ICP DAS HRT-711 Modbus TCP to HART Gateway User Manual

User Manual
Version 1.15
2024/03/07
HRT-711

Contents

HRT-711 Modbus TCP to HART Gateway

Important Information

Warranty

All products manufactured by ICP DAS are under warranty regarding defective materials for a period of one year, beginning from the date of delivery to the original purchaser.

Warning

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Introduction

Modbus and HART are two kinds of famous protocols and used wildly in the fields of factory and process automation. The HRT-711 module is a Modbus/TCP and Modbus/UDP to HART gateway.

By using this module, users can integrate their HART devices into Modbus network easily. The below figure 1 shows an application example for the HRT-711 module.

1.1 Features

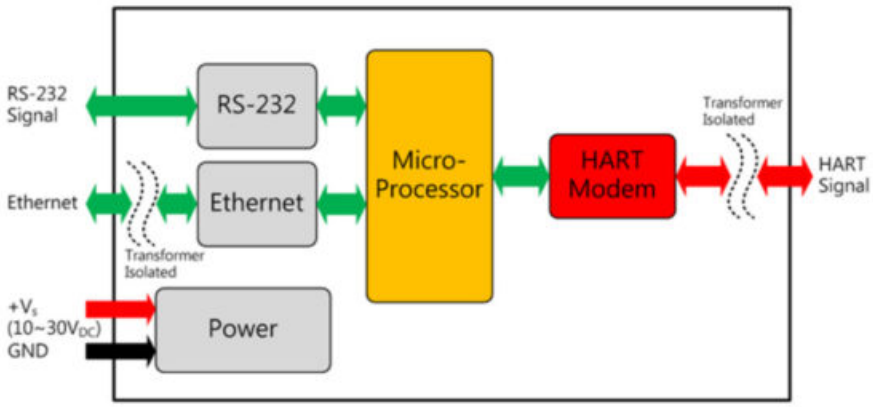
- Support HART Short/Long frame
- Support HART Burst mode
- Allow two HART Masters
- Support Modbus/TCP and Modbus/UDP format
- Support Modbus Slave / HART Master Mode
- Support Firmware Update via Com Port
- Support On-line Replacement of HART Devices
- Support Acquire Long Frame Address Automatically
- Provide LED indicators
- Built-in Watchdog
- DIN-Rail or Wall Mounting

1.2 Specification

Item	Specification		
Com Port	RS-232(3 wire)		
	Screwed terminal block		
	Fixed baud rate 115200 bps		
HART	1 HART Modem		
	Screwed terminal block		
	Operates as a HART Master station and supports all HART commands		
	Support Short and Long Frame		
	Support Point to Point or Multi-drop		
	Max. 15 HART modules		
	Max. 100 user commands and 32 default commands		
Ethernet	1 x 10/100Base-TX Ethernet Controller		
	RJ-45		
	Auto Negotiation		
	Auto MDIX		
Power	+10 ~ +30 VDC		
	Power reverse protection and Over-Voltage brown-out protection		
	Power Consumption 2 W		
Module	Dimensions: 72 mm x 121 mm x 35 mm (W x L x H)		
	Operating temperature: -25 ~ 75 ºC		
	Storage temperature: -30 ~ 85 ºC		
	Humidity: 5 ~ 95% RH, non-condensing		
	3 x LED indicators		
	ETH LED	Network Status	
	HART LED	HART Status	
	ERR LED	Error	

Hardware

2.1 Block Diagram



2.2 Pin Assignment

Pin Name	Group	Description
HART+	HART	Positive of HART
HART-		Negative of HART
+VS	Power Source	V+ of Power Supply(+10 ~ +30 VDC)
GND		GND of Power Supply
TXD	Configuration	Transmit Data of RS-232
RXD		Receive Data of RS-232
GND		GND of RS-232
E1	Modbus/TCP Modbus/UDP	Ethernet RJ45 connector for Modbus/TCP and Modbus/UDP

2.3 Wiring

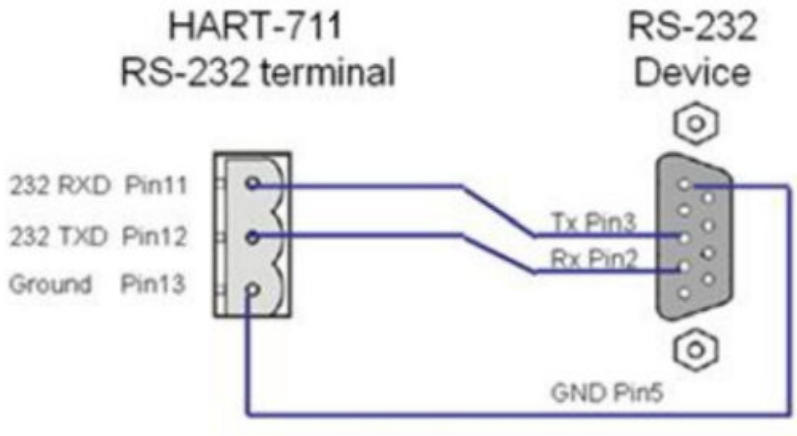
In this section, this user's manual will introduce the wiring for each interface.

2.3.1 RS-232

The RS-232 port of HRT-711 uses a 3-wire communication interface. It needs a unique cable, CA-0910, to wire from screwed terminal block to D-Sub 9pin connector. Users can choose between using CA-0910 for RS-232 wiring or directly connecting to D-Sub. 2.3.1.1 and 2.3.1.2 are the wiring for the RS-232 interface.

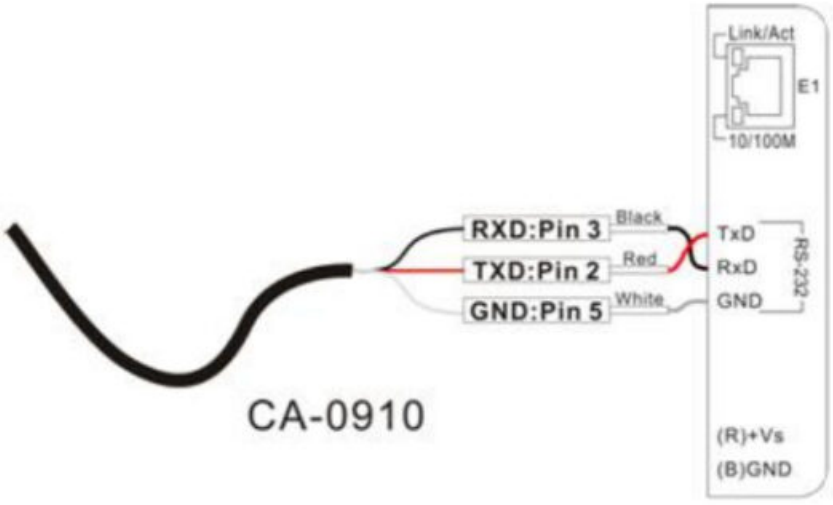
Without CA-0910

When users choose not to use CA-0910 for RS-232 wiring, users have to have a D-Sub 9pin connector to wire. The following figure is the wiring diagram for wiring without CA-0910.



With CA-0910

It is recommended that users use CA-0910 for wiring the RS-232 port. The wiring of CA-0910 and HRT-711 is shown as below.



2.3.2 HART

The wiring of HART bus can be classified to the below two types.

[1] “Point to Point” Mode

[2] “Multi-Drop” Mode

(1) “Point to Point” Mode :

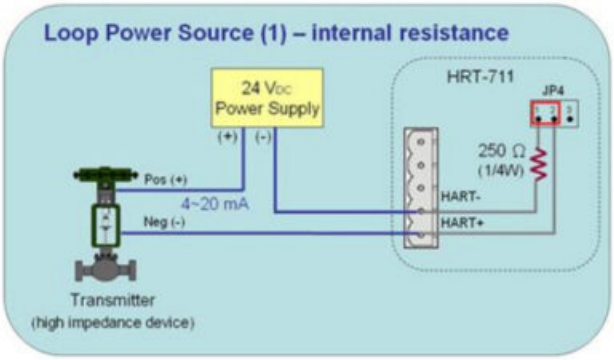


Fig 2.3.2-1 : "Point to Point" Mode (Loop Power (Passive) with internal resistor in HRT-711)

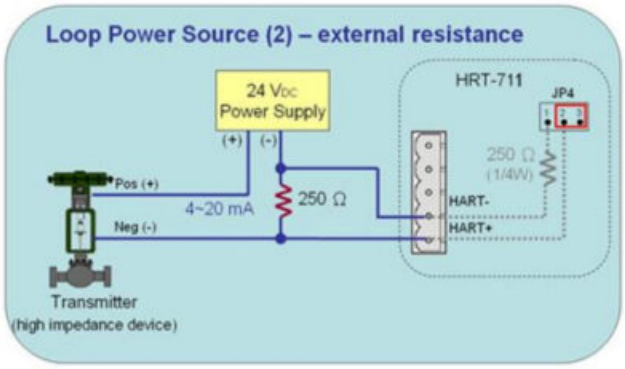


Fig 2.3.2-2 : "Point to Point" Mode (Loop Power (Passive) with external resistor)

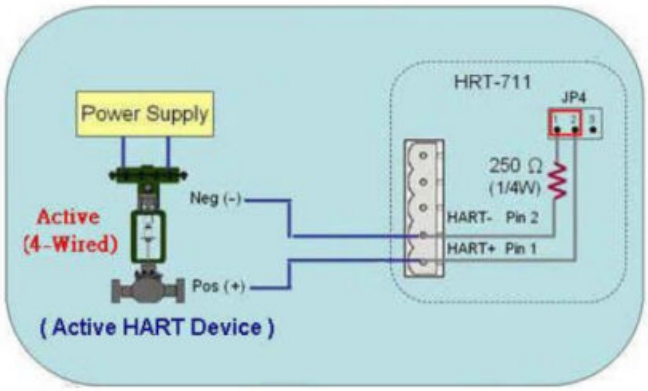


Fig 2.3.2-3 : "Point to Point" Mode (External Power (Active))

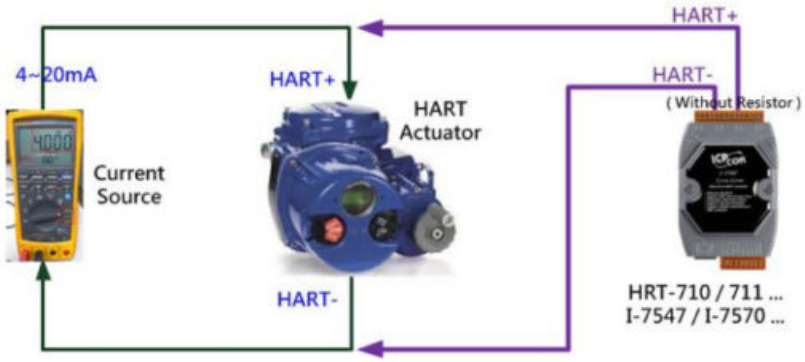


Fig 2.3.2-4 : "Point to Point" Mode (HART Actuator, without resistor)

(2) "Multi-Drop" Mode :

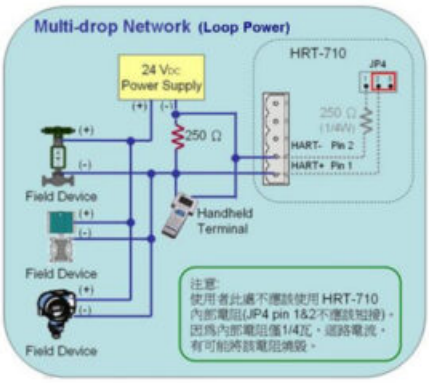


Fig 2.3.2-5 : "Multi-Drop" Mode (Loop Power (Passive))

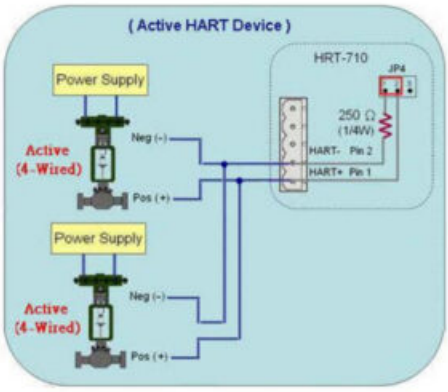


Fig 2.3.2-6 : "Multi-Drop" Mode (External Power (Active))

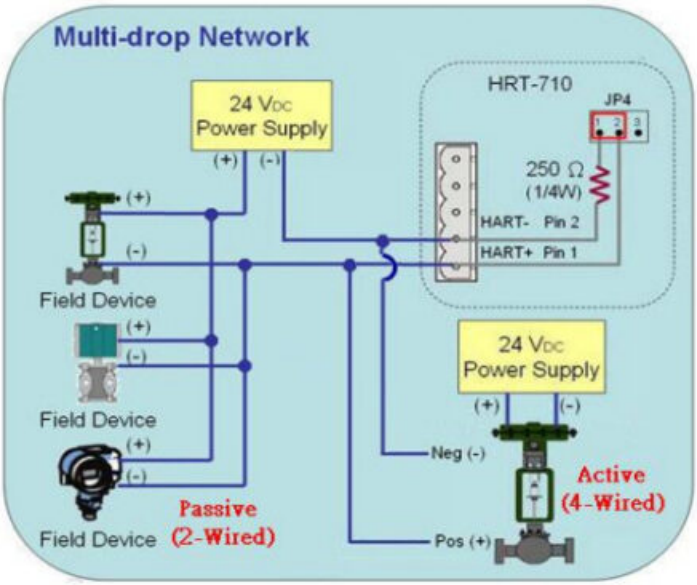


Fig 2.3.2-7 : "Multi-Drop" Mode (Loop Power(Passive) and External Power (Active))

2.3.3 Ethernet

The wiring for Ethernet is directly connecting your RJ-45 Ethernet cable to the RJ-45 port on the HRT-711.

2.4 LED Indicators

The HRT-711 provides three LED indicators to indicate the module status. The descriptions are shown as follow.

LED	Status	Description
ETH	Blink	Blink every 0.2 second Receiving Ethernet packet Blink every 3 second The network function is normal
	Off	Ethernet Error
HART	Blink	Blink every 1 second: The HRT-711 is in the initialing procedure Blink every 0.5 second: The HRT-711 is handling the burst frame sent from HART device
	Solid	The HRT-711 is in the normal status
	Off	Firmware is not loaded
ERR	Blink	HART communication error
	Off	HART communication is good

2.5 DIP Switch

The DIP switch is used for switching the mode between Init and Normal. The switch is located on the back of the module. On the init side, the module can be configured through Utility. On the normal side, the module is a gateway between HART and Modbus/TCP, Modbus/UDP protocol.

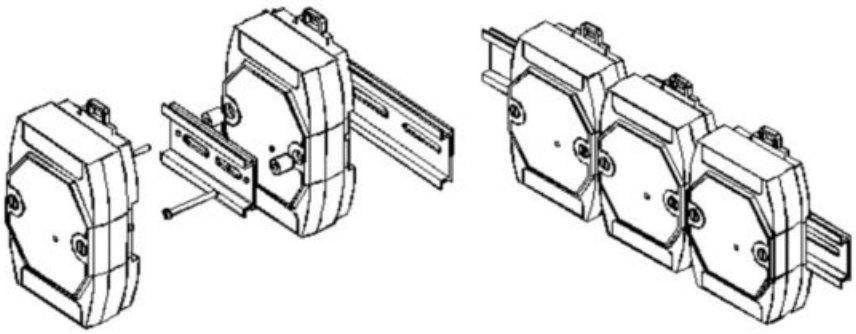
Users have to power cycle the module when switch to different mode.

2.6 Jumpers

There are three jumpers for enabling/disabling function. The description for each jumper is shown as following table.

Jumper	Description
JP2	(1) Position 1 & 2 : Enable hardware WDT. (Default setting) (2) Position 2 & 3 : Firmware Update Mode. (JP3 should be also in the 2 & 3)
JP3	(1) Position 1 & 2 : Firmware Operation Mode. (Default setting) (2) Position 2 & 3 : Firmware Update Mode. (JP2 should be also in the 2 & 3) => The detailed steps of Firmware Update, please refer to the Q04 of FAQ.
JP4	The jumper can provide HART bus with 250 Ω (1/4 W) resistor. When the pin 1&2 of of JP4 is clo sed, the resistor will connect to HART bus. When the pin 2&3 of JP4 is closed or JP4 without jum per connected, it will disconnect the resistor from HART bus. By default, the pin1&2 of JP4 is clos ed. Please refer to section 2.3.2.

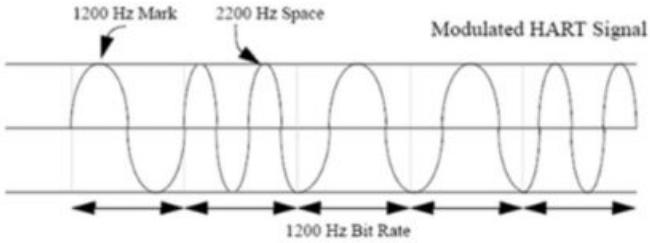
2.7 Mounting



HART Introduction

3.1 Analog and Digital Signal

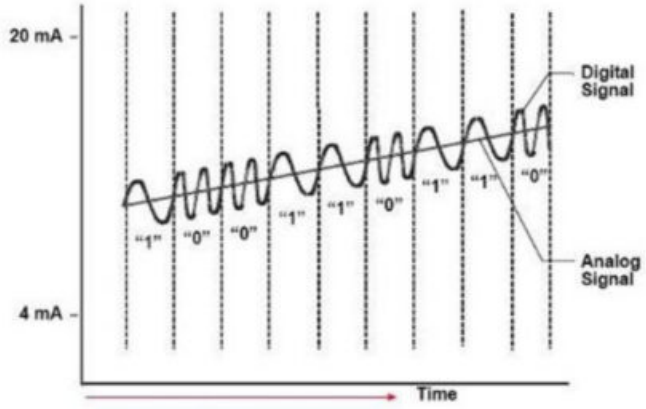
The HART communication protocol is based on the Bell 202 telephone communication standard and operates using the frequency shift keying (FSK, Figure 14) principle. The digital signal is made up of two frequencies – 1,200 Hz and 2,200 Hz representing bits 1 and 0, respectively. Sine waves of these two frequencies are superimposed on the direct current (dc) analog signal cables to provide simultaneous analog and digital communications.



Frequency-Shift-Keying

1200 Hz : 1

2200 Hz : 0

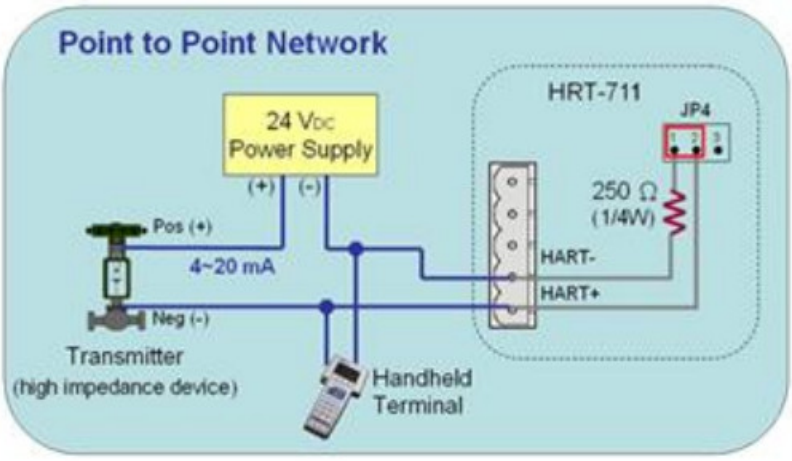


3.2 Topology

HART bus can operate in one of the two network configurartions, point to point and multi-drop.

Point to Point

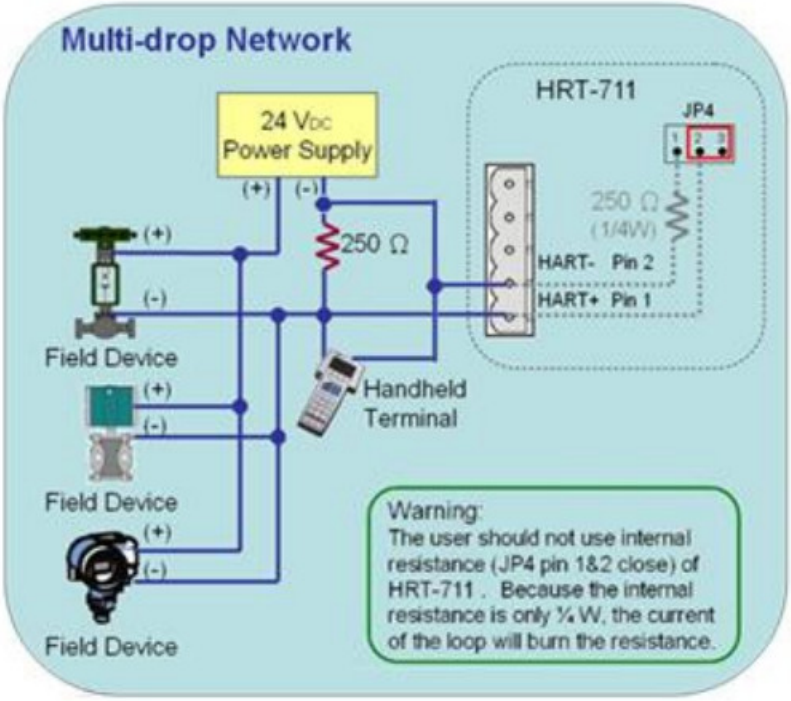
In point to point mode, the analog signal is used to communicate one process variable and the digital signal gives access to secondary variables and other data that can be used for operations, commissioning, maintenance and diagnostic purposes. Only one HART slave device can exist in HART bus and the polling address must be zero.



Multi-drop

In multi-drop mode, all process values are transmitted digitally. The polling address of all field devices must be bigger than 0 and between 1 ~ 15. The current through each device is fixed to a minimum value (typically 4 mA). The maximum HART device number in HART bus is up to 15.

NOTE The built-in resistor in HRT-711 is 250 Ohm with 1/4W. Therefore, HRT-711 supports to connect the maximum 7 HART devices simultaneously. If the HART devices in multi-drop mode are more than 7, then users need to disconnect the built-in resistor in HRT-711 (prevent to burn down) and use an external 250 Ohm resistor with 1W.



3.3 HART Frame

The HART frame format is shown as below.

Preamble	Delimiter	Address	Command	Byte Count	[Data]	Check Byte

Master to Slave Frame

Slave to Master Frame

Preamble	Delimiter	Address	Command	Byte Count	Response Code	[Data]	Check Byte

<table>
<tr><th>Field</th><th>Description</th></tr>
<tr><td>Preamble</td><td>All frames transmitted by HART master or slave devices are preceded by a specified number of “0xFF” characters and they are called the preamble. The number of preamble can’t be less than 5 and more than 20</td></tr>
<tr><td>Delimiter</td><td>This data can indicate the frame is long or short frame and the frame is master frame, slave fra me or burst frame.</td></tr>
<tr><td>Address</td><td>If the HART frame is short frame, the address field is only one byte. If it is long frame, the addre ss field are 5 bytes and include manufacturer ID, device type and device ID.</td></tr>
<tr><td>Command</td><td>The HART command set can be devided into Universal, Common Practice and Device-Speific cl ass. These three class shown as below
<table>
<tr><td>Command Number</td><td>Command Class</td></tr>
<tr><td>Universal</td><td>0~30, 31 is reserved</td></tr>
<tr><td>Common Practice</td><td>32~126, 127 is reserved</td></tr>
<tr><td>Device-Specific</td><td>128~253</td></tr>
<tr><td>Reserved</td><td>254 & 255</td></tr>
</table>
Please refer to Appendix A for more detail of HART command</td></tr>
<tr><td>Byte Count</td><td>It is the number of bytes between it and the check byte the end of the HART frame.</td></tr>
<tr><td>Response C ode</td><td>It includes two bytes of status. These bytes convey three types of information: Communication e rrors, Command response problems and Field device status. They are shown as below.
<table>
<tr><td>Response Code Data</td><td>Byte1</td><td>Byte0</td></tr>
</table>
NOTE When first byte shows the communication error, the value of the second byte is 0
<table>
<tr><td colspan="8">Byte 0 represents the communication error or response code</td></tr>
<tr><td colspan="8">This byte is used for error status when Bit7 is 1. The status bits are shown as follow</td></tr>
<tr><td>Bit7</td><td>Bit6</td><td>Bit5</td><td>Bit4</td><td>Bit3</td><td>Bit2</td><td>Bit1</td><td>Bit0</td></tr>
</table></td></tr>
</table>

<table>
<tr><th>Field</th><th>Description</th></tr>
<tr><td></td><td>
<table>
<tr><td>1</td><td>Pari ty E rror</td><td>Overru n err or</td><td>Framin g E rror</td><td>Checksu m e rror</td><td>0(Reserved)</td><td>RX buffer o verflow</td><td>Overflow (Undefin e)</td></tr>
<tr><td colspan="8">This byte is used for response code when Bit7 is 0.</td></tr>
<tr><td>Bit 7</td><td>Bit6</td><td>Bit5</td><td>Bit4</td><td>Bit3</td><td>Bit2</td><td>Bit1</td><td>Bit0</td></tr>
<tr><td>0</td><td colspan="7">Response Code</td></tr>
</table>
</td></tr>
</table>

Response Code	Description
0	No command-specific error
1	Undefined
2	Invalid selection
3	Passed parameter too large
4	Passed parameter too small
5	Too few data bytes received
6	Device-specific command error (rarely used)
7	In write-protect mode
8-15	Multiple meanings
16	Access restricted
28	Multiple meanings
32	Device is busy
64	Command not implemented

Byte 1 indicates field device status	
Bit 7	Field device malfunction
Bit 6	Configuration changed
Bit 5	Cold start
Bit 4	More status available
Bit 3	Analog output current fixed
Bit 2	Analog output saturated
Bit 1	Non-primary variable out of limits
Bit 0	Primary variable out of limits

Data	The contents of the data are decided by HART command number.
Check Byte	Every HART frame has a check byte at the last data byte. HART device can detect error frame by this byte.

Modbus Communication

4.1 Module Execution Process

When the HRT-711 module is started, it will perform the Initial mode first and then the Operation mode.
(1) When HRT-711 runs under Initial mode, it will execute all initial command and the HART LED will flash.
(2) When HRT-711 runs under Operation mode, it will execute all polling command automatically and the HART LED will always on.

4.2 Modbus / HART Mapping Table

Users can access the HART device by using these Modbus address defined by HRT-711 module.
These Modbus address can be divided into two parts as below.
(1) Input Data Area (FC04)
(2) Output Data Area (FC06, FC16)
[**Note**] The meaning of every Modbus address in the below table is based on the setting of SWAP Mode to be None. If the setting of SWAP Mode is Byte or WORD or W&B, then the meaning of every Modbus address in the below table will be moved one byte or word address

4.2.1 Input Data Area User CMD Data

Modbus Addr (Hexadecimal)	Modbus Addr (Decimal)	Description
0x0~1F3	0~499	User CMD Data

4.2.2 Input Data Area Module State Data

<table>
<tr><th>Modbus Addr (Hexadecimal)</th><th>Modbus Addr (Decimal)</th><th>Description</th></tr>
<tr><td>0x1F4</td><td>500</td><td><table><tr><td>High Byte</td><td>Low Byte</td></tr><tr><td>Module request command count(2)</td><td>Module state machine(1)</td></tr></table></td></tr>
<tr><td>0x1F5</td><td>501</td><td><table><tr><td>High Byte</td><td>Low Byte</td></tr><tr><td>Module receive errorcommand count(2)</td><td>Module receive command count(2)</td></tr></table></td></tr>
<tr><td>0x1F6
0x1F7~1F9</td><td>502
503~505</td><td><table><tr><td>High Byte</td><td>Low Byte</td></tr><tr><td>Module error command index (4)</td><td>Module error status(3)</td></tr></table>Reserved</td></tr>
</table>

NOTE 1 The module state machine represents current state of command handling. The meanings of the states are shown in the following table.

Value	Status
0	Idle
1	Waiting to send HART command
2	Sending HART command.
3	Waiting to receive HART data
4	Receiving HART data.

NOTE 2 In HRT-711, the module request and receive command and error count are used 1 byte respectively.

Each request, receive or error will increase this byte until 256, then the value will start from 0 again.
NOTE 3 The module error status records the latest error status. The status is shown as following table.

Value	Error Status
0	No error
1	The command has never be executed
2	Receive timeout, can’t receive any HART data
3	Receive HART data is too short
4	The delimiter of HART data has some error
5	The address (the bit of master type) of HART data has some error
6	The address (the bit of burst mode) of HART data has some error
7	The command of HART data has some error
8	The parity of HART data has error
9	The communication with HART slave device has some error and the error messages are record ed in the responses codes

NOTE 4 The module command index records the latest command index. There is no error occur when this byte is 255.

4.2.3 Input Data Area Default CMD 0 Data

The HRT-711 will automatically add two default commands, CMD 0 and CMD 3, when add a HART device. The following table represents the default CMD 0 data Modbus address mapping.

Modbus Addr (Hexadecimal)	Modbus Addr (Decimal)	Description
0x1FA~200	506~512	Default CMD 0 input data of Module 0
0x201~207	513~519	Default CMD 0 input data of Module 1
0x208~20E	520~526	Default CMD 0 input data of Module 2
0x20F~215	527~533	Default CMD 0 input data of Module 3
0x216~21C	534~540	Default CMD 0 input data of Module 4
0x21D~223	541~547	Default CMD 0 input data of Module 5
0x224~22A	548~554	Default CMD 0 input data of Module 6
0x22B~231	555~561	Default CMD 0 input data of Module 7
0x232~238	562~568	Default CMD 0 input data of Module 8
0x239~23F	569~575	Default CMD 0 input data of Module 9
0x240~246	576~582	Default CMD 0 input data of Module 10
0x247~24D	583~589	Default CMD 0 input data of Module 11
0x24E~254	590~596	Default CMD 0 input data of Module 12
0x255~25B	597~603	Default CMD 0 input data of Module 13
0x25C~262	604~610	Default CMD 0 input data of Module 14
0x263~269	611~617	Default CMD 0 input data of Module 15

4.2.4 Input Data Area Default CMD 3 Normal Format Data

When configure HRT-711 default CMD 3 to normal format, the data of Modbus address for each HART device is shown as following table.

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4
Unit	Primary Variable of HART device (In IEEE 754 format)			
Byte 5	Byte 6	Byte 7	Byte 8	Byte 9
Unit	Secondary Variable of HART device (In IEEE 754 format)			
Byte 10	Byte 11	Byte 12	Byte 13	Byte 14
Unit	Tertiary Variable of HART device (In IEEE 754 format)			
Byte 15	Byte 16	Byte 17	Byte 18	Byte 19
Unit	Quaternary Variable of HART device (In IEEE 754 format)			

Modbus Addr (Hexadecimal)	Modbus Addr (Decimal)	Description
0x26A~276	618~630	Default CMD 3 Normal Format Data of Module 0
0x277~283	631~643	Default CMD 3 Normal Format Data of Module 1
0x284~290	644~656	Default CMD 3 Normal Format Data of Module 2
0x291~29D	657~669	Default CMD 3 Normal Format Data of Module 3
0x29E~2AA	670~682	Default CMD 3 Normal Format Data of Module 4
0x2AB~2B7	683~695	Default CMD 3 Normal Format Data of Module 5
0x2B8~2C4	696~708	Default CMD 3 Normal Format Data of Module 6
0x2C5~2D1	709~721	Default CMD 3 Normal Format Data of Module 7
0x2D2~2DE	722~734	Default CMD 3 Normal Format Data of Module 8
0x2DF~2EB	735~747	Default CMD 3 Normal Format Data of Module 9
0x2EC~2F8	748~760	Default CMD 3 Normal Format Data of Module 10
0x2F9~305	761~773	Default CMD 3 Normal Format Data of Module 11
0x306~312	774~786	Default CMD 3 Normal Format Data of Module 12
0x313~31F	787~799	Default CMD 3 Normal Format Data of Module 13
0x320~32C	800~812	Default CMD 3 Normal Format Data of Module 14
0x32D~339	813~825	Default CMD 3 Normal Format Data of Module 15

4.2.5 Input Data Area Module Error Record Data

The HRT-711 records the latest 3 error when HART communication has error. These 3 records are put in the module error record. The format of each record is shown as following table.

Byte 0	The length of send data
Byte 1~53	The record of send data
Byte 54	The length of receive data
Byte 55~109	The record of receive data
Byte 110~113	The time stamp record
Byte 114~115	Reserved

Modbus Addr (Hexadecimal)	**Modbus Addr (Decimal)**	**Description**
0x33A~373	826~883	Module Error Record 1
0x374~3AD	884~941	Module Error Record 2
0x3AE~3E7	942~999	Module Error Record 3

4.2.6 Input Data Area Default CMD 0&3 Status Data

It consists of two bytes. The first byte is the state of Default CMD 0 and the second byte is the state of Default CMD 3.

Ex: If the value is 0x0100 for the MB address 1000, then the low byte of the 1000 is 0x00 and the high byte of the 1000 is 0x01. It means the error status of Default CMD 0 is 0x00 and the error status of Default CMD 3 is 0x01 in Module 0.

High Byte	Low Byte
CMD 3 Status	CMD 0 Status

Modbus Addr (Hexadecimal)	Modbus Addr (Decimal)	Description
0x3E8	1000	Default CMD 0&3 status of Module 0
0x3E9	1001	Default CMD 0&3 status of Module 1
0x3EA	1002	Default CMD 0&3 status of Module 2
0x3EB	1003	Default CMD 0&3 status of Module 3
0x3EC	1004	Default CMD 0&3 status of Module 4
0x3ED	1005	Default CMD 0&3 status of Module 5
0x3EE	1006	Default CMD 0&3 status of Module 6
0x3EF	1007	Default CMD 0&3 status of Module 7
0x3F0	1008	Default CMD 0&3 status of Module 8
0x3F1	1009	Default CMD 0&3 status of Module 9
0x3F2	1010	Default CMD 0&3 status of Module 10
0x3F3	1011	Default CMD 0&3 status of Module 11
0x3F4	1012	Default CMD 0&3 status of Module 12
0x3F5	1013	Default CMD 0&3 status of Module 13
0x3F6	1014	Default CMD 0&3 status of Module 14
0x3F7	1015	Default CMD 0&3 status of Module 15
0x3F8~419	1016~1049	Reserved

4.2.7 Input Data Area User CMD Error Status

The HRT-711 supports maximum 100 User CMDs. The index of the User CMD is from 0 to 99. Each Modbus address represents two User CMD statuses.
Ex: If the value is 0x0200 for the MB address 1050, then the low byte of the 1050 is 0x00 and the high byte of the 1050 is 0x02. It means the error status of User CMD Index 0 is 0x00 and the error status of User CMD Index 1 is 0x02.

Modbus Addr (Hexadecimal)	Modbus Addr (Decimal)	Description
0x41A~44B	1050~1099	User CMD Index 0~99 error status

4.2.8 Input Data Area Module Hardware Data

Modbus Addr (Hexadecimal)	Modbus Addr (Decimal)	Description
0x44C~44D	1100~1101	Module ID (An ASCII value to represent HART)
0x44E~455	1102~1109	Module Name (An ASCII value to represent the 16-byte module name)
0x456~459	1110~1113	Module Firmware Version (An ASCII value to represent the 8-byte firmware version)
0x45A~47D	1114~1149	Reserved

4.2.9 Input Data Area Through Mode Data

<table>
<tr><th>Modbus Addr (Hexadecimal)</th><th>Modbus Addr (Decimal)</th><th>Description</th></tr>
<tr><td>0x47E</td><td>1150</td><td><table><tr><td>High Byte</td><td>Low Byte</td></tr><tr><td>Receive count in through mode</td><td>Send count in through mode</td></tr></table></td></tr>
<tr><td>0x47F</td><td>1151</td><td><table><tr><td>High Byte</td><td>Low Byte</td></tr><tr><td>Reserved</td><td>Receive error count in through mode</td></tr></table></td></tr>
<tr><td>0x480</td><td>1152</td><td>Receive length in through mode</td></tr>
<tr><td>0x481~50E</td><td>1153~1294</td><td>Receive data in through mode</td></tr>
<tr><td>0x50F~513</td><td>1295~1299</td><td>Reserved</td></tr>
</table>

4.2.10 Input Data Area Default CMD 3 Simple Format Data

When configure HRT-711 default CMD 3 to simple format, the data of Modbus address for each HART device is shown as following table.

