



FAQ Version 1.00

# **Revision History**

Revision	Date	Description
1.00	2015/08/05	First revision

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# FAQ

# List of FAQs

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### Q01 : How to add HART devices to HRT-711 ?

### 1. Add first HART device: (Ex: Add <u>ABB AS800</u> HART device)

[Step 1] Connect to HRT-711 and use "HRT-711 Utility" to start configuration

(1) Select HART in the first page of the Utility and switch operation mode to Init.



(2) Selecting device to HRT-711 and switching to appropriate com port in the Communication Setting, and then click OK

(3) Click the "Connect" button to connect to HRT-711 module

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

[Step 2] Deleting the default HART device setting in HRT-711

Once successfully connected to HRT-711, the traffic light indicator will change to green (🔻) to indicate

users that the Utility can start configure HRT-711. Now, users will need to delete the default configuration by clicking Device Configuration option on the right side of the Utility. Follow the figure below to delete the default configuration for preparing add a new HART device.



#### [Step 3] Add the new HART device setting

Users can now adding new HART device by right clicking System item.

		HRT-711			1	
		Ed	it			
		Ad	ld Module			
		the second second			~	
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
	ifier					
Unique Identi						
Unique Identi	Unique ID					
Unique Ident Auto Get Manufacture	Unique ID r ID : 22	Device Type : 1	33		Device ID : 7	23522
Unique Ident	Unique ID r ID : 22	Device Type : 1	33		Device ID:7	23522

#### [Step 4] Save the HART device setting to HRT-711

(1) Click the "Save to Device" button to save the new HART device setting to HRT-711

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

### 2. Add more than one HART devices : (Ex : Add <u>ABB AS800 (Addr=2)</u> and

### Foxboro I/A Pressure (Addr=1) HART devices)

#### [ Step 1 ] Follow the previous step to delete default configuration

#### [Step 2] Add two new HART device setting

The following figures are the settings for these two HART devices.

🔽 Easy Mode						1
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 Identii	fier					
📝 Auto Get	Unique ID					
Manufacturer	r ID : 22	Device Type : 1	33		Device ID : 723522	
					OK Cano	cel
					OK Can	cel
w Module		-		-		el Σ
w Module		-	-	-		el Σ
w Module V Easy Mode Module				-		cel Σ
w Module Easy Mode Module HART Ch. :	0	<ul> <li>Auto Configure :</li> </ul>	Disable	*	OK Cand	≫ Σ
w Module Easy Mode Module HART Ch. : Master Type :	0 Primary Master	<ul> <li>Auto Configure :</li> <li>Network Mode :</li> </ul>	Disable	*	OK Cand	⊳el €
w Module Easy Mode Module HART Ch. : Master Type : Preambles :	0 Primary Master 5	<ul> <li>Auto Configure :</li> <li>Network Mode :</li> <li>Cmd 0 Mode :</li> </ul>	Disable Multidrop Initial	*) *)	OK Cano Cano Frame Type : Long Address : 2 Cmd 3 Mode : Polling	⇒l
w Module We Easy Mode Module HART Ch. : Master Type : Preambles : Unique Identii	0 Primary Master 5 fier	<ul> <li>Auto Configure :</li> <li>Network Mode :</li> <li>Cmd 0 Mode :</li> </ul>	Disable Multidrop Initial	*	OK Cano Frame Type : Long Address : 2 Cmd 3 Mode : Polling	⇒el €
w Module Easy Mode Module HART Ch. : Master Type : Preambles : Unique Identii Auto Get	0 Primary Master 5 fier Unique ID	<ul> <li>Auto Configure :</li> <li>Network Mode :</li> <li>Cmd 0 Mode :</li> </ul>	Disable Multidrop Initial	•	OK Cano Frame Type : Long Address : 2 Cmd 3 Mode : Polling	el S
w Module We Easy Mode Module HART Ch. : Master Type : Preambles : Unique Identii Auto Get Manufacturen	0 Primary Master 5 fier Unique ID r ID : 22	<ul> <li>Auto Configure :</li> <li>Network Mode :</li> <li>Cmd 0 Mode :</li> <li>Device Type : 1</li> </ul>	Disable Multidrop Initial	•	OK Canc Frame Type : Long Address : 2 Cmd 3 Mode : Polling Device ID : 723522	el S

