HRT-710 FAQ

Ver 1.1

Q01 : How to add HART devices to HRT-710 ?

A01:

1. Add "Only One" HART device : (Ex : Add <u>ABB AS800</u> HART device)

[Step 1] Connect to HRT-710 with "HG_Tool" utility.

(1) Set the com port parameters.

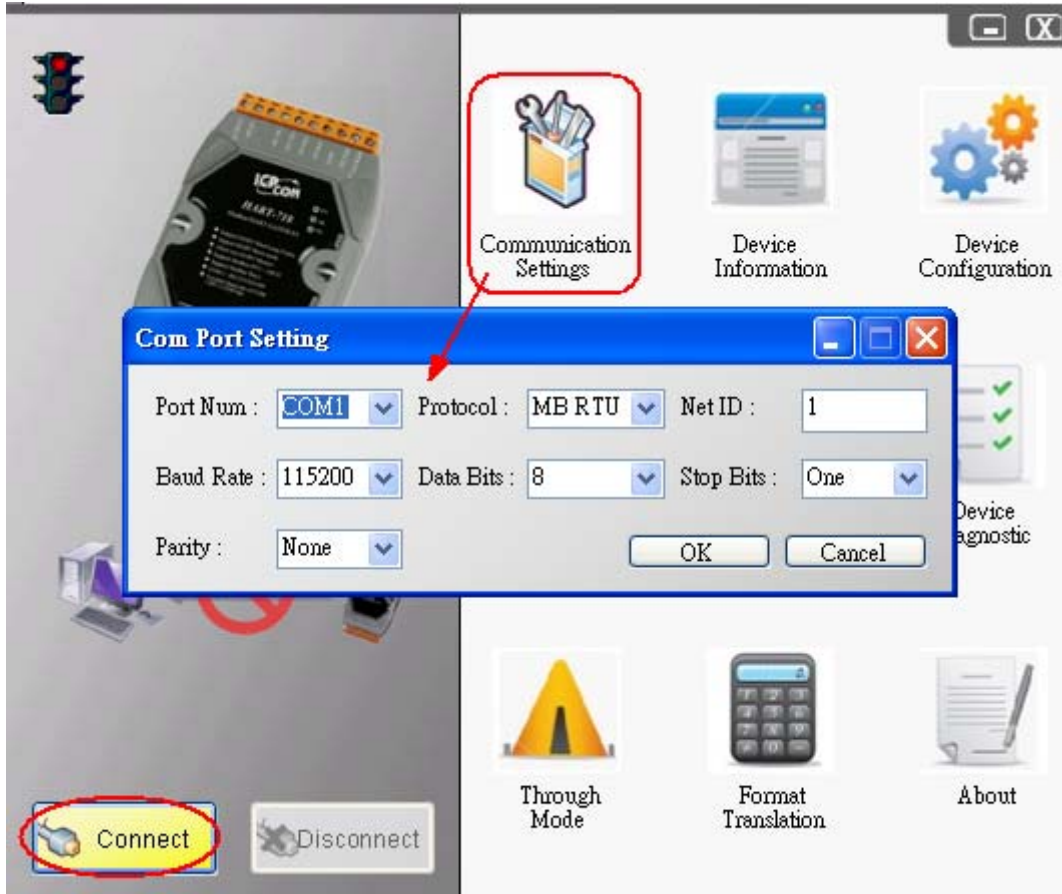(2) Click the "Connect" button to connect to HRT-710 module like Figure 1-1.

Figure 1-1 Connect to HRT-710

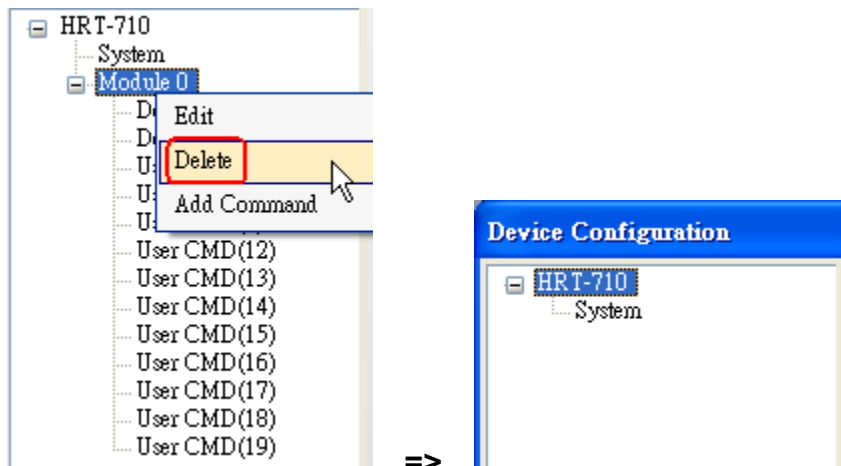**[Step 2] Delete the default HART device setting in HRT-710**

Figure 1-2 Delete the default setting of HRT-710.

[Step 3] Add the new HART device setting

(1) **Method 1** => Choose "Auto Configure" option to be **Enable** like Figure 1-3.
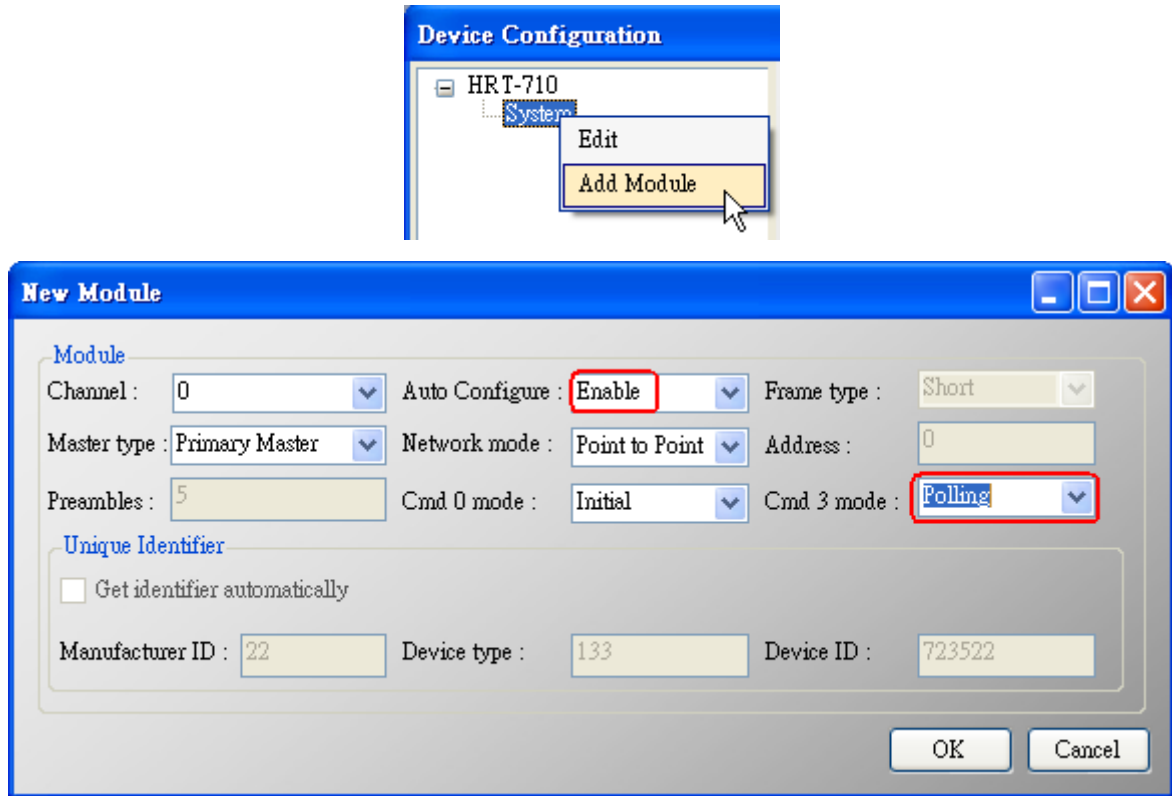

Figure 1-3 Add new HART device setting (Auto Config **:** Enable)

(2) **Method 2** => Choose "Auto Configure" option to be **Disable** like Figure 1-4.
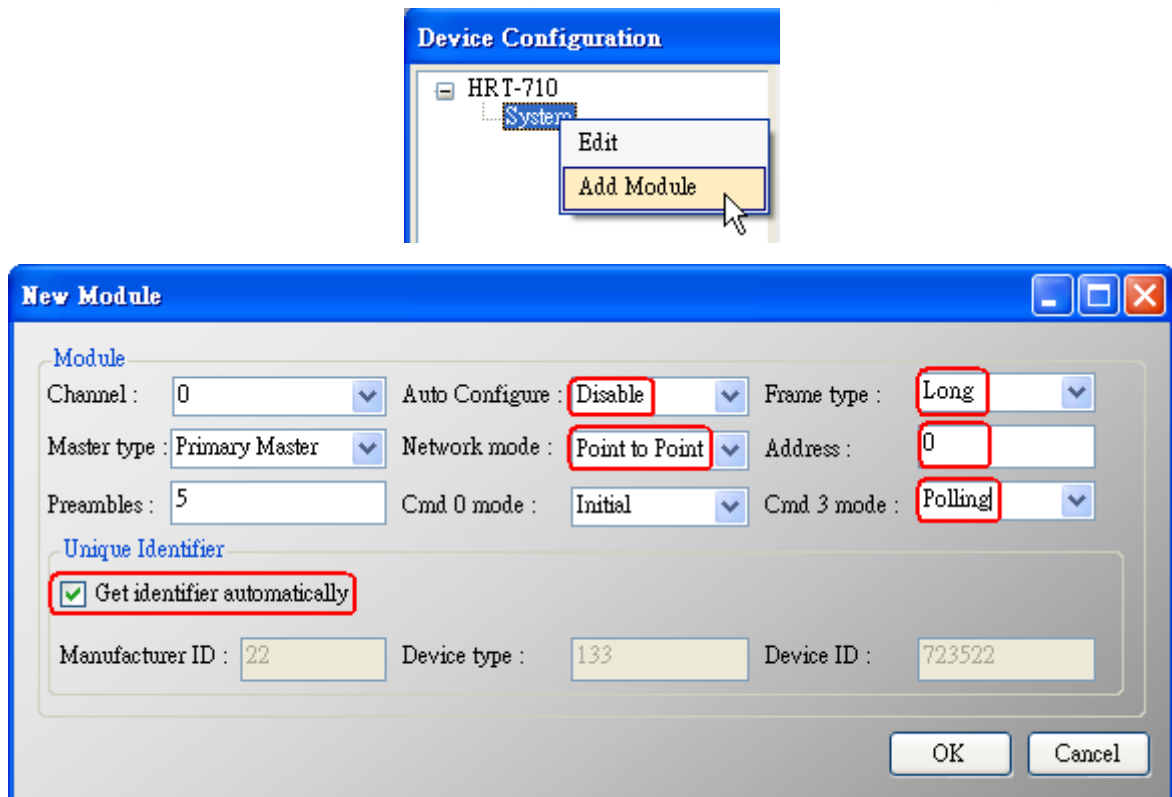

Figure 1-4 Add new HART device setting (Auto Config **:** Disable)

[Step 4] Save the HART device setting to HRT-710

(1) Click the "Save to Device" button to save the new HART device setting to HRT-710

like Figure 1-5.

Figure 1-5 "Save to Device" function

2. Add "More than One" HART devices : (Ex : Add ABB AS800 (Addr=2) and Foxboro I/A Pressure (Addr=1) HART devices)

    [Step 1] Connect to HRT-710 with "HG_Tool" utility.

    [Step 2] Delete the default HART device setting in HRT-710

    => These above two steps are the same with those of the "**Only One**" HART device.