Byte 0	Byte 1	Byte 2	Byte 3
Primary Variable of HART device (In IEEE 754 format)			
Byte 4	Byte 5	Byte 6	Byte 7
Secondary Variable of HART device (In IEEE 754 format)			

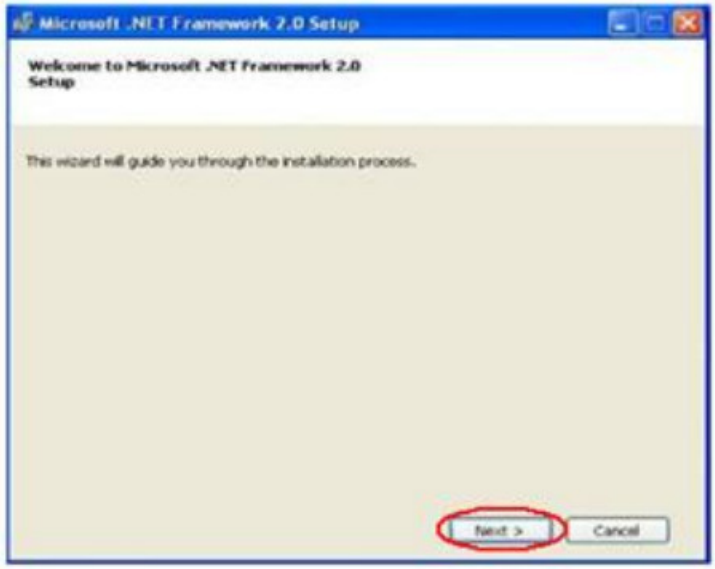
Byte 8	Byte 9	Byte 10	Byte 11
Tertiary Variable of HART device (In IEEE 754 format)			
Byte 12	Byte 13	Byte 14	Byte 15
Quaternary Variable of HART device (In IEEE 754 format)			

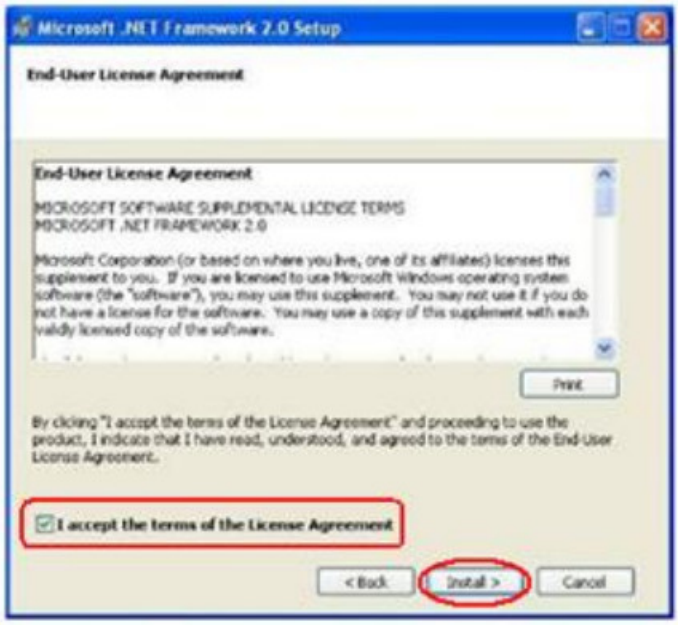
Modbus Addr (Hexadecimal)	**Modbus Addr (Decimal)**	**Description**
0x514~51D	1300~1309	Default CMD 3 Simple Format data of Module 0
0x51E~527	1310~1319	Default CMD 3 Simple Format data of Module 1
0x528~531	1320~1329	Default CMD 3 Simple Format data of Module 2
0x532~53B	1330~1339	Default CMD 3 Simple Format data of Module 3
0x53C~545	1340~1349	Default CMD 3 Simple Format data of Module 4
0x546~54F	1350~1359	Default CMD 3 Simple Format data of Module 5
0x550~559	1360~1369	Default CMD 3 Simple Format data of Module 6
0x55A~563	1370~1379	Default CMD 3 Simple Format data of Module 7
0x564~56D	1380~1389	Default CMD 3 Simple Format data of Module 8
0x56E~577	1390~1399	Default CMD 3 Simple Format data of Module 9
0x578~581	1400~1409	Default CMD 3 Simple Format data of Module 10
0x582~58B	1410~1419	Default CMD 3 Simple Format data of Module 11
0x58C~595	1420~1429	Default CMD 3 Simple Format data of Module 12
0x596~59F	1430~1439	Default CMD 3 Simple Format data of Module 13
0x5A0~5A9	1440~1449	Default CMD 3 Simple Format data of Module 14
0x5AA~5B3	1450~1459	Default CMD 3 Simple Format data of Module 15

4.2.11 Output Data Area

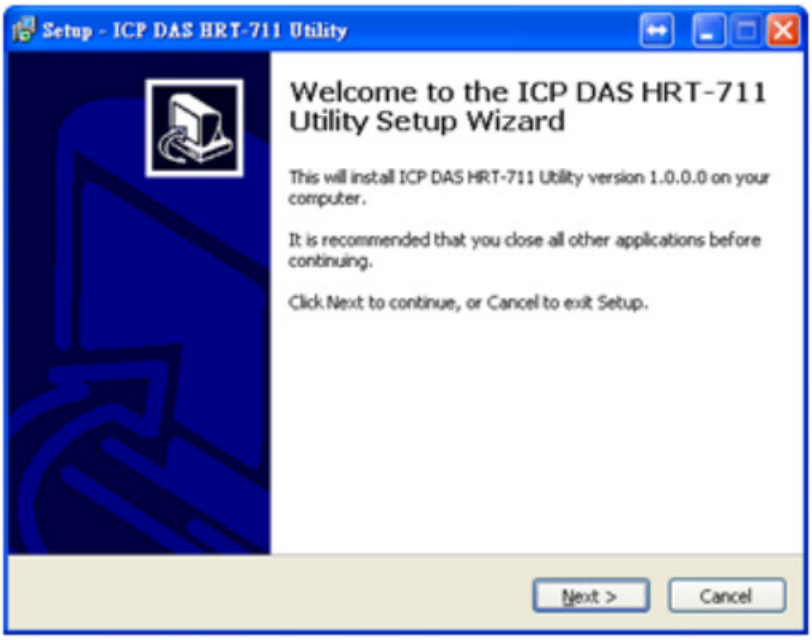
<table>
<tr><th>Modbus Addr (Hexadecimal)</th><th>Modbus Addr (Decimal)</th><th>Description</th></tr>
<tr><td>0x0~1F3</td><td>0~499</td><td>User command</td></tr>
<tr><td>0x1F4</td><td>500</td><td><table><tr><td>High Byte</td><td>Low Byte</td></tr><tr><td>Reserved</td><td>Reset module state function(1)</td></tr></table></td></tr>
<tr><td>0x1F5</td><td>501</td><td><table><tr><td>High Byte</td><td>Low Byte</td></tr><tr><td>Reserved</td><td>Auto Polling function(2)</td></tr></table></td></tr>
<tr><td>0x1F6</td><td>502</td><td><table><tr><td>High Byte</td><td>Low Byte</td></tr><tr><td>The index of trigger command(3)</td><td>Output Trigger function(3)</td></tr></table></td></tr>
<tr><td>0x1F7~1F9</td><td>503~505</td><td>Reserved</td></tr>
<tr><td>0x1FA~76B</td><td>506~1899</td><td>Reserved (For Module Configuration)</td></tr>
<tr><td>0x76C</td><td>1900</td><td><table><tr><td>High Byte</td><td>Low Byte</td></tr><tr><td>Reserved</td><td>Channel selection in through mode</td></tr></table></td></tr>
<tr><td>0x76D</td><td>1901</td><td>Send data length in through mode</td></tr>
<tr><td>0x76E~7FB</td><td>1902~2043</td><td>Send data in through mode</td></tr>
</table>

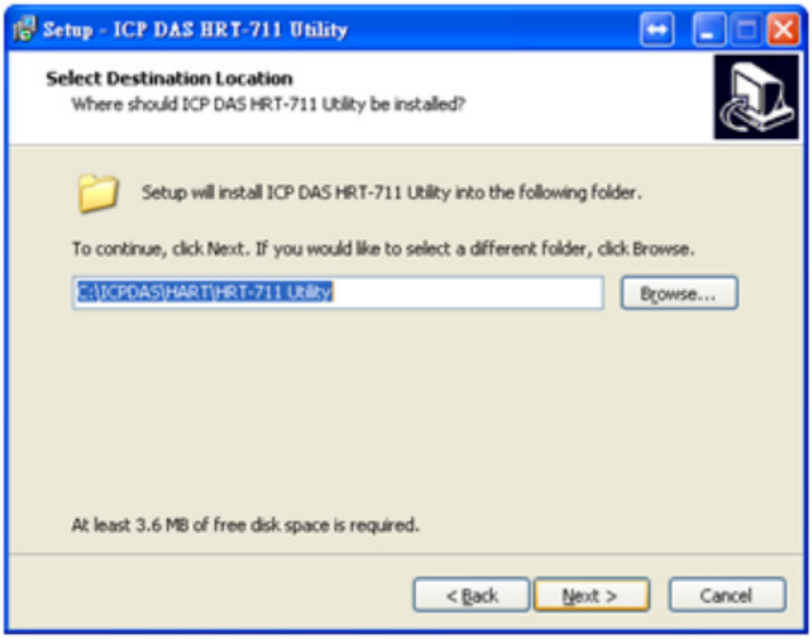
NOTE 1 When write the value greater than zero, the module will clear module request count, module response count, module error count, module error status and set module error command index to 255. To complete reset procedure, user has to write 0 to this field.
NOTE 2 When set the value to be 1, the module will execute all HART polling commands automatically.
NOTE 3 If change the value, the module will refer to the index value (0~99, 255 is for through mode) of trigger command to execute the corresponding user command. Ex: If the index of trigger command is 0 and the output trigger function value is 1, when change the value of output trigger function from 1 to 2, the module will execute the user command (index = 0).

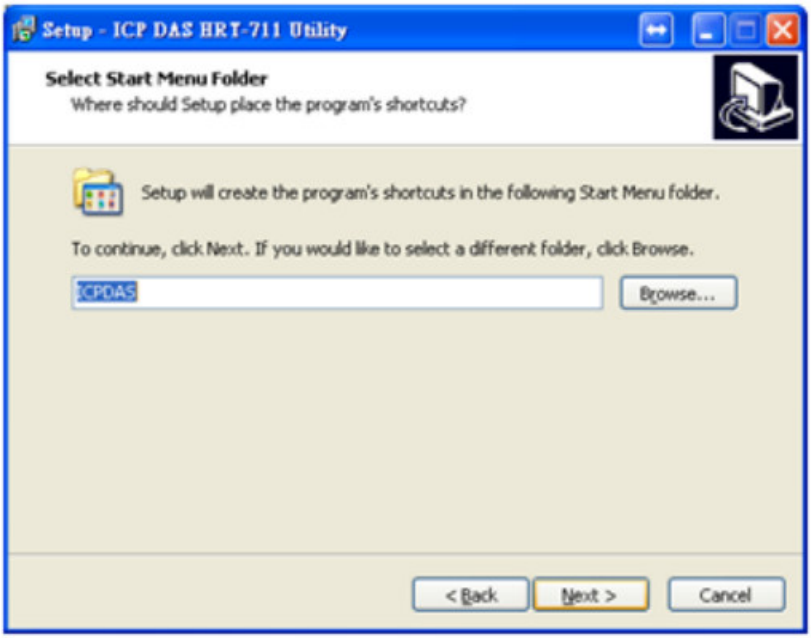

Microsoft .NET Framework 2.0 Setup
Welcome to Microsoft .NET Framework 2.0 Setup
This wizard will guide you through the installation process.
Next >
Cancel

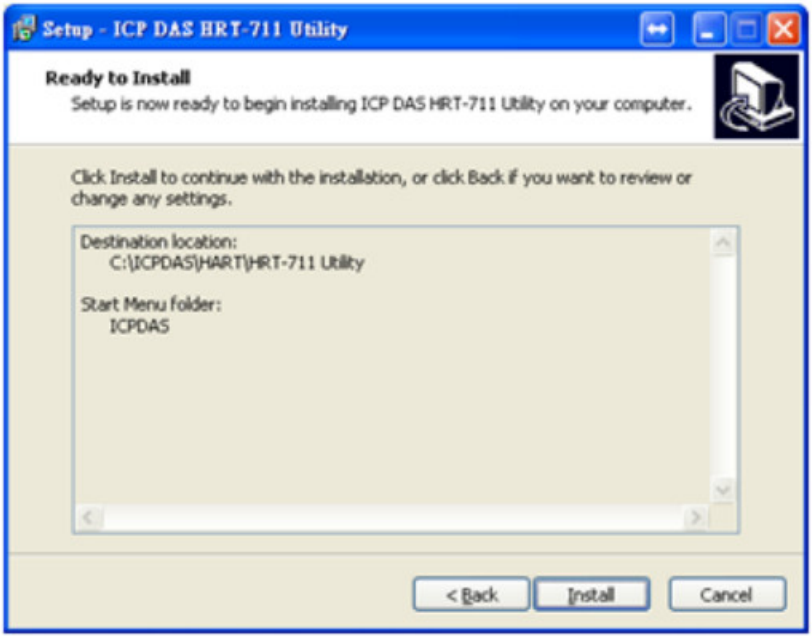

Microsoft .NET Framework 2.0 Setup
End-User License Agreement
End-User License Agreement
MICROSOFT SOFTWARE SUPPLEMENTAL LICENSE TERMS
MICROSOFT .NET FRAMEWORK 2.0
Microsoft Corporation (or based on where you live, one of its affiliates) licenses this supplement to you. If you are licensed to use Microsoft Windows operating system software (the "software"), you may use this supplement. You may not use it if you do not have a license for the software. You may use a copy of this supplement with each validly licensed copy of the software.
Print
By clicking "I accept the terms of the License Agreement" and proceeding to use the product, I indicate that I have read, understood, and agreed to the terms of the End-User License Agreement.
I accept the terms of the License Agreement
< Back
Install >
Cancel

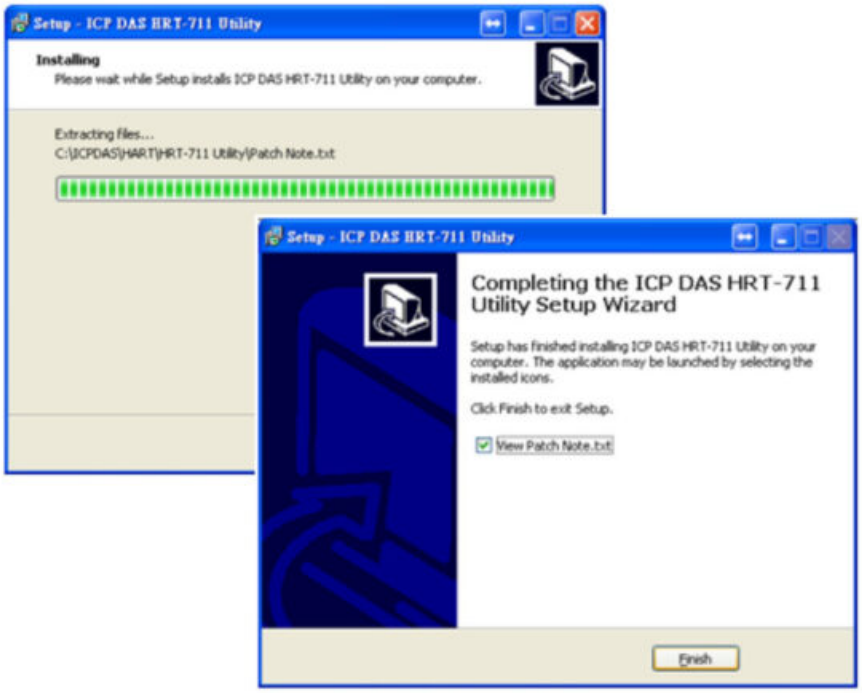

Microsoft .NET Framework 2.0 Setup
Setup Complete
Microsoft .NET Framework 2.0 has been successfully installed.
It is highly recommended that you download and install the latest service packs and security updates for this product.
For more information, visit the following Web site:
Product Support Center
Finish


Setup - ICP DAS HRT-711 Utility
Welcome to the ICP DAS HRT-711 Utility Setup Wizard
This will install ICP DAS HRT-711 Utility version 1.0.0.0 on your computer.
It is recommended that you close all other applications before continuing.
Click Next to continue, or Cancel to exit Setup.
Next >
Cancel

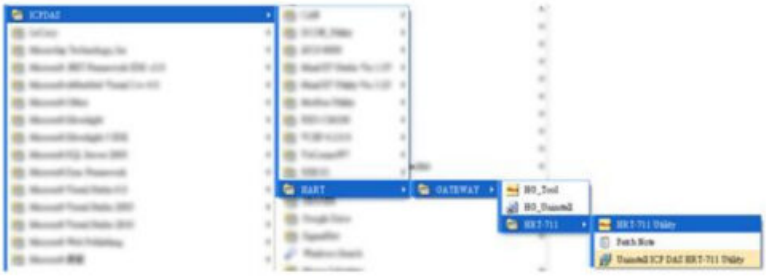

Setup - ICP DAS HRT-711 Utility
Select Destination Location
Where should ICP DAS HRT-711 Utility be installed?
Setup will install ICP DAS HRT-711 Utility into the following folder.
To continue, click Next. If you would like to select a different folder, click Browse.
C:\ICPDAS\HART\HRT-711 Utility
Browse...
At least 3.6 MB of free disk space is required.
< Back
Next >
Cancel


Setup - ICP DAS HRT-711 Utility
Select Start Menu Folder
Where should Setup place the program's shortcuts?
Setup will create the program's shortcuts in the following Start Menu folder.
To continue, click Next. If you would like to select a different folder, click Browse.
ICPDAS
Browse...
< Back
Next >
Cancel

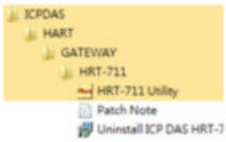




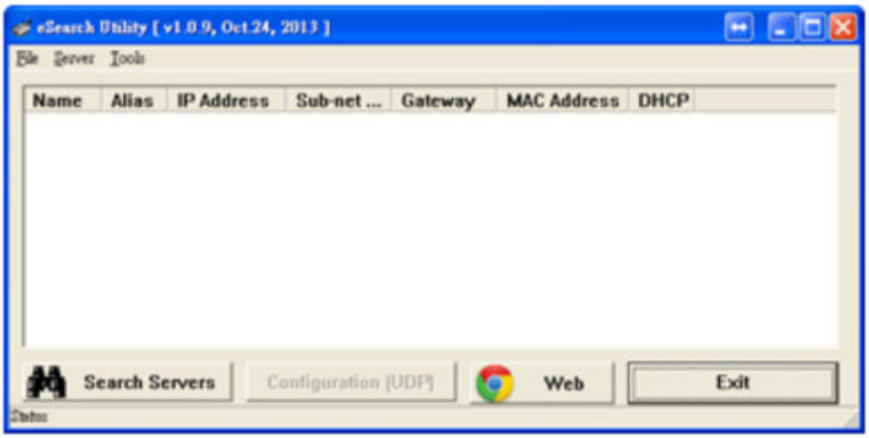
Windows XP

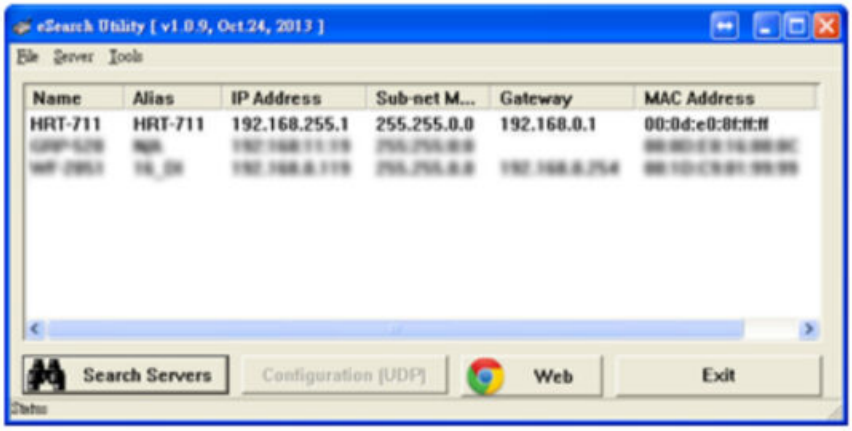


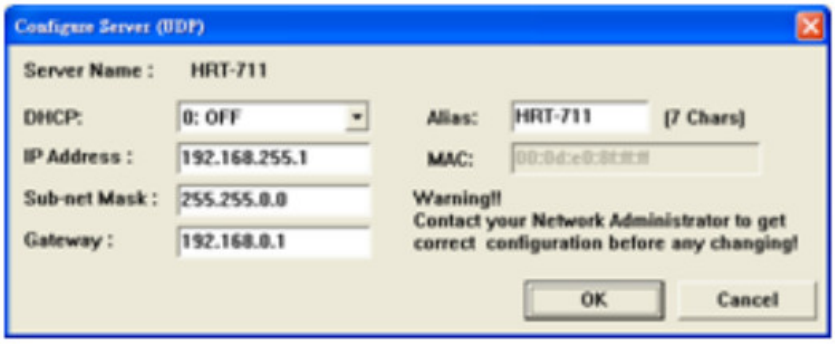
Windows 7

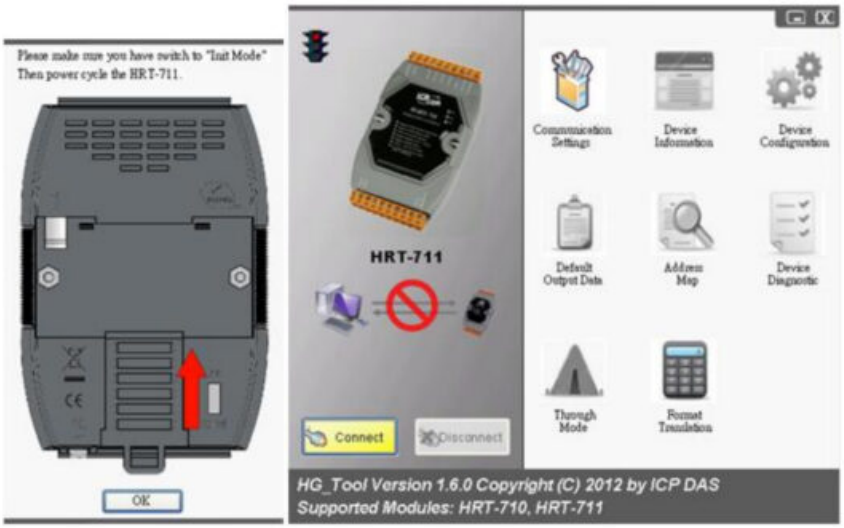


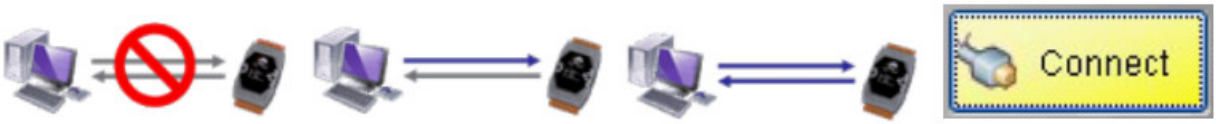

Please click the following figure for related configuration
Ethernet
HART
HART
Modbus


eSearch Utility [v1.0.9, Oct.24, 2013]
File Server Tools
Name Alias IP Address Sub-net ... Gateway MAC Address DHCP
Search Servers
Configuration [UDP]
Web
Exit

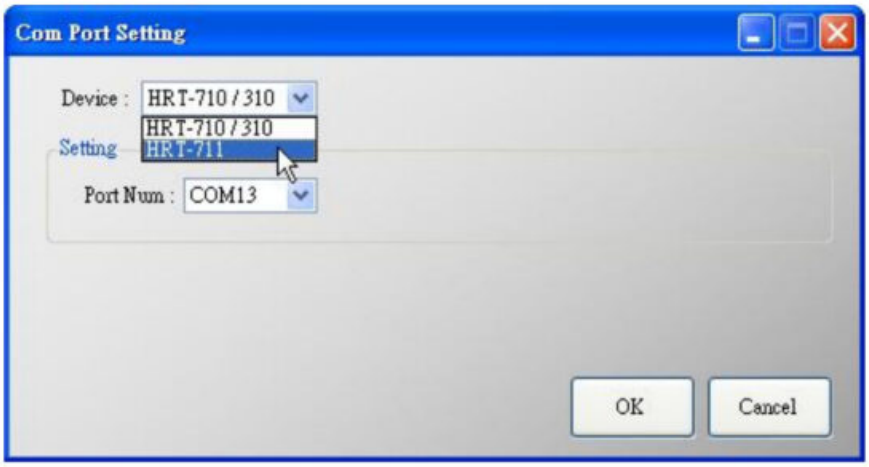

eSearch Utility [v1.0.9, Oct.24, 2013]
File Server Tools
Name Alias IP Address Sub-net M... Gateway MAC Address
HRT-711 HRT-711 192.168.255.1 255.255.0.0 192.168.0.1 00:0d:e0:8f:ff:ff
Search Servers
Configuration [UDP]
Web
Exit

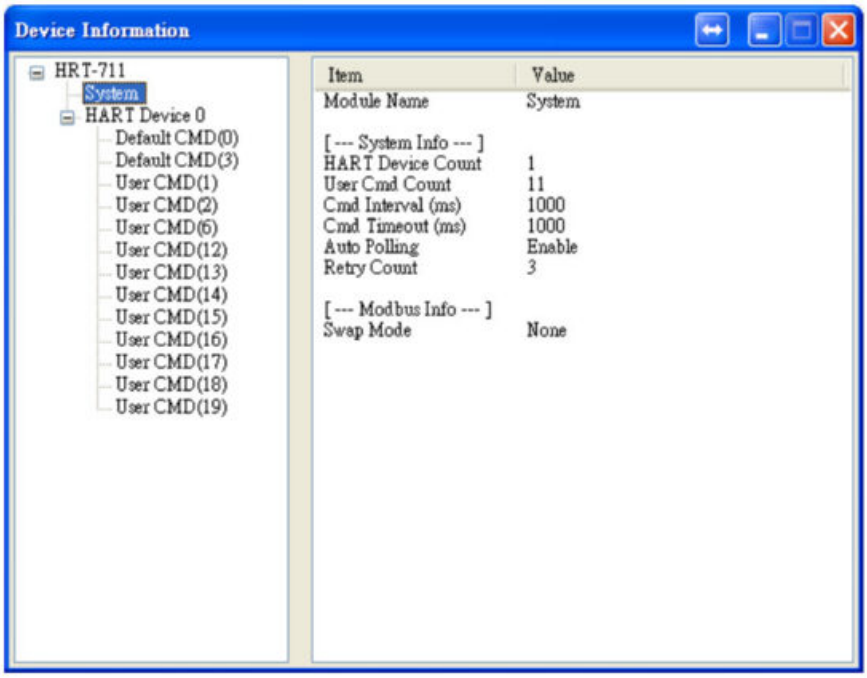

Configure Server (UDP)
Server Name : HRT-711
DHCP: 0: OFF
IP Address : 192.168.255.1
Sub-net Mask : 255.255.0.0
Gateway : 192.168.0.1
Alias: HRT-711 (7 Chars)
MAC:
Warning!!
Contact your Network Administrator to get correct configuration before any changing!
OK
Cancel

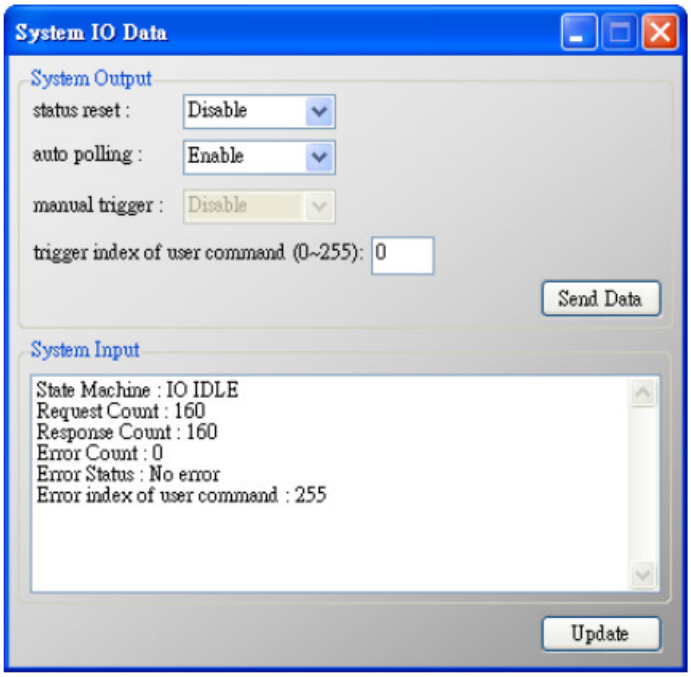


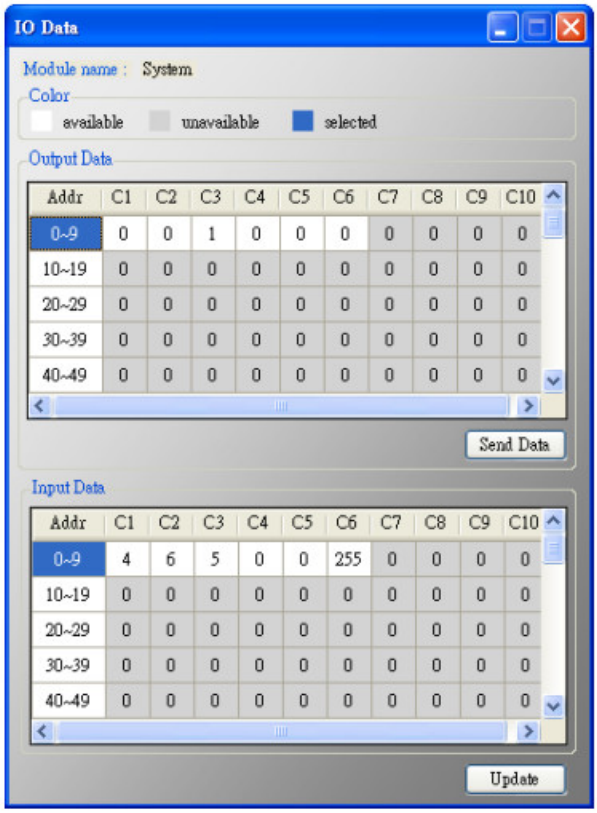


Format Translation

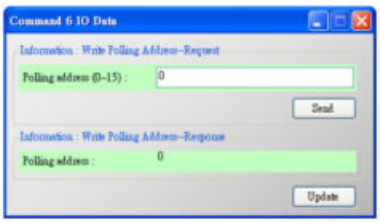


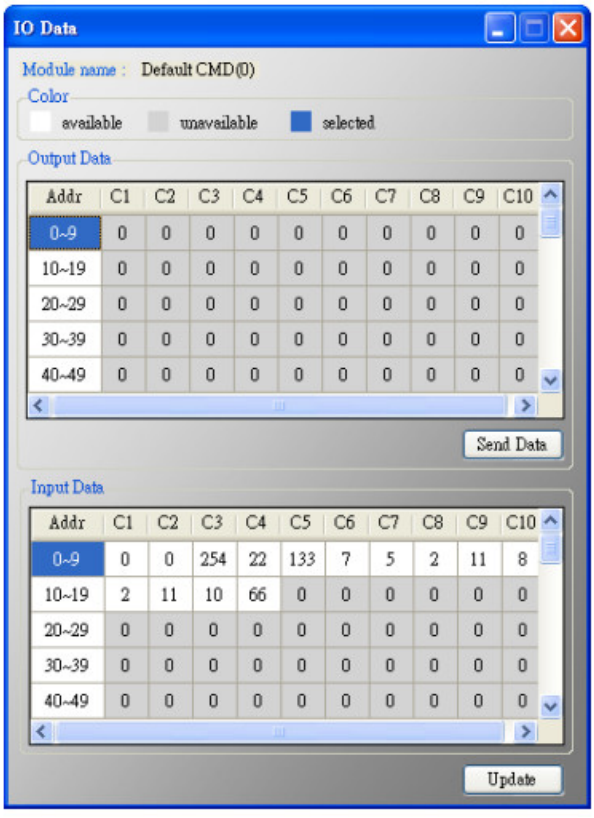


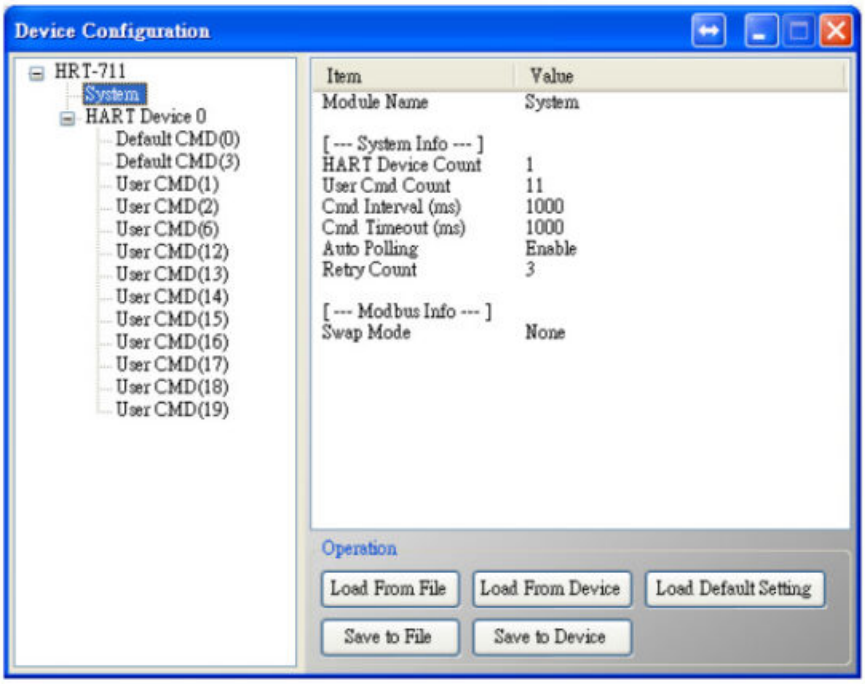

System IO Data
System Output
status reset : Disable
auto polling : Enable
manual trigger : Disable
trigger index of user command (0~255): 0
Send Data
System Input
State Machine : IO IDLE
Request Count : 160
Response Count : 160
Error Count : 0
Error Status : No error
Error index of user command : 255
Update

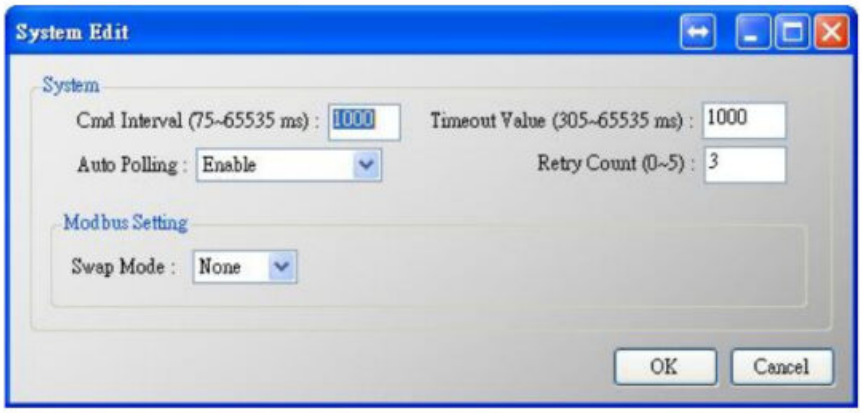

IO Data
Module name : System
Color
available unavailable selected
Output Data
Addr C1 C2 C3 C4 C5 C6 C7 C8 C9 C10
0~9 0 0 1 0 0 0 0 0 0 0
10~19 0 0 0 0 0 0 0 0 0 0
20~29 0 0 0 0 0 0 0 0 0 0
30~39 0 0 0 0 0 0 0 0 0 0
40~49 0 0 0 0 0 0 0 0 0 0
Send Data
Input Data
Addr C1 C2 C3 C4 C5 C6 C7 C8 C9 C10
0~9 4 6 5 0 0 255 0 0 0 0
10~19 0 0 0 0 0 0 0 0 0 0
20~29 0 0 0 0 0 0 0 0 0 0
30~39 0 0 0 0 0 0 0 0 0 0
40~49 0 0 0 0 0 0 0 0 0 0
Update

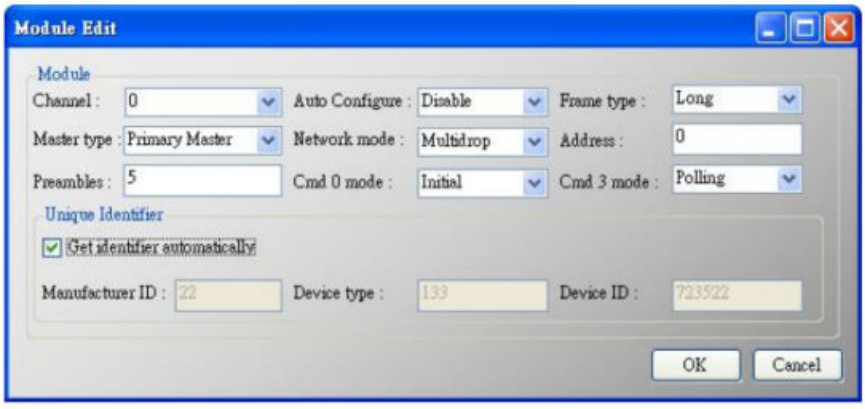

Command 0 IO Data
Information : Read Unique Identifier
Manufacturer : Hartmann_and_Braun(22)
Device Type Code : 133
Preambles Number : 7
Command Set Revision : 5
Transmitter Revision : 2
Software Revision : 11
Hardware Revision : 0
Flag : 2
Device ID : 723522
Show Long Frame Address
Update

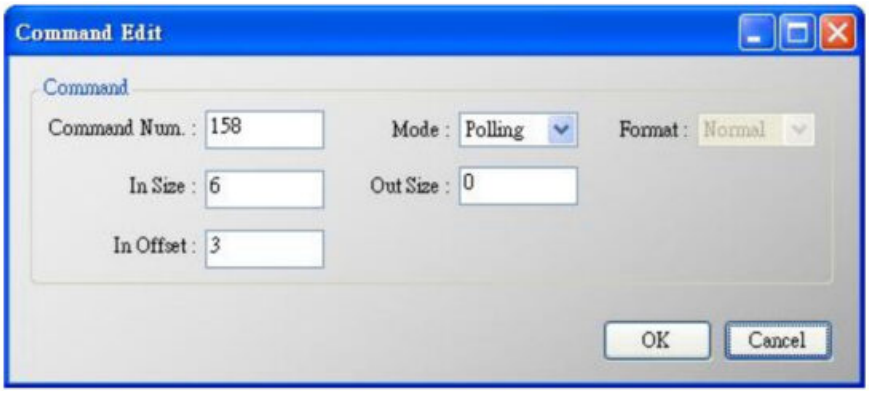

Command 6 IO Data
Information : Write Polling Address--Request
Polling address (0~15) : 0
Send
Information : Write Polling Address--Response
Polling address : 0
Update

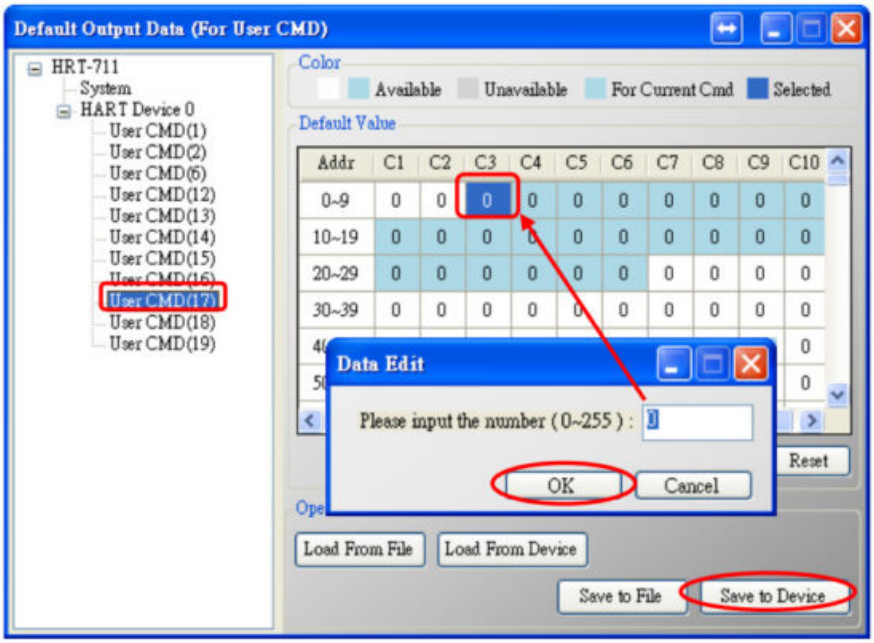

IO Data
Module name : Default CMD(0)
Color
available unavailable selected
Output Data
Addr C1 C2 C3 C4 C5 C6 C7 C8 C9 C10
0~9 0 0 0 0 0 0 0 0 0 0
10~19 0 0 0 0 0 0 0 0 0 0
20~29 0 0 0 0 0 0 0 0 0 0
30~39 0 0 0 0 0 0 0 0 0 0
40~49 0 0 0 0 0 0 0 0 0 0
Send Data
Input Data
Addr C1 C2 C3 C4 C5 C6 C7 C8 C9 C10
0~9 0 0 254 22 133 7 5 2 11 8
10~19 2 11 10 66 0 0 0 0 0 0
20~29 0 0 0 0 0 0 0 0 0 0
30~39 0 0 0 0 0 0 0 0 0 0
40~49 0 0 0 0 0 0 0 0 0 0
Update