#### [ Step 3 ] Save the HART device setting to HRT-711

(1) Click the "Save to Device" button to save the new HART device setting to HRT-711

Device Configuration		
- HRT-711 - System - HART Device 0 - Default CMD(0) - Default CMD(3) - HART Device 1 - Default CMD(0) - Default CMD(3) - Default CMD(4) - Default CMD(4) - Default CMD(4) - Default CMD(4) - Def	Item HART Device Name HART Channel Auto Configuration Network Preamble Length Master Type Frame Type Module Address Auto Get Unique ID Default Command (0) Default Command (3)	Value HART Device 0 O Disable Multi-Drop 5 Primary Master Long Frame 2 Enable Initial Polling
	Operation Load From File Loa Save to File Sa	d From Device Load Default Setting

# Q02 : How to make sure that HRT-711 gets the HART device data

### correctly?

After adding HART device setting to HRT-711 module (refer to Q01), then users can follow the following steps.

(1) Make sure HRT-711 and Utility are well connected and then click "Device Information" button

	Device Information				
	HRT-711	Item	Value		
	HART Device 0	Module Name	HRT-711		
Device Information	Default CMD(0) Default CMD(3)	Firmware Version	¥1.01		

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

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



(3) The following figure shows I/O Data of the "Default CMD(0)" is OK and NG

M. C. L. ID.C. 1	H I D CO	Duin The Cal	100
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		
	01	<b>T D A D</b>	** 1 .
	Sho	w Long Frame Address	Update
	Sho	w Long Frame Address	Update
	Sho	w Long Frame Address	Update
mmand 0 IO Data	Sho	w Long Frame Address	Update
mmand 0 IO Data Information : Read Uniqu	Sho 2e Identifier	w Long Frame Address	Update
mmand 0 IO Data Information : Read Uniqu Manufacturer ID Code :	Sho ze Identifier	w Long Frame Address	Update
mmand 0 IO Data Information : Read Uniqu Manufacturer ID Code : Preambles Number :	Sho De Identifier O	w Long Frame Address	Update
mmand 0 IO Data Information : Read Uniqu Manufacturer ID Code : Preambles Number : Device Cmd Revision :	Sho ne Identifier 0 0	w Long Frame Address	Update
mmand 0 IO Data Information : Read Uniqu Manufacturer ID Code : Preambles Number : Device Cmd Revision : Hardware Revision :	Sho De Identifier 0 0	w Long Frame Address	Update
mmand 0 IO Data Information : Read Uniqu Manufacturer ID Code : Preambles Number : Device Cmd Revision : Hardware Revision : Device ID :	Sho te Identifier 0 0 0	w Long Frame Address	Update

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

(4) Right click the button on the "Default CMD(3)" item and choose the "Basic operation" option to open the "I/O Data" screen of the "Default CMD(3)"



(5) The following figure shows I/O Data of the "Default CMD(3)" is OK and NG

Command 3 IC	) Data		
Information :	Read Dynamic Variable	es and PV Cw	ment
PV Current	4.00070190429688	PV 1 Unit	kPA
PV 1 Value	0.000595808029174	PV 2 Unit	degC
PV 2 Value	26.091739654541	PV 3 Unit	Percent
PV 3 Value	0.004386901855468	PV 4 Unit	???
PV 4 Value	0		
Auto Update			
Start	Stop Inte	rval (s) : 1	Update

Command 3 IC	) Data	¢	) _	
-Information :	Read Dynamic Variabl	les and PV Curr	ent	
PV Current	0	PV 1 Unit	<b>?</b> ??	
PV 1 Value	0	PV 2 Unit	???	
PV 2 Value	0	PV 3 Unit	???	
PV 3 Value	0	PV 4 Unit	???	
PV 4 Value	0			
Auto Update				
Start	Stop Int	erval (s) : 1		Update

(6) After testing the I/O data of the "Default CMD(0)" and "Default CMD(3)", when the result is ok, it means that the communication between HRT-711 and HART devices is ok.