    [Step 3] Add two new HART device setting

    (1) Click "Auto Configure" option to be **Disable** like Figure 1-6.
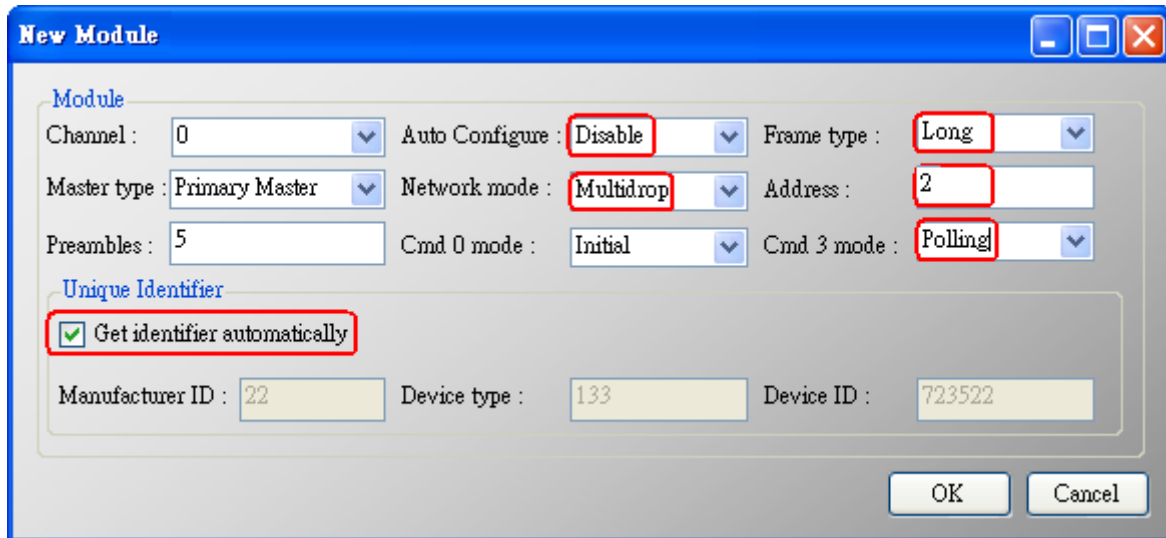
Figure 1-6 Add new HART device setting

[Step 4] Save the HART device setting to HRT-710

(1) Click the "Save to Device" button to save the new HART device setting to HRT-710 like Figure 1-7.
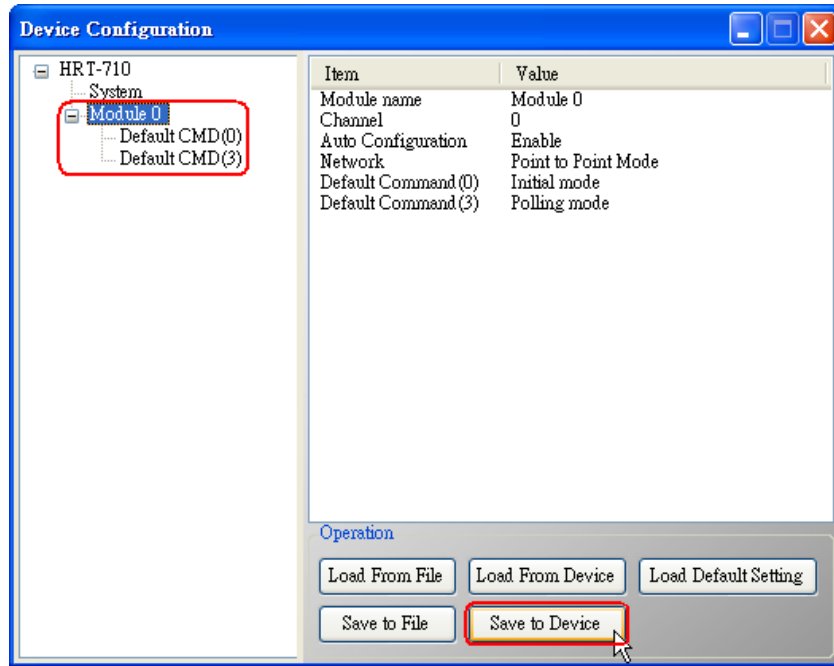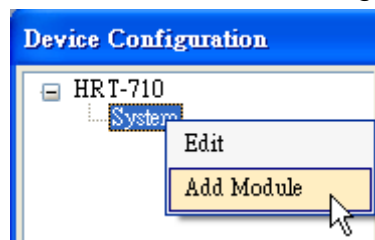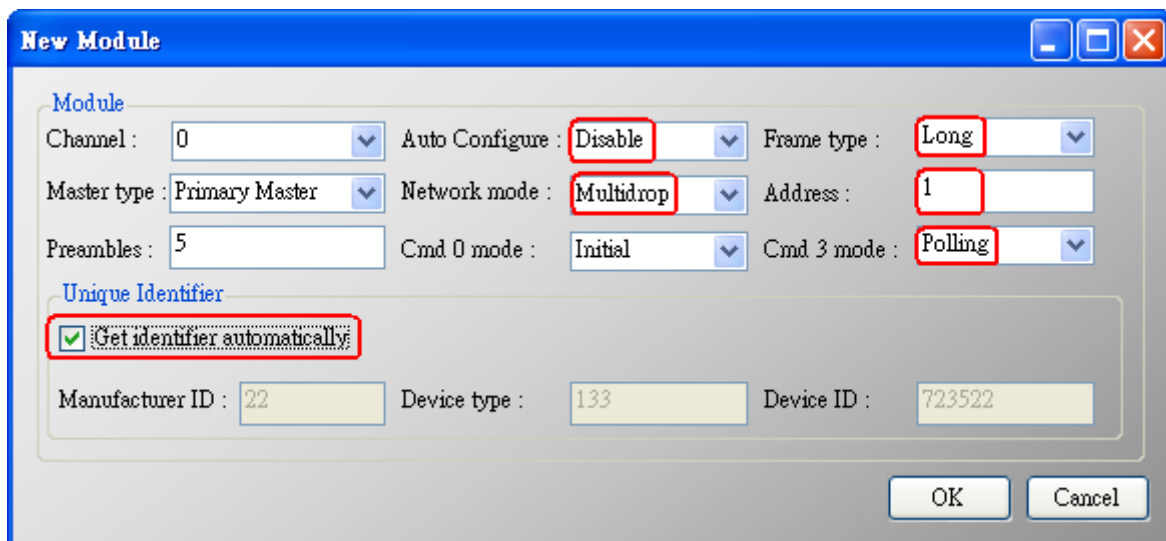
Figure 1-7 "Save to Device" function

Q02 : How to make sure that HRT-710 gets the HART device data correctly ?

A02:

After adding HART device setting to HRT-710 module (refer to the steps of Q01), please follow the steps.

(1) Make sure connecting to HRT-710 with HG_Tool successfully and then click "**Device Information**" button like Figure 2-1.

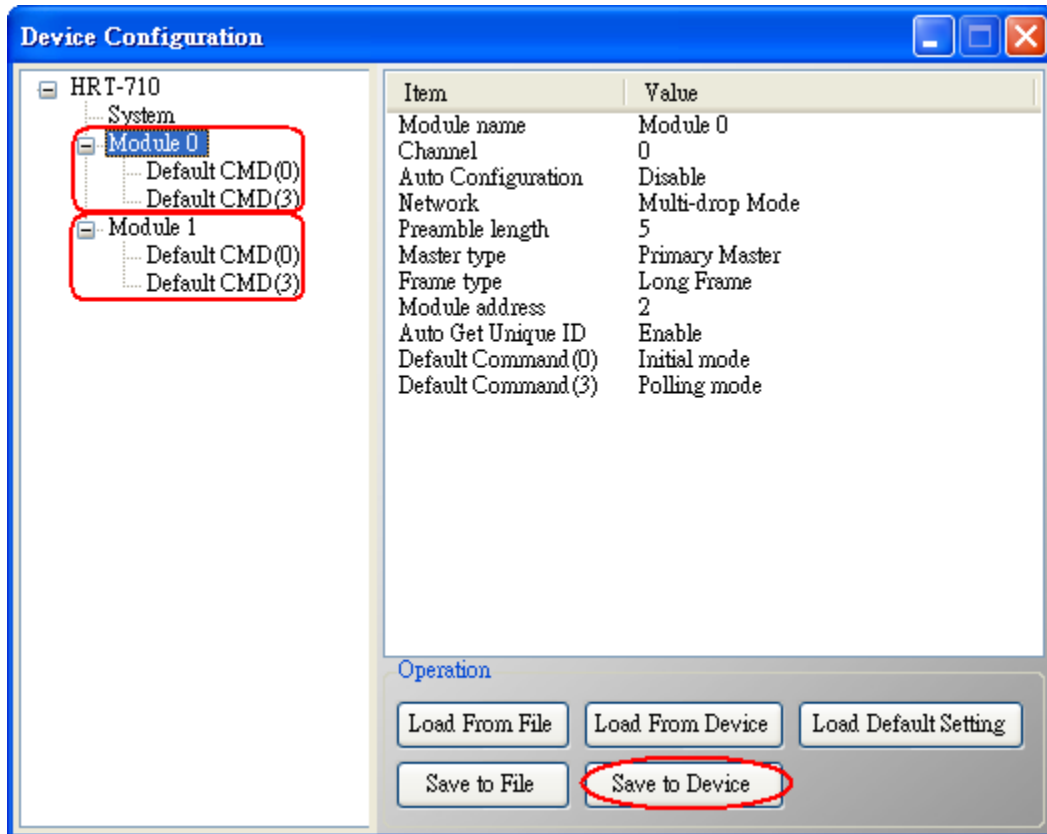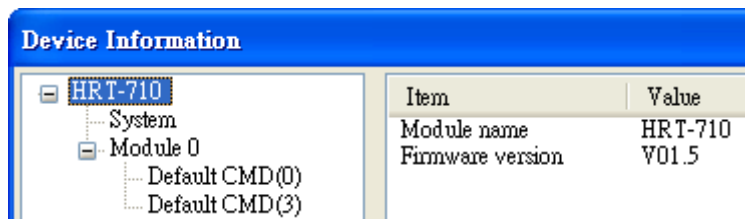Figure 2-1 "Device Information" screen

[Check I/O Data of the Default CMD(0)]

(2) Right click the button of mouse on the "Default CMD(0)" item and choose the "Basic operation" option to open the "I/O Data" screen of the "Default CMD(0)" like Figure 2-2.
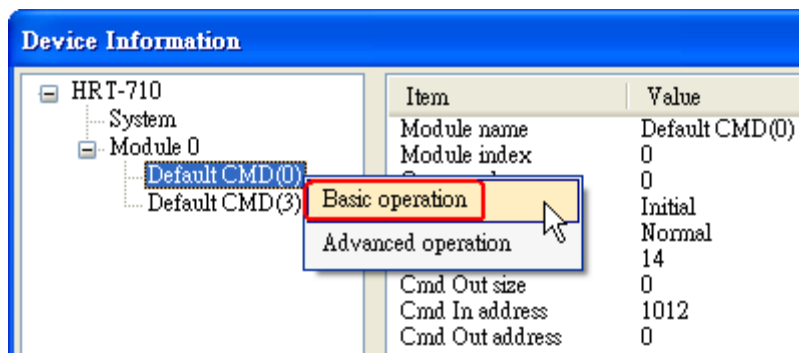

Figure 2-2 The "Basic operation" of the "Default CMD(0)"

(3) The I/O Data of the "Default CMD(0)" is **OK** like Figure 2-3.

Figure 2-3 The I/O Data screen of the "Default CMD(0)" => OK

(4) The I/O Data of the "Default CMD(0)" is **NG** like Figure 2-4.

Figure 2-4 The I/O Data screen of the "Default CMD(0)" => NG

[Check I/O Data of the Default CMD(3)]

(5) Right click the button of mouse on the "Default CMD(3)" item and choose the "Basic operation" option to open the "I/O Data" screen of the "Default CMD(3)" like Figure 2-5.