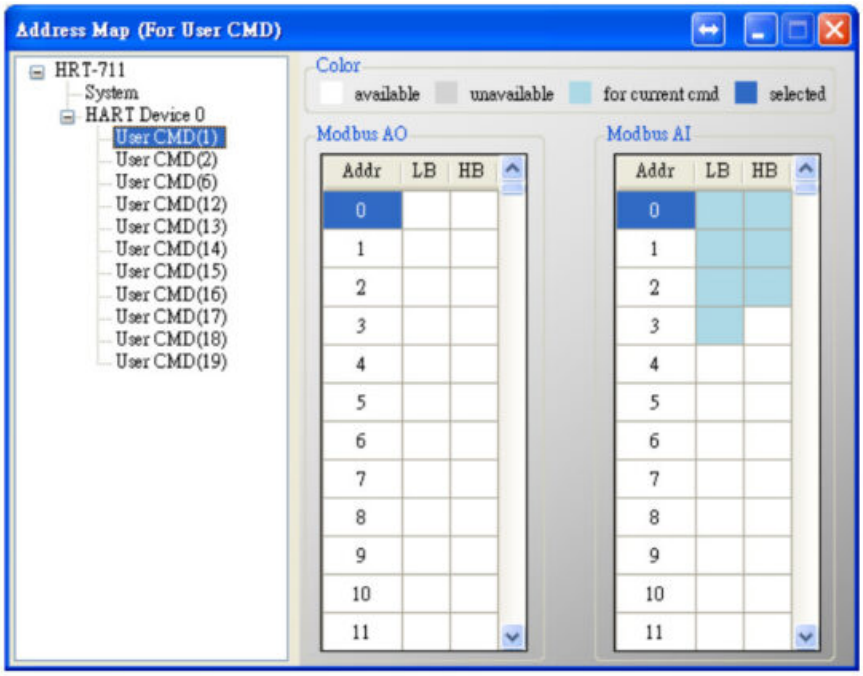

Device Configuration
HRT-711
System
HART Device 0
Default CMD(0)
Default CMD(3)
User CMD(1)
User CMD(2)
User CMD(6)
User CMD(12)
User CMD(13)
User CMD(14)
User CMD(15)
User CMD(16)
User CMD(17)
User CMD(18)
User CMD(19)
Item
Value
Module Name
System
[--- System Info ---]
HART Device Count
1
User Cmd Count
11
Cmd Interval (ms)
1000
Cmd Timeout (ms)
1000
Auto Polling
Enable
Retry Count
3
[--- Modbus Info ---]
Swap Mode
None
Operation
Load From File
Load From Device
Load Default Setting
Save to File
Save to Device

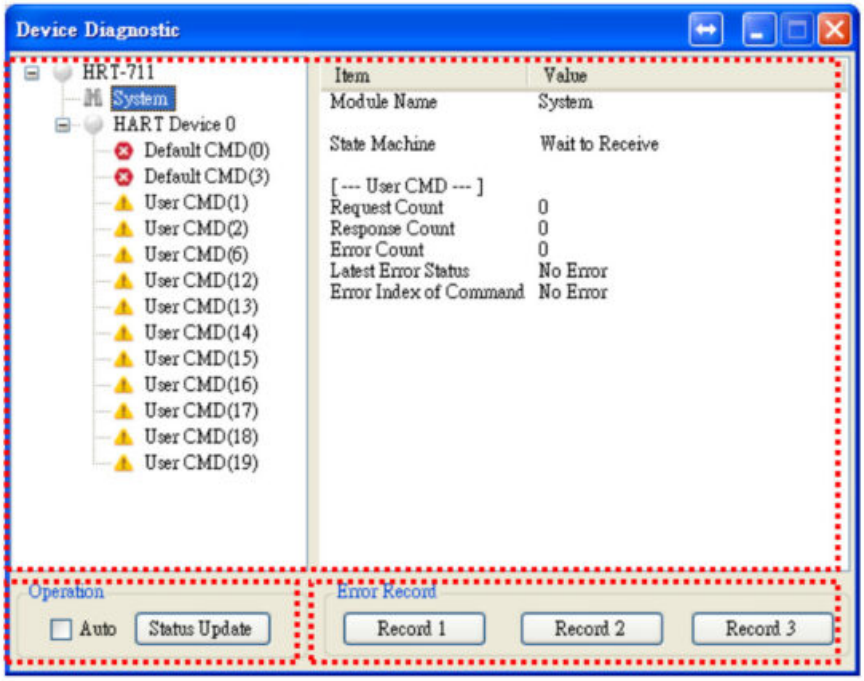

System Edit
System
Cmd Interval (75~65535 ms) :
1000
Timeout Value (305~65535 ms) :
1000
Auto Polling :
Enable
Retry Count (0~5) :
3
Modbus Setting
Swap Mode :
None
OK
Cancel

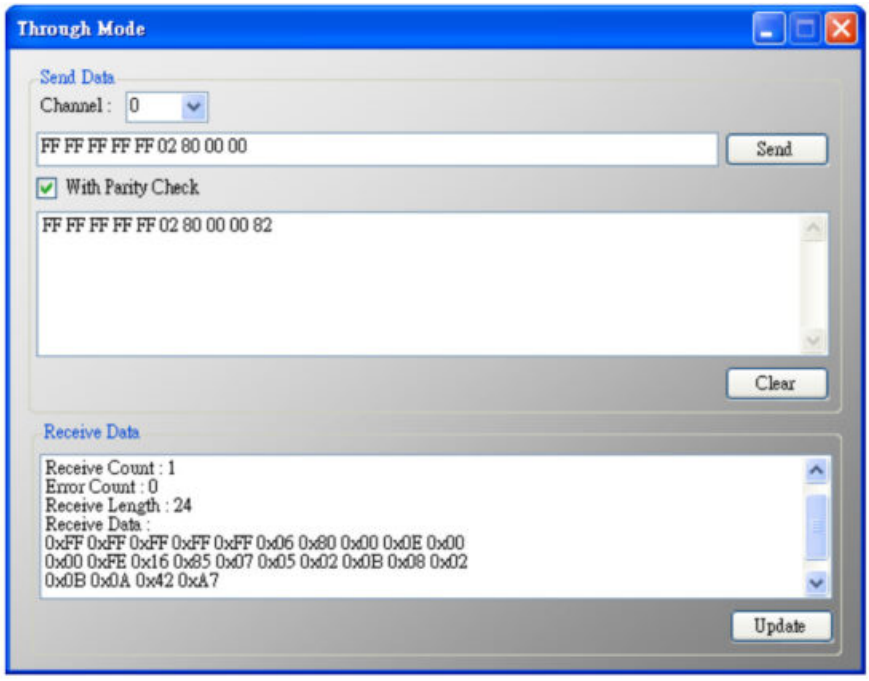

Module Edit
Module
Channel :
0
Auto Configure :
Disable
Frame type :
Long
Master type :
Primary Master
Network mode :
Multidrop
Address :
0
Preambles :
5
Cmd 0 mode :
Initial
Cmd 3 mode :
Polling
Unique Identifier
Get identifier automatically
Manufacturer ID :
22
Device type :
133
Device ID :
723522
OK
Cancel

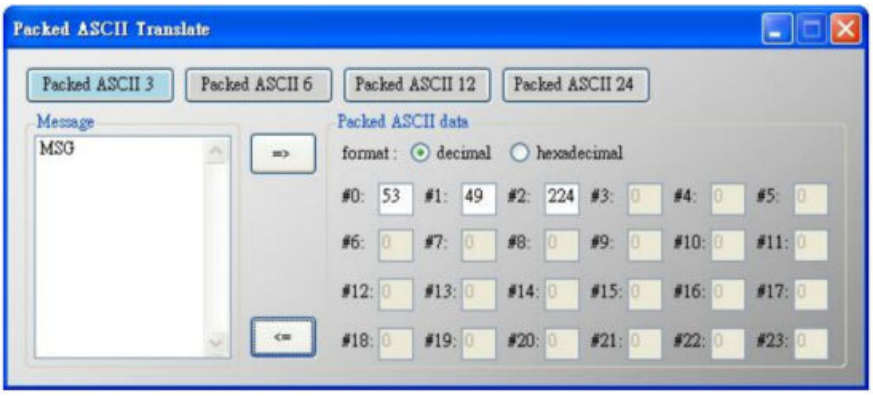

Command Edit
Command
Command Num. :
158
Mode :
Polling
Format :
Normal
In Size :
6
Out Size :
0
In Offset :
3
OK
Cancel

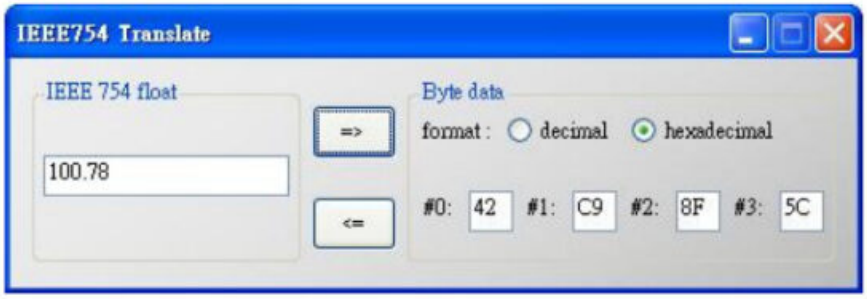

Default Output Data (For User CMD)
HRT-711
System
HART Device 0
User CMD(1)
User CMD(2)
User CMD(6)
User CMD(12)
User CMD(13)
User CMD(14)
User CMD(15)
User CMD(16)
User CMD(17)
User CMD(18)
User CMD(19)
Color
Available
Unavailable
For Current Cmd
Selected
Default Value
Addr C1 C2 C3 C4 C5 C6 C7 C8 C9 C10
0~9 0 0 0 0 0 0 0 0 0 0
10~19 0 0 0 0 0 0 0 0 0 0
20~29 0 0 0 0 0 0 0 0 0 0
30~39 0 0 0 0 0 0 0 0 0 0
Data Edit
Please input the number (0~255) :
OK
Cancel
Reset
Load From File
Load From Device
Save to File
Save to Device

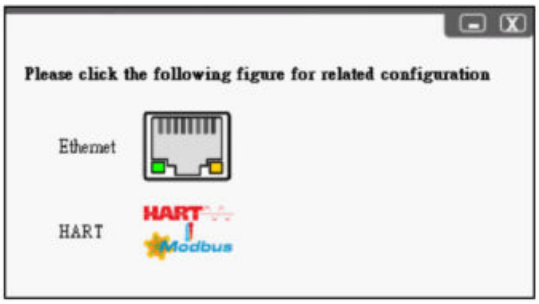

Address Map (For User CMD)
HRT-711
System
HART Device 0
User CMD(1)
User CMD(2)
User CMD(6)
User CMD(12)
User CMD(13)
User CMD(14)
User CMD(15)
User CMD(16)
User CMD(17)
User CMD(18)
User CMD(19)
Color
available
unavailable
for current cmd
selected
Modbus AO
Addr LB HB
Modbus AI
Addr LB HB


Device Diagnostic
HRT-711
System
HART Device 0
Default CMD(0)
Default CMD(3)
User CMD(1)
User CMD(2)
User CMD(6)
User CMD(12)
User CMD(13)
User CMD(14)
User CMD(15)
User CMD(16)
User CMD(17)
User CMD(18)
User CMD(19)
Item
Value
Module Name
System
State Machine
Wait to Receive
[--- User CMD ---]
Request Count
0
Response Count
0
Error Count
0
Latest Error Status
No Error
Error Index of Command
No Error
Operation
Auto
Status Update
Error Record
Record 1
Record 2
Record 3


Through Mode
Send Data
Channel : 0
FF FF FF FF FF 02 80 00 00
Send
With Parity Check
FF FF FF FF FF 02 80 00 00 82
Clear
Receive Data
Receive Count : 1
Error Count : 0
Receive Length : 24
Receive Data :
0xFF 0xFF 0xFF 0xFF 0xFF 0x06 0x80 0x00 0x0E 0x00
0x00 0xFE 0x16 0x85 0x07 0x05 0x02 0x0B 0x08 0x02
0x0B 0x0A 0x42 0xA7
Update

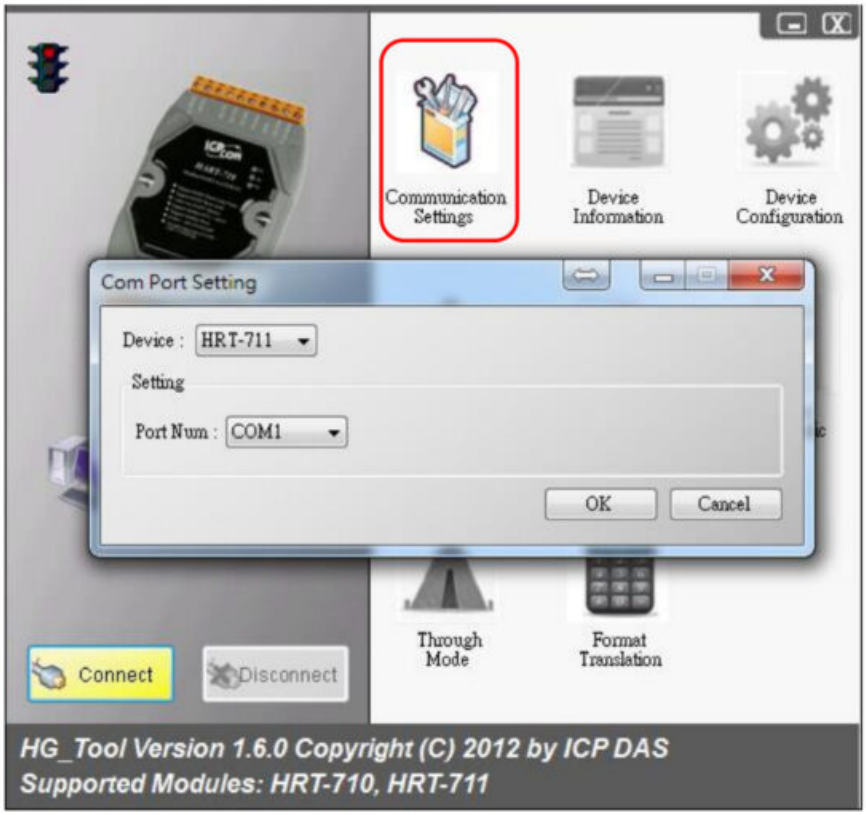

Packed ASCII Translate
Packed ASCII 3
Packed ASCII 6
Packed ASCII 12
Packed ASCII 24
Message
MSG
=>
<=
Packed ASCII data
format : decimal hexadecimal
#0: 53 #1: 49 #2: 224 #3: 0 #4: 0 #5: 0
#6: 0 #7: 0 #8: 0 #9: 0 #10: 0 #11: 0
#12: 0 #13: 0 #14: 0 #15: 0 #16: 0 #17: 0
#18: 0 #19: 0 #20: 0 #21: 0 #22: 0 #23: 0

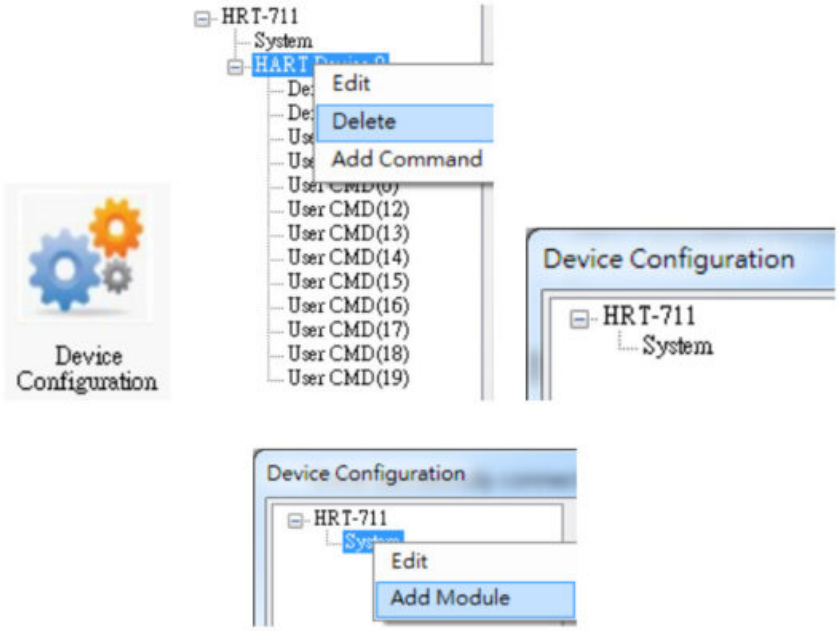

IEEE754 Translate
IEEE 754 float
100.78
=>
<=
Byte data
format : decimal hexadecimal
#0: 42 #1: C9 #2: 8F #3: 5C

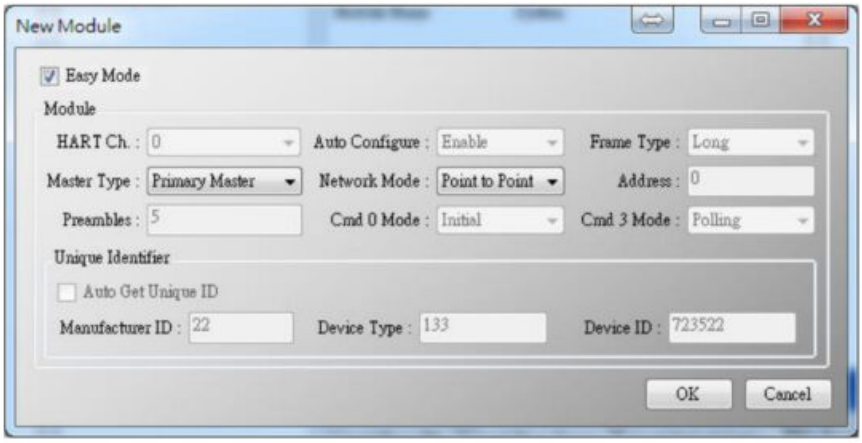

Please click the following figure for related configuration
Ethernet
HART
HART
Modbus

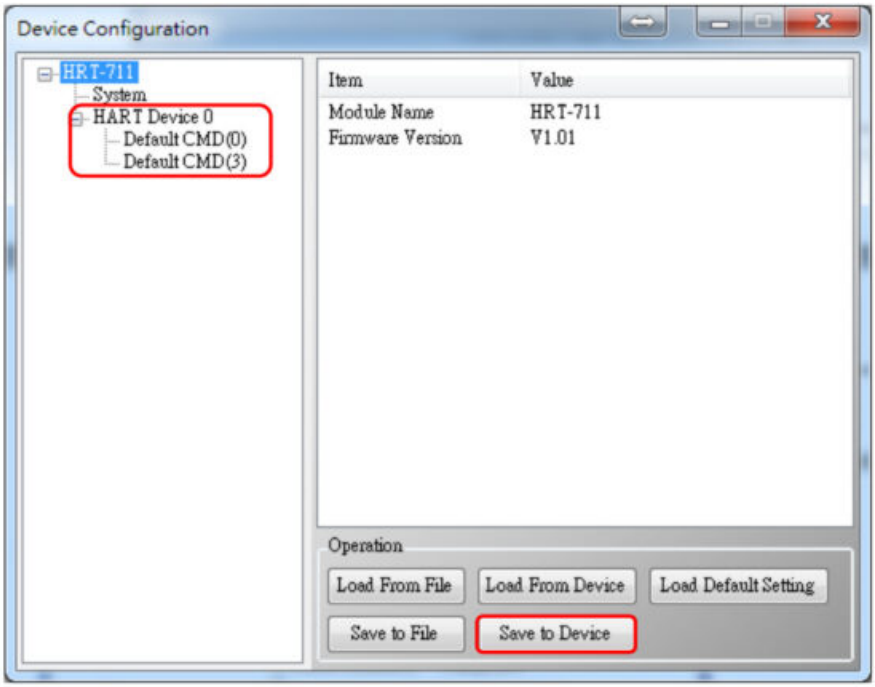

Please make sure you have switch to "Init Mode"
Then power cycle the HRT-711.
OK

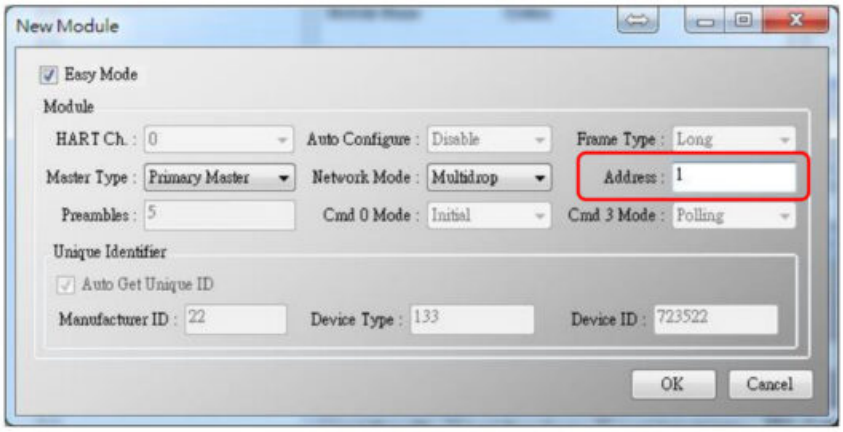

ICP CON
HRT-711
RevB
Module : HRT-711RevB

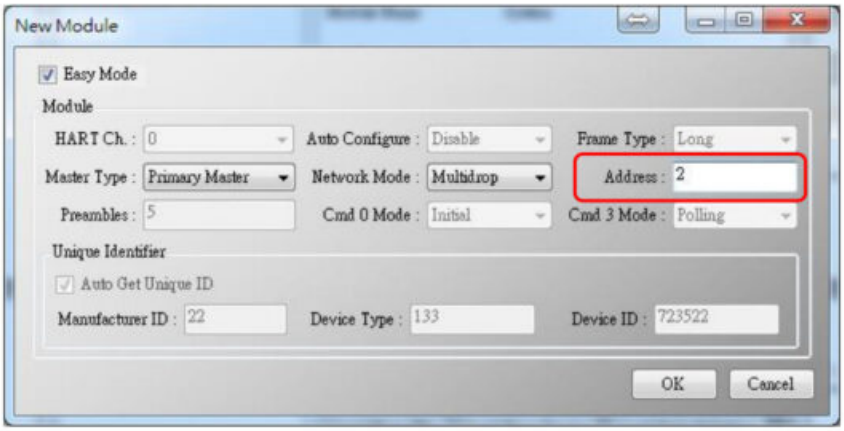

Communication Settings
Device Information
Device Configuration
Com Port Setting
Device : HRT-711
Setting
Port Num : COM1
OK
Cancel
Through Mode
Format Translation
Connect
Disconnect
HG_Tool Version 1.6.0 Copyright (C) 2012 by ICP DAS
Supported Modules: HRT-710, HRT-711

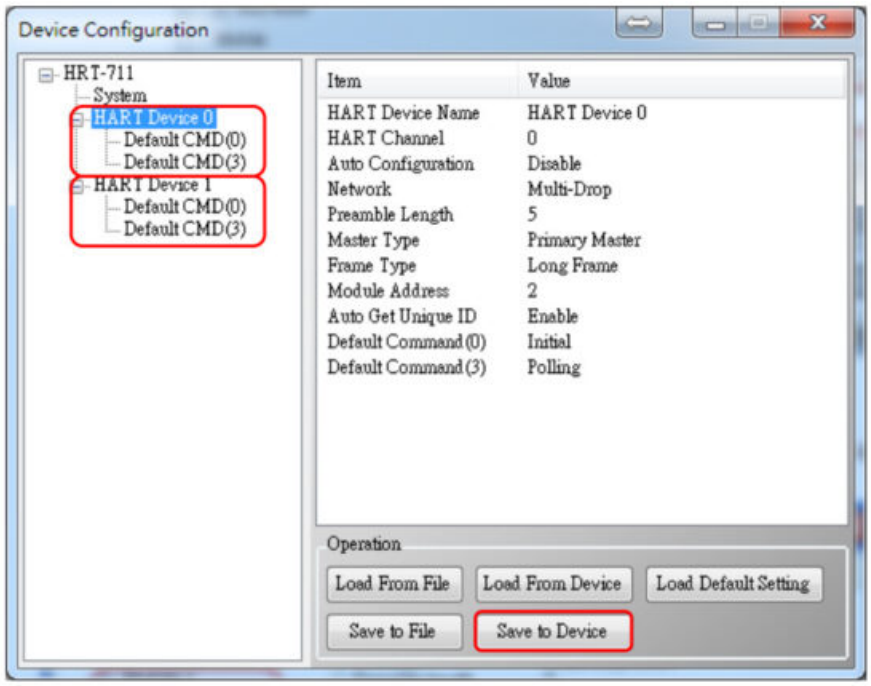

HRT-711
System
Edit
Delete
Add Command
User CMD(12)
User CMD(13)
User CMD(14)
User CMD(15)
User CMD(16)
User CMD(17)
User CMD(18)
User CMD(19)
Device Configuration
Device Configuration
HRT-711
System
Device Configuration
HRT-711
Edit
Add Module

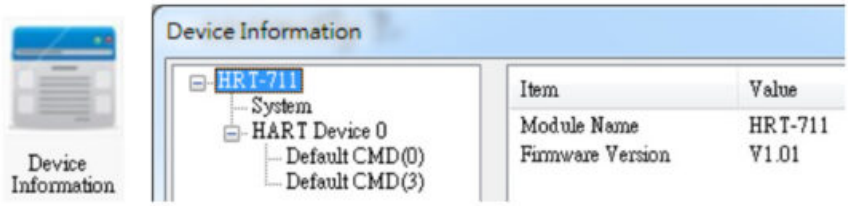

New Module
Easy Mode
Module
HART Ch. : 0
Auto Configure : Enable
Frame Type : Long
Master Type : Primary Master
Network Mode : Point to Point
Address : 0
Preambles : 5
Cmd 0 Mode : Initial
Cmd 3 Mode : Polling
Unique Identifier
Auto Get Unique ID
Manufacturer ID : 22
Device Type : 133
Device ID : 723522
OK
Cancel

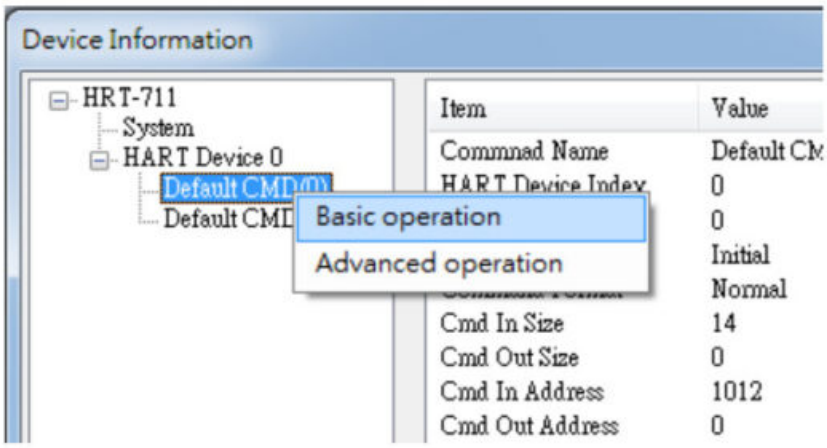

Device Configuration
HRT-711
System
HART Device 0
Default CMD(0)
Default CMD(3)
Item
Value
Module Name
HRT-711
Firmware Version
V1.01
Operation
Load From File
Load From Device
Load Default Setting
Save to File
Save to Device

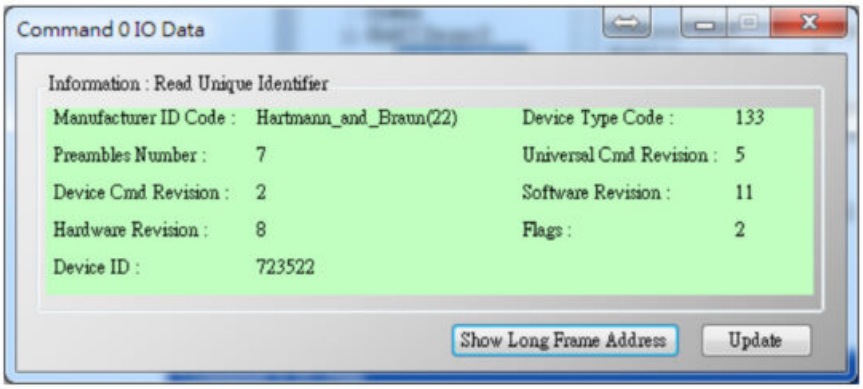

New Module
Easy Mode
Module
HART Ch. : 0
Auto Configure : Disable
Frame Type : Long
Master Type : Primary Master
Network Mode : Multidrop
Address : 1
Preambles : 5
Cmd 0 Mode : Initial
Cmd 3 Mode : Polling
Unique Identifier
Auto Get Unique ID
Manufacturer ID : 22
Device Type : 133
Device ID : 723522
OK
Cancel

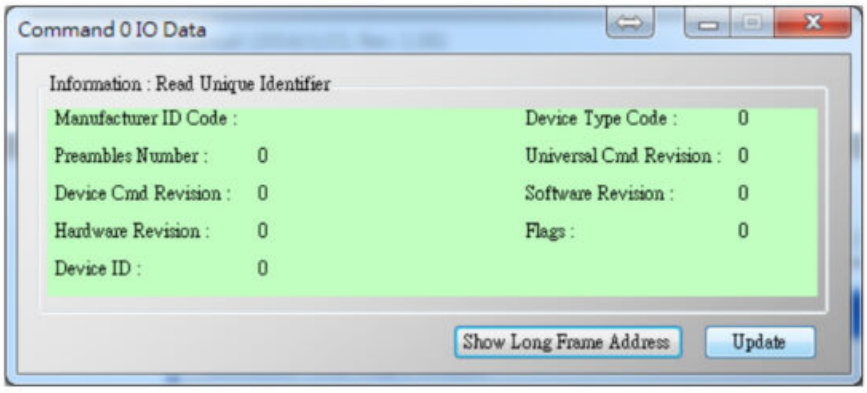

New Module
Easy Mode
Module
HART Ch. : 0
Auto Configure : Disable
Frame Type : Long
Master Type : Primary Master
Network Mode : Multidrop
Address : 2
Preambles : 5
Cmd 0 Mode : Initial
Cmd 3 Mode : Polling
Unique Identifier
Auto Get Unique ID
Manufacturer ID : 22
Device Type : 133
Device ID : 723522
OK
Cancel

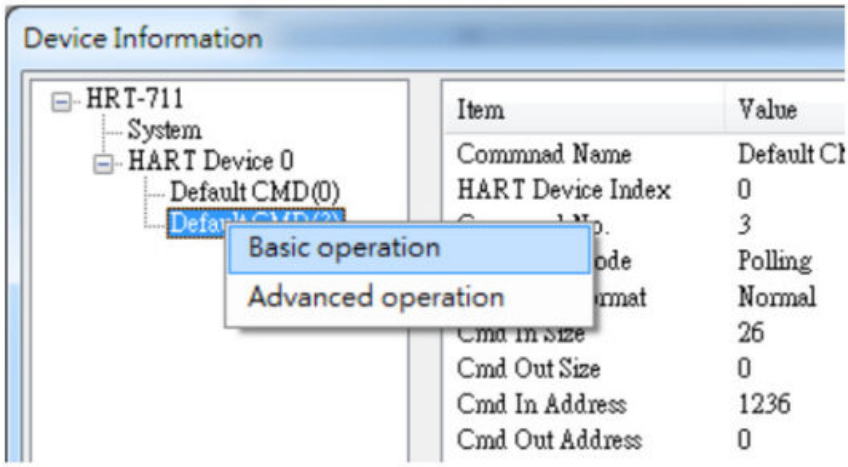

Device Configuration
HRT-711
System
HART Device 0
Default CMD(0)
Default CMD(3)
HART Device 1
Default CMD(0)
Default CMD(3)
Item
Value
HART Device Name
HART Device 0
HART Channel
0
Auto Configuration
Disable
Network
Multi-Drop
Preamble Length
5
Master Type
Primary Master
Frame Type
Long Frame
Module Address
2
Auto Get Unique ID
Enable
Default Command(0)
Initial
Default Command(3)
Polling
Operation
Load From File
Load From Device
Load Default Setting
Save to File
Save to Device


Device Information
Device Information
HRT-711
System
HART Device 0
Default CMD(0)
Default CMD(3)
Item
Value
Module Name
HRT-711
Firmware Version
V1.01


Device Information
HRT-711
System
HART Device 0
Default CMD(0)
Default CMD
Basic operation
Advanced operation
Item
Value
Commnad Name
Default CM
HART Device Index
0
0
Initial
Normal
Cmd In Size
14
Cmd Out Size
0
Cmd In Address
1012
Cmd Out Address
0


Command 0 IO Data
Information : Read Unique Identifier
Manufacturer ID Code :
Hartmann_and_Braun(22)
Device Type Code :
133
Preambles Number :
7
Universal Cmd Revision :
5
Device Cmd Revision :
2
Software Revision :
11
Hardware Revision :
8
Flags :
2
Device ID :
723522
Show Long Frame Address
Update


Command 0 IO Data
Information : Read Unique Identifier
Manufacturer ID Code :
Device Type Code :
0
Preambles Number :
0
Universal Cmd Revision :
0
Device Cmd Revision :
0
Software Revision :
0
Hardware Revision :
0
Flags :
0
Device ID :
0
Show Long Frame Address
Update


Device Information
HRT-711
System
HART Device 0
Default CMD(0)
Basic operation
Advanced operation
Item
Value
Commnad Name
Default CI
HART Device Index
0
3
Polling
Normal
26
Cmd Out Size
0
Cmd In Address
1236
Cmd Out Address
0

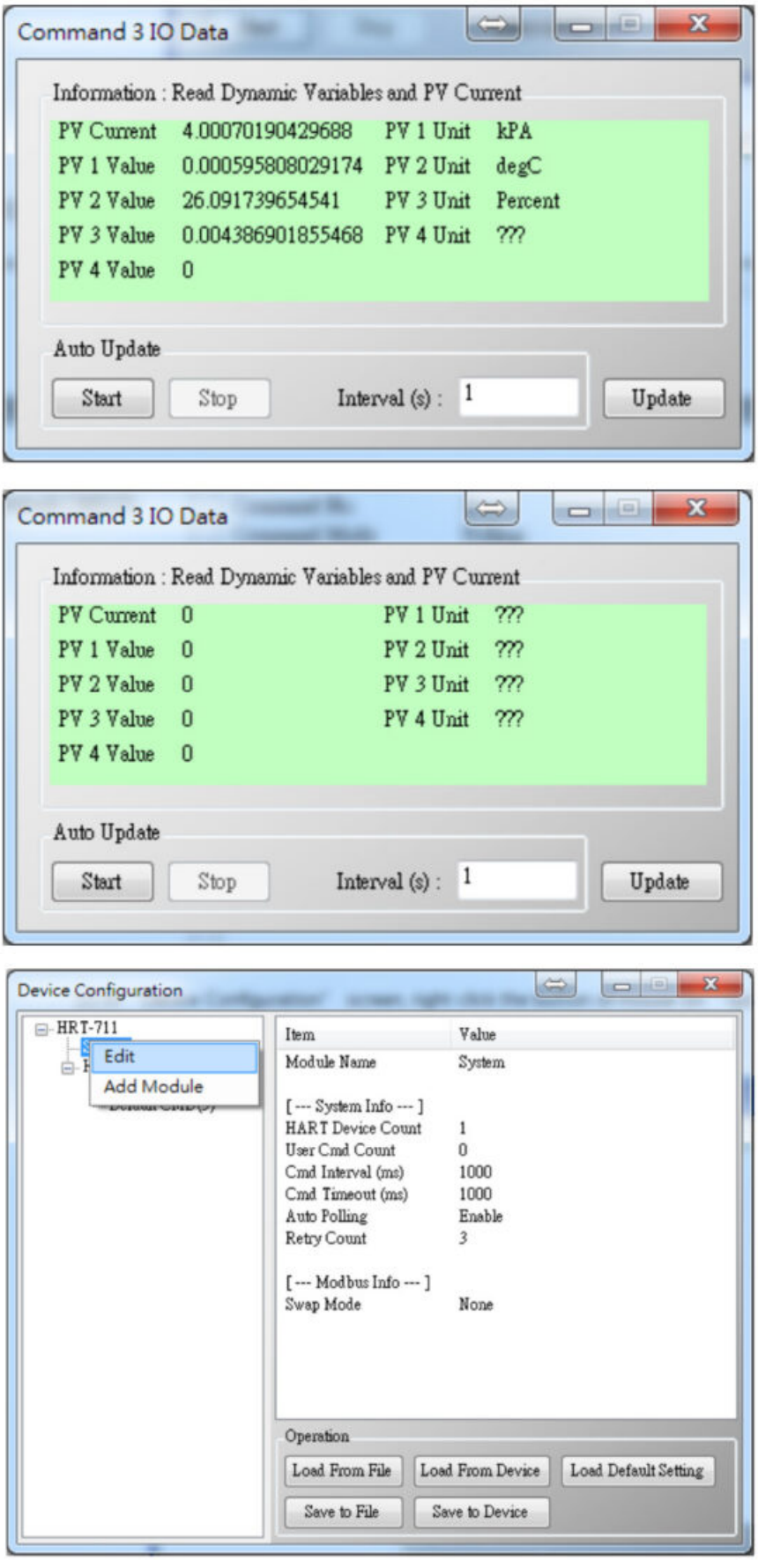


Figure 3-1 Open "System Edit" screen

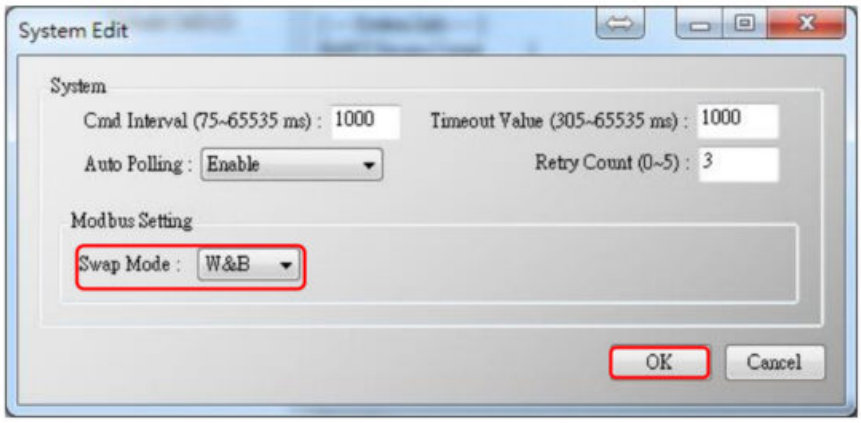


Figure 3-2 Set "Swap mode" to be "W&B"