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

### HMI?

- (1) Make sure that the connection between HRT-711 and HART device is good.
- (2) Set "Swap Mode" of system setting in HRT-711 to be "W&B".
  - [1] In "Device Configuration" screen, right click the button of mouse on "System" item and click the "Edit" option to open "System Edit" screen

Device Configuration		
Edit Add Module	Item Module Name [ System Info ] HART Device Count User Cmd Count Cmd Interval (ms) Cmd Timeout (ms) Auto Polling Retry Count [ Modbus Info ] Swap Mode Operation Load From File Loa	Value System  1 0 1000 1000 Enable 3 None d From Device Load Default Setting
	Save to File Sa	ave to Device

[2] Set the "Swap mode" item to be "W&B" and click "OK" button

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 : W&B 🔻		

[3] Click the "Save to Device" button to save the new system setting to HRT-711

Device Configuration			J
HRT-711	Item	Value	
HART Device 0	Module Name	System	
Default CMD(3)	[ System Info ]		
	HART Device Count	1	L
	User Cmd Count	U 1000	
	Cmd Timeout (ms)	1000	
	Auto Polling	Enable	ľ
	Retry Count	3	
	[ Maller Info ]		
	Swan Mode	Word & Byte	
			ľ
	Operation		
	Load Emm File	d From Device Load Default Setting	
	Lota romrie Lota	Four Delaar beimig	
	Save to File Sa	we to Device	

(3) Read HART data by Modbus TCP from HRT-711.

[1] The HRT-711 provides the MB Address 1300 ~ 1459 (Default CMD(3)(S) Data for Module 0 ~ 15 in HRT-711 => The detailed information refers to the sector 4.3 of users' manual) and users can map the CMD(3) data of HART device to SCADA directly with these Modbus address 1300 ~ 1459.

[2] For the "Default CMD(3)(S) data of Module 0" in HRT-711, the mapped MB address is 1300 ~ 1309. The below MB/RTU client will use the "Modscan" tool to show the CMD(3) data of HART device by polling Modbus address 1300 ~ 1309.

<1> Confirm the connection between Utility and HRT-711 is disconnected.

<2> Make sure the HRT-711 is in the Normal operation.

<3> Set the "Display" mode to be "Float" format

M 🖷	lodScan32 - M	odSc	a1					
File	<u>Connection</u>	Setu	ıp <u>V</u> iew <u>W</u> indow	<u>H</u> e	lp			
	2 <b>.</b> .		Data Definition					7
			Display Options	×	$\checkmark$	Show Data		
			Extended	×		Show Traffic		
	ModSca1		Text Capture			Binary		
			Dbase Capture			Hex		1
Ad	ddress: 13		Capture Off			Unsigned Decimal		115: 430 sponses: 430
Le Le	ength: 10		Reset Ctrs			Integer		Beset Ctrs
						Long Integer	- ►.	
						Floating Point	•	Most Significant Register First
						Double Float	+	✓ Least Significant Register First
						Hex Addresses		

#### <4> Fill the "IP Address" & "Port Number" and click "OK" button to connect to HRT-711

Connect Using:							
Carlingation	IP Address: Service Port:	192.168.255.3 502					
Baud Rate: Word Length: Parity: Stop Bits:	115200 - 8 - NONE - 1 -	Hardware Flow Control Wait for DSR from slave Wait for CTS from slave DTR Control: Disable RTS Control: Disable Delay 0 ms after RTS before transmitting first character Delay 0 ms after last character before releasing RTS					
Protocol Selections Cancel							

<5> The CMD(3) data of HART device is successfully read

File

A L

autei					
IodScan	32 - ModSca1		100	the Destroy Contract of	
<u>C</u> onne	ection <u>S</u> etup	<u>V</u> iew <u>W</u> indow <u>H</u> elp			
<b>2</b>	● €¥ 褒	💭 🖓 🎒 🤋 📢 👘			
10 Io	× 52 🜌	64 <u>6</u> 4			
ModSc	a1				
ddress	: 1301	Device Id: 1 MODBUS Point	 Туре	Number of Polls: 27 Valid Slave Responses: 27	
ength:	10	04: INPUT REGISTE	R 🔽	Reset Ctrs	
301:	3.9988				
302: 303:	-0.0013				
304: 305:	25.7611				
306: 307:	-0.0074				

[Note] The simple CMD(3) data format and value are shown as below.