Figure 2-5 The "Basic operation" of the "Default CMD(3)"

(6) The I/O Data of the "Default CMD(3)" is **OK** like Figure 2-6.
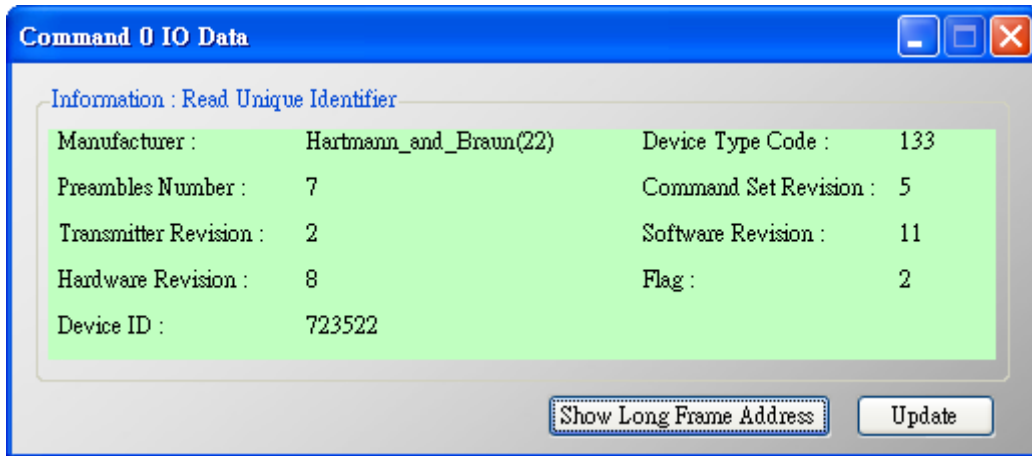
2013-01-14
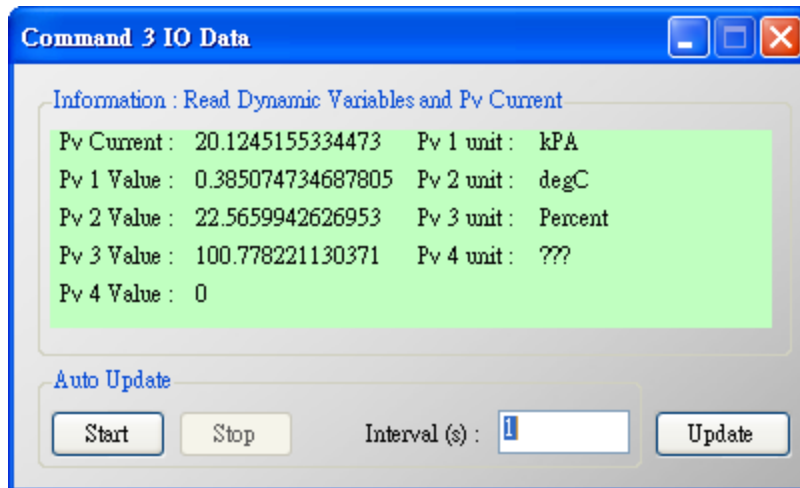
Figure 2-6 The I/O Data screen of the "Default CMD(3)" => OK

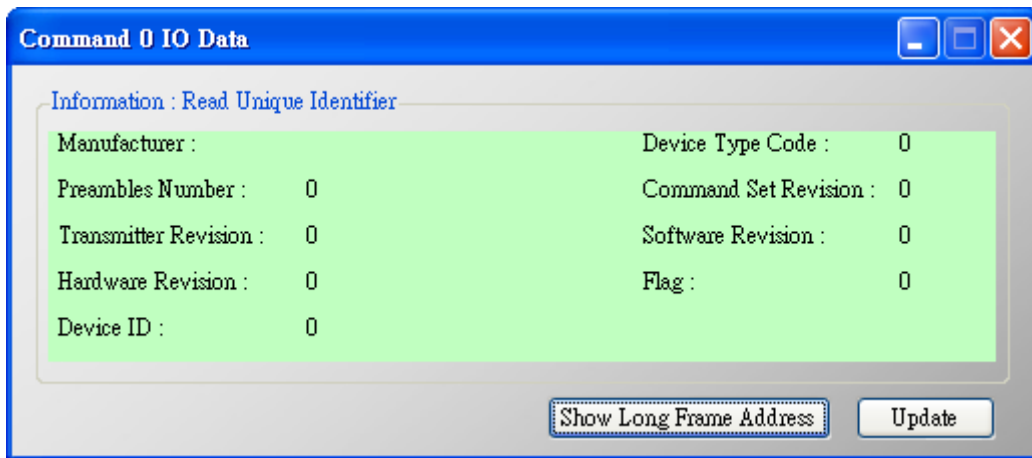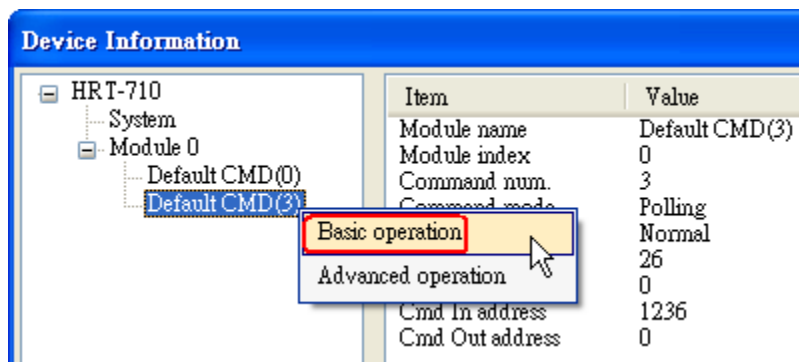(7) The I/O Data of the "Default CMD(3)" is **NG** like Figure 2-7.
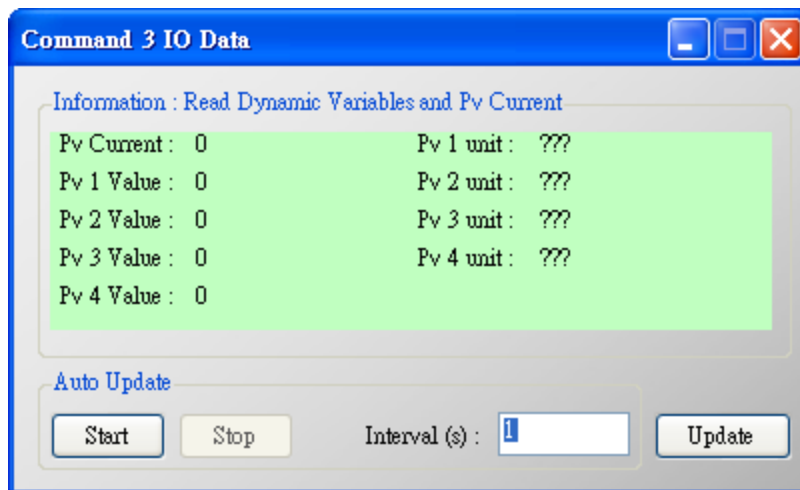
Figure 2-7 The I/O Data screen of the "Default CMD(3)" => NG

=> If the I/O data of the "Default CMD(0)" and "Default CMD(3)" is ok, it means that the communication between HRT-710 and HART devices is ok.

Q03 : How to map HART device CMD(3) data directly to SCADA or HMI ?

A03:

(1) Make sure that the communication between **HRT-710** and **HART device** is ok. (Refer to the steps of Q02)

(2) Set "**Swap Mode**" of system setting in HRT-710 to be "**W&B**".

　　[1] In "Device Configuration" screen, right click the button of mouse on "System" item and click the "Edit" option to open "System Edit" screen like Figure 3-1.

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Figure 3-1 Open "System Edit" screen

[2] Set the "Swap mode" item to be "W&B" and click "OK" button like Figure 3-2.

Figure 3-2 Set "Swap mode" to be "W&B"

[3] Click the "Save to Device" button to save the new system setting to HRT-710 like Figure 3-3.

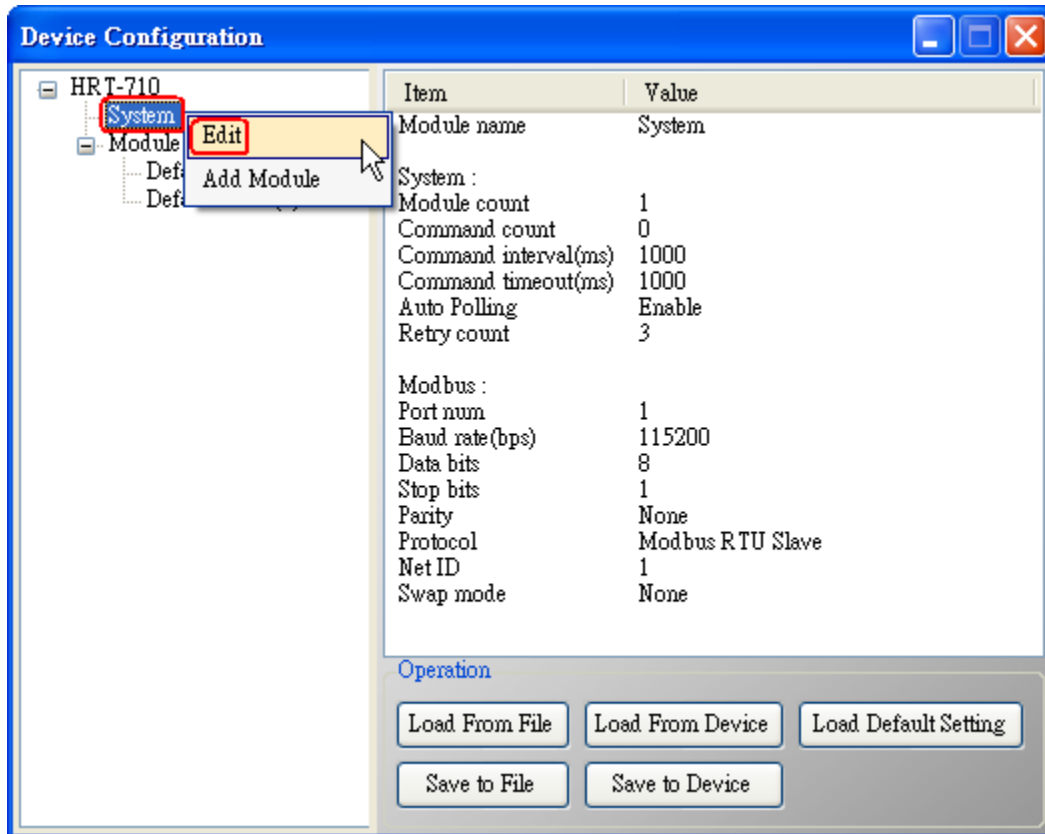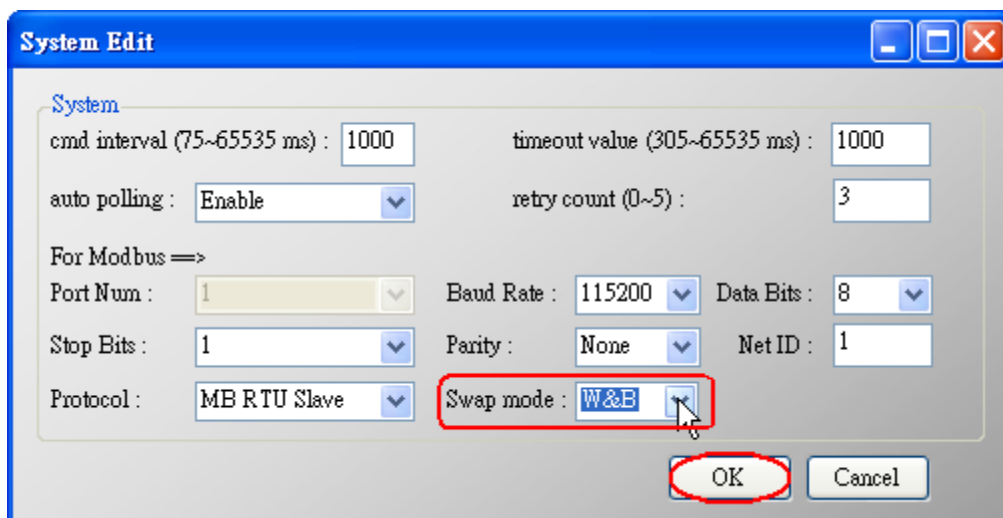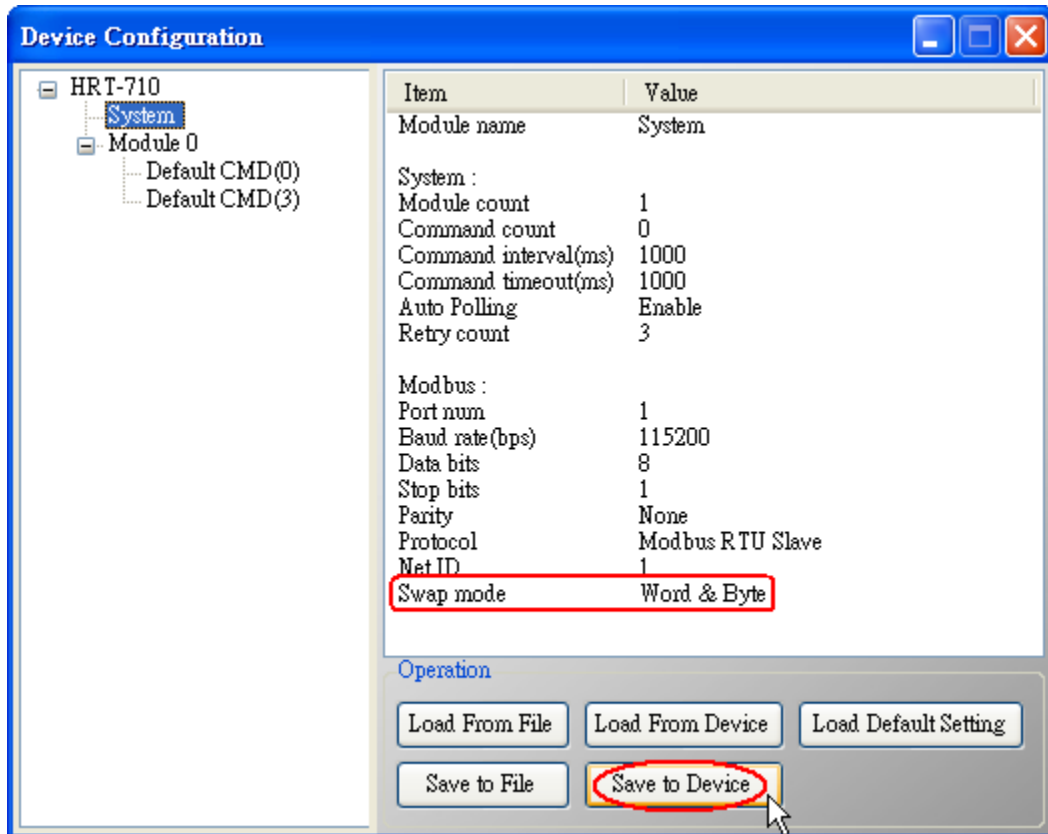Figure 3-3 "Save to Device" function