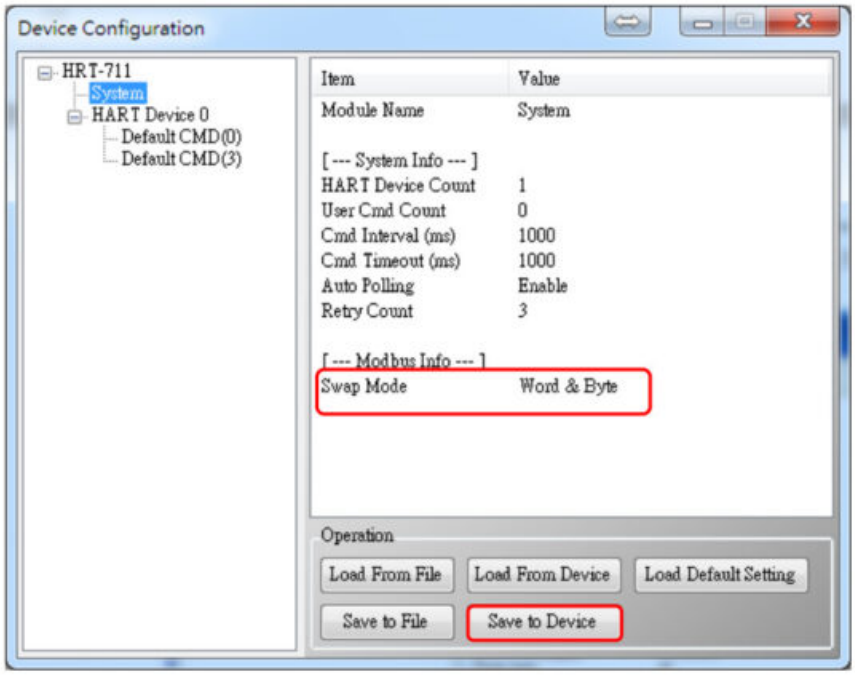


Figure 3-3 "Save to Device" function

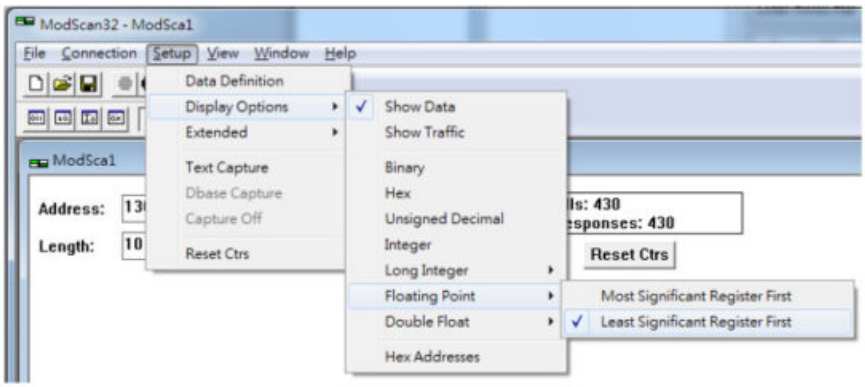


Figure 3-4 Modbus display format

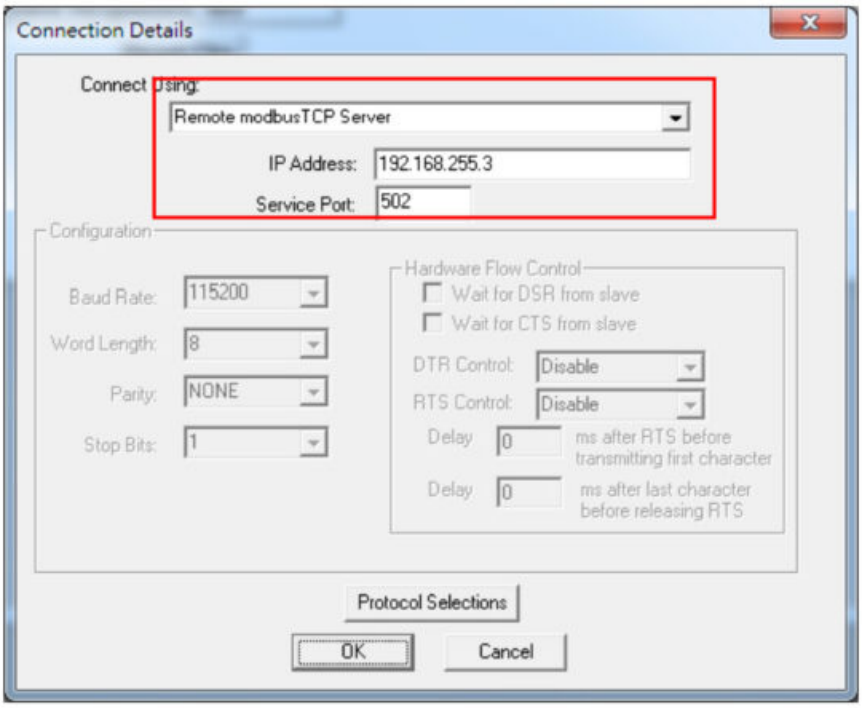


Figure 3-5 Connection parameters

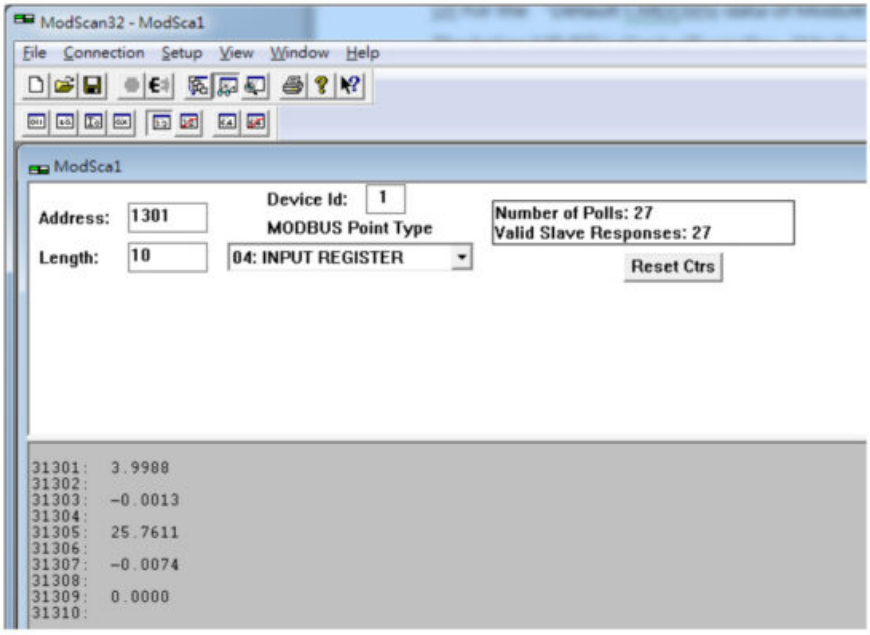


Figure 3-6 The CMD(3) data of HART device

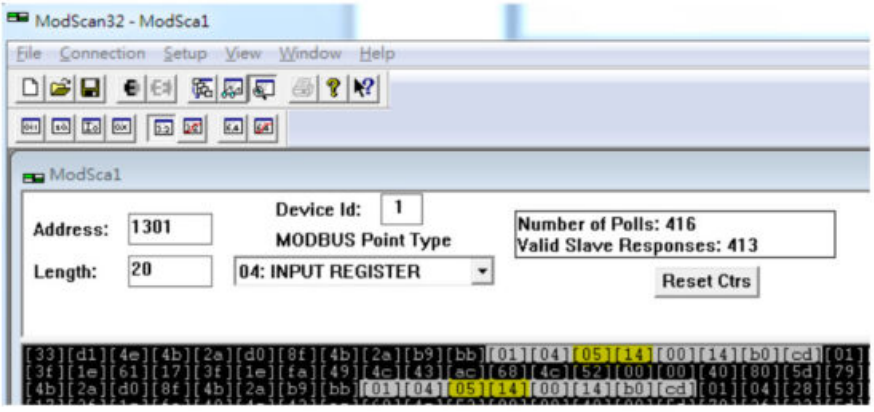


Figure 3-7 The actual polling Modbus address

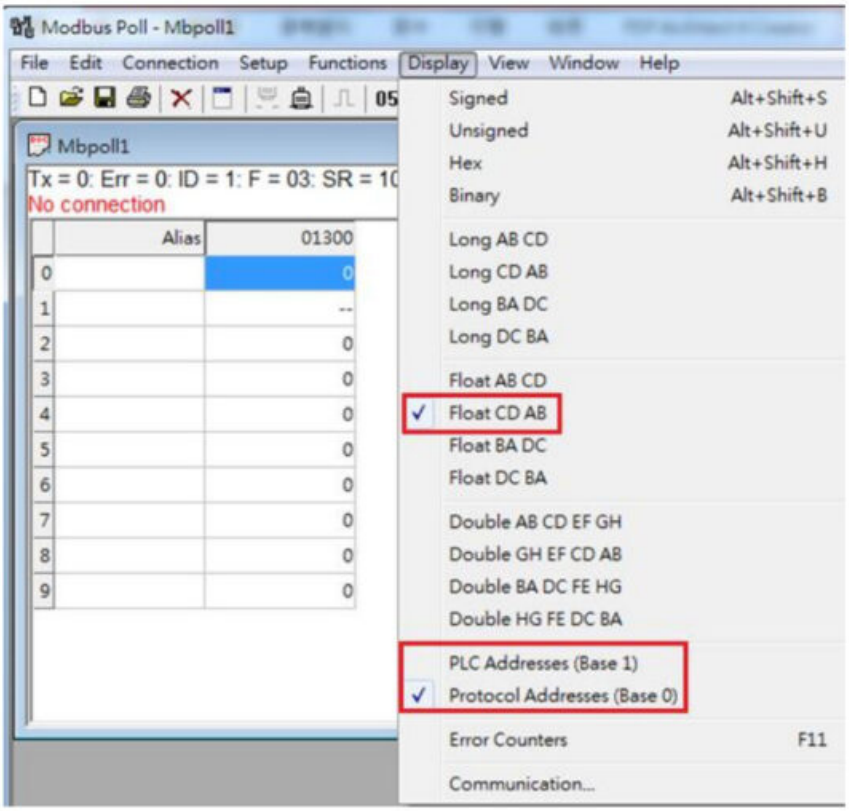


Figure 3-8 Address Base types and display formats

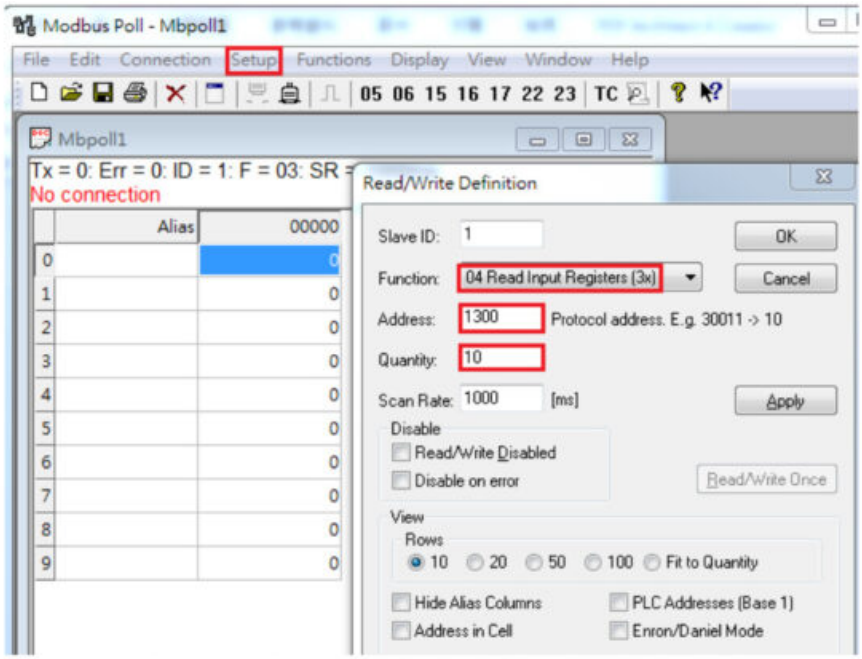


Figure 3-9 "Read/Write Definition" of Modbus Poll tool

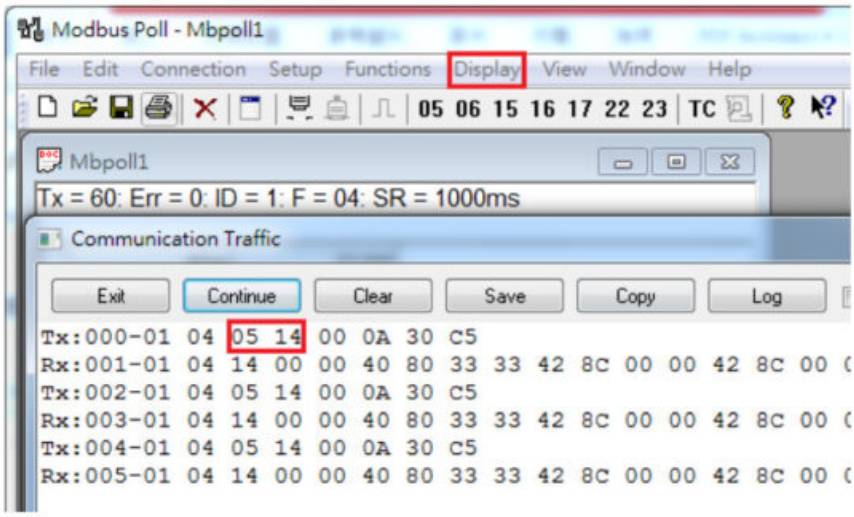


Figure 3-10 Polling address from "Communication Traffic"

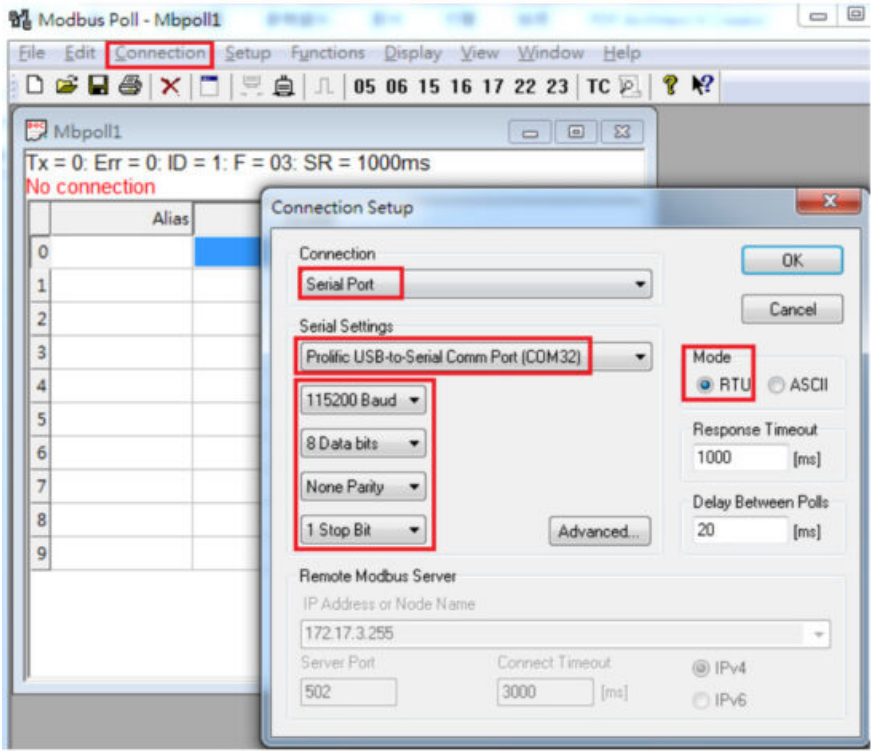


Figure 3-11 Com Port Parameters of "Modbus Poll" tool

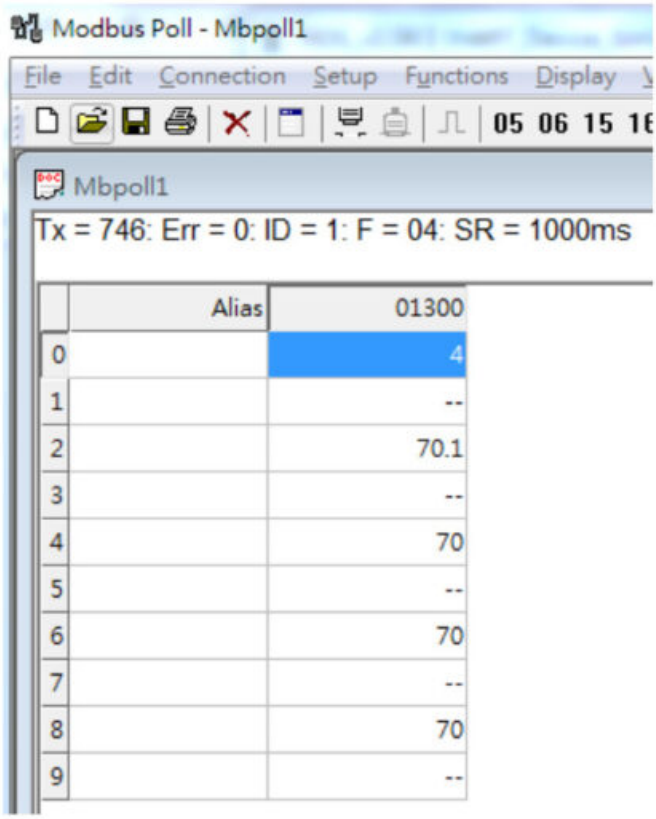
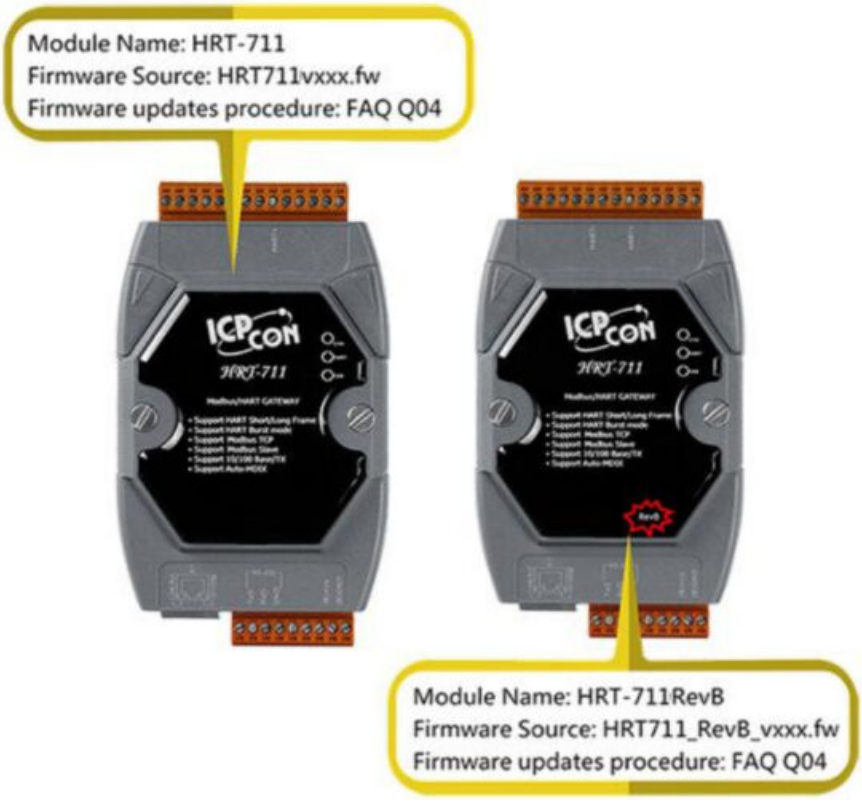
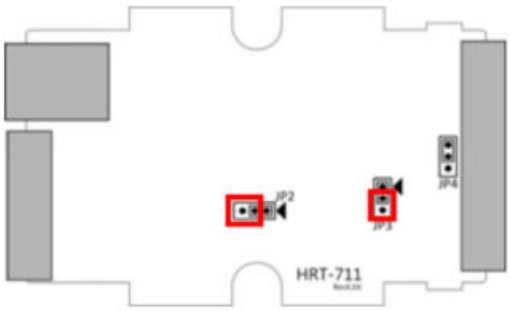
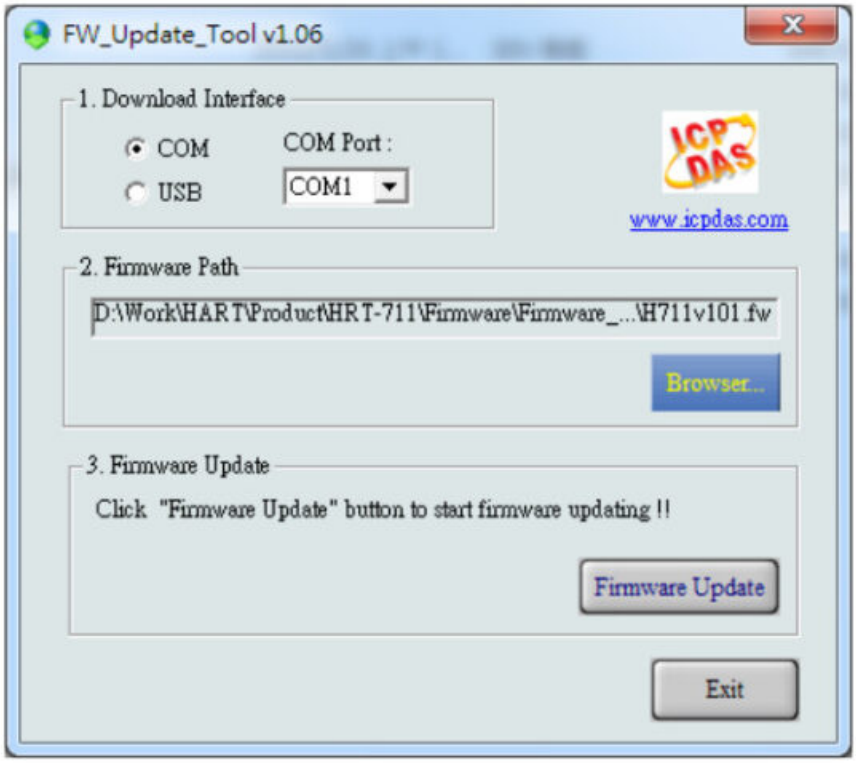


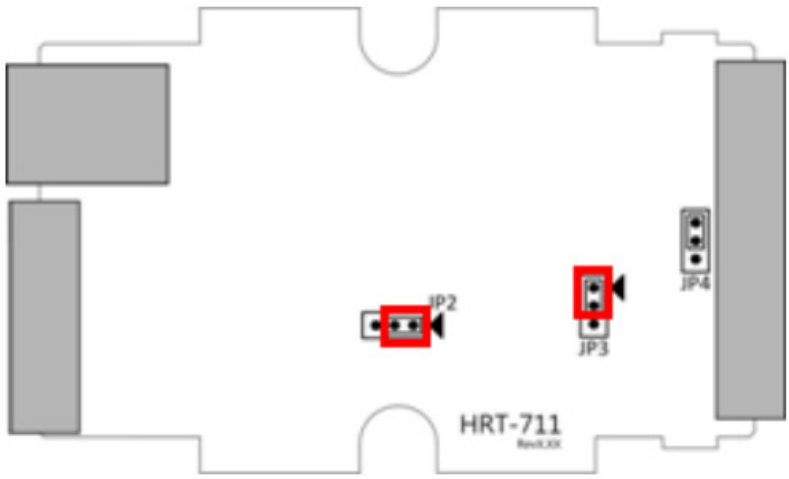
Figure 3-12 The CMD(3) data of HART device

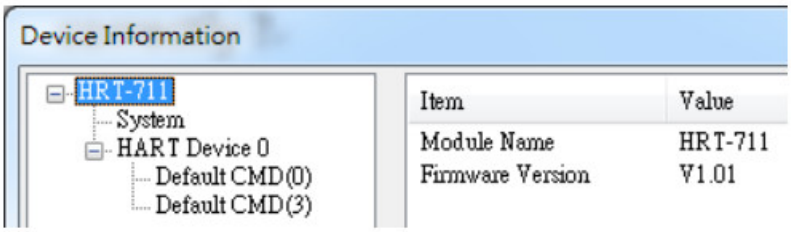


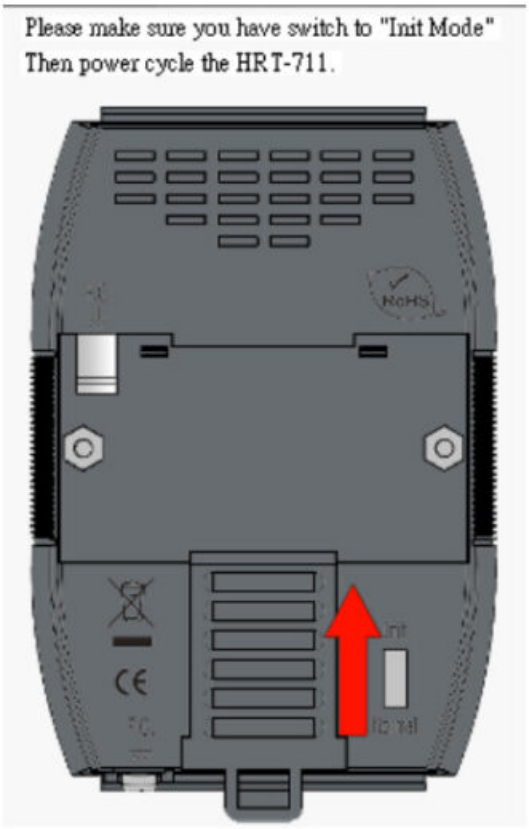

Please make sure you have switch to "Init Mode"
Then power cycle the HRT-711.
OK

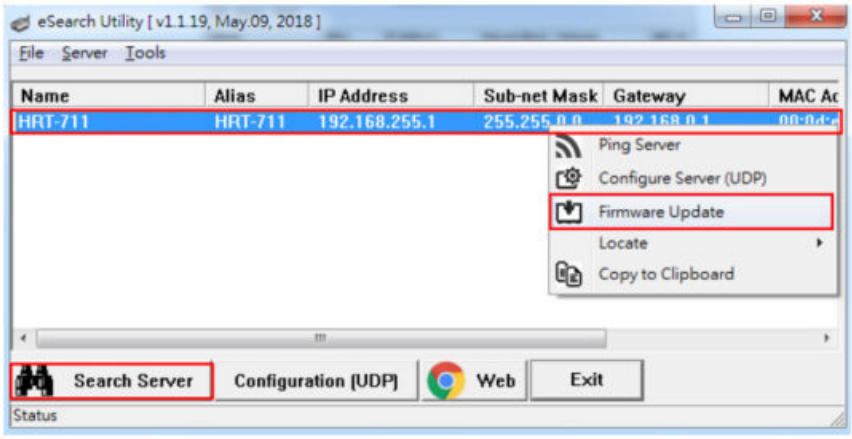

JP2
JP3
JP4
HRT-711

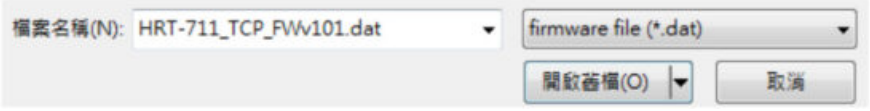

FW_Update_Tool v1.06
1. Download Interface
COM
USB
COM Port :
COM1
www.icpdas.com
2. Firmware Path
D:\Work\HART\Product\HRT-711\Firmware\Firmware_...\H711v101.fw
Browser...
3. Firmware Update
Click "Firmware Update" button to start firmware updating !!
Firmware Update
Exit


JP2
JP3
JP4
HRT-711

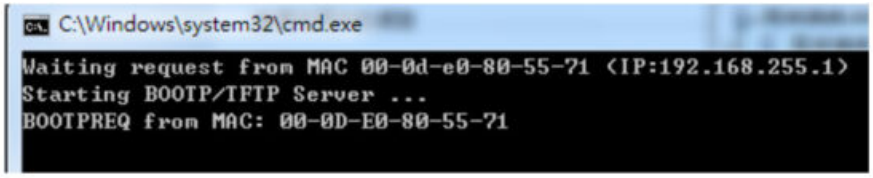

Device Information
HRT-711
System
HART Device 0
Default CMD(0)
Default CMD(3)
Item
Value
Module Name
HRT-711
Firmware Version
V1.01


Please make sure you have switch to "Init Mode"
Then power cycle the HRT-711.
Init
Normal

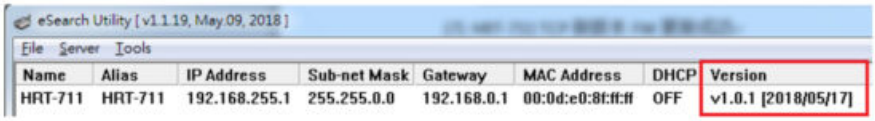

eSearch Utility [v1.1.19, May.09, 2018]
File Server Tools
Name
Alias
IP Address
Sub-net Mask
Gateway
MAC Ac
HRT-711
HRT-711
192.168.255.1
255.255.0.0
192.168.0.1
Ping Server
Configure Server (UDP)
Firmware Update
Locate
Copy to Clipboard
Search Server
Configuration [UDP]
Web
Exit
Status

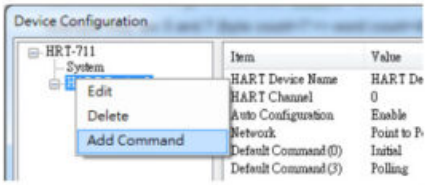

檔案名稱(N): HRT-711_TCP_FWv101.dat
firmware file (*.dat)
開啟舊檔(O)
取消


C:\Windows\system32\cmd.exe
ARP 項目刪除失敗: 要求的作業需要提升的權限。
Waiting request from MAC 00-0d-e0-8f-ff-ff (IP:192.168.255.1)
Starting BOOTP/TFTP Server ...
% Complete: 0%

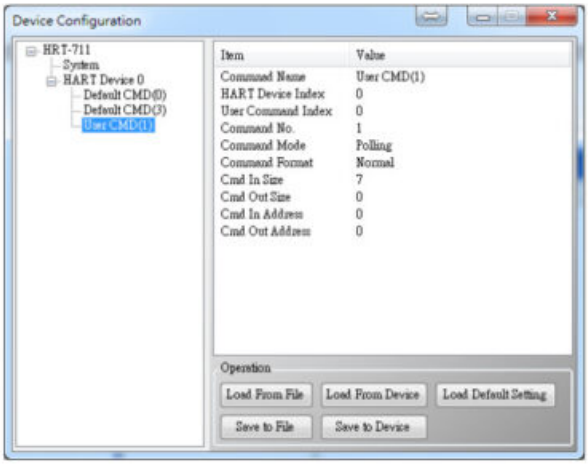

C:\Windows\system32\cmd.exe
Waiting request from MAC 00-0d-e0-80-55-71 (IP:192.168.255.1)
Starting BOOTP/TFTP Server ...
BOOTPREQ from MAC: 00-0D-E0-80-55-71

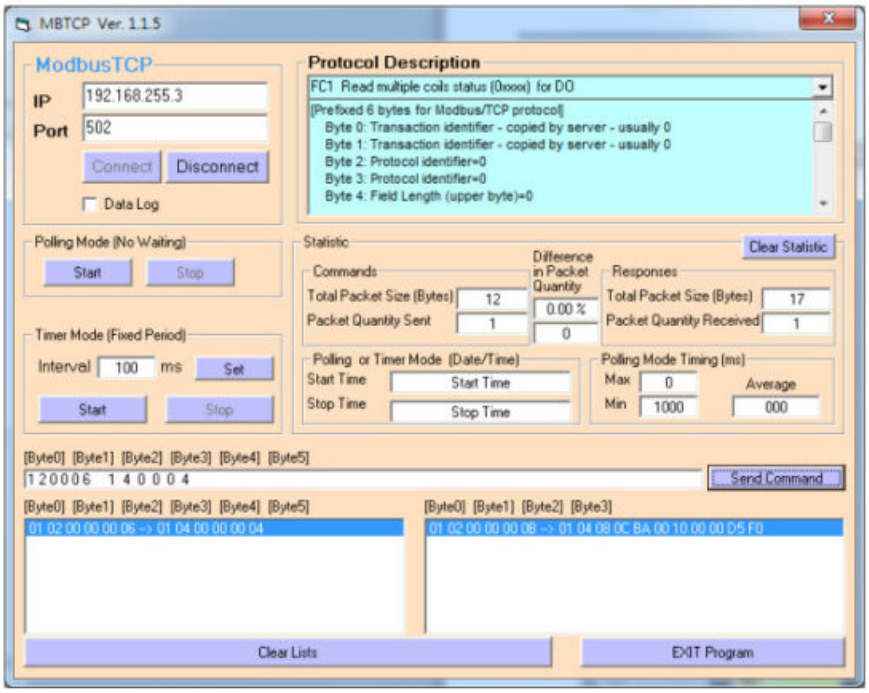

C:\Windows\system32\cmd.exe
ARP 項目刪除失敗: 要求的作業需要提升的權限。
Waiting request from MAC 00-0d-e0-8f-ff-ff (IP:192.168.255.1)
Starting BOOTP/TFTP Server ...
BOOTPREQ from MAC: 00-0D-E0-8F-FF-FF
% Complete: 100%
請按任意鍵繼續 . . .

