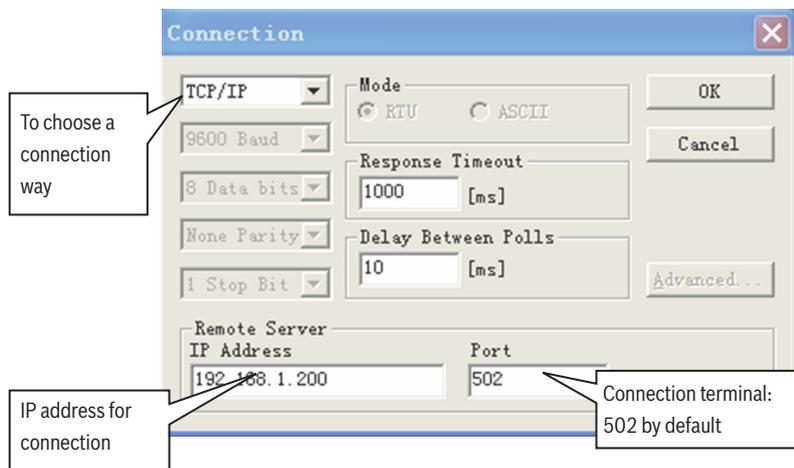


Fig.3.8

Click "OK" when finish setting. 2 Connection through Modbus/RTU Choose RTU to connect, as shown below:

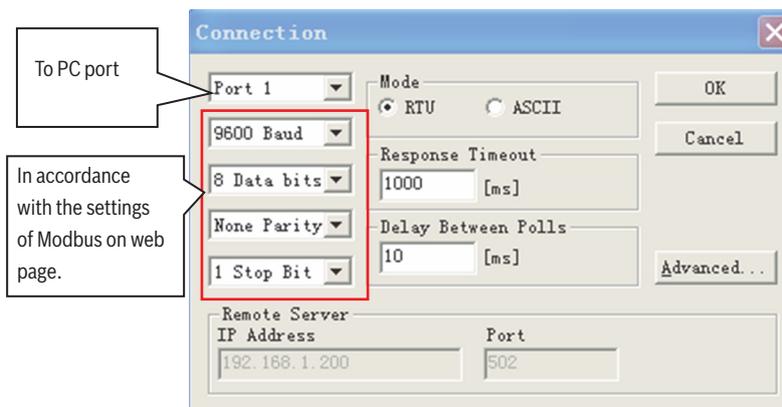


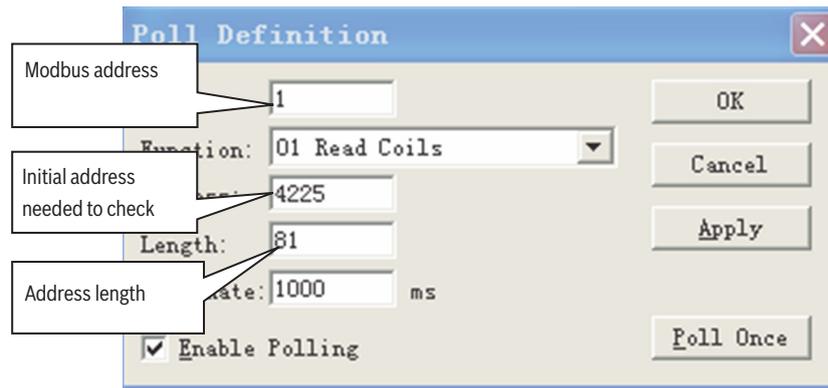
Fig.3.9

**1.1.4.3. Test**

Modbus Poll software can read/write the content of corresponding address in mapping table.

Take reading coil content for an example:

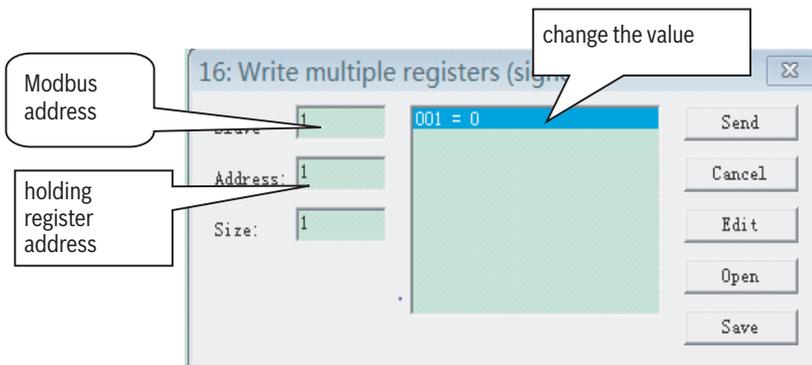
Choose "Poll Definition" under "Setup"



Click the “OK” button and it will display the content. If the content is the same as the value of the web page which has the same address, it means that the software debugging is complete.

Take writing holding register for example:

Choose button **16** in Fig.3.7, as shown below:



After changed the value, click “send” button to finish the writing operation.

#### 4. Software Reset

Press “RESET” button on the gateway for 3 seconds and power on again, the software configuration will be back to the original setting.

#### 5. Appendix Mapping Table

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