(3) Check the **firmware version** of HRT-710 like Figure 3-4.
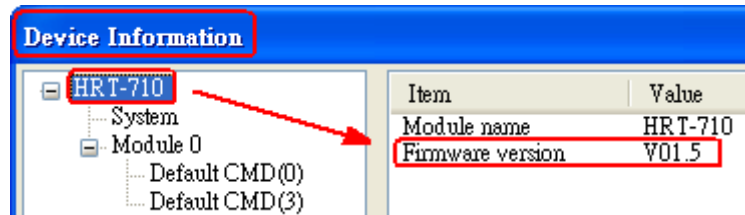
Figure 3-4 Firmware Version of HRT-710

(4) Follow the below steps according to the different firmware version of HRT-710.

[4.1 - The firmware version of HRT-710 is v1.5 or newer]

[1] In firmware v1.5 or newer, HRT-710 provides the MB Address **1300 ~ 1459** (**Default CMD(3)(S) Data for Module 0 ~ 15 in HRT-710** => The detailed information refers to the sector 4.3 of users' manual) and users can map the CMD(3) data of HART device to SCADA directly with these Modbus address 1300 ~ 1459.

[2] For the "**Default CMD(3)(S) data of Module 0**" in HRT-710, the mapped MB address is **1300 ~ 1309**. The below MB/RTU client will use the "**Modbus Poll**" tool to show the CMD(3) data of HART device by polling Modbus address 1300 ~ 1309.

<1> Confirm the connection between HG_Tool and HRT-710 is disconnected.

<2> Set the "**Modbus**" parameters like Figure 3-5.

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Figure 3-5 Modbus Parameters of "Modbus Poll" tool

<3> Set the "**Display**" mode to be "**Float**" format like Figure 3-6.

Figure 3-6 "Float" format of "Modbus Poll" tool

<4> Set the "**Com Port**" parameters and click "**OK**" button to connect to HRT-710 like Figure 3-7.

Figure 3-7 Com Port Parameters of "Modbus Poll" tool

<5> The CMD(3) data of HART device is shown like Figure 3-8.

Figure 3-8 The CMD(3) data of HART device

[4.2 - The firmware version of HRT-710 is older than v1.5]

[1] Add "**User CMD(3)**" with "**Simple**" format and then click "Save to Device" to save the new HART device setting to HRT-710 like Figure 3-9. The mapped Modbus start address and length of User CMD(3) data can be found in "**Cmd In address**" and "**Cmd In size**" field. In the example, they are 0 and 20.
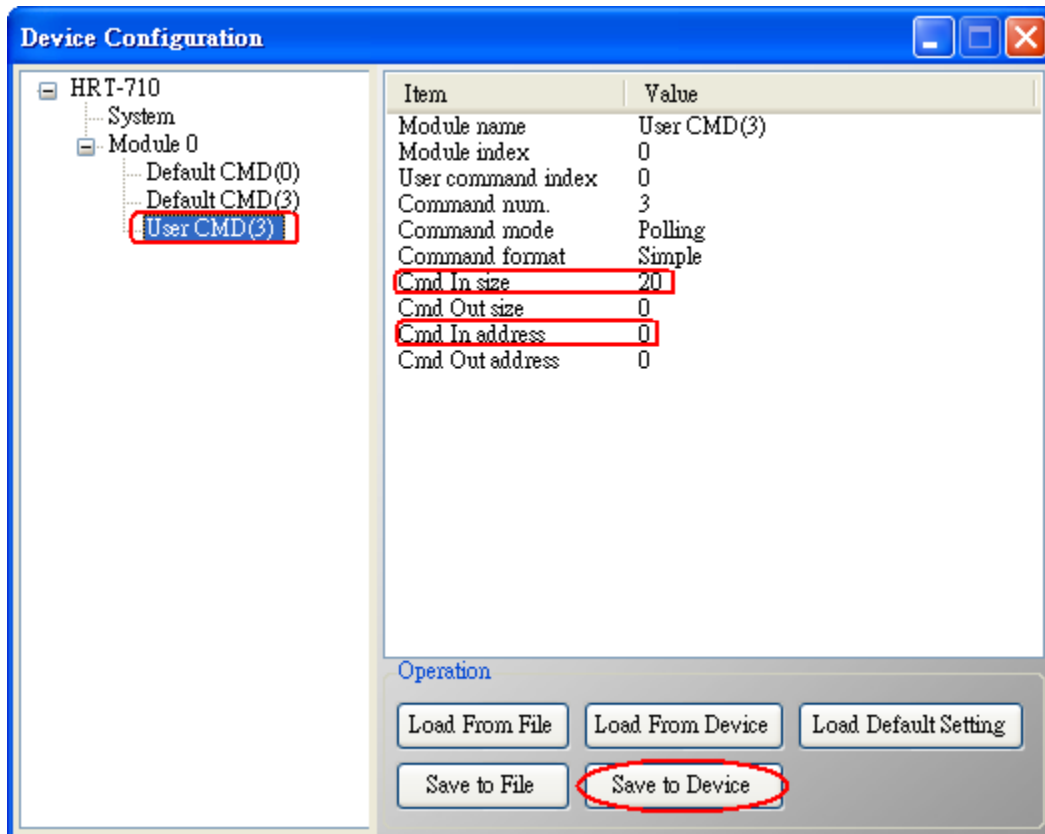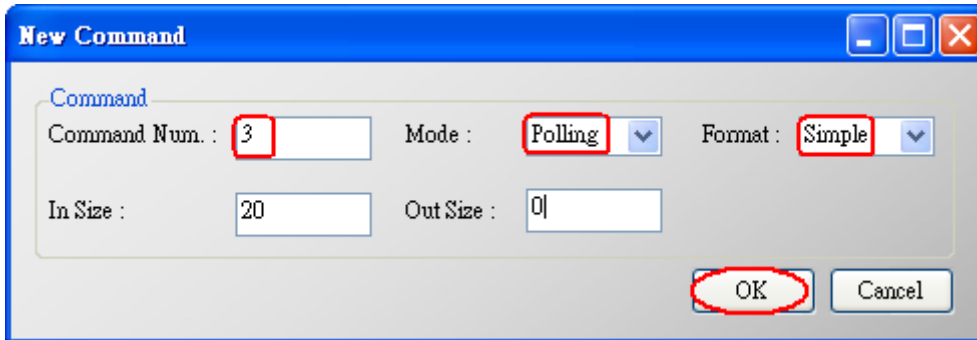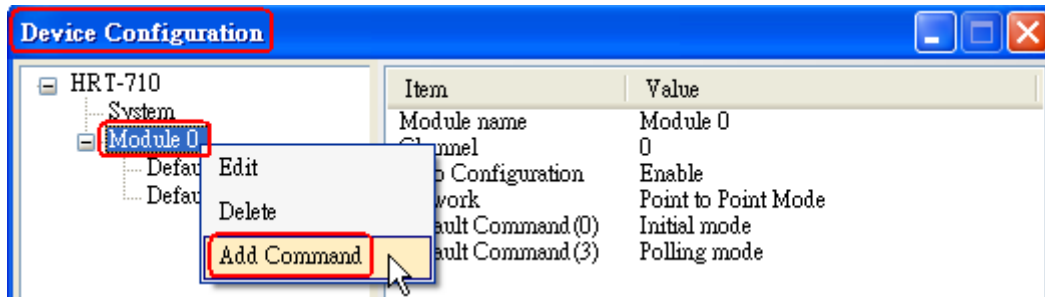
Figure 3-9 Add "User CMD(3)" to HRT-710

[2] The below MB/RTU client will use the "**Modbus Poll**" tool to show the CMD(3) data of HART device by polling Modbus address 0 ~ 9.