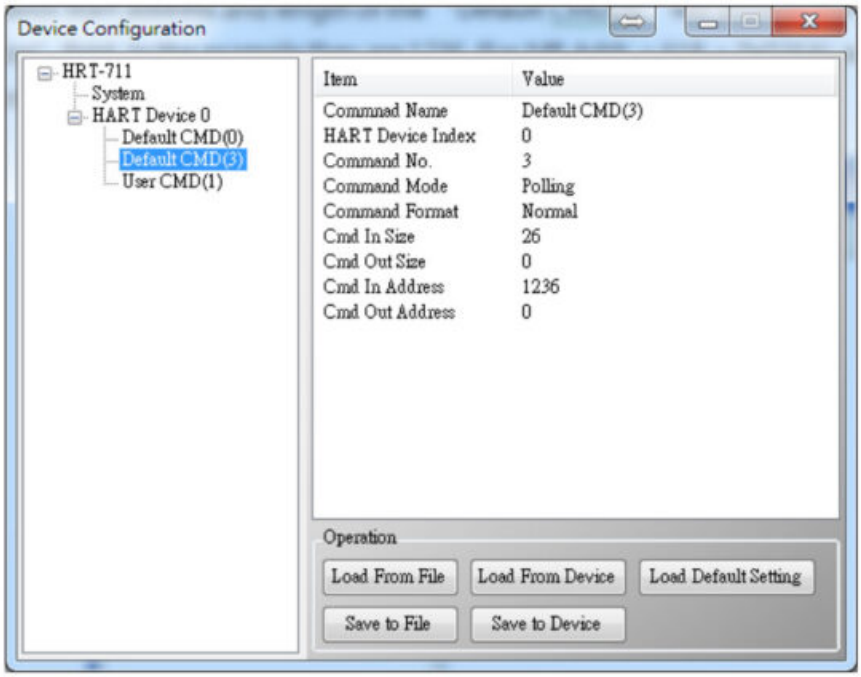

eSearch Utility [v1.1.19, May.09, 2018]
File Server Tools
Name Alias IP Address Sub-net Mask Gateway MAC Address DHCP Version
HRT-711 HRT-711 192.168.255.1 255.255.0.0 192.168.0.1 00:0d:e0:8f:ff:ff OFF v1.0.1 [2018/05/17]

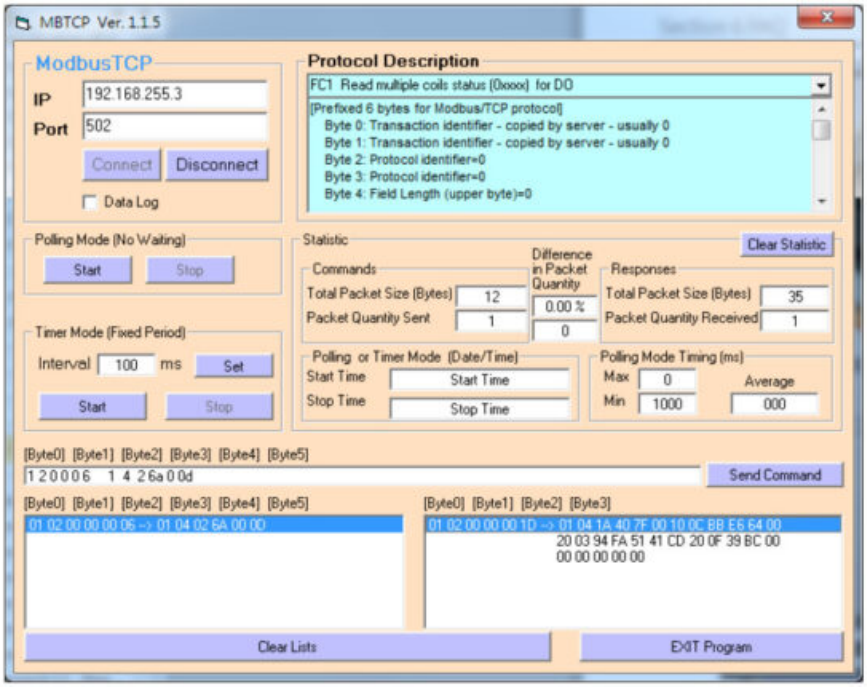

Device Configuration
HRT-711
System
Edit
Delete
Add Command
Item
Value
HART Device Name
HART Channel
Auto Configuration
Network
Default Command (0)
Default Command (3)
Initial
Polling


New Command
Command
Command Num. : 1
Mode : Polling
Format : Normal
In Size : 7
Out Size : 0
OK
Cancel


Device Configuration
HRT-711
System
HART Device 0
Default CMD(0)
Default CMD(3)
User CMD(1)
Item
Value
Command Name
User CMD(1)
HART Device Index
0
User Command Index
0
Command No.
1
Command Mode
Polling
Command Format
Normal
Cmd In Size
7
Cmd Out Size
0
Cmd In Address
0
Cmd Out Address
0
Operation
Load From File
Load From Device
Load Default Setting
Save to File
Save to Device


MBTCP Ver. 1.1.5
ModbusTCP
IP
192.168.255.3
Port
502
Connect
Disconnect
Data Log
Protocol Description
FC1 Read multiple coils status (0xxxx) for DO
[Prefixed 6 bytes for Modbus/TCP protocol]
Byte 0: Transaction identifier - copied by server - usually 0
Byte 1: Transaction identifier - copied by server - usually 0
Byte 2: Protocol identifier=0
Byte 3: Protocol identifier=0
Byte 4: Field Length (upper byte)=0
Polling Mode (No Waiting)
Start
Stop
Timer Mode (Fixed Period)
Interval
100
ms
Set
Start
Stop
Statistic
Clear Statistic
Commands
Difference in Packet Quantity
Responses
Total Packet Size (Bytes)
12
0.00 %
Total Packet Size (Bytes)
17
Packet Quantity Sent
1
0
Packet Quantity Received
1
Polling or Timer Mode (Date/Time)
Start Time
Start Time
Stop Time
Stop Time
Polling Mode Timing (ms)
Max
0
Min
1000
Average
000
[Byte0] [Byte1] [Byte2] [Byte3] [Byte4] [Byte5]
120006 140004
Send Command
[Byte0] [Byte1] [Byte2] [Byte3] [Byte4] [Byte5]
01 02 00 00 00 06 -> 01 04 00 00 00 04
[Byte0] [Byte1] [Byte2] [Byte3]
01 02 00 00 00 08 -> 01 04 08 0C BA 00 10 00 00 D5 F0
Clear Lists
EXIT Program


Device Configuration
HRT-711
System
HART Device 0
Default CMD(0)
Default CMD(3)
User CMD(1)
Item
Value
Commnad Name
Default CMD(3)
HART Device Index
0
Command No.
3
Command Mode
Polling
Command Format
Normal
Cmd In Size
26
Cmd Out Size
0
Cmd In Address
1236
Cmd Out Address
0
Operation
Load From File
Load From Device
Load Default Setting
Save to File
Save to Device



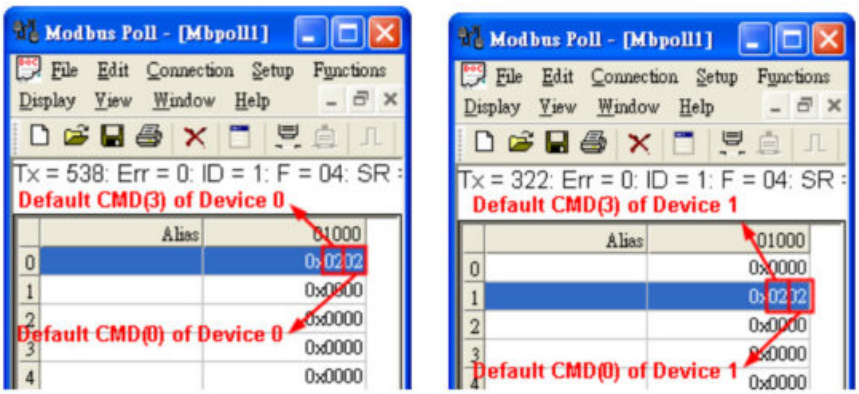


Figure 7-1.1 The status of Default CMD(0&3) in Device 0 and Device 1

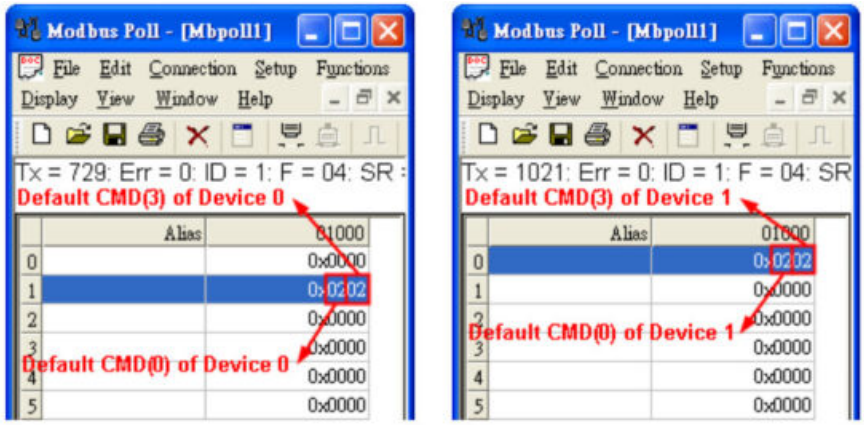
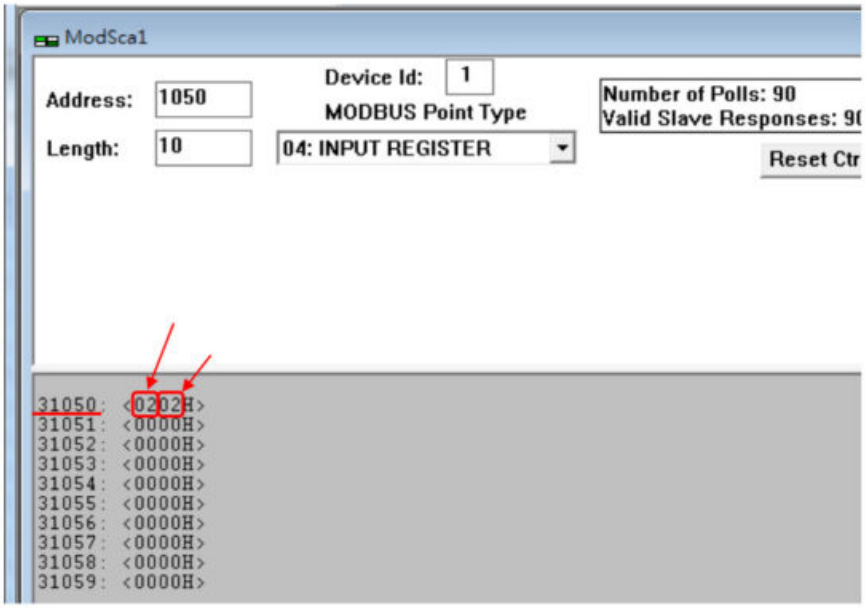
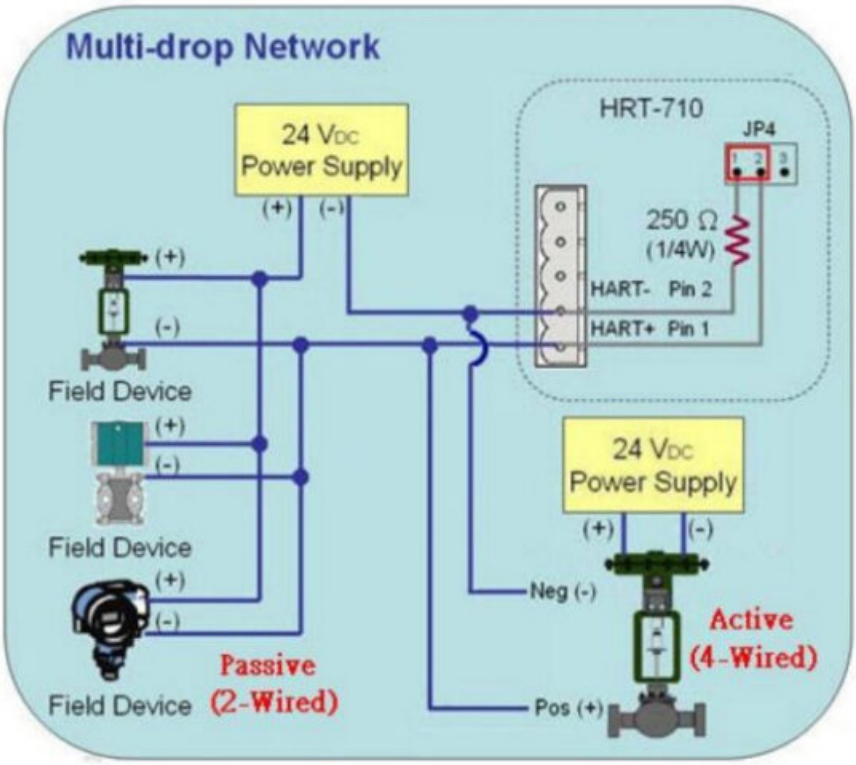


Figure 7-1.2 The status of Default CMD(0&3) in Device 0 and Device 1





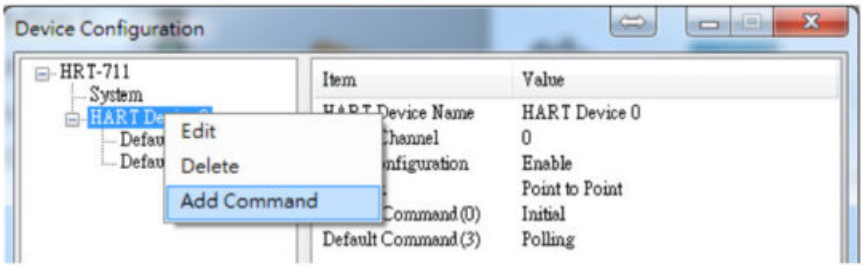
Command 149 - Read Fixed Process Density

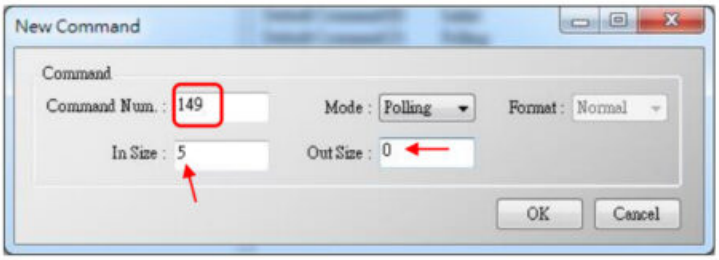
[redacted]

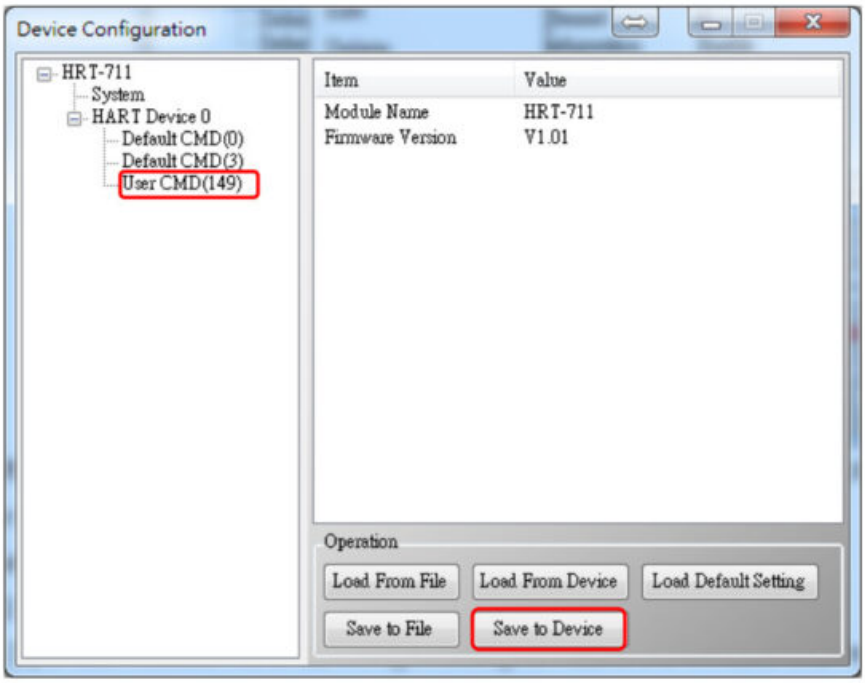
REQUEST DATA BYTES
NONE

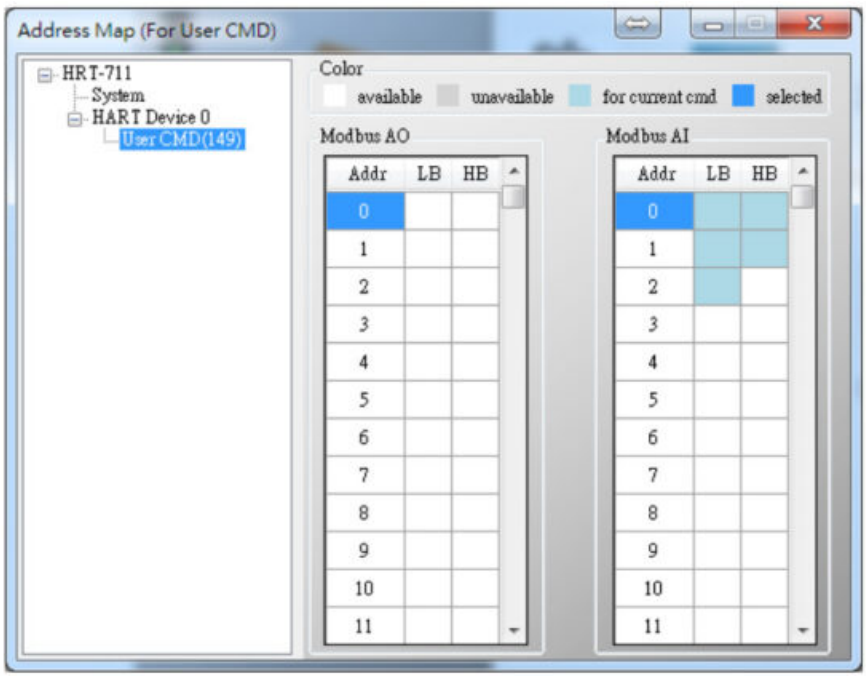
RESPONSE DATA BYTES
BYTE 0
1-4

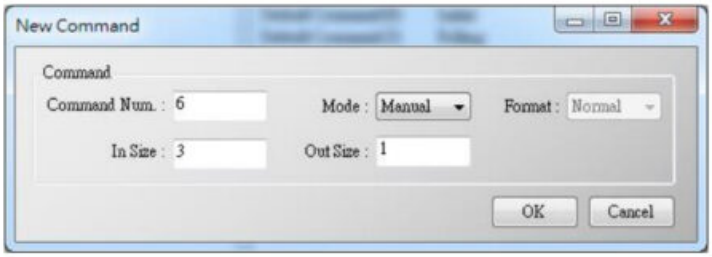
[redacted], 8-bit unsigned integer.
[redacted], IEEE 754 floating point format.

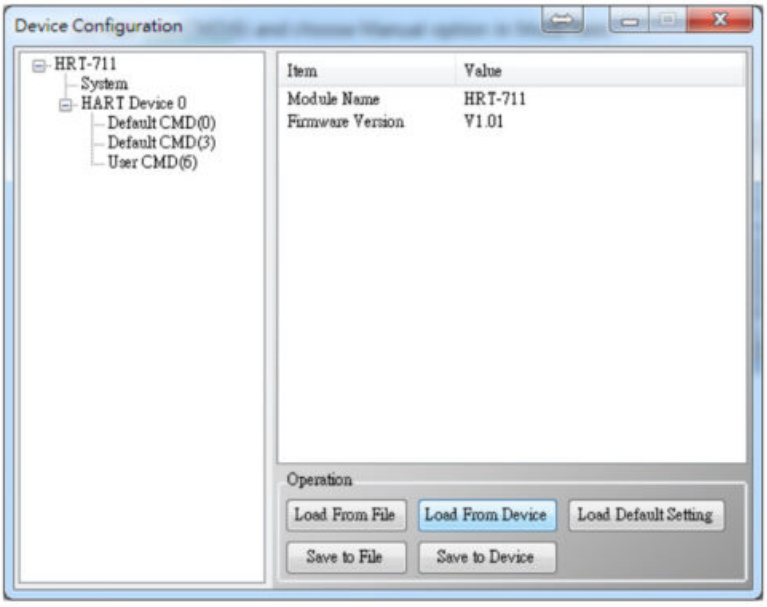

Device Configuration
HRT-711
System
HART Device 0
Edit
Delete
Add Command
Item
Value
Device Name
HART Device 0
Channel
0
Enable
Point to Point
Command (0)
Initial
Default Command (3)
Polling

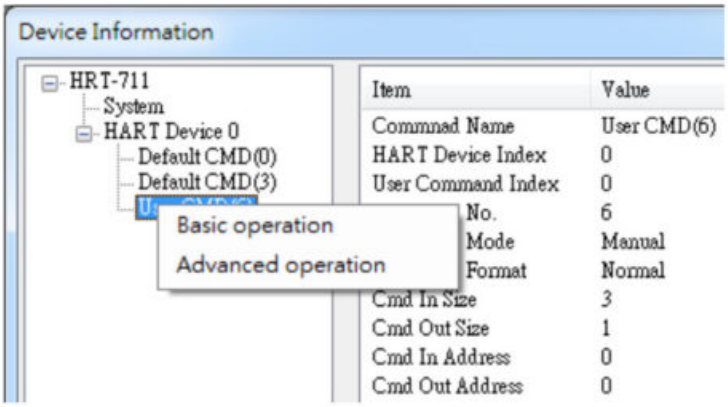

New Command
Command
Command Num. :
149
Mode :
Polling
Format :
Normal
In Size :
5
Out Size :
0
OK
Cancel

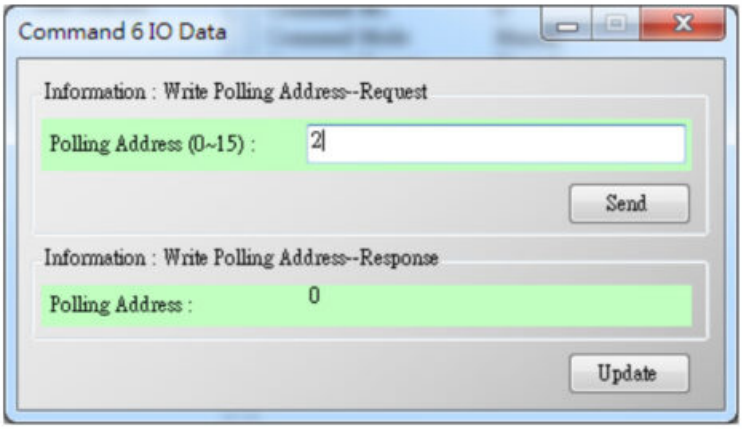

Device Configuration
HRT-711
System
HART Device 0
Default CMD(0)
Default CMD(3)
User CMD(149)
Item
Value
Module Name
HRT-711
Firmware Version
V1.01
Operation
Load From File
Load From Device
Load Default Setting
Save to File
Save to Device

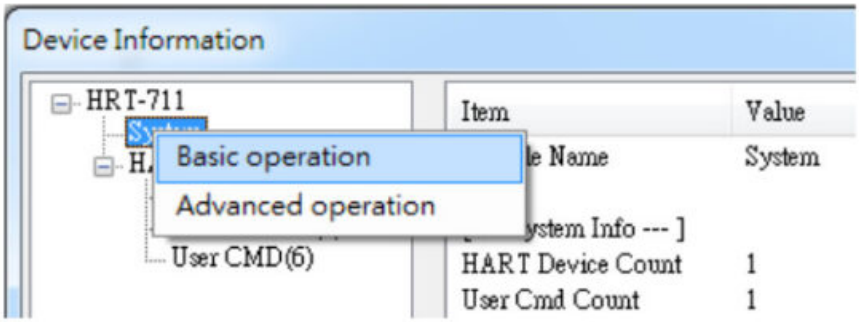

Address Map (For User CMD)
HRT-711
System
HART Device 0
User CMD(149)
Color
available
unavailable
for current cmd
selected
Modbus AO
Addr
LB
HB
Modbus AI
Addr
LB
HB

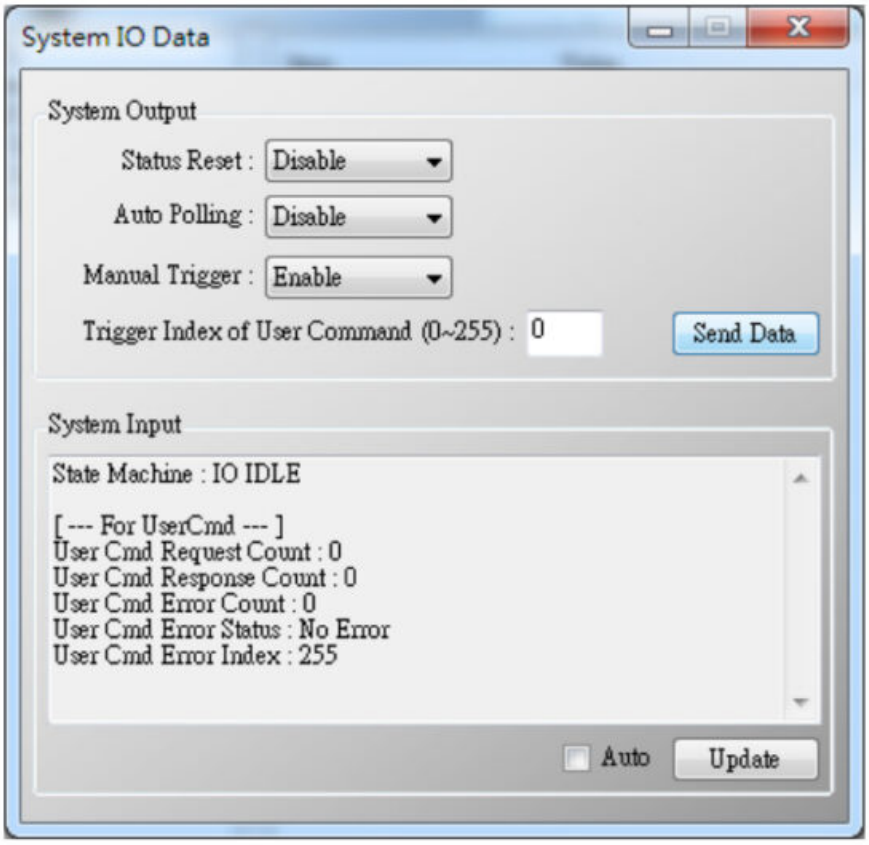

New Command
Command
Command Num. : 6
Mode : Manual
Format : Normal
In Size : 3
Out Size : 1
OK
Cancel


Device Configuration
HRT-711
System
HART Device 0
Default CMD(0)
Default CMD(3)
User CMD(6)
Item
Value
Module Name
HRT-711
Firmware Version
V1.01
Operation
Load From File
Load From Device
Load Default Setting
Save to File
Save to Device


Device Information
HRT-711
System
HART Device 0
Default CMD(0)
Default CMD(3)
Basic operation
Advanced operation
Item
Value
Commnad Name
User CMD(6)
HART Device Index
0
User Command Index
0
No.
6
Mode
Manual
Format
Normal
Cmd In Size
3
Cmd Out Size
1
Cmd In Address
0
Cmd Out Address
0


Command 6 IO Data
Information : Write Polling Address--Request
Polling Address (0~15) :
2
Send
Information : Write Polling Address--Response
Polling Address :
0
Update


Device Information
HRT-711
Basic operation
Advanced operation
User CMD(6)
Item
Value
System
HART Device Count
1
User Cmd Count
1


System IO Data
System Output
Status Reset : Disable
Auto Polling : Disable
Manual Trigger : Enable
Trigger Index of User Command (0~255) : 0
Send Data
System Input
State Machine : IO IDLE
[--- For UserCmd ---]
User Cmd Request Count : 0
User Cmd Response Count : 0
User Cmd Error Count : 0
User Cmd Error Status : No Error
User Cmd Error Index : 255
Auto
Update

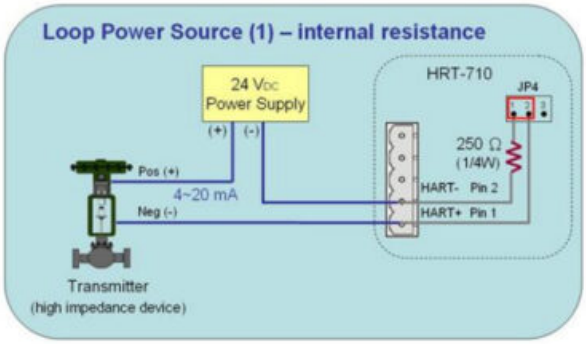


Figure 13-1 HART_P2P_Network_Passive (Built-In-Resistor)

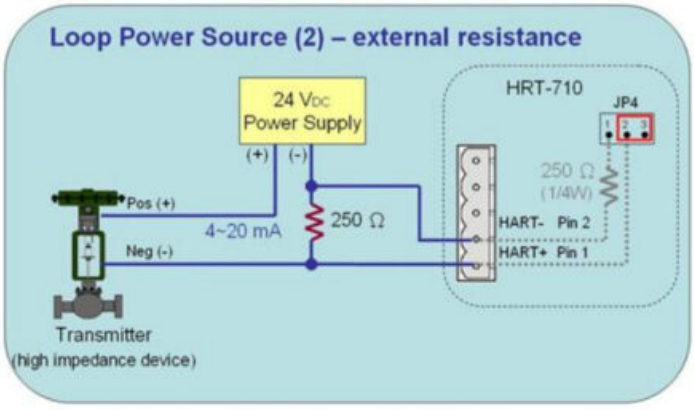


Figure 13-2 HART_P2P_Network_Passive (Ext-Resistor)

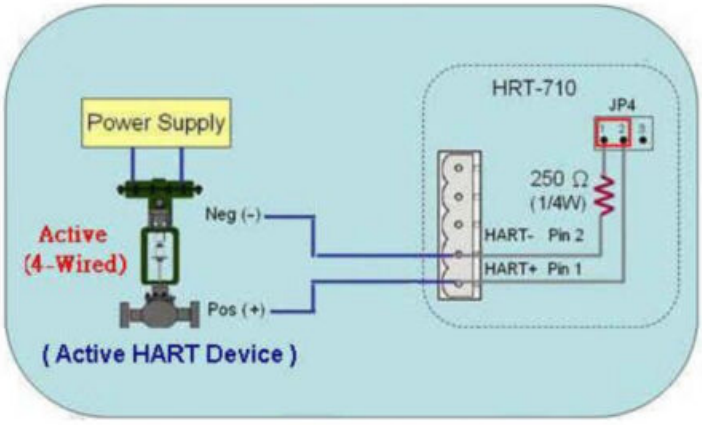


Figure 13-3 HART_P2P_Network_Active (Built-In-Resistor)

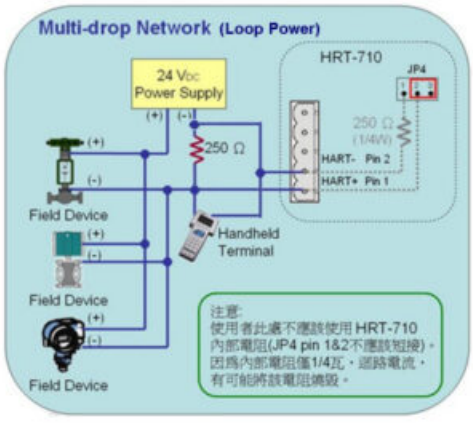


Figure 13-4 HART_Multi-Drop_Network_Passive.jpg

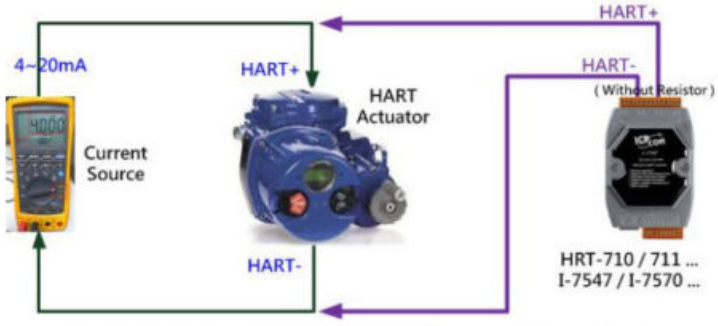


Fig 13-3-1 : "Point to Point" Mode (HART Actuator, without resistor)

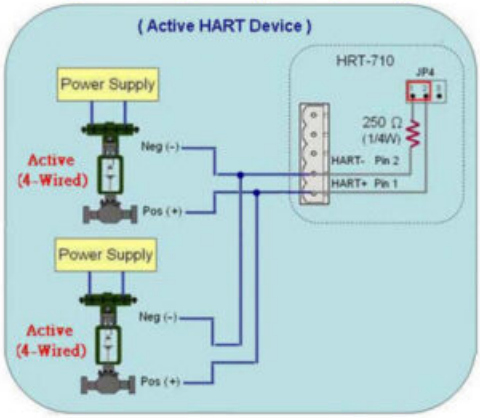


Figure 13-5 HART_Multi-Drop_Network_Active

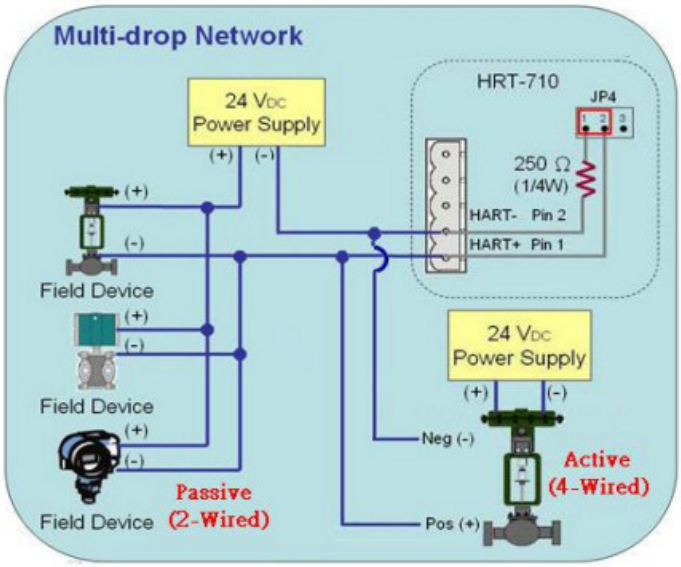
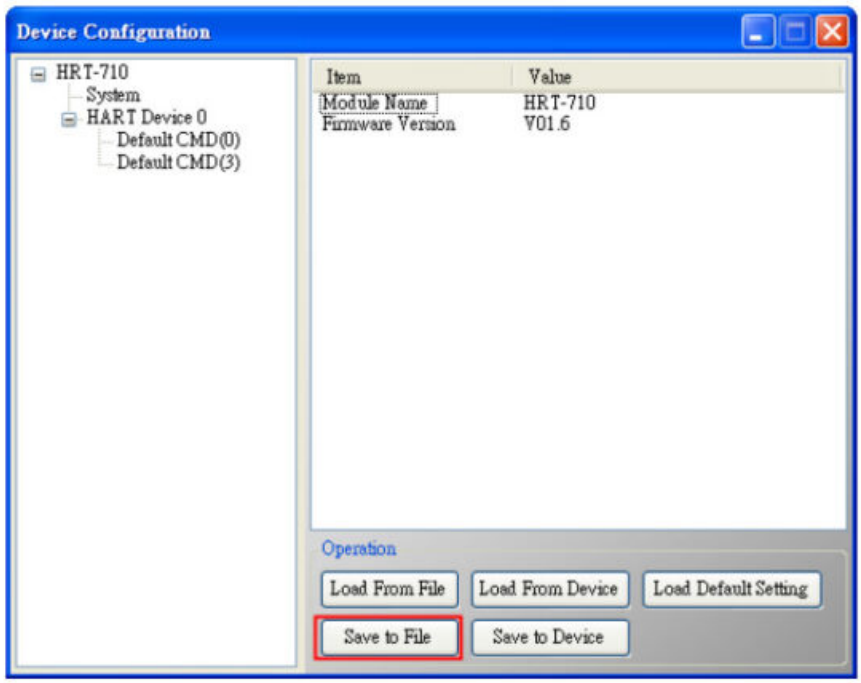
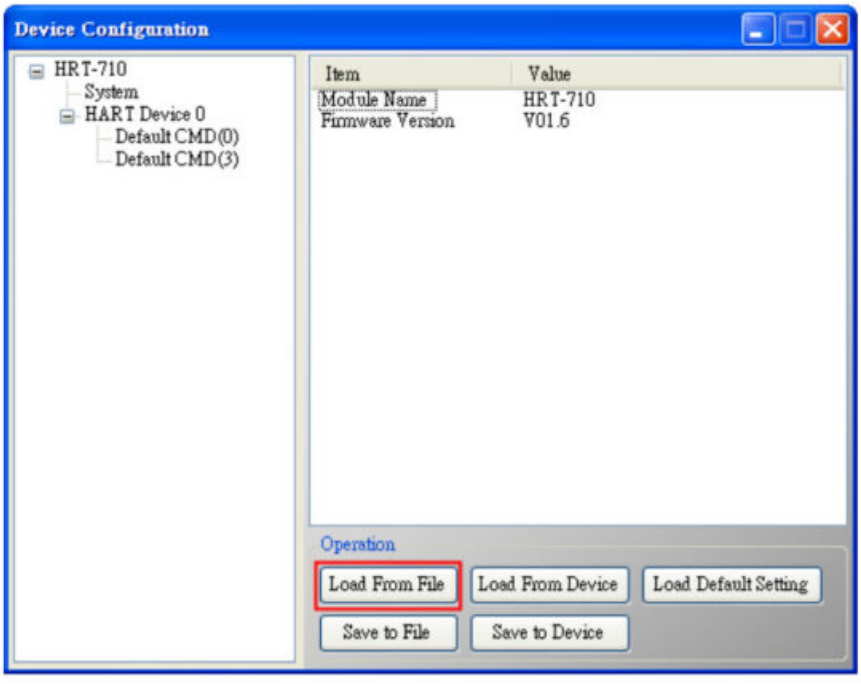
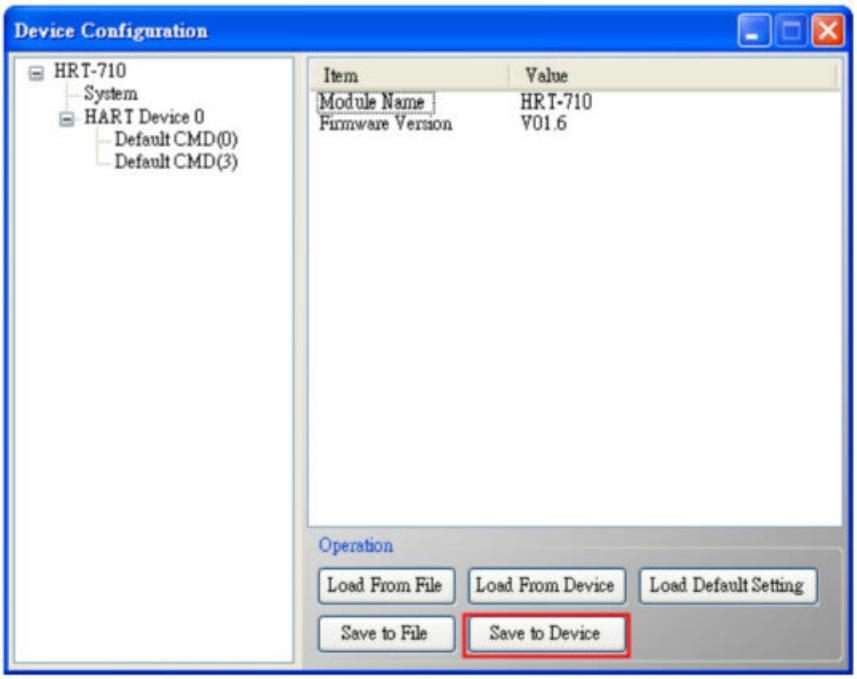
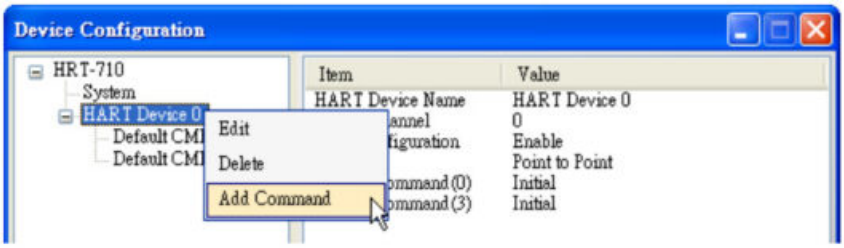


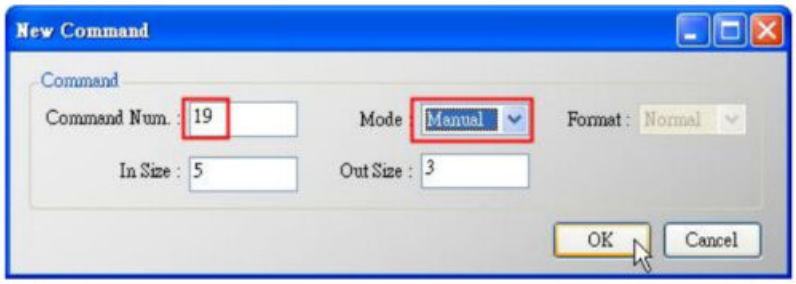
Figure 13-6 HART_Multi-Drop_Network_Active＆Passive

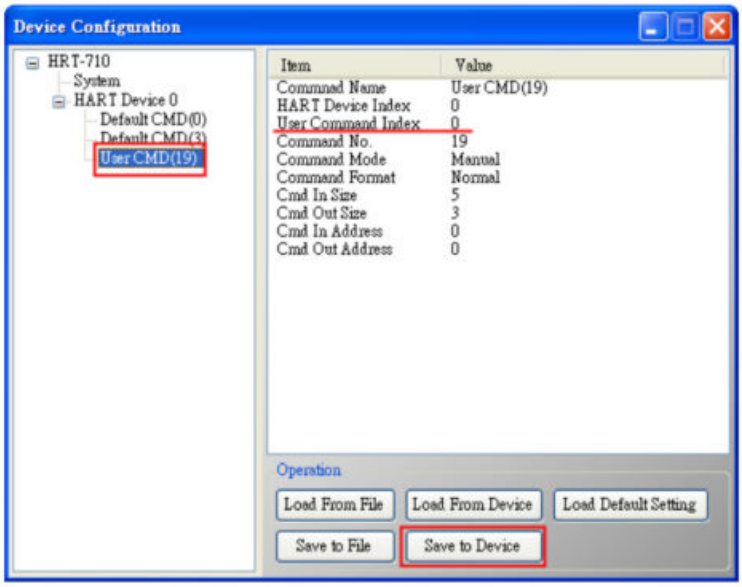


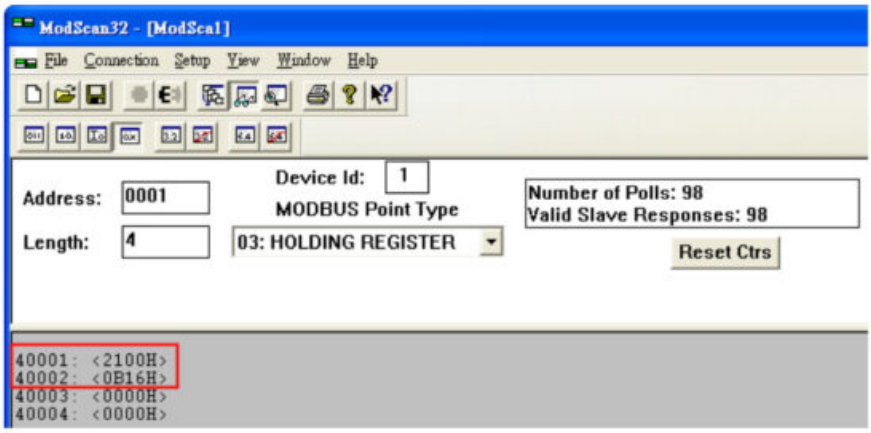


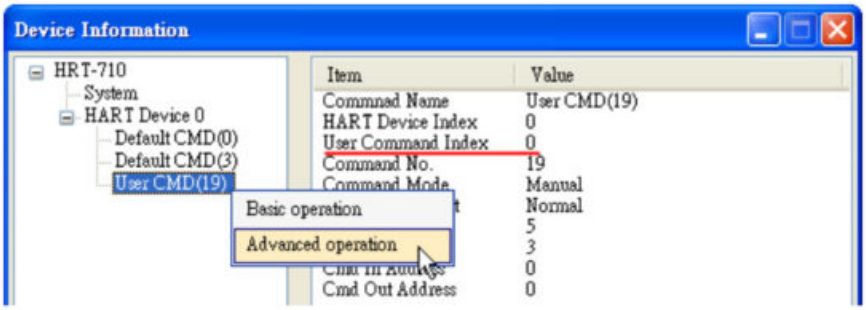

Device Configuration
HRT-710
System
HART Device 0
Default CMD(0)
Default CMD(3)
Item
Value
Module Name
HRT-710
Firmware Version
V01.6
Operation
Load From File
Load From Device
Load Default Setting
Save to File
Save to Device