    <1> Confirm the connection between HG_Tool and HRT-710 is disconnected.
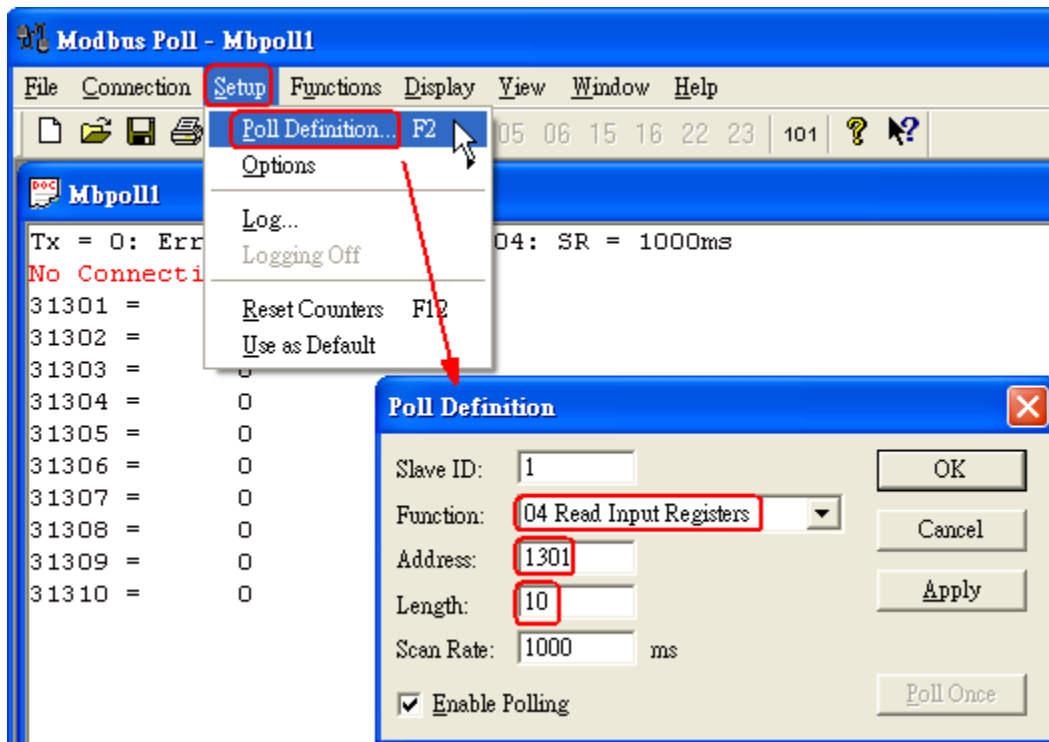
    <2> Set the "**Modbus**" parameters like Figure 3-10.
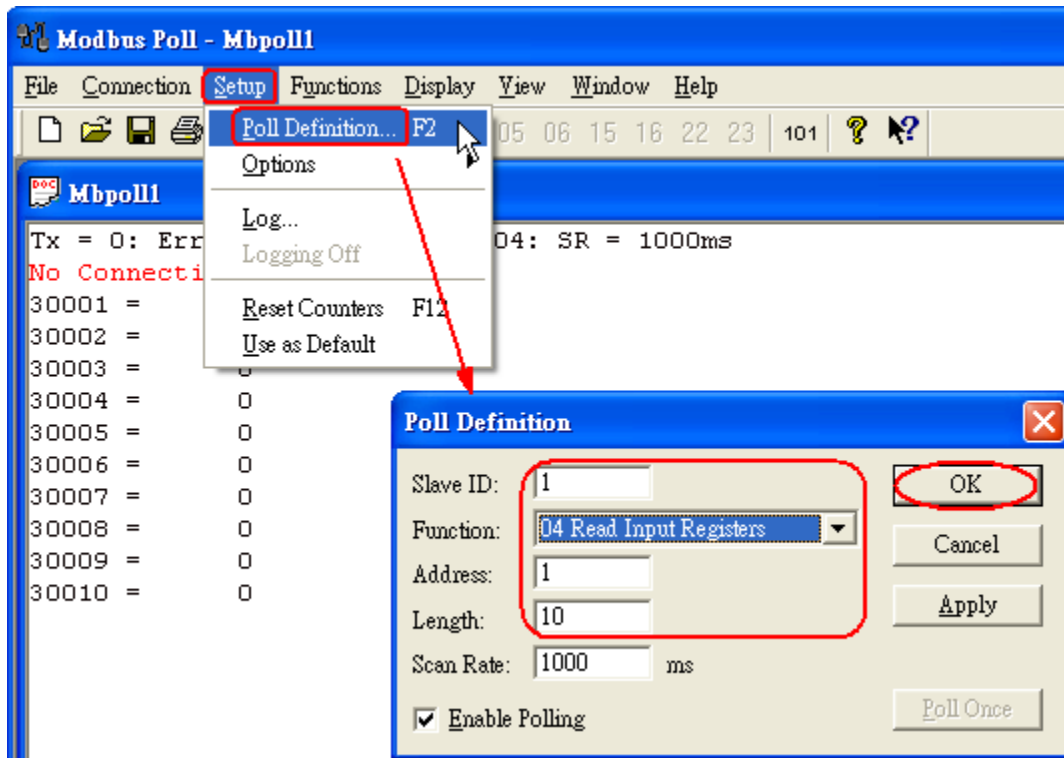
Figure 3-10 Modbus Parameters of "Modbus Poll" tool

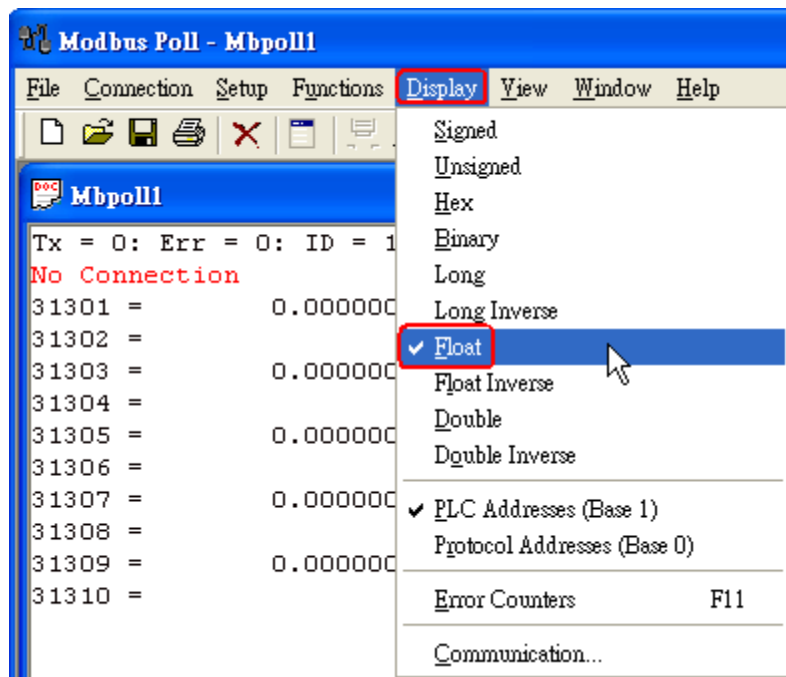<3> Set the "**Display**" mode to be "**Float**" format like Figure 3-11.
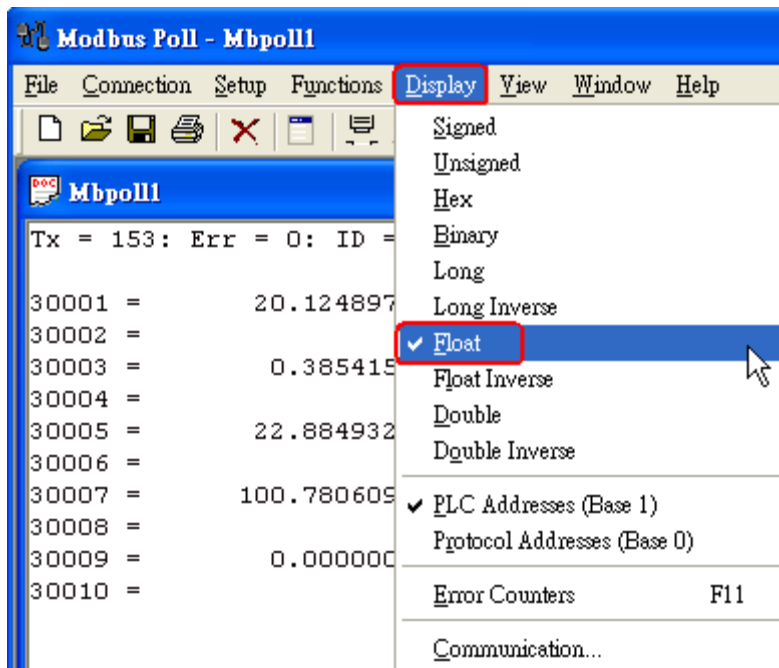
Figure 3-11 "Float" format of "Modbus Poll" tool

<4> Set the "**Com Port**" parameters and click "**OK**" button to connect to HRT-710 like Figure 3-12.
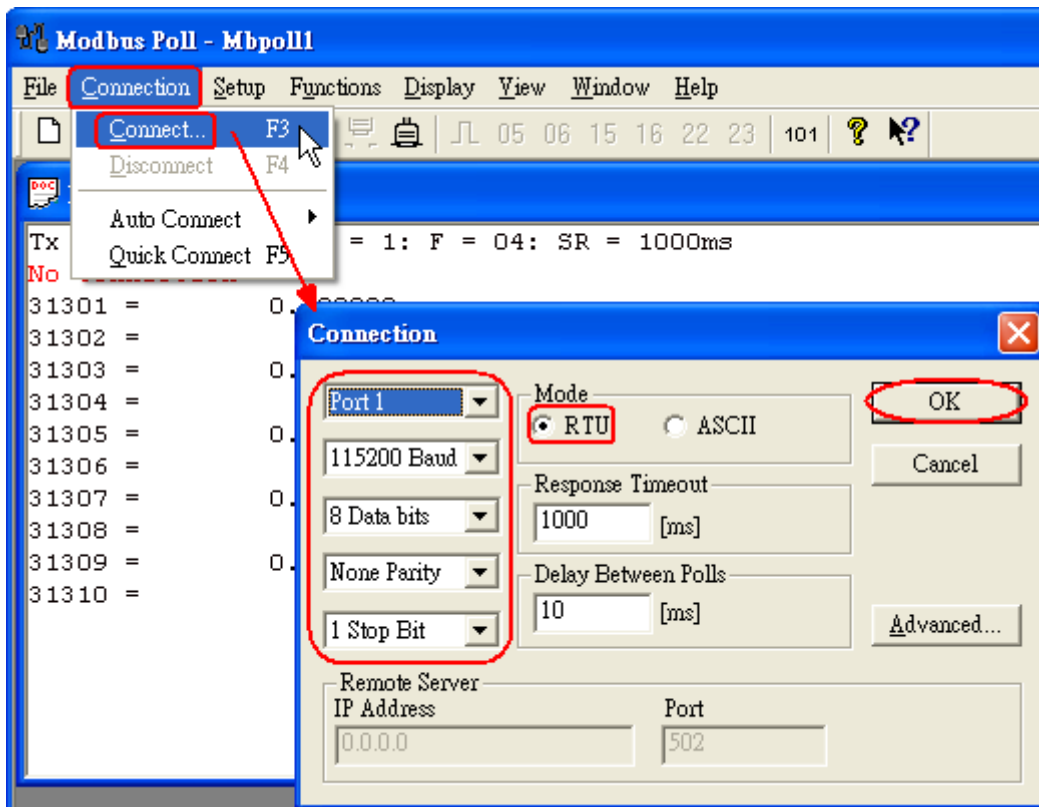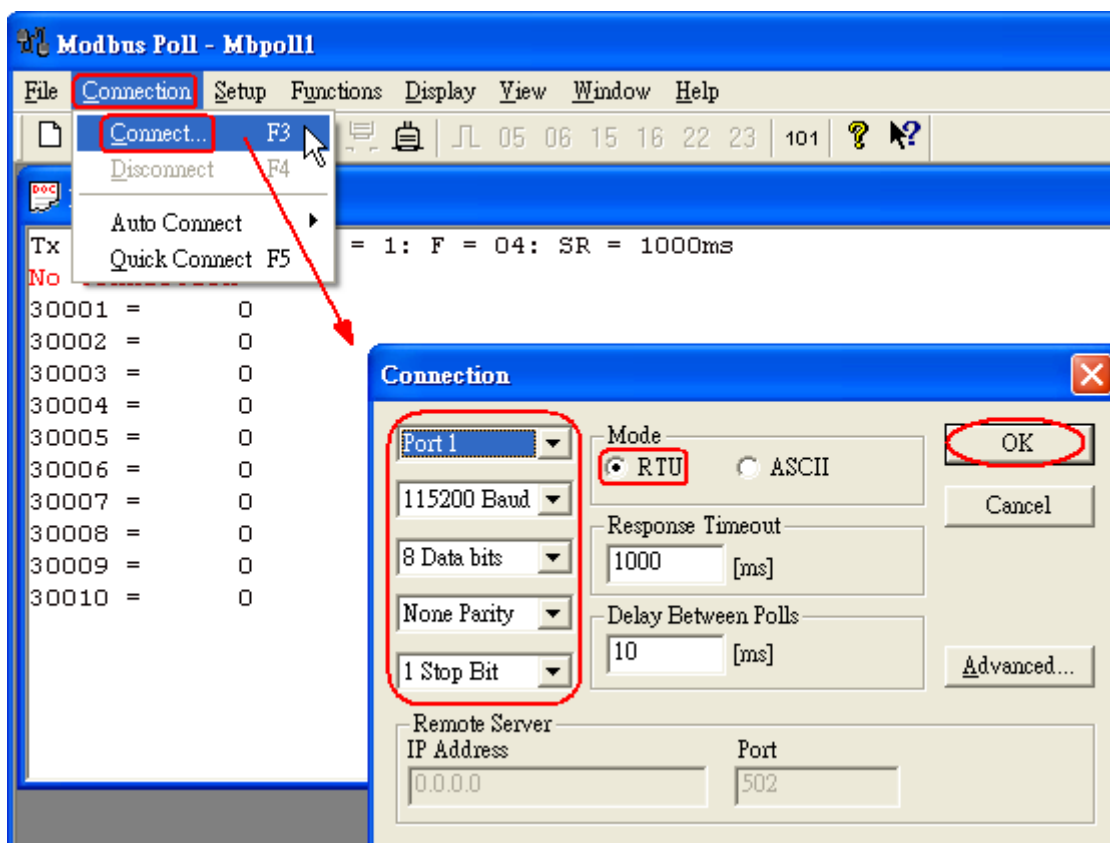
Figure 3-12 Com Port Parameters of "Modbus Poll" tool

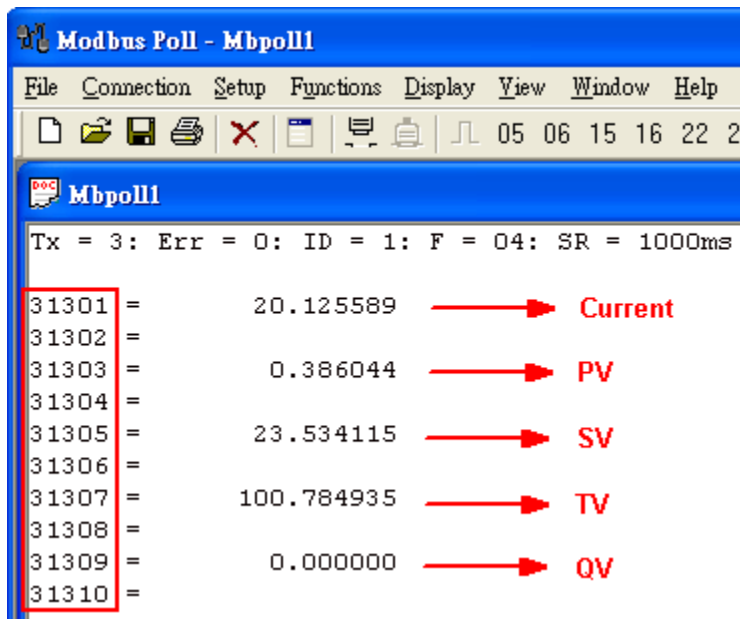<5> The CMD(3) data of HART device is shown like Figure 3-13.
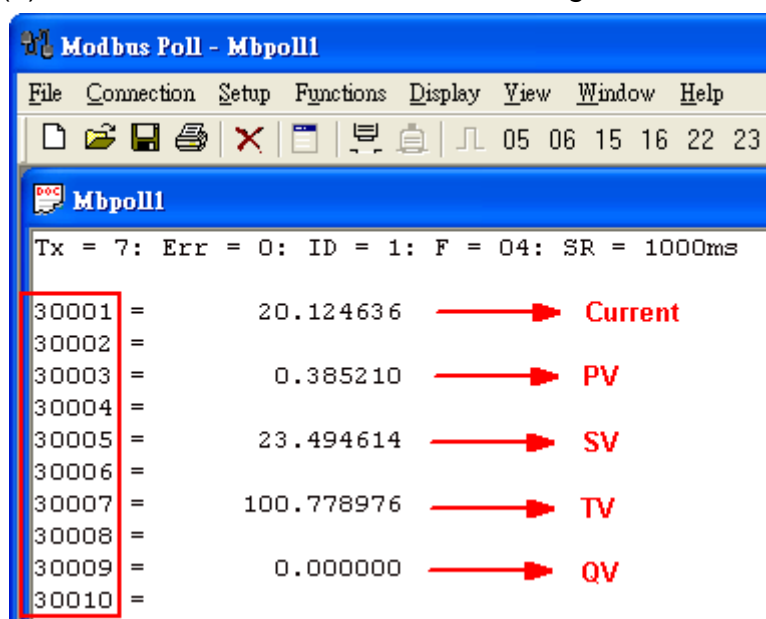
Figure 3-13 The CMD(3) data of HART device

[Note]

1. The simple CMD(3) data format and value are shown as below.

[Index]   [Format]   [Description]

Byte 00~03**:**   float   Primary Variable Current

Byte 04~07**:**   float   Primary Variable

Byte 08~11**:**   float   Secondary Variable

Byte 12~15**:**   float   Tertiary Variable

Byte 16~19**:**   float   4th Variable

The 30001 and 30002 registers mean "Primary Variable Current (20.124636)"

The 30003 and 30004 registers mean "Primary Variable (0.385210)"

The 30005 and 30006 registers mean "Secondary Variable (23.494614)"

The 30007 and 30008 registers mean "Tertiary Variable (100.778976)"

The 30009 and 30010 registers mean "4th Variable (0)"

Q04 : How to update the firmware of HRT-710 ?

A04:

[For HRT-710 hardware v1.1 or firmware v1.1 or below]

The firmware update function is not supported for users and please contact your local dealer.

[For HRT-710 hardware v1.2 and firmware v1.2 or newer]

The firmware update function is supported for users. Please follow the below steps.

(1) Download the newest firmware of HRT-710. (Download from

ftp://ftp.icpdas.com/pub/cd/fieldbus_cd/hart/gateway/hrt-710/firmware/)

(2) Turn off the power and open the shell of HRT-710. Then connect the pin 2 & 3 of JP5 together like Figure 4-1.
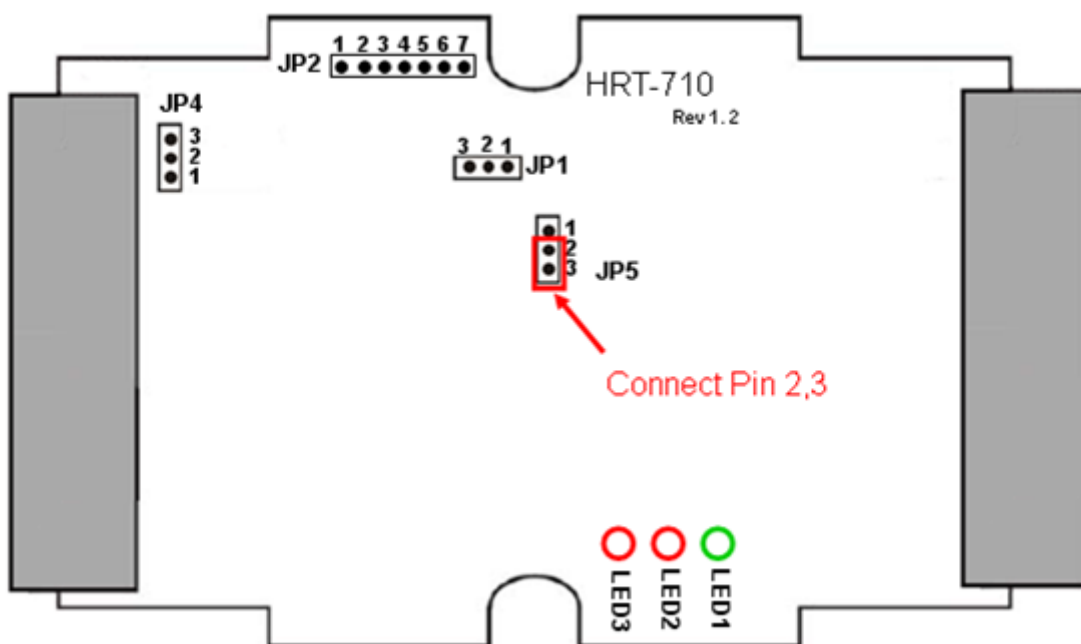
Figure 4-1 Connect pin 2 & 3 of JP5 together

(3) Connect RS-232 cable between PC and HRT-710 and turn on the power of HRT-710 (LED 1,2,3 will flash every second => Firmware Update Mode) like Figure 4-2.
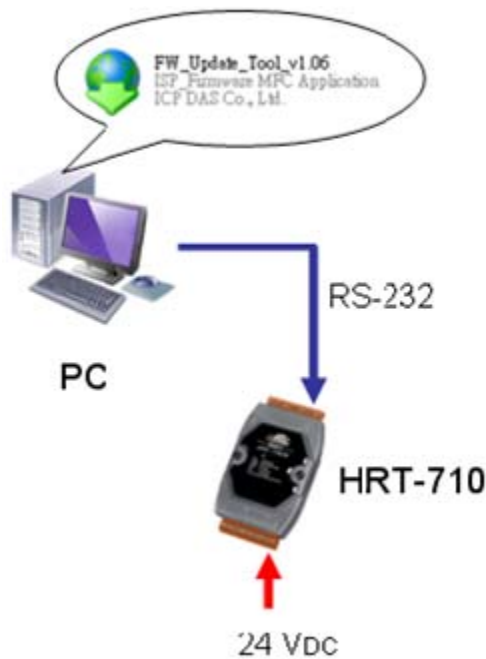
Figure 4-2 RS-232 Connection between PC and HRT-710

(4) Run "**FW_Update_Tool**" like Figure 4-3 (Download from **:**
ftp://ftp.icpdas.com/pub/cd/fieldbus_cd/hart/gateway/utilities/fw_tool/).

    [1] Choose "COM" option and select "Com Port number".

    [2] Click "Browser" button to choose the firmware of HRT-710.

    [3] Click "Firmware Update" button to start firmware update process.

    [4] Wait for "Firmware Update Success" message.
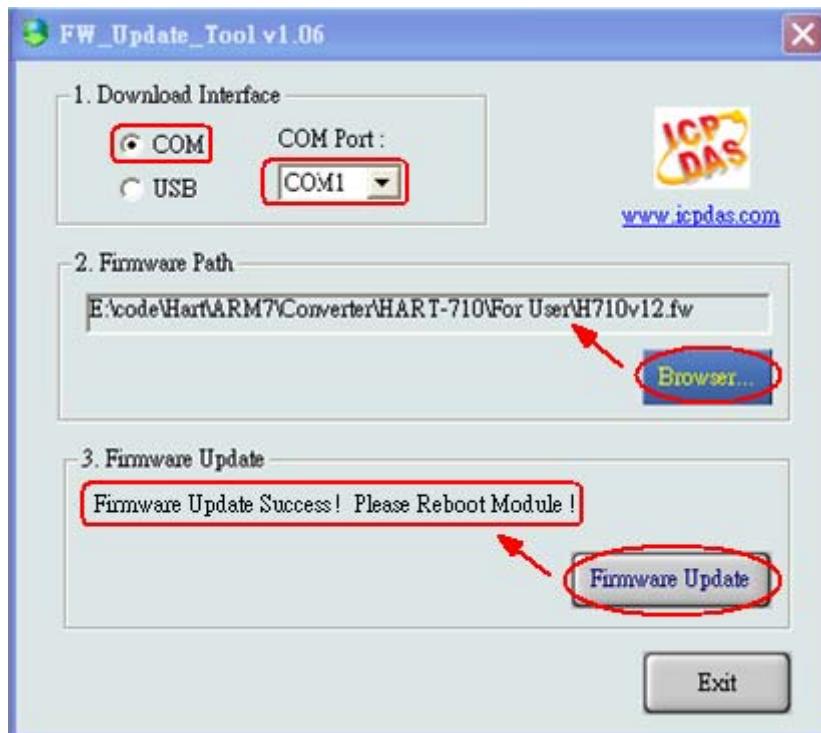
Figure 4-3 "FW_Update_Tool"