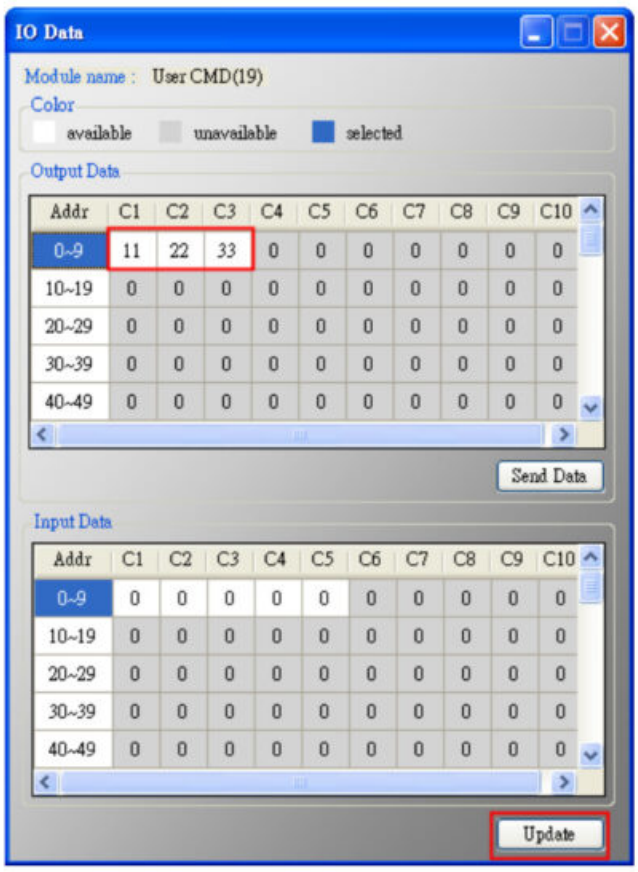

Device Configuration
HRT-710
System
HART Device 0
Default CMD(0)
Default CMD(3)
Edit
Delete
Add Command
Item
Value
HART Device Name
HART Device 0
Point to Point
Initial
Initial


New Command
Command
Command Num. :
19
Mode :
Manual
Format :
Normal
In Size :
5
Out Size :
3
OK
Cancel


Device Configuration
HRT-710
System
HART Device 0
Default CMD(0)
Default CMD(3)
User CMD(19)
Item
Value
Command Name
User CMD(19)
HART Device Index
0
User Command Index
0
Command No.
19
Command Mode
Manual
Command Format
Normal
Cmd In Size
5
Cmd Out Size
3
Cmd In Address
0
Cmd Out Address
0
Operation
Load From File
Load From Device
Load Default Setting
Save to File
Save to Device


ModScan32 - [ModScal]
File Connection Setup View Window Help
Address: 0001
Device Id: 1
MODBUS Point Type
Length: 4
03: HOLDING REGISTER
Number of Polls: 98
Valid Slave Responses: 98
Reset Ctrs
40001: <2100H>
40002: <0B16H>
40003: <0000H>
40004: <0000H>


Device Information
HRT-710
System
HART Device 0
Default CMD(0)
Default CMD(3)
User CMD(19)
Basic operation
Advanced operation
Item
Value
Commnad Name
User CMD(19)
HART Device Index
0
User Command Index
0
Command No.
19
Command Mode
Manual
Normal
5
3
0
Cmd Out Address
0


IO Data
Module name : User CMD(19)
Color
available
unavailable
selected
Output Data
Addr C1 C2 C3 C4 C5 C6 C7 C8 C9 C10
0~9 11 22 33 0 0 0 0 0 0 0
10~19 0 0 0 0 0 0 0 0 0 0
20~29 0 0 0 0 0 0 0 0 0 0
30~39 0 0 0 0 0 0 0 0 0 0
40~49 0 0 0 0 0 0 0 0 0 0
Send Data
Input Data
Addr C1 C2 C3 C4 C5 C6 C7 C8 C9 C10
0~9 0 0 0 0 0 0 0 0 0 0
10~19 0 0 0 0 0 0 0 0 0 0
20~29 0 0 0 0 0 0 0 0 0 0
30~39 0 0 0 0 0 0 0 0 0 0
40~49 0 0 0 0 0 0 0 0 0 0
Update

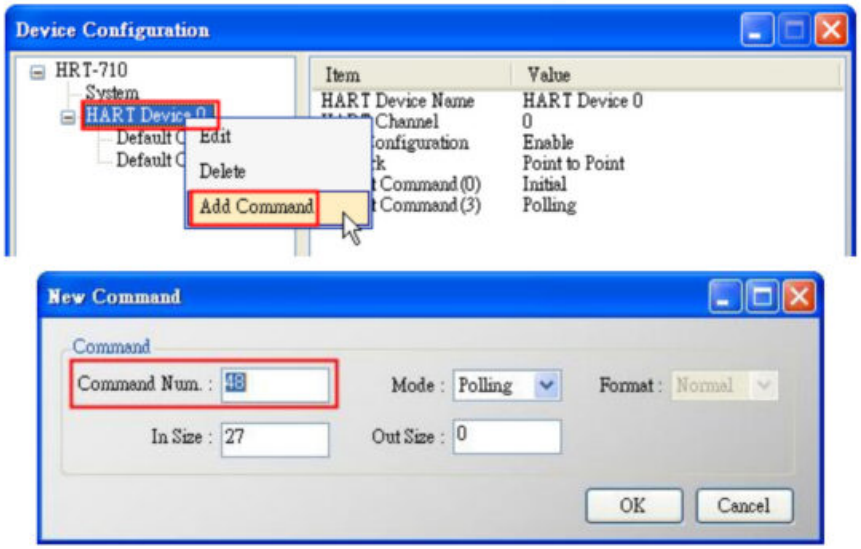


Figure 17-1 Add HART CMD 48 to HRT-711

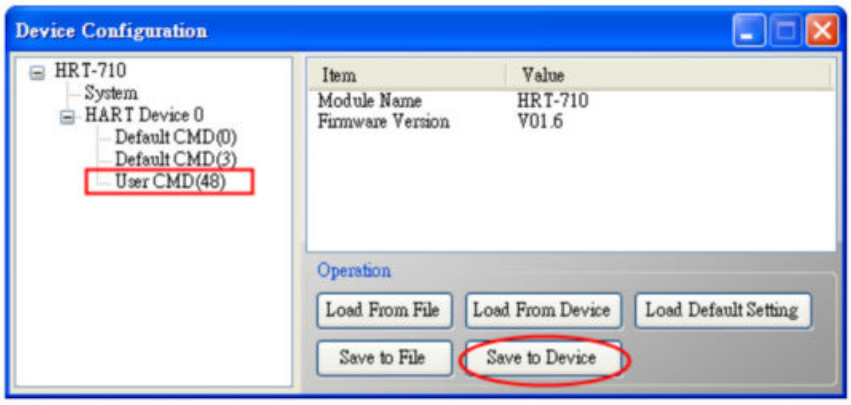
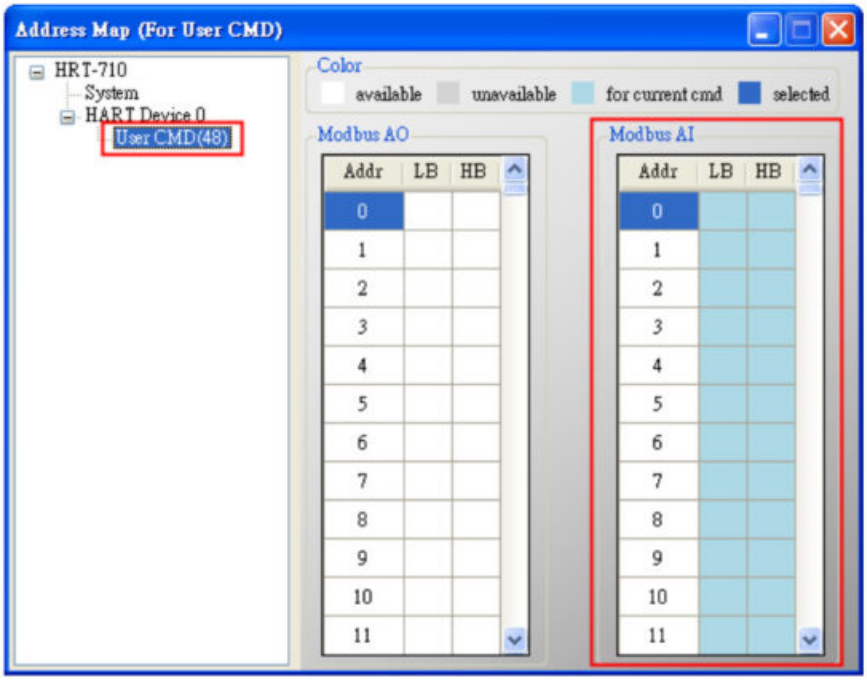


Figure 17-2 Save the settings to HRT-711



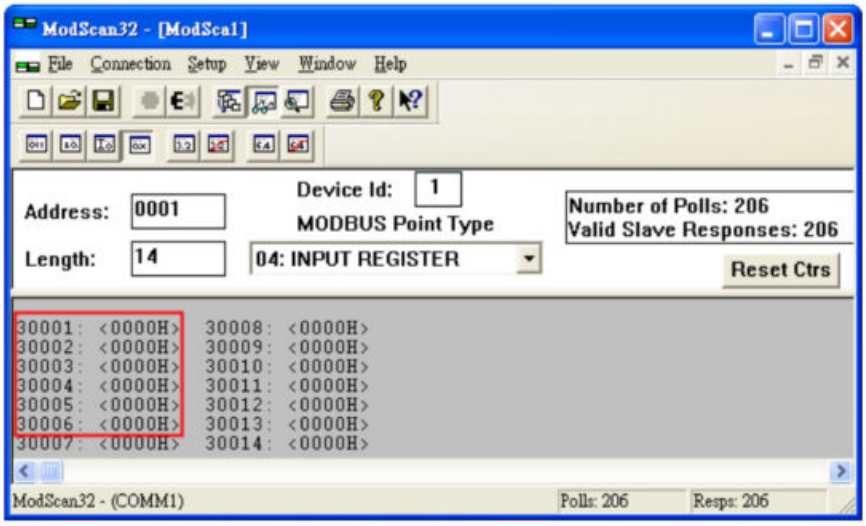


Figure 17-4 Get the HART CMD 48 data by using "ModScan"

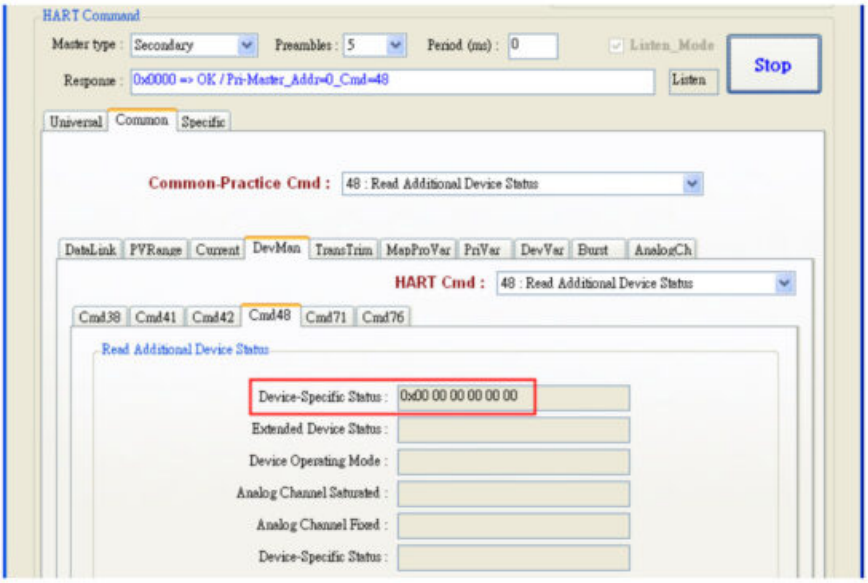
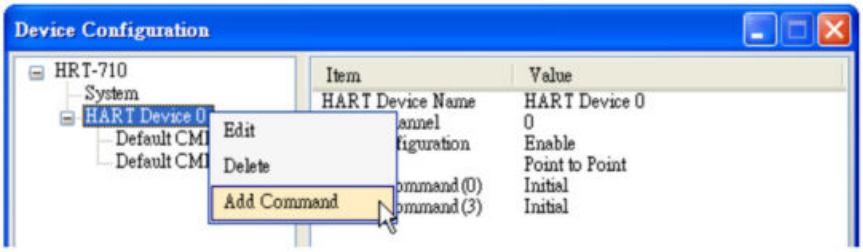
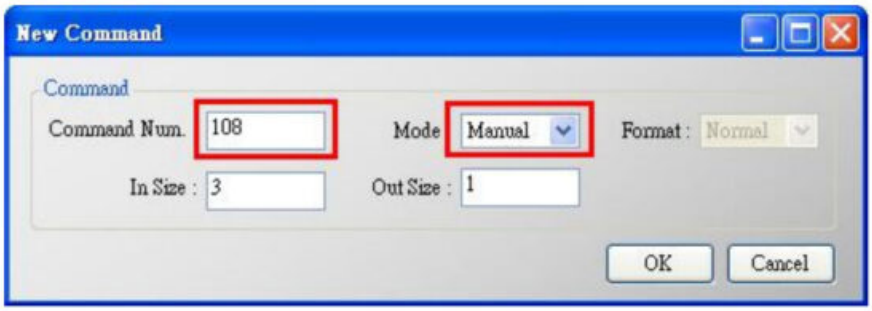
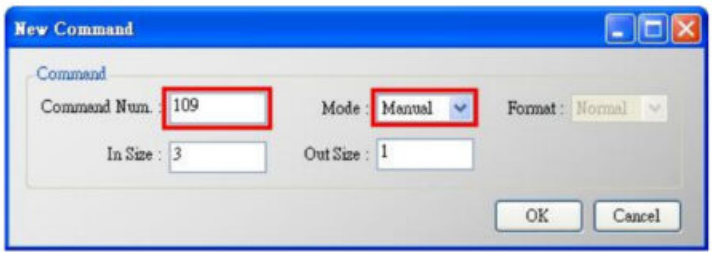
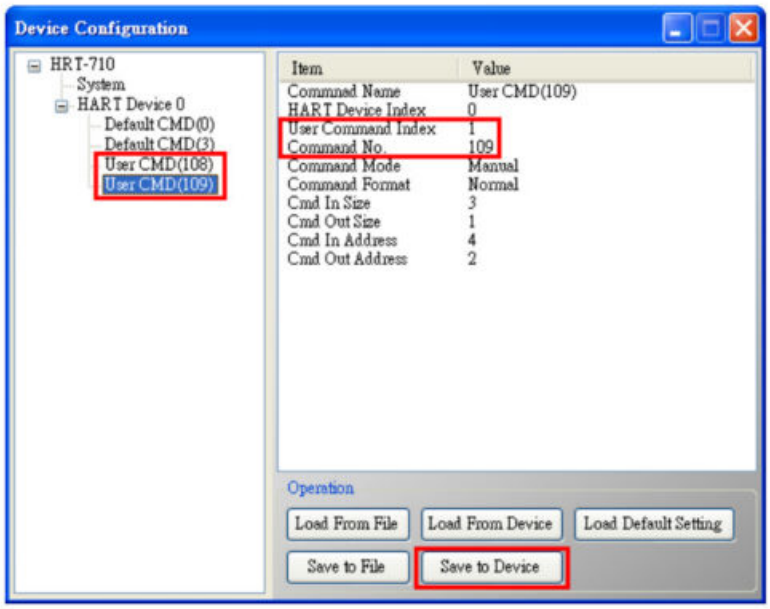


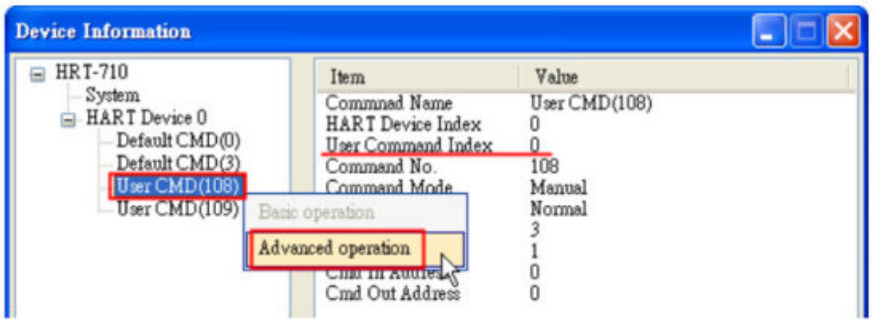
Figure 17-5 Get the HART CMD 48 data by using "HC_Tool (HART Master)"

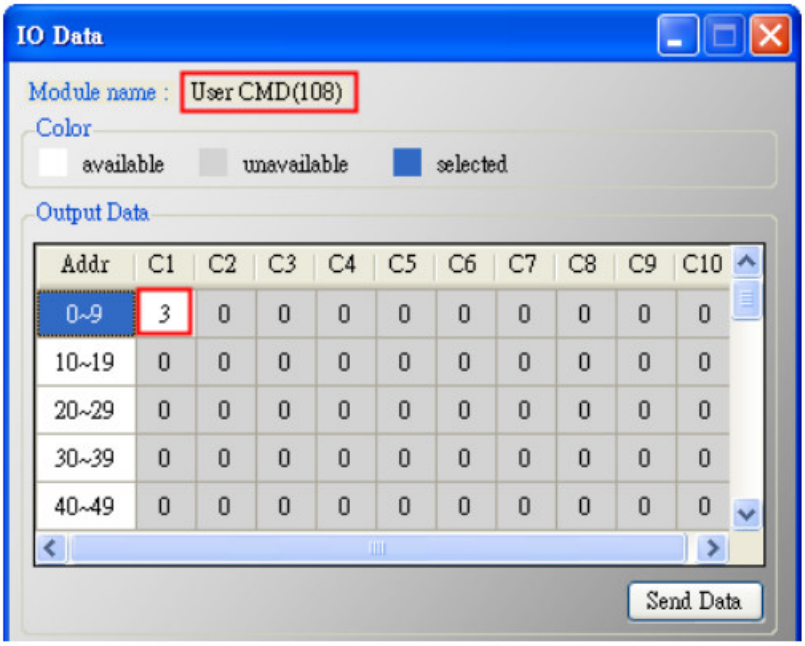


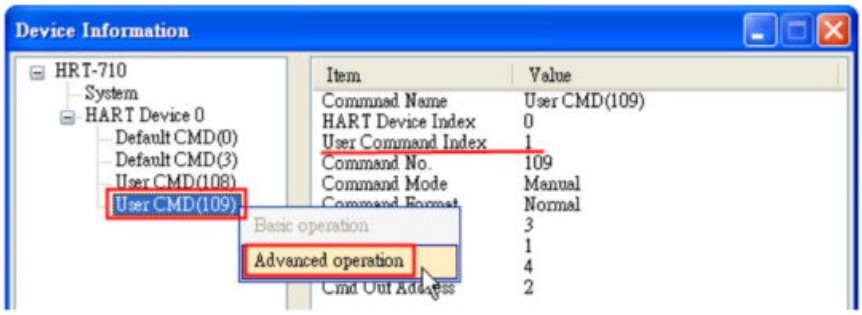


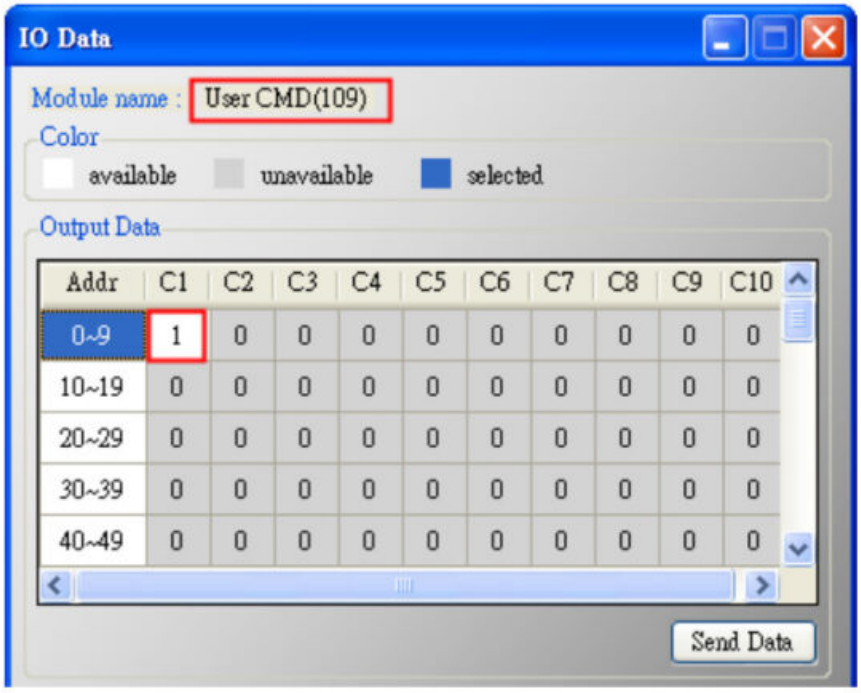

New Command
Command
Command Num. : 109
Mode : Manual
Format : Normal
In Size : 3
Out Size : 1
OK
Cancel


Device Configuration
HRT-710
System
HART Device 0
Default CMD(0)
Default CMD(3)
User CMD(108)
User CMD(109)
Item
Value
Commnad Name
User CMD(109)
HART Device Index
0
User Command Index
1
Command No.
109
Command Mode
Manual
Command Format
Normal
Cmd In Size
3
Cmd Out Size
1
Cmd In Address
4
Cmd Out Address
2
Operation
Load From File
Load From Device
Load Default Setting
Save to File
Save to Device


Device Information
HRT-710
System
HART Device 0
Default CMD(0)
Default CMD(3)
User CMD(108)
User CMD(109)
Item
Value
Commnad Name
User CMD(108)
HART Device Index
0
User Command Index
0
Command No.
108
Command Mode
Manual
Normal
3
1
0
Cmd Out Address
0
Basic operation
Advanced operation


IO Data
Module name : User CMD(108)
Color
available
unavailable
selected
Output Data
Addr C1 C2 C3 C4 C5 C6 C7 C8 C9 C10
0~9 3 0 0 0 0 0 0 0 0 0
10~19 0 0 0 0 0 0 0 0 0 0
20~29 0 0 0 0 0 0 0 0 0 0
30~39 0 0 0 0 0 0 0 0 0 0
40~49 0 0 0 0 0 0 0 0 0 0
Send Data





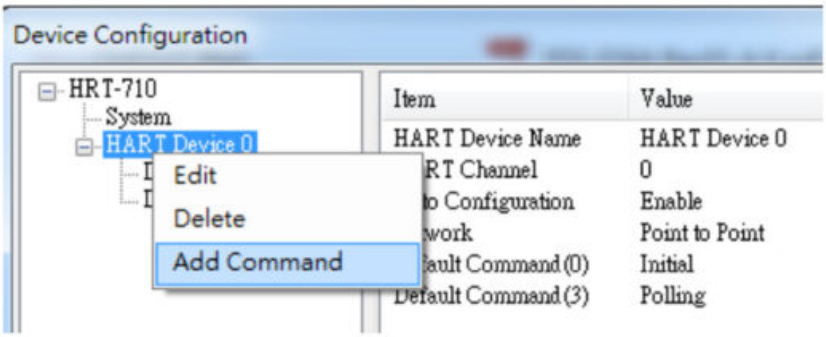
Request Data Bytes

Byte	Format	Description
None		Resets the Totalizer Value to Zero

Response Data Bytes

Byte	Format	Description
None		

Figure 19-1 CMD137's frame format of KROHNE ESK



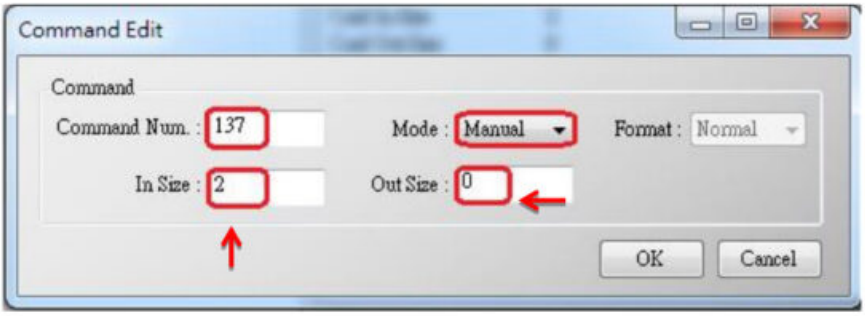


Figure19-2 Add HART command 137 to HRT-711

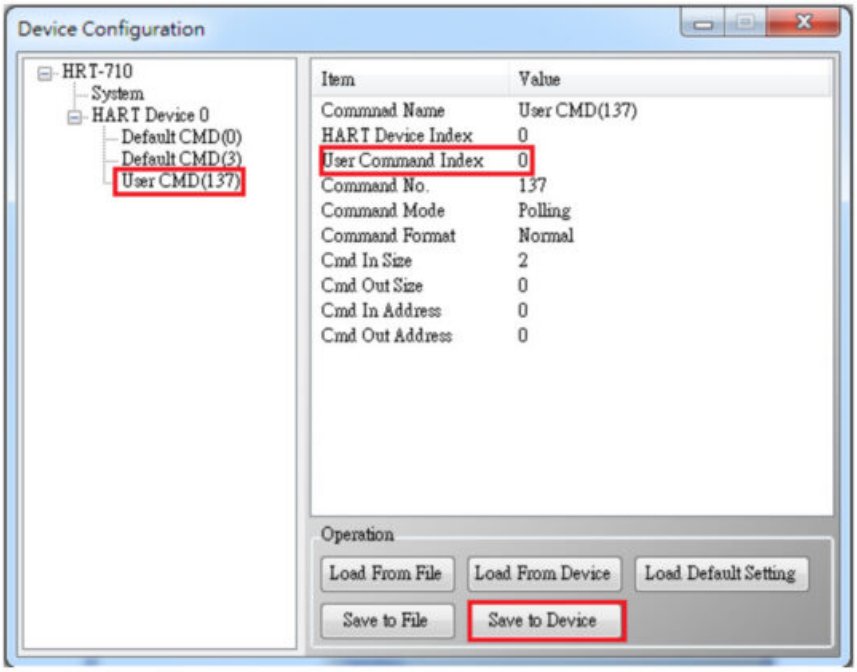
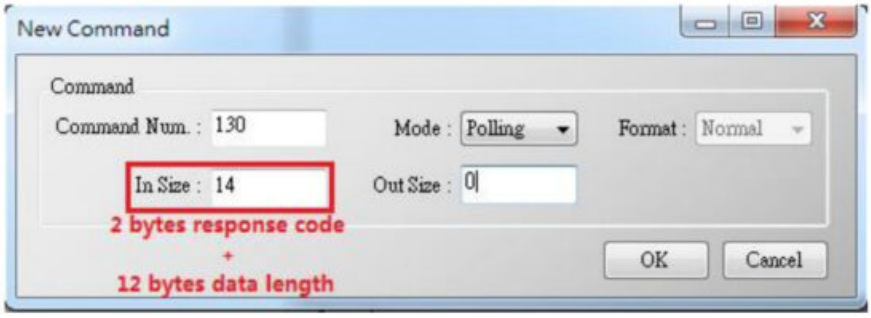
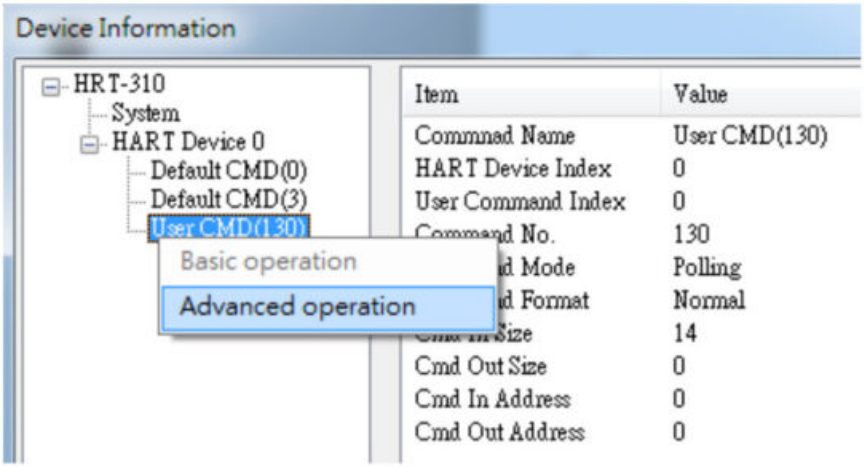


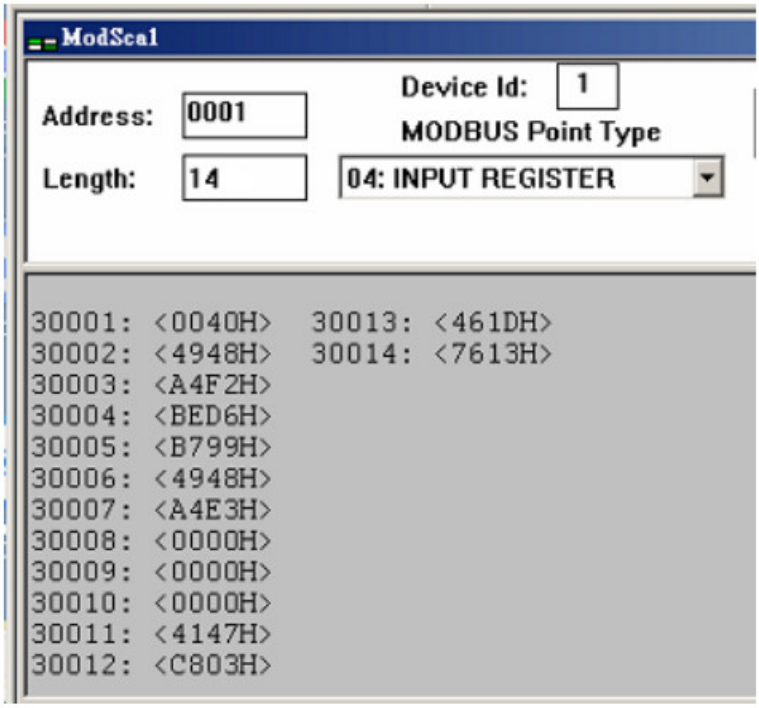
Figure19-3 Save settings to HRT-711

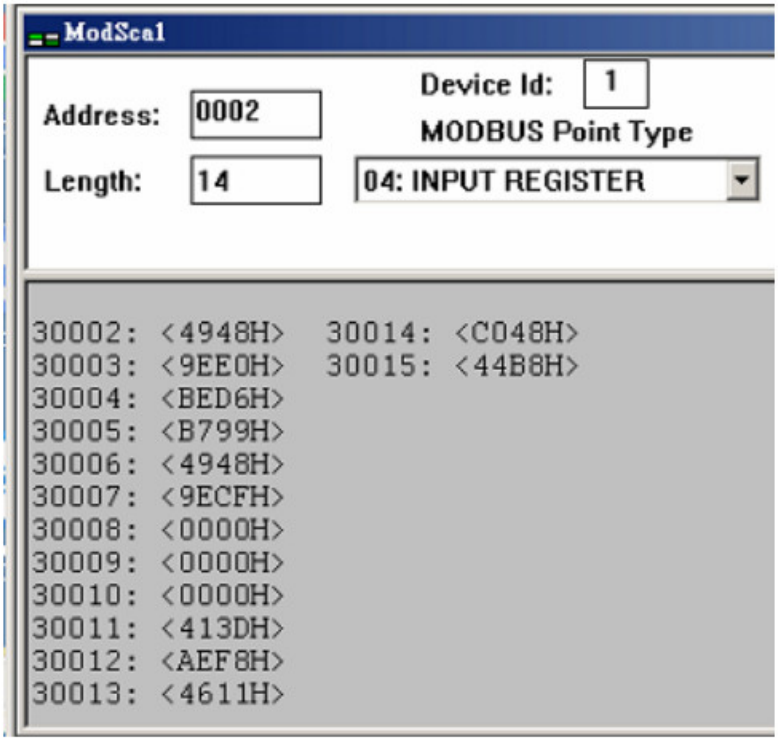
HART command list

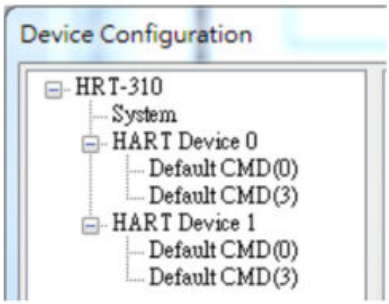
Command #	Name	Operation	Parameters	Type	Bytes
130	read_HART_dynamic_variables	read	func6_TOT_total_value, func7_TOT_total_value, func3_TOT_total_value	FLOAT FLOAT FLOAT	4 4 4

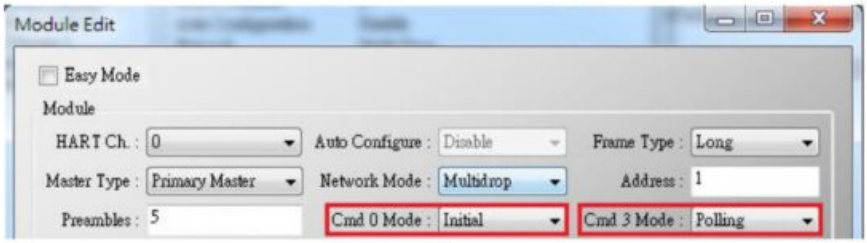


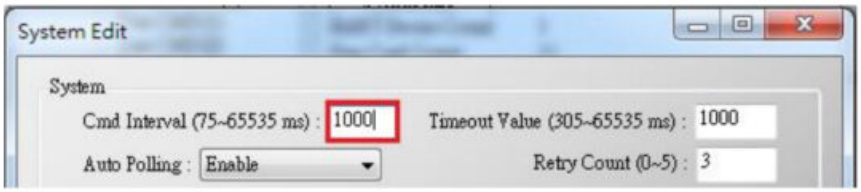


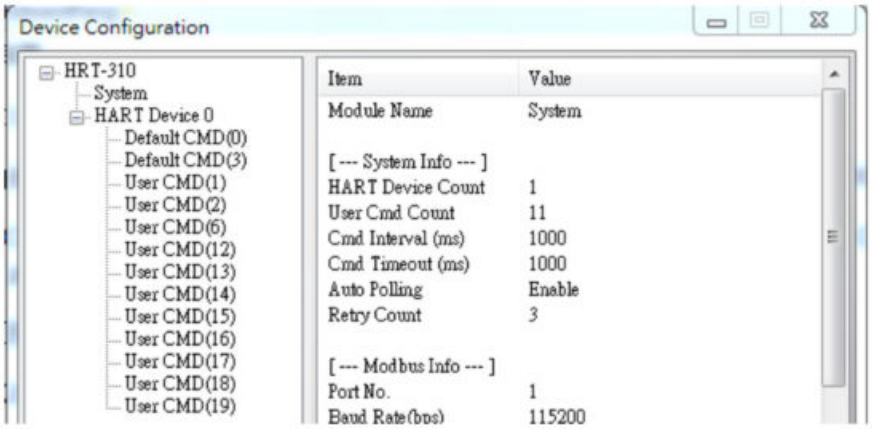

ModScal
Address:
0001
Device Id:
1
MODBUS Point Type
Length:
14
04: INPUT REGISTER
30001: <0040H>
30002: <4948H>
30003: <A4F2H>
30004: <BED6H>
30005: <B799H>
30006: <4948H>
30007: <A4E3H>
30008: <0000H>
30009: <0000H>
30010: <0000H>
30011: <4147H>
30012: <C803H>
30013: <461DH>
30014: <7613H>


ModScal
Address:
0002
Device Id:
1
MODBUS Point Type
Length:
14
04: INPUT REGISTER
30002: <4948H>
30003: <9EE0H>
30004: <BED6H>
30005: <B799H>
30006: <4948H>
30007: <9ECFH>
30008: <0000H>
30009: <0000H>
30010: <0000H>
30011: <413DH>
30012: <AEF8H>
30013: <4611H>
30014: <C048H>
30015: <44B8H>

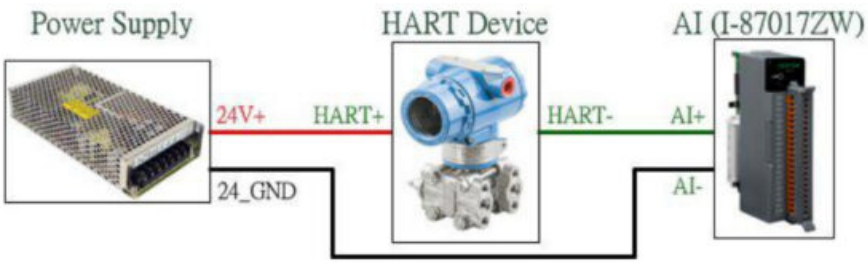

Device Configuration
HRT-310
System
HART Device 0
Default CMD(0)
Default CMD(3)
HART Device 1
Default CMD(0)
Default CMD(3)