(5) Turn off the power and connect the pin 1 & 2 of JP5 together like Figure 4-4.
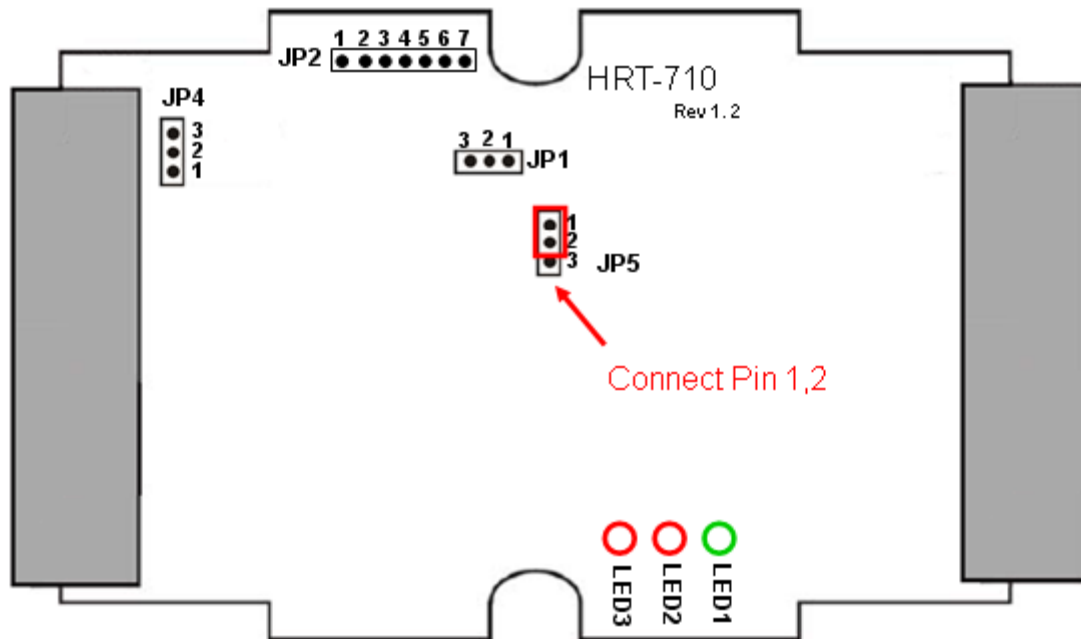
Figure 4-4 Connect pin 1 & 2 of JP5 together

(6) Close the shell and turn on the power of HRT-710. Then users can check the firmware version of HRT-710 by using "HG_Tool" like Figure 4-5.
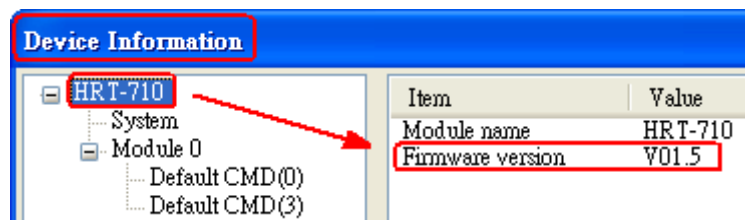
Figure 4-5 Firmware Version of HRT-710

Q05 : How to read HART device command 1 data with standard format by Modbus ?

A05:

(1) By using "HG_Tool" to add "User CMD(1)" of HART device and save settings to HRT-710. The Modbus start address and length of the "User CMD(1)" will show in the "**Cmd In address**" and "**Cmd In size**" field like Figure 5-1. In the example they are 0 and 7 (byte count=7 => word count=4).
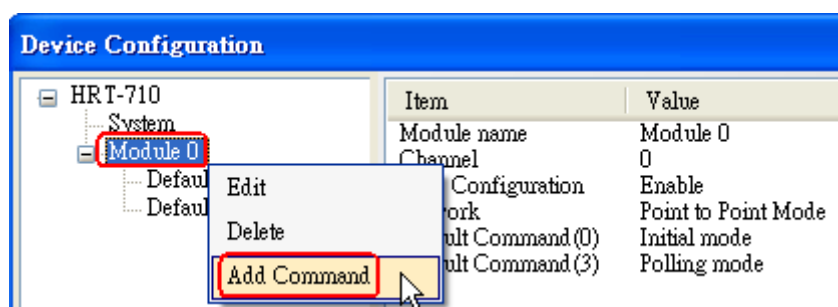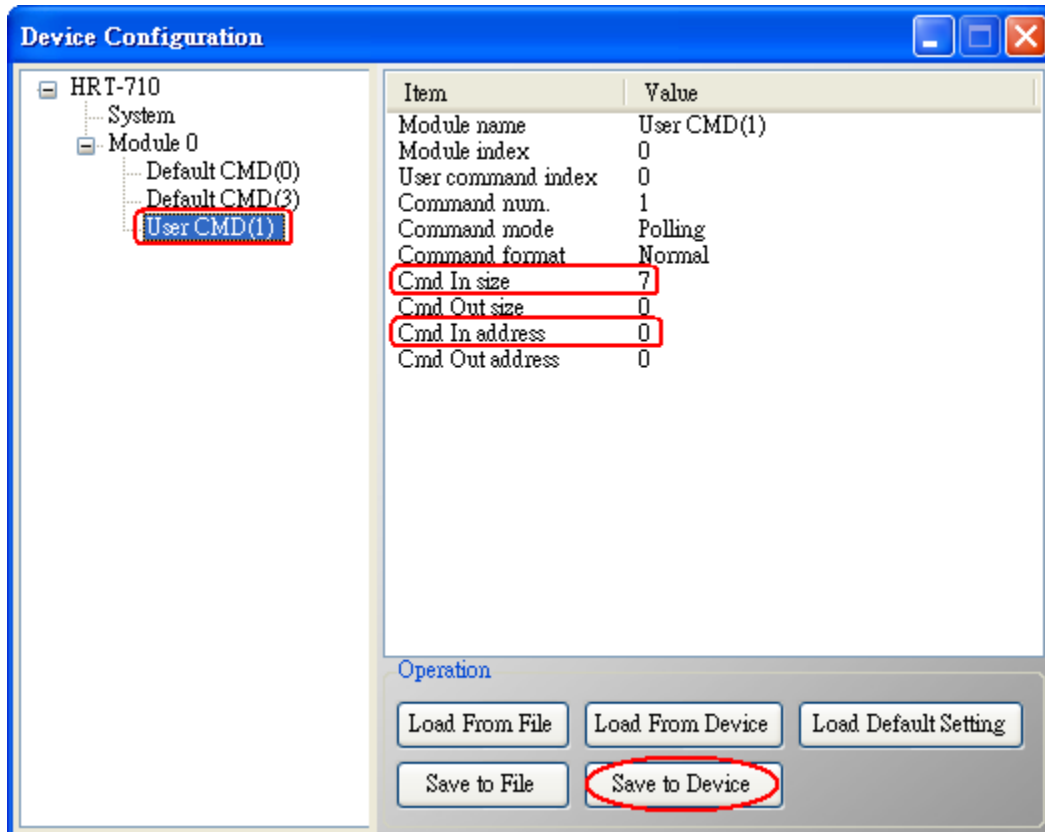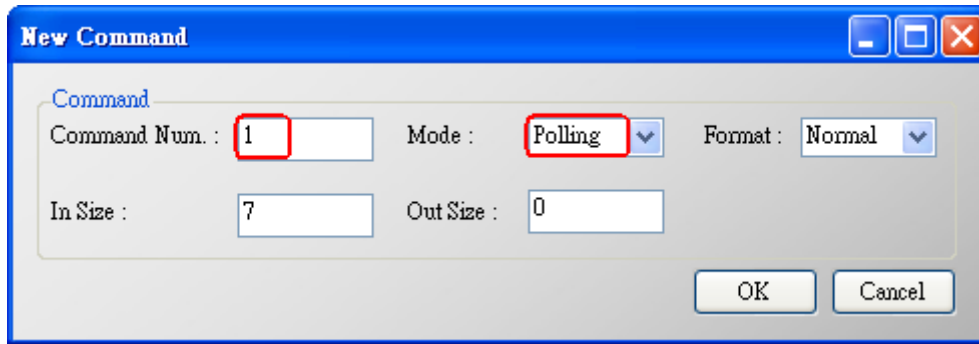
Figure 5-1 Add "User CMD(1)" of HART device to HRT-710

(2) The below demo will use the free **MB/RTU tool** provided by ICP DAS to show HART command 1 data. (Download from http://ftp.icpdas.com.tw/pub/cd/8000cd/napdos/modbus/modbus_utility/)

(3) Run "MB/RTU" tool. Set the com port settings the same with HART-710 (Baud Rate / Data Bits / Stop Bits / Parity) and then click "Open" button to connect to HRT-710 like Figure 5-2.

(4) Input "**1 4 0 0 0 4**" in "Command" field and click "Send Command" button to send the modbus command. The HART command 1 data will be received in "Responses" field => "**01 04 08 00 00 3E 0C 20 C5 00 A4 2A 94**" like Figure 5-2.

Send Modbus Command : **01 04 00 00 00 04 F1 C9**

Get Response : **01 04 08 00 00 3E 0C 20 C5 00 A4 2A 94**
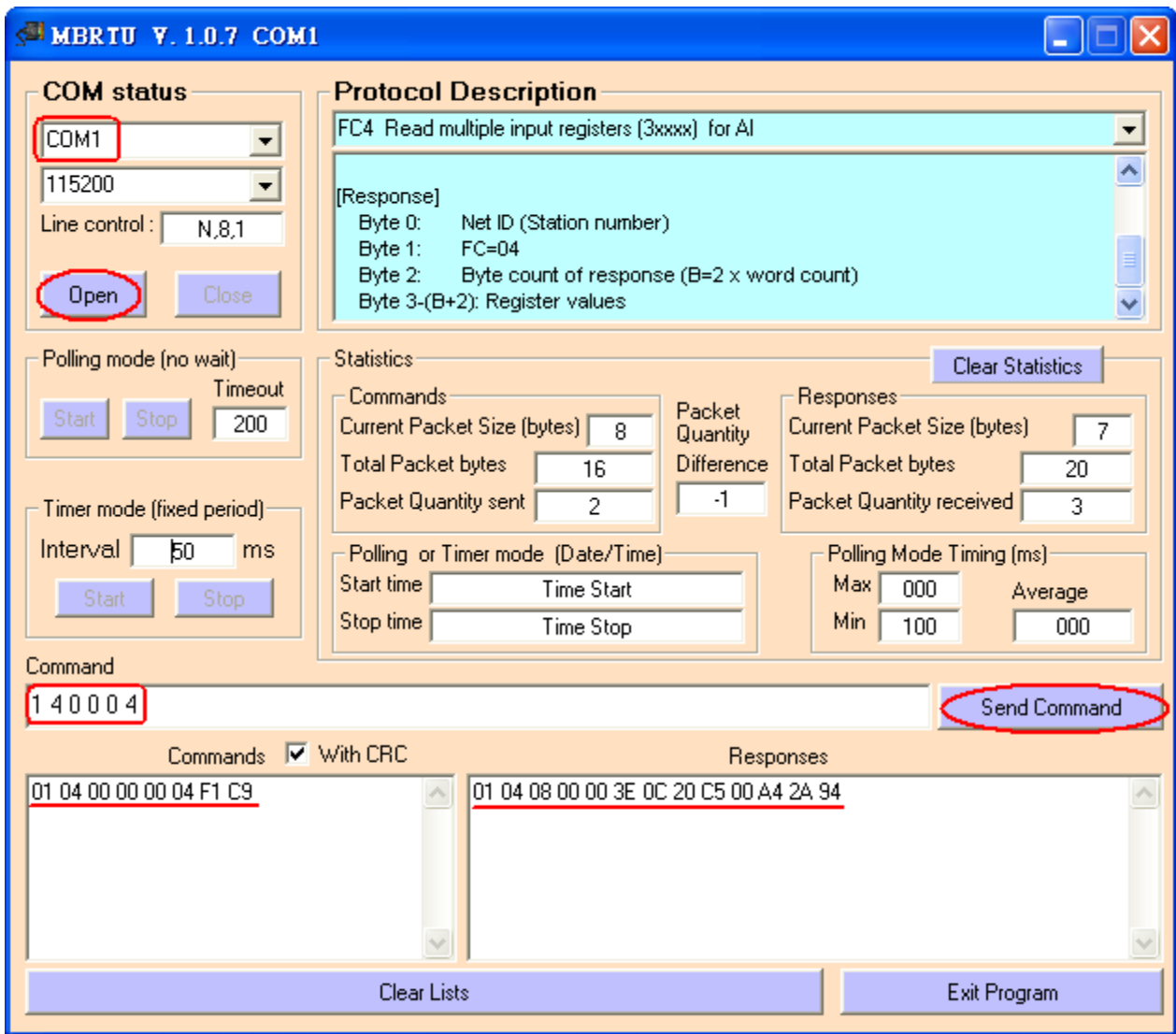
Figure 5-2 Receive HART Command 1 data

(5) Parse the modbus response data.

Response Data => 01 04 08 00 00 3E 0C 20 C5 00 A4 2A 94

Register data => 00 00 3E 0C 20 C5 00 A4

Because the unit of HART-710's database is byte and the unit of Modbus register is word and the Modbus register is composed of database's byte and the order is low byte first.

(For example: Modbus register0 = 0x3412, database byte0 = 0x12, byte1 = 0x34).

So we need to change the byte order.

So the data will be 00 00   0C 3E   C5 20   A4 00.

According to the data count is 7, so the actual data will be 00 00   0C   3E C5 20 A4

About the format of HART Command 1, it is shown as below.

Command 1: Read Primary Variable

Request data bytes: None

Response data bytes: 2+5 = 7

Index format description

Byte 0: uint8 Response code 1

Byte 1: uint8 Response code 2

Byte 2: uint8 Unit code

Byte 3~6: float Primary Variable

So the data of HART command 1 is parsed as below.

Response code1 = 0x00

Response code2 = 0x00

Primary Variable Unit code = 0x0C (kPA)

Primary Variable = 0x3E 0xC5 0x20 0xA4 (0.385 => IEEE754)

Q06 : How to read HART device command 3 data with standard format by Modbus ?

A06:

(1) When adding a new HART device to HRT-710, the "Default CMD(3)" will be added automatically. The Modbus <u>start address</u> and <u>length</u> of the "Default CMD(3)" will show in the "**Cmd In address**" and "**Cmd In size**" field like Figure 6-1. In the example they are 1236 (For MB Addr = 618 = 0x026A) and 26 (byte count=26 => word count=13).
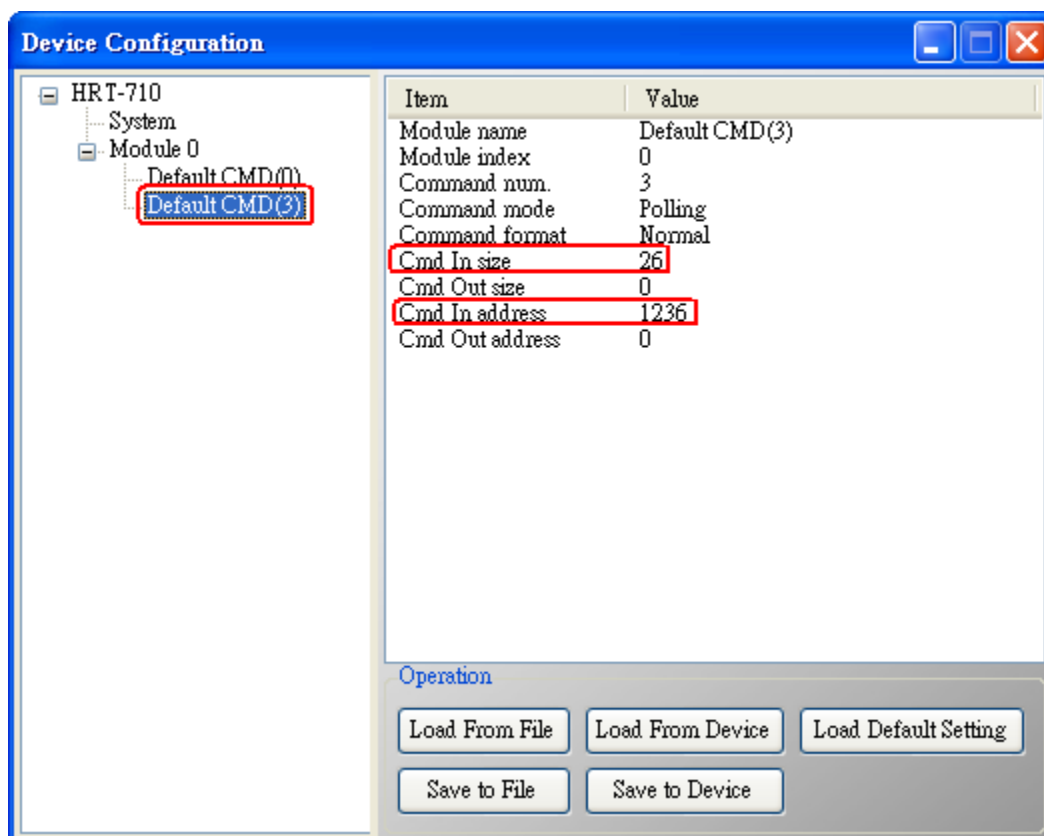
Figure 6-1 "Default CMD(3)" of HART device in HRT-710

(2) The below demo will use the free **MB/RTU tool** provided by ICP DAS to show HART command 1 data. (Download from

http://ftp.icpdas.com.tw/pub/cd/8000cd/napdos/modbus/modbus_utility/)

(3) Run "MB/RTU" tool. Set the com port settings the same with HART-710 (Baud Rate /

Data Bits / Stop Bits / Parity) and then click "Open" button to connect to HRT-710 like Figure 6-2.

(4) Input "**01 04 02 6A 00 0D**" in "Command" field and click "Send Command" button to send the modbus command. The HART command 3 data will be received in "Responses" field => "**01 04 1A 00 00 A1 41 22 01 3E 0C C5 C5 20 B0 B6 41 C0 78 42 39 91 C9 00 C5 00 00 00 00 E5 B0**" like Figure 6-2.

Send Modbus Command **: 01 04 02 6A 00 0D 10 6B**

Get Response **: 01 04 1A 00 00 A1 41 22 01 3E 0C C5 C5 20 B0 B6 41 C0 78 42 39 91 C9 00 C5 00 00 00 00 E5 B0**
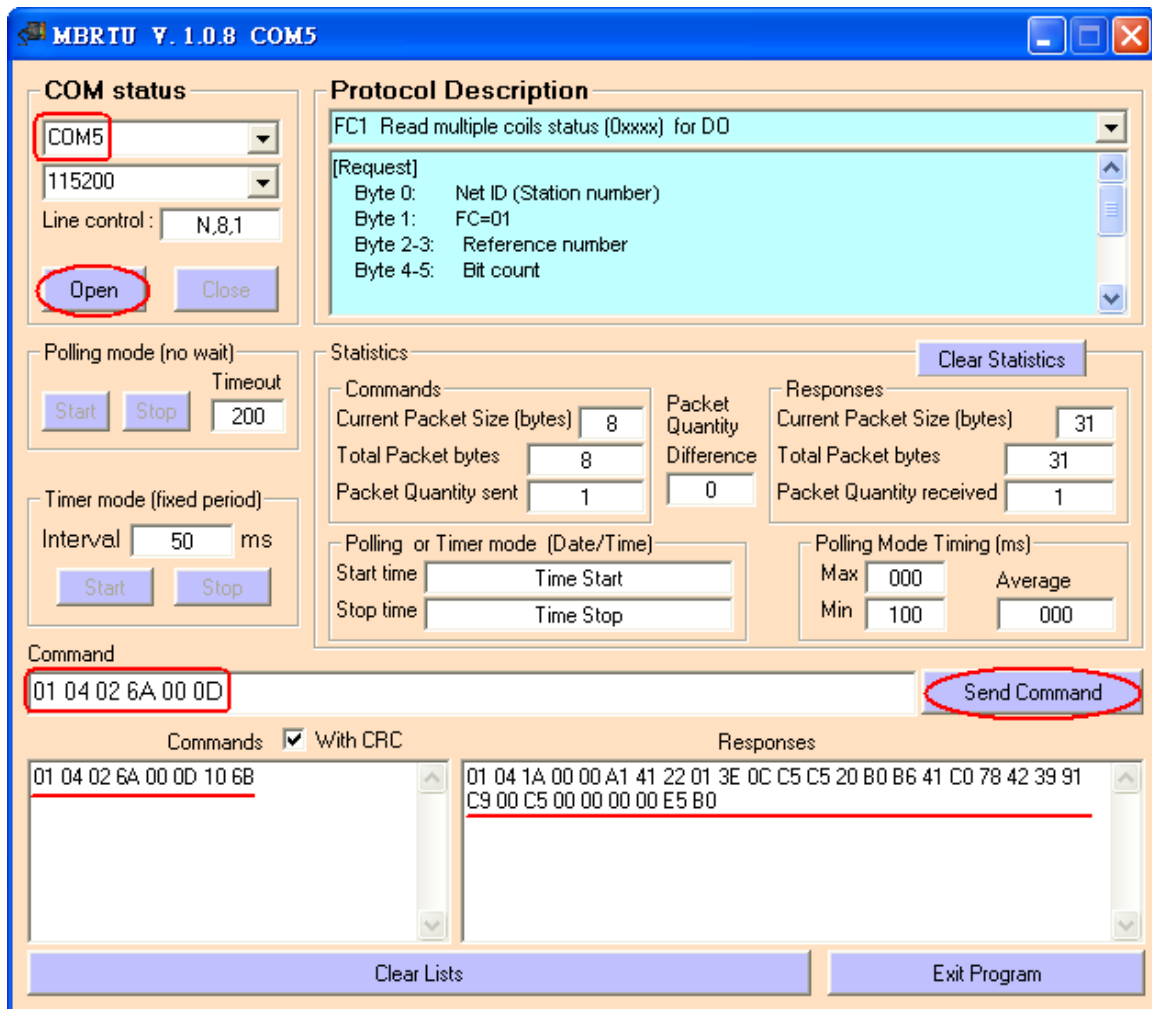

Figure 6-2 Receive HART Command 3 data

(5) Parse the modbus response data.

Response Data => 01 04 1A 00 00 A1 41 22 01 3E 0C C5 C5 20 B0 B6 41 C0 78 42 39 91 C9 00 C5 00 00 00 00 E5 B0

Register data =>

00 00 A1 41 22 01 3E 0C C5 C5 20 B0 B6 41 C0 78 42 39 91 C9 00 C5 00 00 00 00

Because the unit of HART-710's database is byte and the unit of Modbus register is word and the Modbus register is composed of database's byte and the order is low byte first.

(For example**:** Modbus register0 = 0x3412, database byte0 = 0x12, byte1 = 0x34).

So we need to change the byte order. So the data will be as below.

00 00 41 A1 01 22 0C 3E C5 C5 B0 20 41 B6 78 C0 39 42 C9 91 C5 00 00 00 00 00

About the format of HART Command 3, it is shown as below.

Command 3: Read Dynamic Variables and P.V. Current

Request data bytes**:** None

Response data bytes**:** 2+24 = 26

Index format description

Byte 2~5**:**   float Primary Variable Current

Byte 6**:**   uint8 Primary Variable Unit code

Byte 7~10**:**   float Primary Variable

Byte 11**:**   uint8 Secondary Variable Unit code

Byte 12~15**:** float Secondary Variable

Byte 16**:**   uint8 Tertiary Variable Unit code

Byte 17~20**:** float Tertiary Variable

So the data of HART command 3 is parsed as below.

Response code1 = 0x00

Response code2 = 0x00

Primary Variable Current = 0x41 0xA1 0x01 0x22 (20.125553)

Primary Variable Unit code = 0x0C (kPA)

Primary Variable = 0x3E 0xC5 0xC5 0xB0 (0.386274)

Secondary Variable Unit code = 0x20 (degC)

Secondary Variable = 0x41 0xB6 0x78 0xC0 (22.808960)

Tertiary Variable Unit code = 0x39 (Percent)

Tertiary Variable = 0x42 0xC9 0x91 0xC5 (100.784706)

4th Variable Unit code = 0x00 (???)

4th Variable = 0x00 0x00 0x00 0x00 (0)

2013-01-14