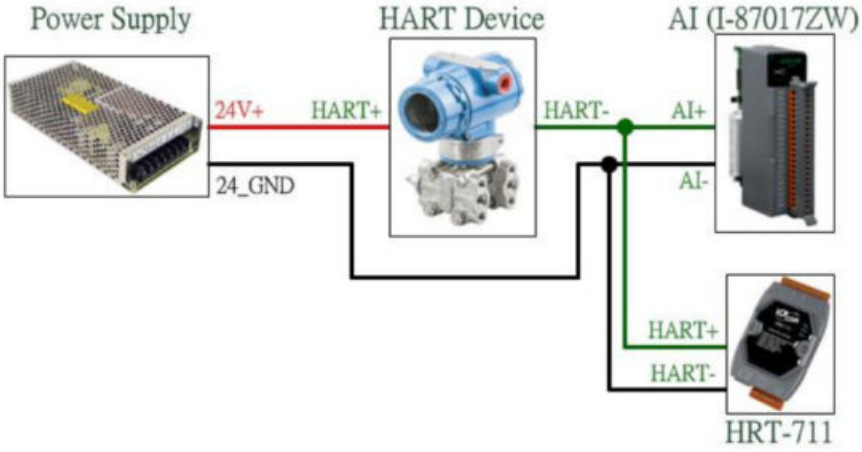

Module Edit
Easy Mode
Module
HART Ch. : 0
Auto Configure : Disable
Frame Type : Long
Master Type : Primary Master
Network Mode : Multidrop
Address : 1
Preambles : 5
Cmd 0 Mode : Initial
Cmd 3 Mode : Polling

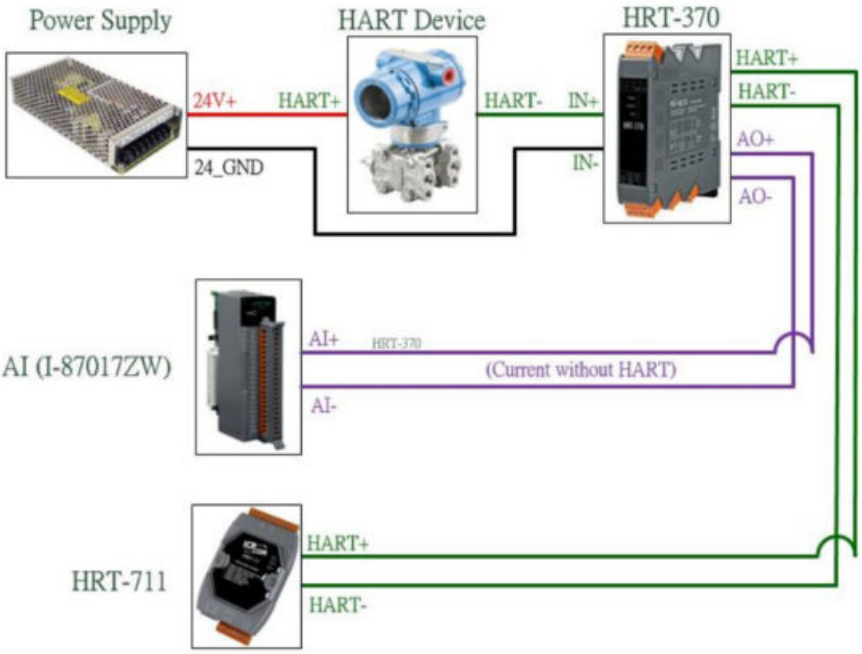

System Edit
System
Cmd Interval (75~65535 ms) : 1000
Timeout Value (305~65535 ms) : 1000
Auto Polling : Enable
Retry Count (0~5) : 3

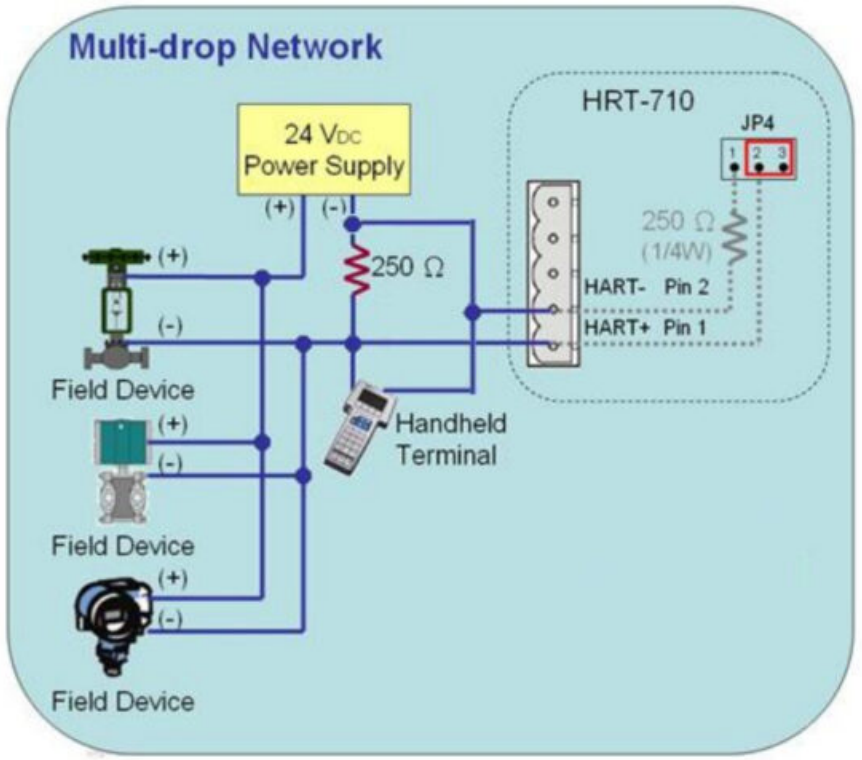

Device Configuration
HRT-310
System
HART Device 0
Default CMD(0)
Default CMD(3)
User CMD(1)
User CMD(2)
User CMD(6)
User CMD(12)
User CMD(13)
User CMD(14)
User CMD(15)
User CMD(16)
User CMD(17)
User CMD(18)
User CMD(19)
Item
Value
Module Name
System
[--- System Info ---]
HART Device Count
1
User Cmd Count
11
Cmd Interval (ms)
1000
Cmd Timeout (ms)
1000
Auto Polling
Enable
Retry Count
3
[--- Modbus Info ---]
Port No.
1
Baud Rate(bps)
115200

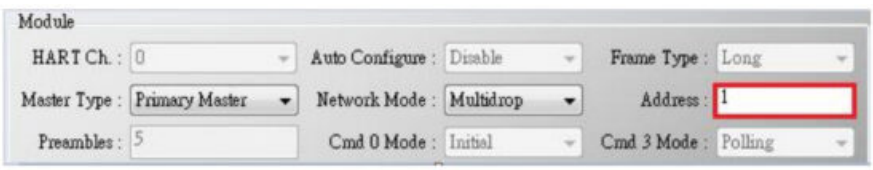

System Edit
System
Cmd Interval (75~65535 ms) : 500
Timeout Value (305~65535 ms) : 1000
Auto Polling : Enable
Retry Count (0~5) : 3


Power Supply
HART Device
AI (I-87017ZW)
24V+
HART+
HART-
AI+
24_GND
AI-

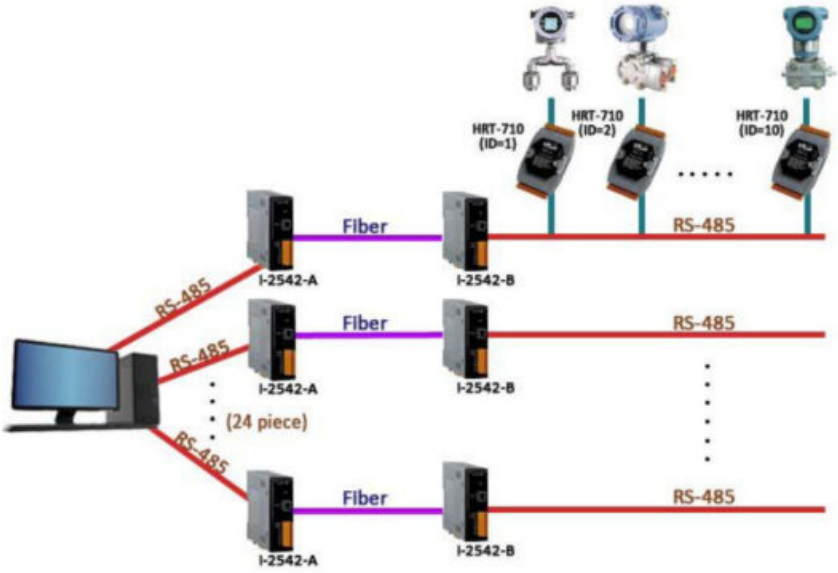

Power Supply
HART Device
AI (I-87017ZW)
24V+
HART+
HART-
AI+
AI-
24_GND
HART+
HART-
HRT-711

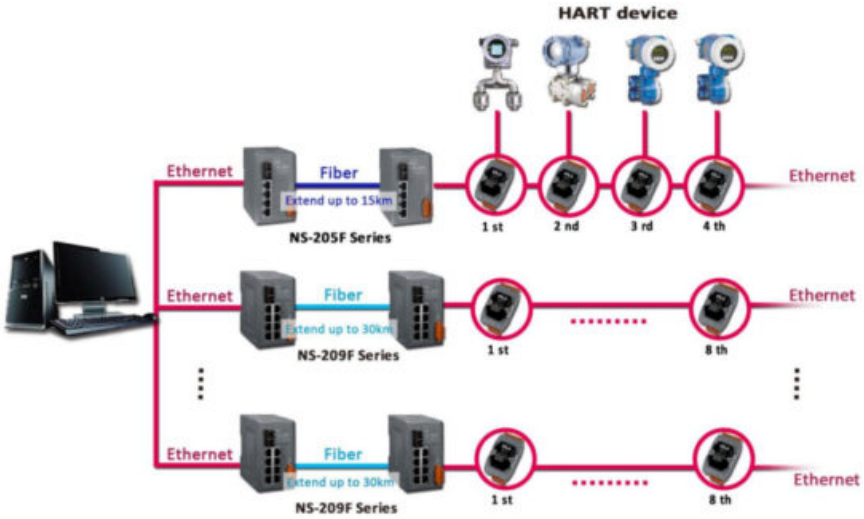

Power Supply
HART Device
HRT-370
24V+
HART+
HART-
IN+
IN-
HART+
HART-
AO+
AO-
24_GND
AI (I-87017ZW)
AI+
HRT-370
(Current without HART)
AI-
HRT-711
HART+
HART-

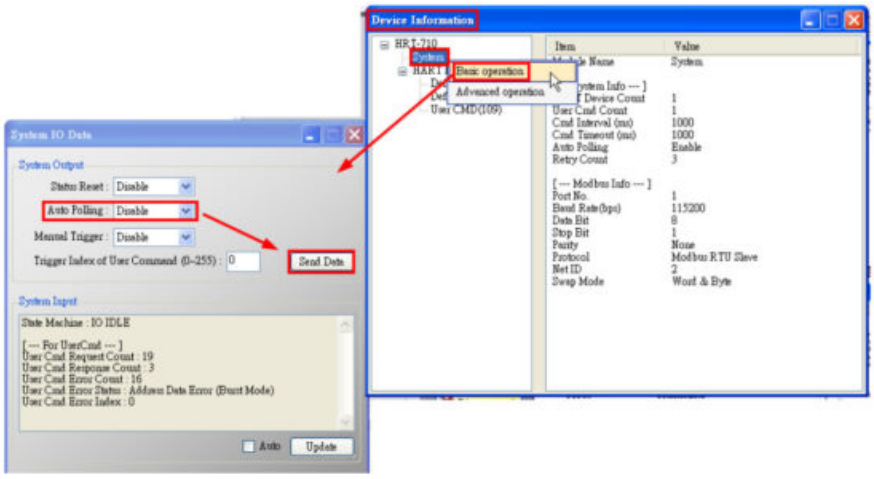

Multi-drop Network
24 VDC
Power Supply
(+)
(-)
250 Ω
HRT-710
JP4
1 2 3
250 Ω
(1/4W)
HART- Pin 2
HART+ Pin 1
Field Device
Handheld
Terminal
Field Device
Field Device

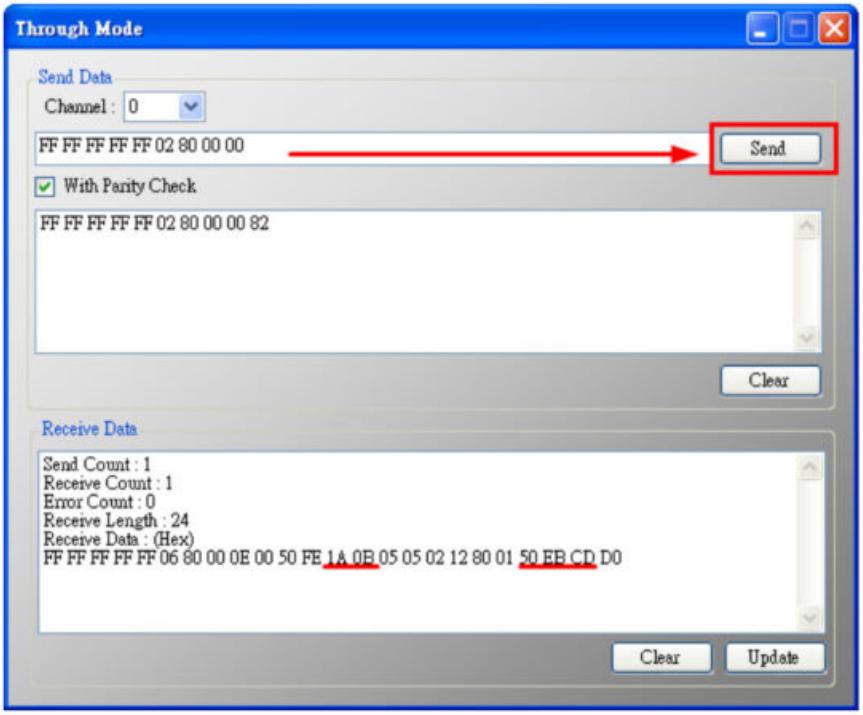

Module
HART Ch. : 0
Auto Configure : Disable
Frame Type : Long
Master Type : Primary Master
Network Mode : Multidrop
Address : 1
Preambles : 5
Cmd 0 Mode : Initial
Cmd 3 Mode : Polling

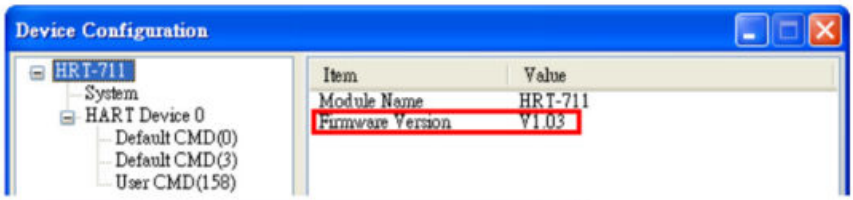

UL1577 Spec.
on HART side
HRT-227CS
Fiber
Up to 30 km
Extend HART
Comm. Distance
HRT-227CS
UL1577 Spec.
on HART side
HART
HART


HRT-710
(ID=1)
HRT-710
(ID=2)
HRT-710
(ID=10)
Fiber
RS-485
I-2542-A
I-2542-B
RS-485
RS-485
RS-485
(24 piece)


HART device
Ethernet
Fiber
Extend up to 15km
NS-205F Series
1 st
2 nd
3 rd
4 th
Ethernet
Extend up to 30km
NS-209F Series
8 th


Device Information
Basic operation
Advanced operation
System IO Data
Send Data
Update





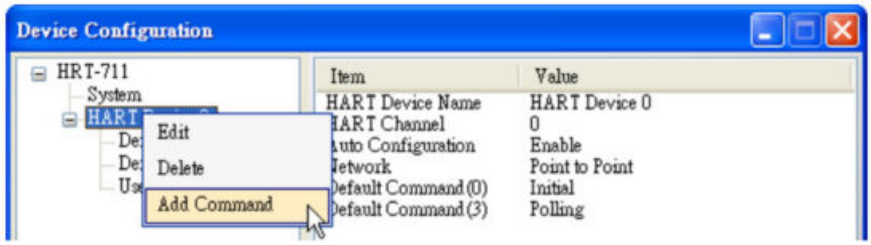
Request Data Bytes

Byte	Format	Description
0-1	Unsigned-16	Parameter HART Index
2	Unsigned-8	Parameter Instance

Response Data Bytes

Byte	Format	Description
0-1	Unsigned-16	Parameter HART Index
2	Unsigned-8	Parameter Instance
3-n		Value → float data

Fig 26-1 HART 158 format of Endress-Hauser Promass F300



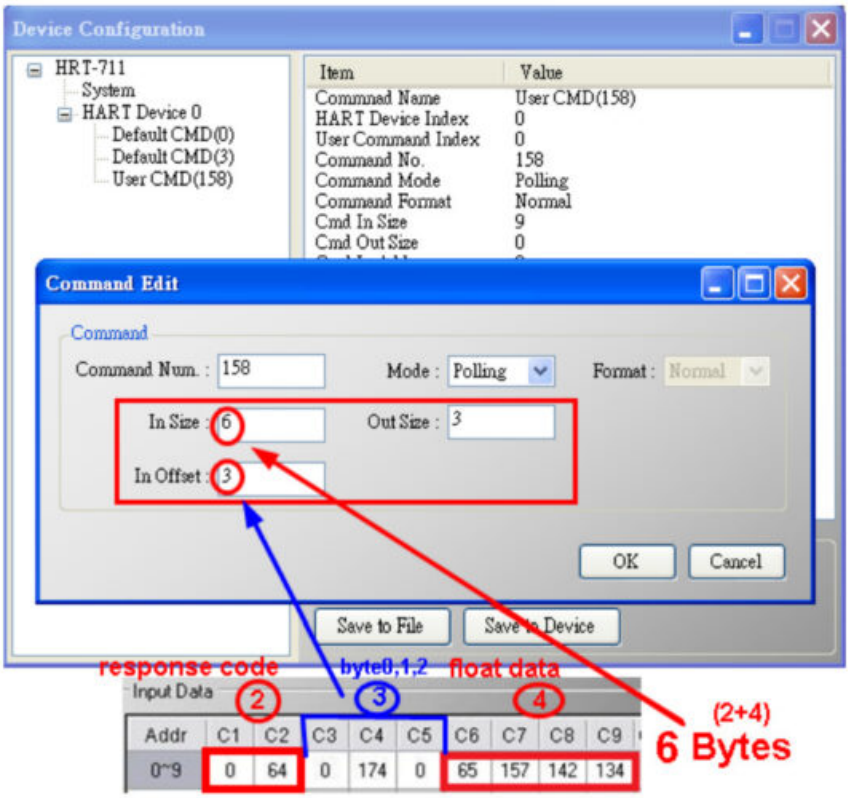
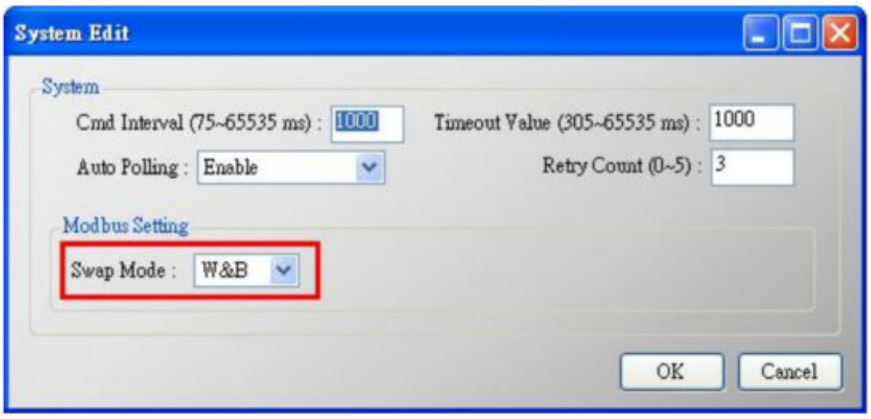


Fig 26-2 Add the UserCMD of HART command 158 to HRT-711



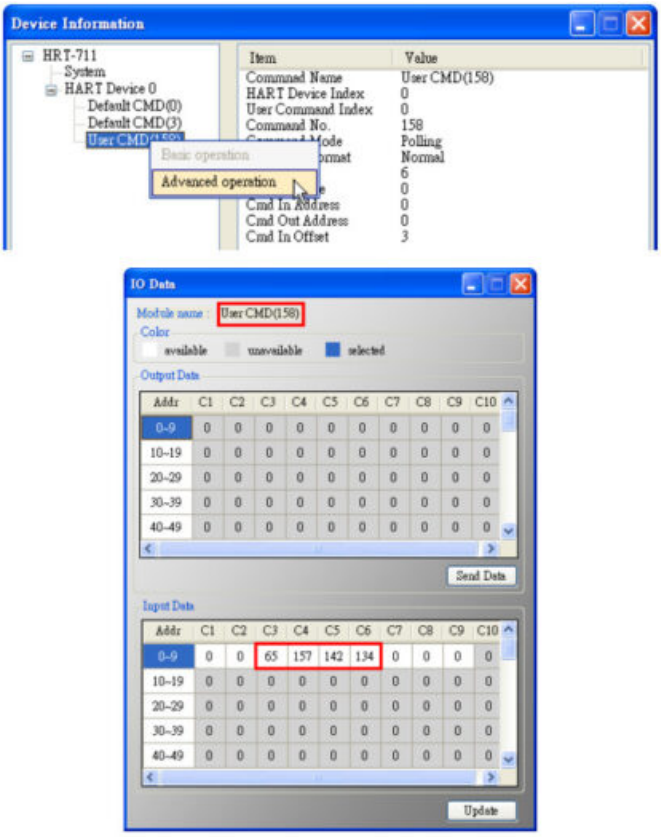


Fig 26-3 The response data of HART command 158

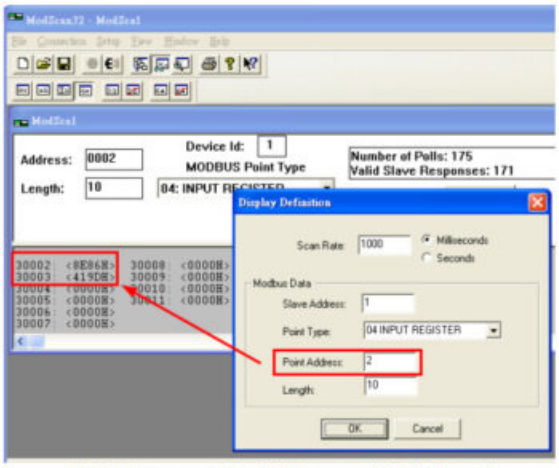


Fig 26-4 The response data of HART command 158 (Hex format)

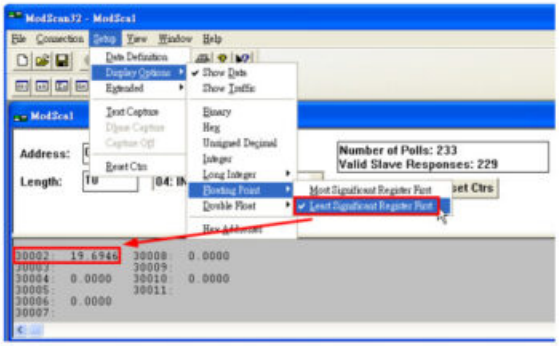


Fig 26-4 The response data of HART command 158 (float format)

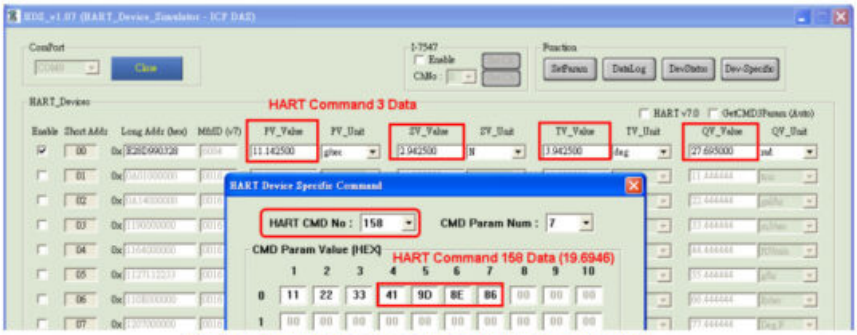


Fig 27-1 Set HART command 3 and 158 data in the HDS

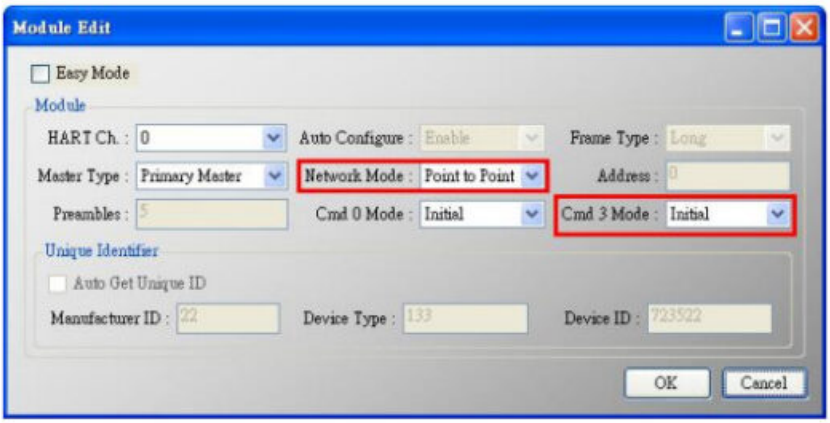


Fig 27-2 HART command 3 setting

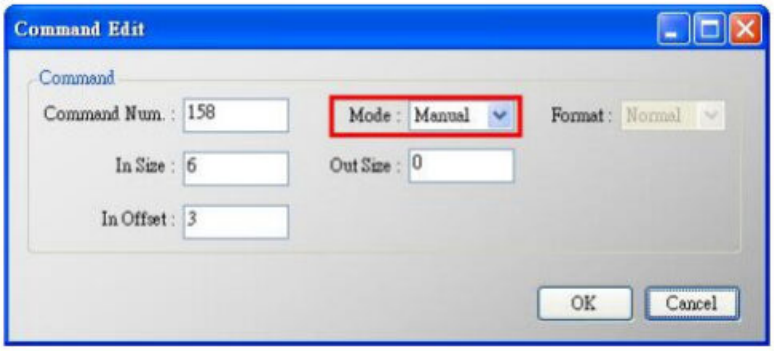


Fig 27-3 Add HART command 158 (UserCMD)

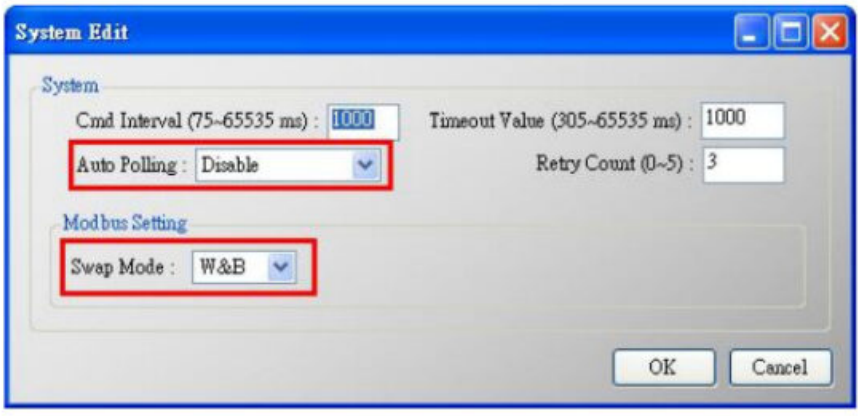


Fig 27-4 Set "Auto Polling" to be "Disable"

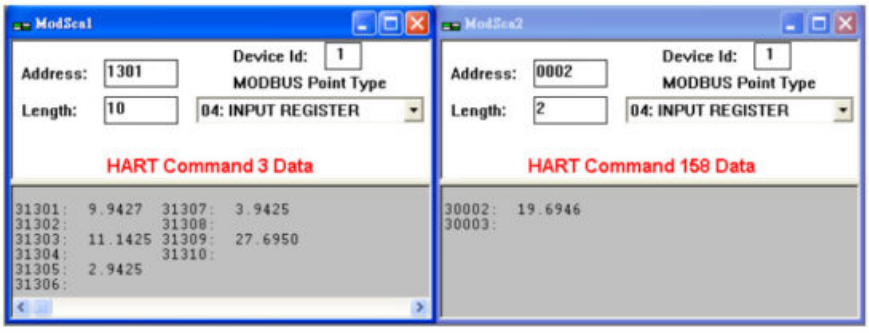


Fig 27-5 HART command 3 and 158 data shown in Modscan

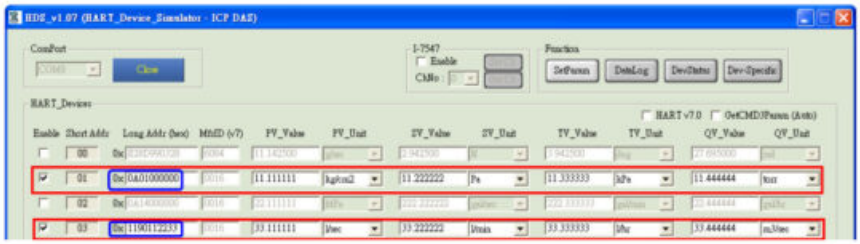


Fig 27-6 Set HART device address and command 3 data in HDS

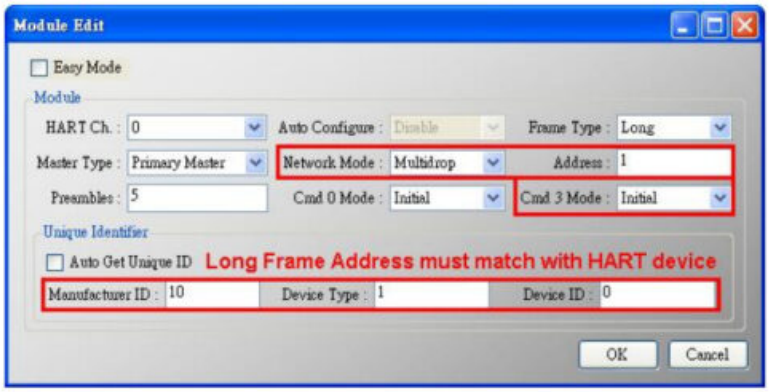


Fig 27-7-1 Add HART device with address 1 (0x0A01000000)

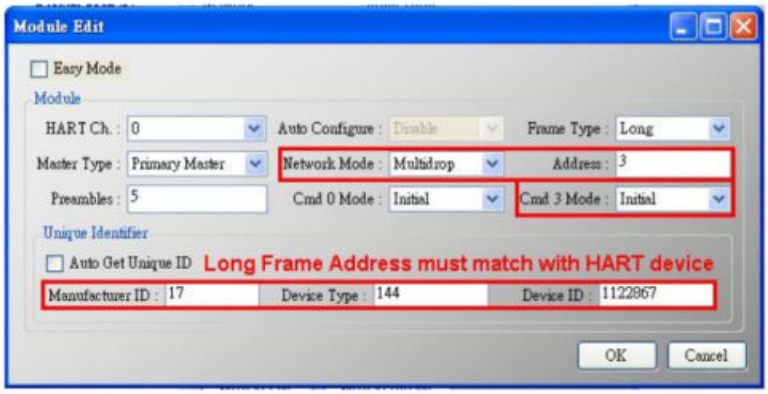


Fig 27-7-1 Add HART device with address 3 (0x1190112233)

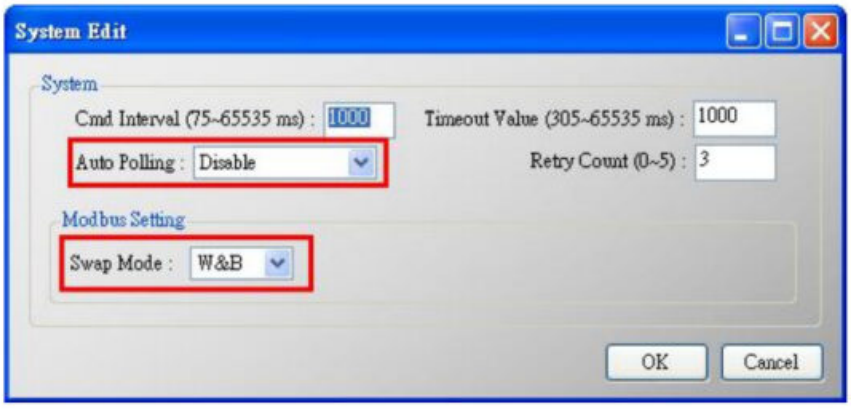


Fig 27-8 Set "Auto Polling" to be "Disable"

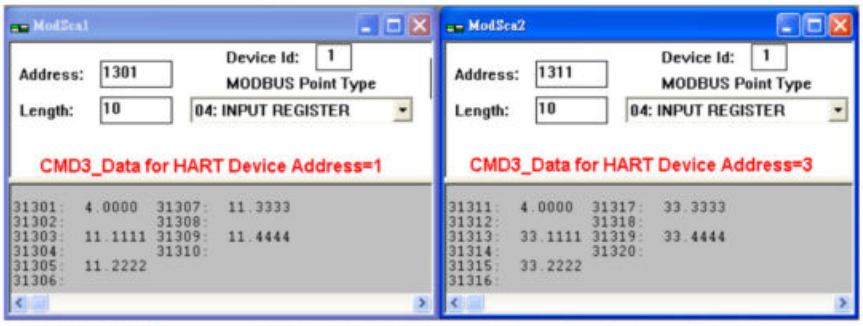


Fig 27-9 HART command 3 data of HART device address 1 and 3 shown in Modscan

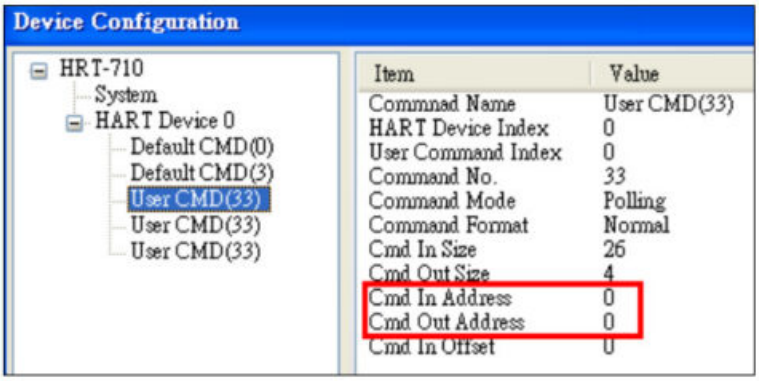


Fig 28-1: Add the first HART command 33

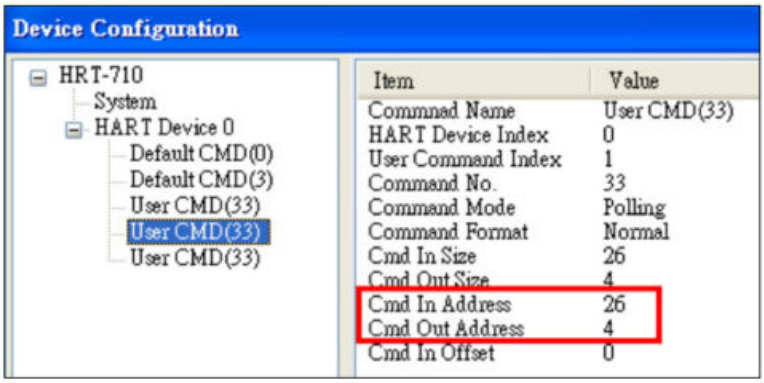


Fig 28-2: Add the second HART command 33

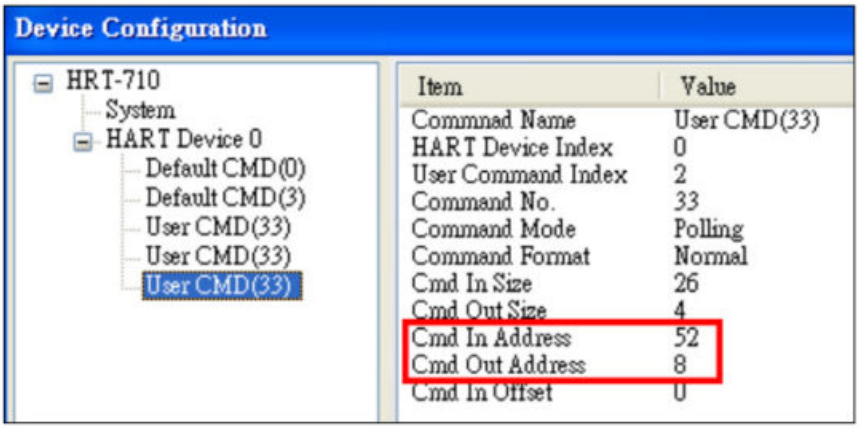


Fig 28-3: Add the third HART command 33

Fig 28-4: Click the "Default Output Data" item

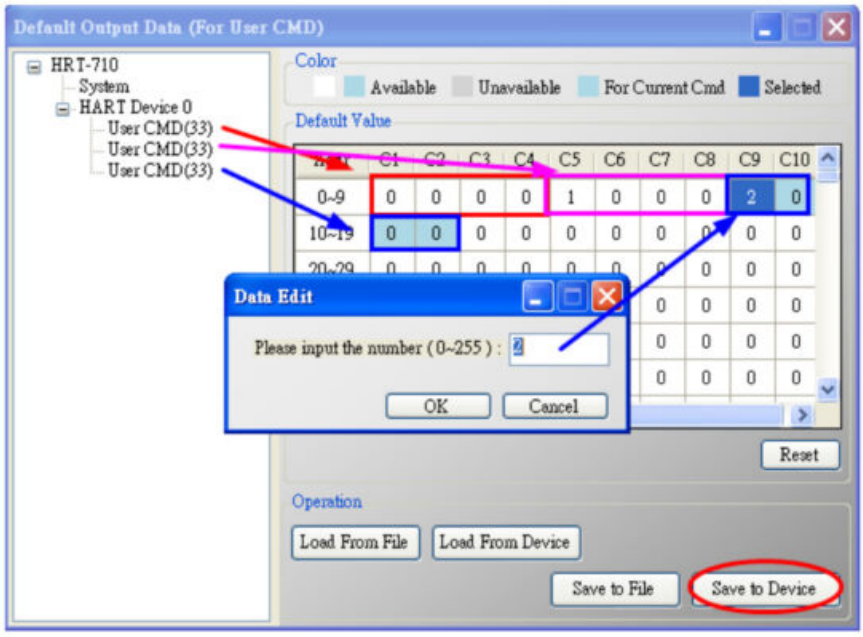
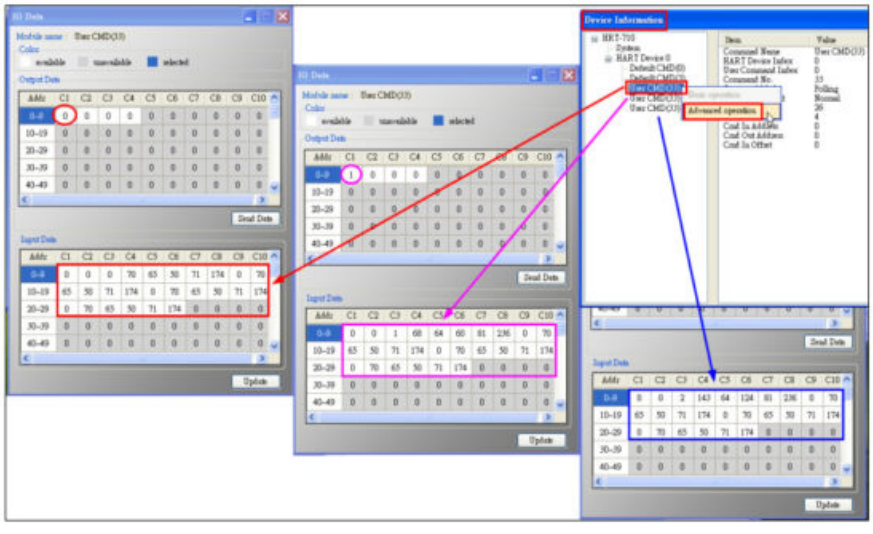
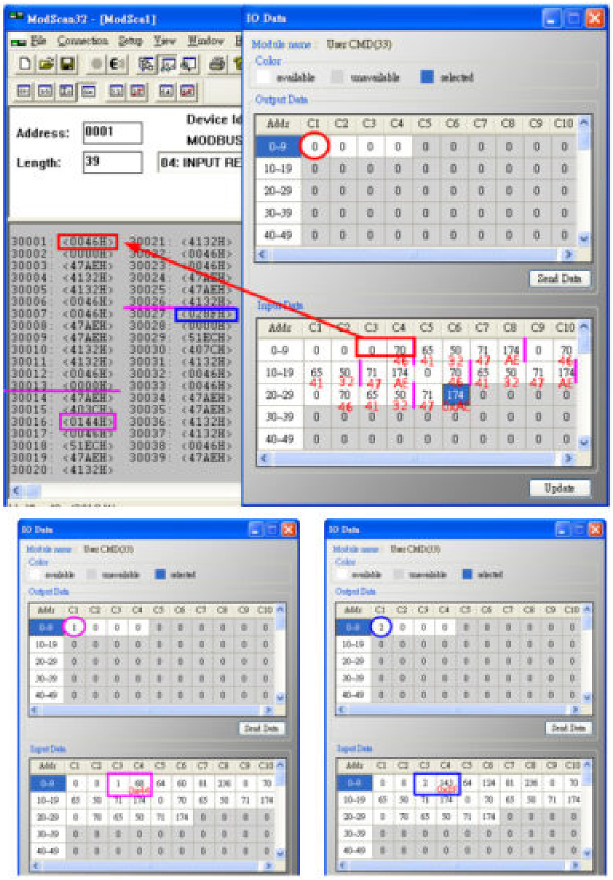


Fig 28-5: Set the "Request Data" of these three HART command 33





Response data bytes

Byte	Format	Description
0	Unsigned-8	Extended device status
1	Unsigned-8	Slot 0: Device variable code
2	Unsigned-8	Slot 0: Device variable classification
3	Unsigned-8	Slot 0: Device variable unit
4..7	Float	Slot 0: Device variable value
8	Unsigned-8	Slot 0: Device variable status
9	Unsigned-8	Slot 1: Device variable code
10	Unsigned-8	Slot 1: Device variable classification
11	Unsigned-8	Slot 1: Device variable unit
12..15	Float	Slot 1: Device variable value
16	Unsigned-8	Slot 1: Device variable status
17	Unsigned-8	Slot 2: Device variable code
18	Unsigned-8	Slot 2: Device variable classification
19	Unsigned-8	Slot 2: Device variable unit
20..23	Float	Slot 2: Device variable value
24	Unsigned-8	Slot 2: Device variable status
25	Unsigned-8	Slot 3: Device variable code
26	Unsigned-8	Slot 3: Device variable classification
27	Unsigned-8	Slot 3: Device variable unit
28..31	Float	Slot 3: Device variable value
32	Unsigned-8	Slot 3: Device variable status
33	Unsigned-8	Slot 4: Device variable code
34	Unsigned-8	Slot 4: Device variable classification
35	Unsigned-8	Slot 4: Device variable unit
36..39	Float	Slot 4: Device variable value
40	Unsigned-8	Slot 4: Device variable status
41	Unsigned-8	Slot 5: Device variable code
42	Unsigned-8	Slot 5: Device variable classification
43	Unsigned-8	Slot 5: Device variable unit
44..47	Float	Slot 5: Device variable value
48	Unsigned-8	Slot 5: Device variable status
49	Unsigned-8	Slot 6: Device variable code
50	Unsigned-8	Slot 6: Device variable classification
51	Unsigned-8	Slot 6: Device variable unit
52..55	Float	Slot 6: Device variable value
56	Unsigned-8	Slot 6: Device variable status
57	Unsigned-8	Slot 7: Device variable code
58	Unsigned-8	Slot 7: Device variable classification
59	Unsigned-8	Slot 7: Device variable unit
60..63	Float	Slot 7: Device variable value
64	Unsigned-8	Slot 7: Device variable status
65..68(*)	Time	Slot 0: Data time stamp

Slot 0, Slot 1, Slot 2, Slot 3, Slot 4, Slot 5, Slot 6, Slot 7

(*) Timestamp is always present, even if less than 8 device variables were requested. Its position is always at the end of the frame. Timestamp is in format 1/32 ms since midnight (Unsigned-32).

Changes from Revision 6.1 to Revision 7.0
Added time stamp to Command 9

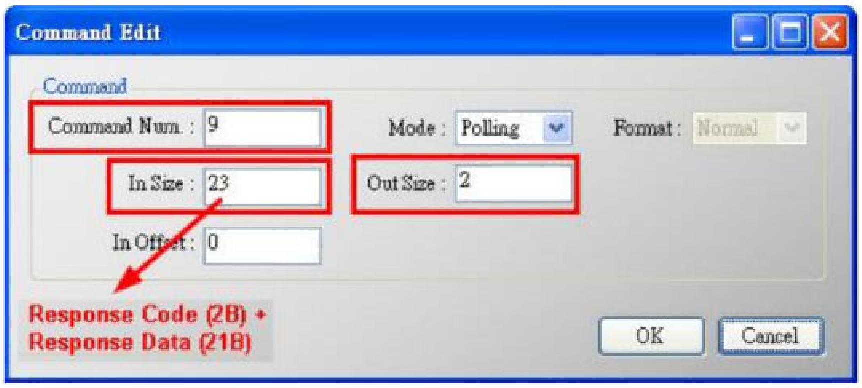
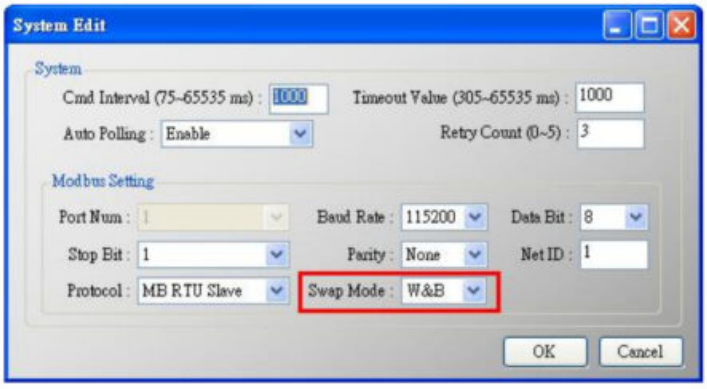


Figure 30-4



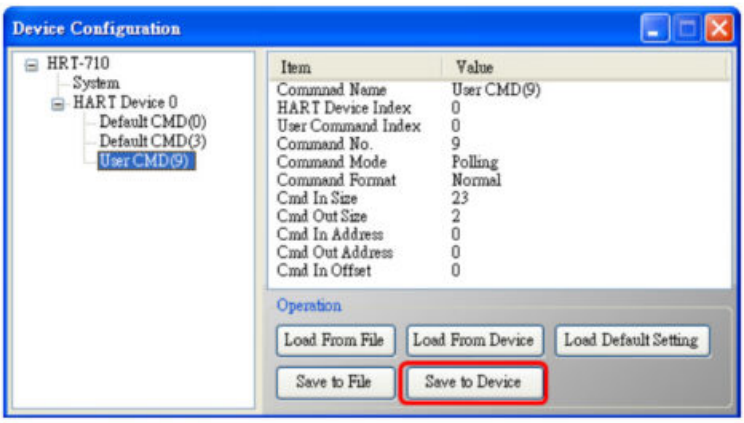


Figure 30-5

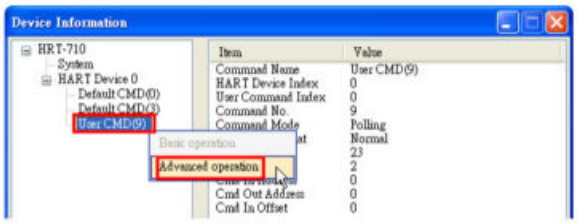


Figure 30-6

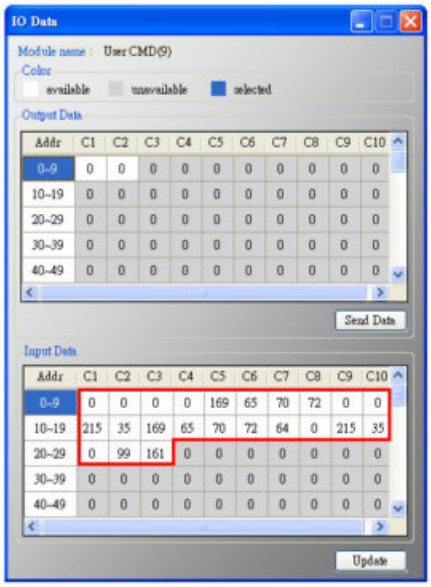


Figure 30-7

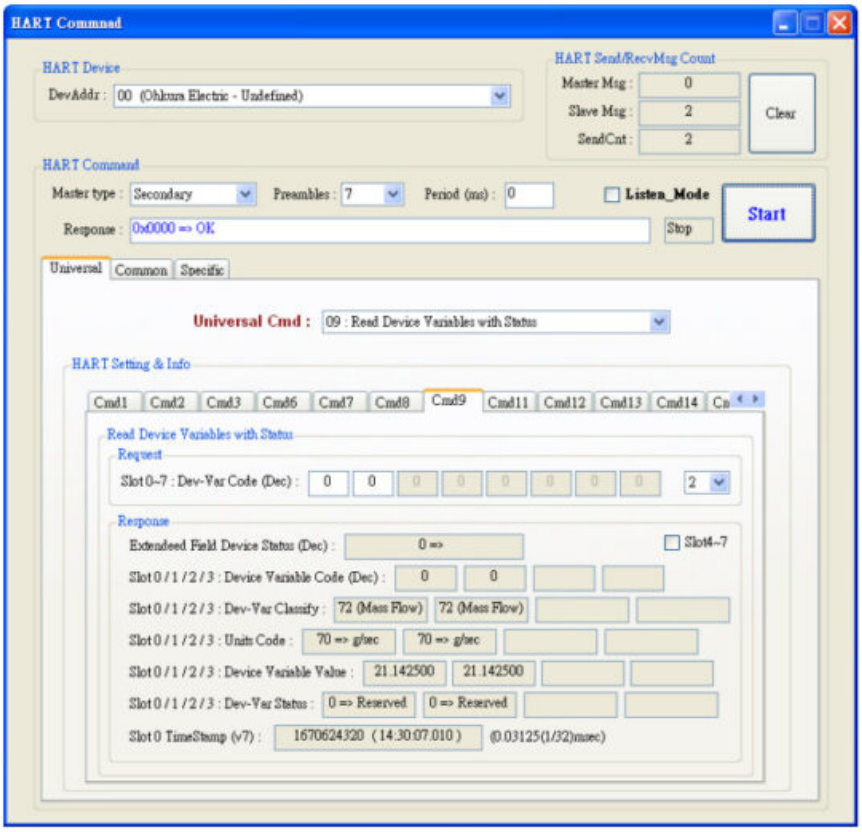


Figure 30-8

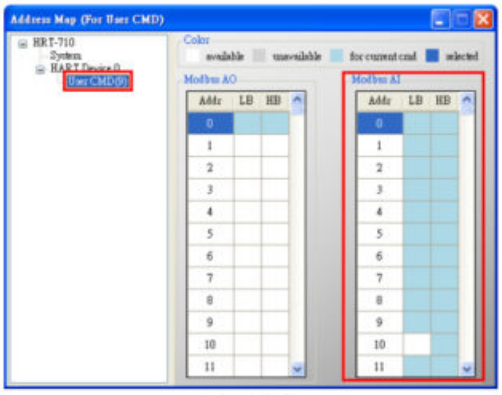


Figure 30-9

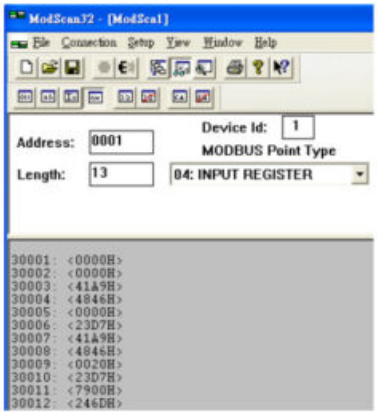


Figure 30-10

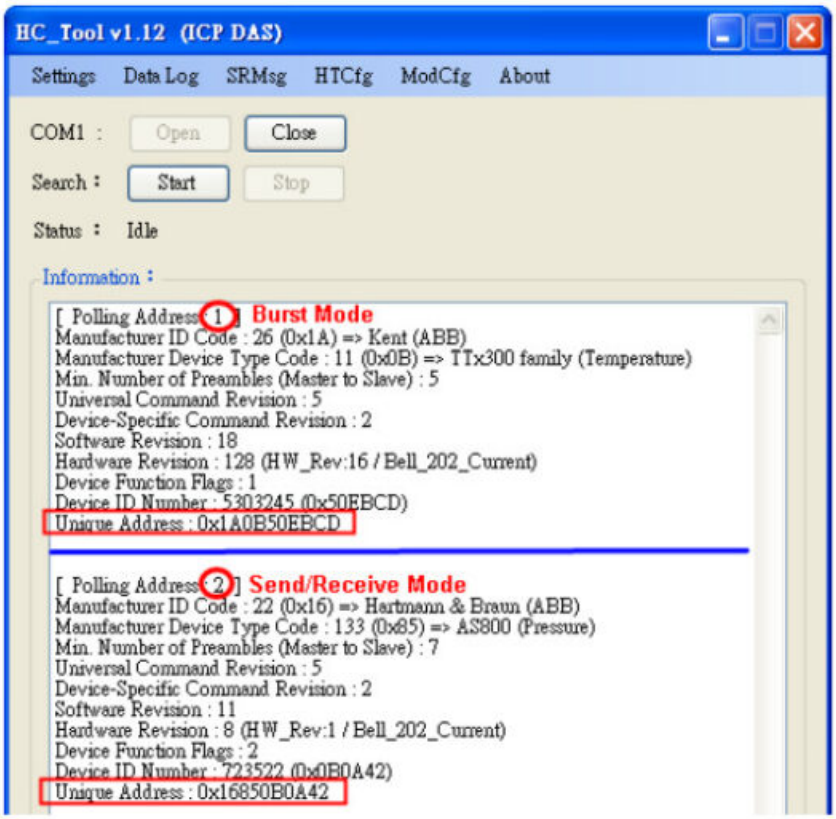


Fig 31-1 Two HART devices information

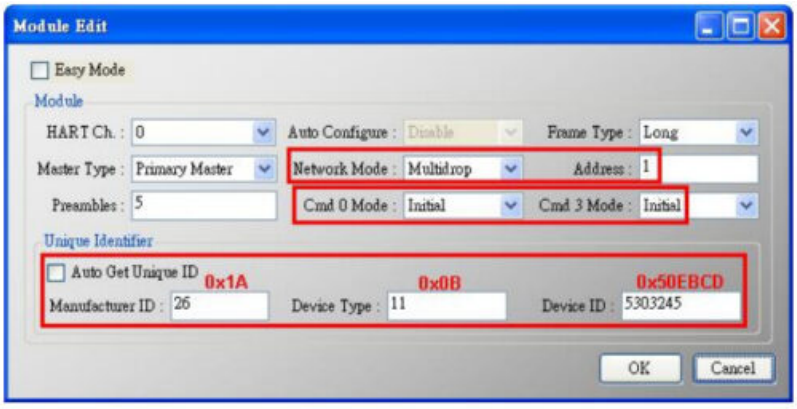


Fig 31-2 Add HART device with address 1 (0x1A 0B 50 EB CD) (Burst Mode)

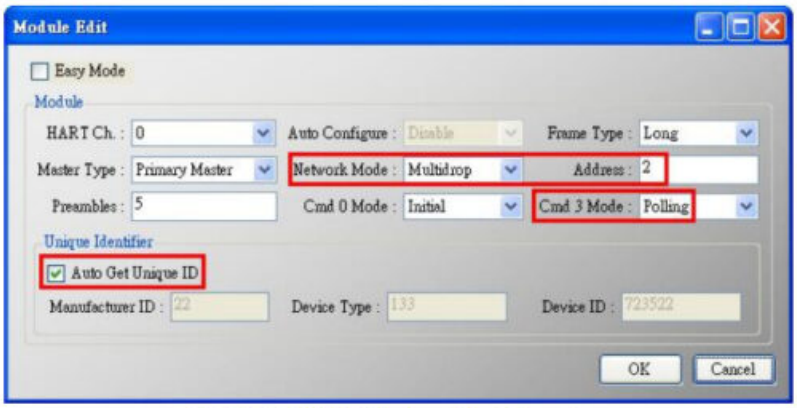


Fig 31-3 Add HART device with address 2

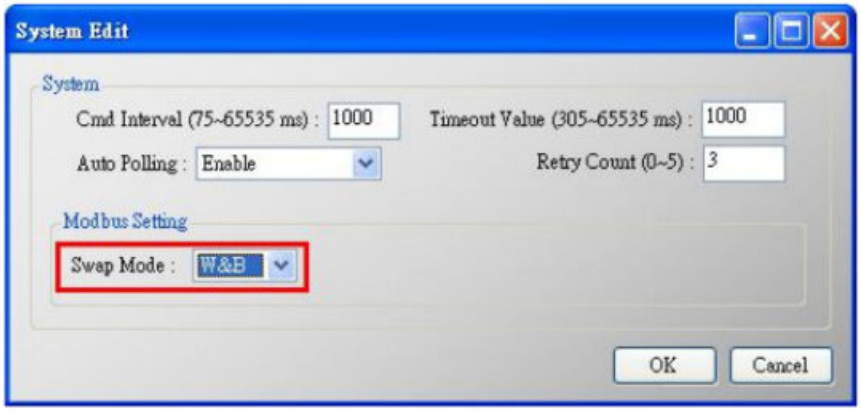


Fig 31-4 Set “Swap Mode” to ”W&B”.

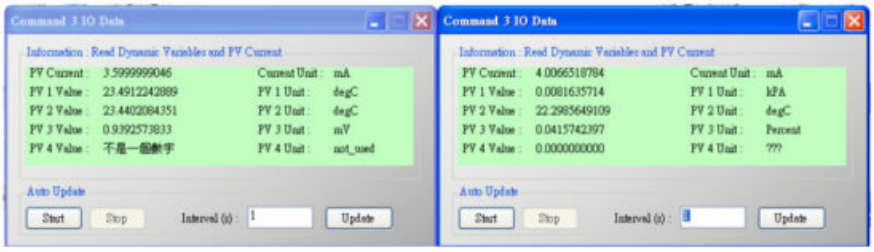


Fig 31-5 Command 3 data in HG_Tool

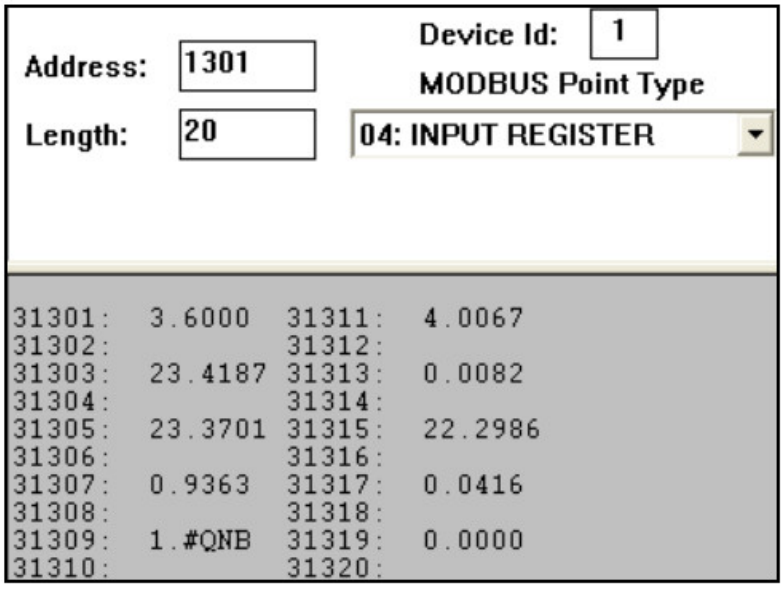
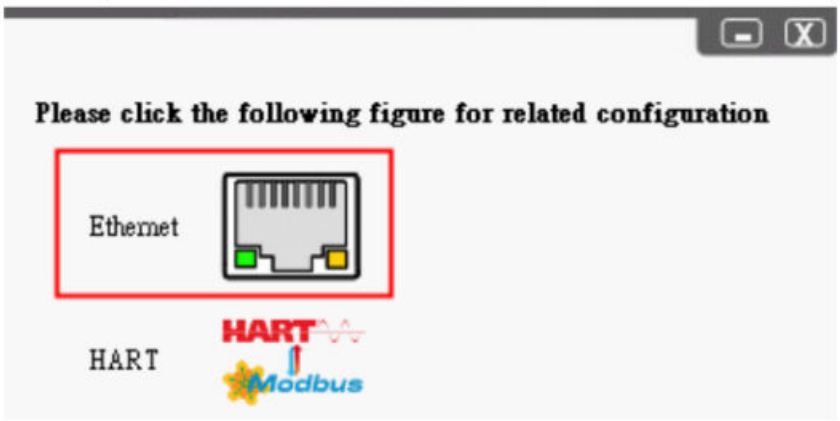
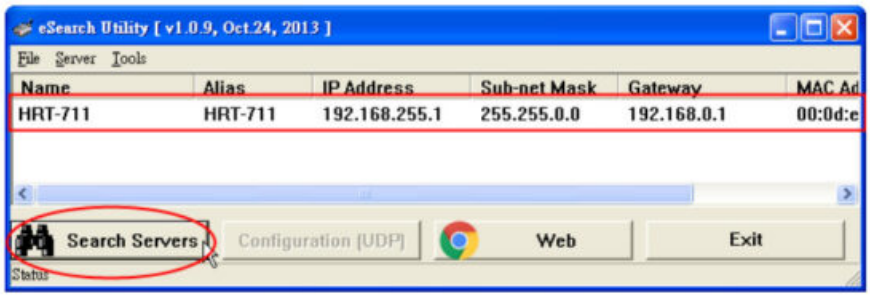
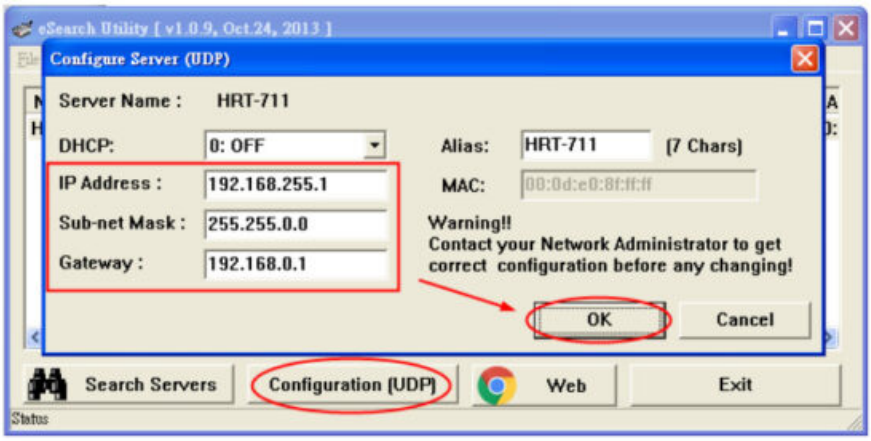
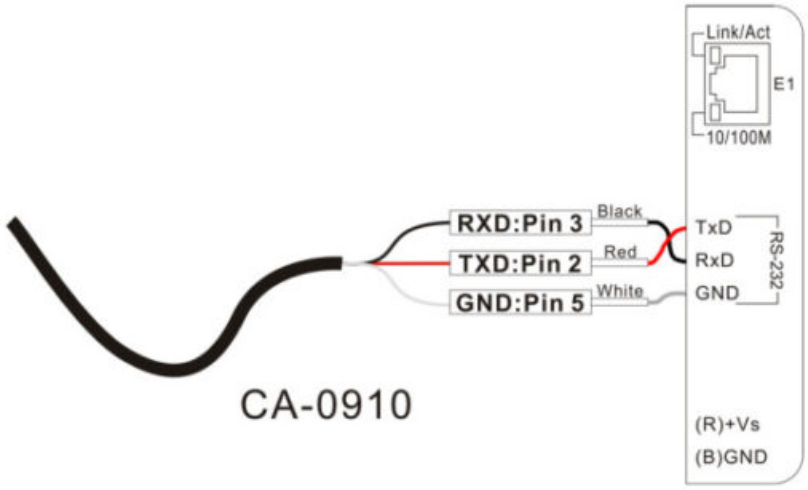


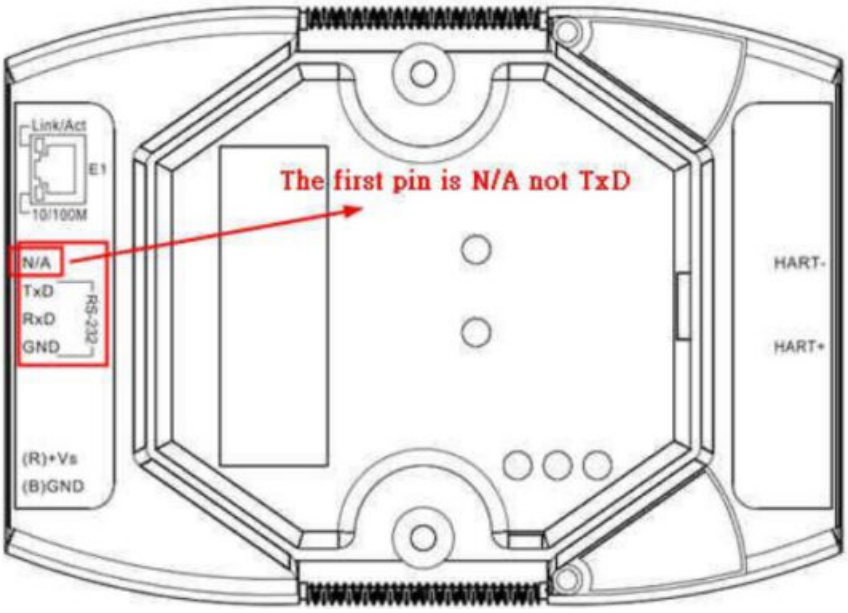
Fig 31-6 Command 3 data in Modscan software




eSearch Utility [v1.0.9, Oct.24, 2013]
File Server Tools
Name Alias IP Address Sub-net Mask Gateway MAC Ad
HRT-711 HRT-711 192.168.255.1 255.255.0.0 192.168.0.1 00:0d:e
Search Servers
Configuration [UDP]
Web
Exit
Status


eSearch Utility [v1.0.9, Oct.24, 2013]
Configure Server (UDP)
Server Name : HRT-711
DHCP: 0: OFF
IP Address : 192.168.255.1
Sub-net Mask : 255.255.0.0
Gateway : 192.168.0.1
Alias: HRT-711 (7 Chars)
MAC: 00:0d:e0:8f:ff:ff
Warning!!
Contact your Network Administrator to get correct configuration before any changing!
OK
Cancel
Search Servers
Configuration [UDP]
Web
Exit
Status


Link/Act
E1
10/100M
RXD:Pin 3
Black
TXD:Pin 2
Red
GND:Pin 5
White
TxD
RxD
GND
RS-232
CA-0910
(R)+Vs
(B)GND

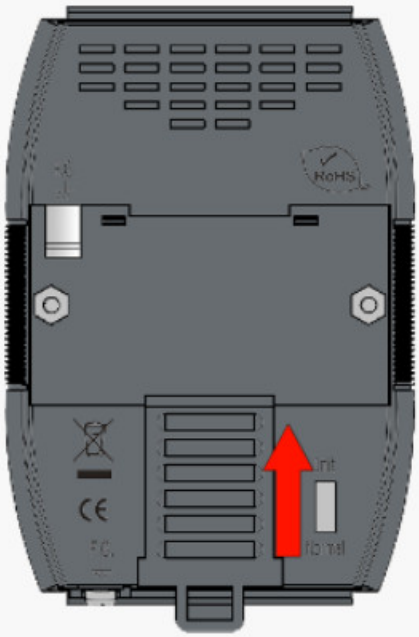

Link/Act
E1
10/100M
The first pin is N/A not TxD
N/A
TxD
RxD
GND
RS-232
(R)+Vs
(B)GND
HART-
HART+

Please click the following figure for related configuration

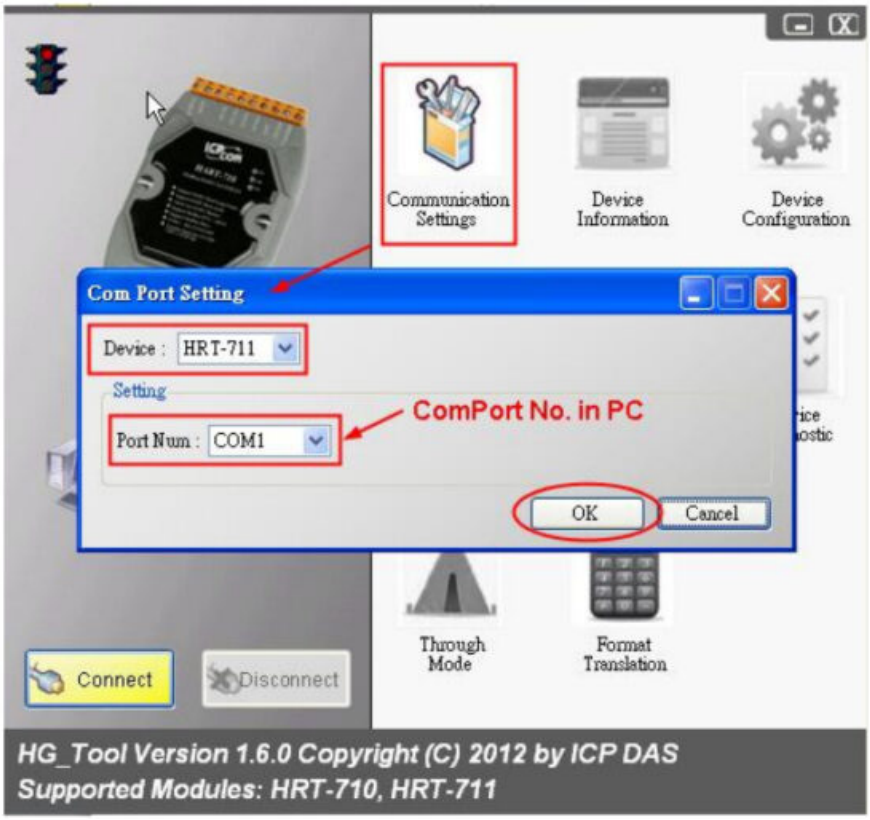
Ethernet

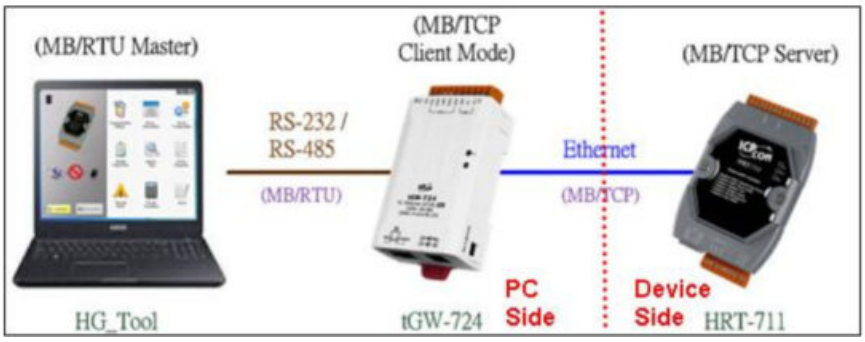
HART

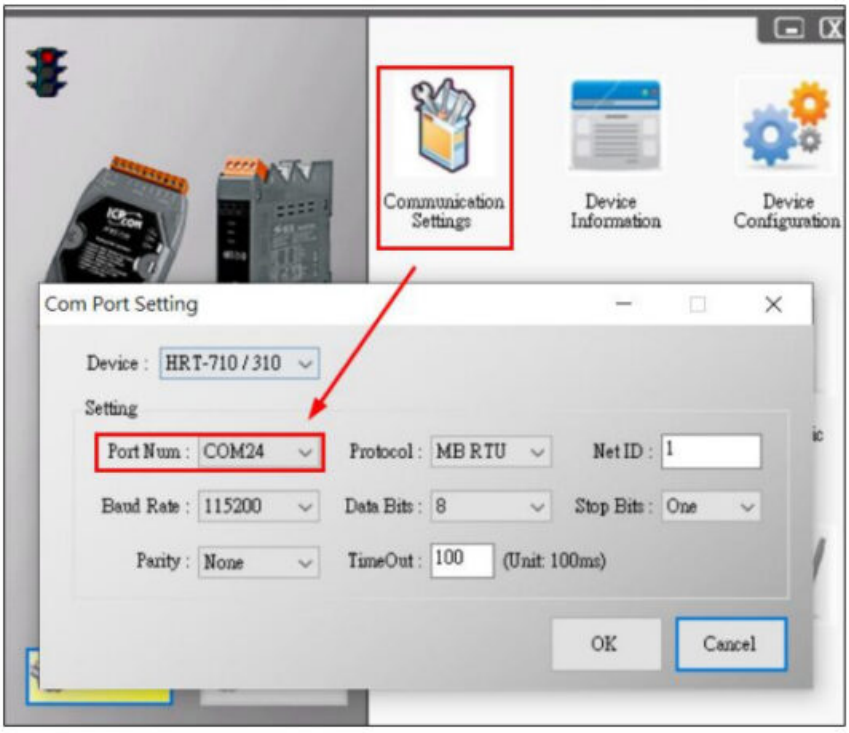
Please make sure you have switch to "Init Mode"
Then power cycle the HRT-711.

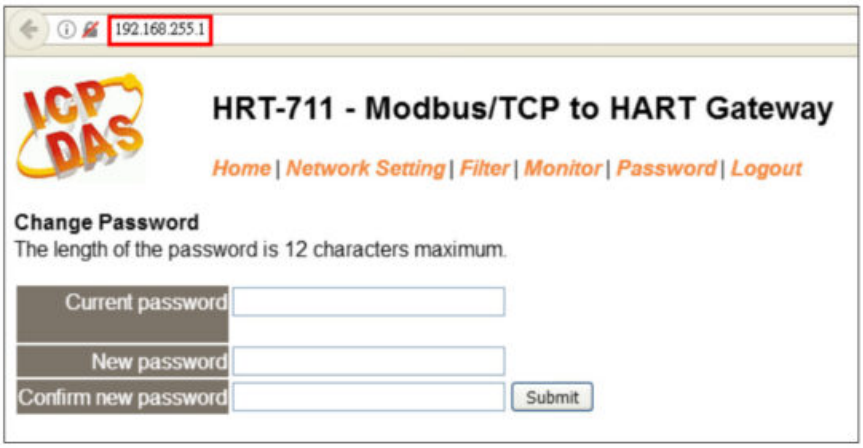


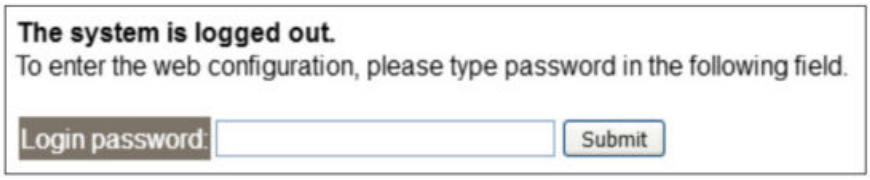
OK

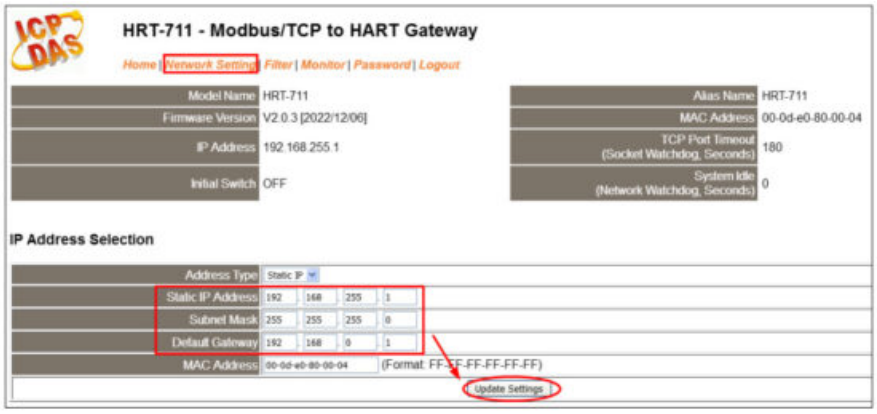

Communication Settings
Device Information
Device Configuration
Com Port Setting
Device : HRT-711
Setting
Port Num : COM1
ComPort No. in PC
OK
Cancel
Through Mode
Format Translation
Connect
Disconnect
HG_Tool Version 1.6.0 Copyright (C) 2012 by ICP DAS
Supported Modules: HRT-710, HRT-711


(MB/RTU Master)
(MB/TCP Client Mode)
(MB/TCP Server)
RS-232 / RS-485
(MB/RTU)
Ethernet
(MB/TCP)
HG_Tool
tGW-724
PC Side
Device Side
HRT-711


Communication Settings
Device Information
Device Configuration
Com Port Setting
Device : HRT-710 / 310
Setting
Port Num : COM24
Protocol : MB RTU
Net ID : 1
Baud Rate : 115200
Data Bits : 8
Stop Bits : One
Parity : None
TimeOut : 100
(Unit: 100ms)
OK
Cancel







Documents / Resources

	ICP DAS HRT-711 Modbus TCP to HART Gateway [pdf] User Manual HRT-711 Modbus TCP to HART Gateway, HRT-711, Modbus TCP to HART Gateway, HART Gateway, Gateway

References

- ftp.icpdas.com - /pub/cd/fieldbus_cd/hart/gateway/hrt-711/firmware/TCP/
- ftp.icpdas.com - /pub/cd/tinymodules/napdos/software/esearch/
- home > product > solutions > industrial ethernet switch & fiber switch > Selection Guide
- SUPPORT - ICP DAS
- SUPPORT - ICP DAS
- tGW-700/GW-2200 Series
- User Manual