Byte Index	Format	Description
00~03	Float	Primary Variable Current
04~07	Float	Primary Variable
08~11	Float	Secondary Variable
12~15	Float	Tertiary Variable
16~19	Float	Quaternary Variable

### Q04 : How to update the firmware of HRT-711 ?

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

(1) Download the newest firmware of HRT-711.

0.0000

(Download from <a href="http://ftp.icpdas.com/pub/cd/fieldbus\_cd/hart/gateway/hrt-711/firmware/">http://ftp.icpdas.com/pub/cd/fieldbus\_cd/hart/gateway/hrt-711/firmware/</a> )

(2) Turn off the power and open the upper chasis of HRT-711. Then switch jumper to pin 2 & 3 of JP3.



- (3) Using RS-232 cable to connect PC and HRT-711, and then turn on the power. (All LED will be off)
- (4) Run "FW\_Update\_Tool"

(Download from : <a href="http://ftp.icpdas.com/pub/cd/fieldbus\_cd/hart/gateway/hrt-711/utilities">http://ftp.icpdas.com/pub/cd/fieldbus\_cd/hart/gateway/hrt-711/utilities</a> ).

- [1] Choose "COM" option and select "Com Port number" .
- [2] Click "Browser" button to choose the firmware of HRT-711.
- [3] Click "Firmware Update" button to start firmware update process.
- [4] Wait for "Firmware Update Success" message.

S FW_Update_Tool v1.06
1. Download Interface COM COM Port : C USB 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

(5) Turn off the power and switch JP3 back to pin 1 & 2.



(6) Close the shell and turn on the power of HRT-711. Then users can check the firmware version of HRT-711 by using "HRT-711 Utility".

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

### Q05 : How to read HART device command 1 data with standard

### format by Modbus ?

(1) By using "HRT-711 Utility" to add "User CMD(1)" of HART device and save settings to HRT-711. The Modbus start address and length of the "User CMD(1)" will show in the "Cmd In address" and "Cmd In size" field. In the example they are 0 and 7 (byte count=7 => word count=4).

v Command Command Command Num. : 1 In Size : 7 Out Size : 0		T-711 System Edit Delete Add Com	mand	Item HART Device HART Chann Auto Configu Network Default Comm Default Comm	e Name lel ration nand (O) nand (3)	Value HART De O Enable Point to Pi Initial Polling
Command Num. : 1 Mode : Polling - Format : Normal In Size : 7 Out Size : 0	w Command Command		-			
	Command Num. : 1 In Size : 7		Mode : Out Size :	Polling •	- For	mat : Normal 🖣

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

(2) The below demo will use the free MBTCP tool provided by ICP DAS to show HART command 1 data. (Download from <a href="http://ftp.icpdas.com.tw/pub/cd/8000cd/napdos/modbus/modbus\_utility/">http://ftp.icpdas.com.tw/pub/cd/8000cd/napdos/modbus/modbus\_utility/</a>)

(3) Run "MBTCP" tool. Fill the settings (IP and Port) and then click "Open" button to connect to HRT-711.

(4) Input "1 4 0 0 0 4" in "Command" field and click "Send Command" button to send the modbus command. The HART command 1 data will be received in "Responses" field => "01 04 08 0C BA 00 10 00 00 D5 F0".

Send Modbus Command : 01 04 00 00 00 04

Get Response : 01 04 08 0C BA 00 10 00 00 D5 F0

B. MBTCP Ver. 1.1.5		X
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 s Byte 1: Transaction identifier - copied by s Byte 2: Protocol identifier=0 Byte 3: Protocol identifier=0 Byte 4: Field Length (upper byte)=0	erver - usually 0 erver - usually 0
Polling Mode (No Waiting)           Start         Stop           Timer Mode (Fixed Period)         Interval         100         ms         Set           Start         Stop         Stop         Stop         Stop         Stop	Statistic       Differer         Commands       in Pack         Total Packet Size (Bytes)       12         Packet Quantity Sent       1         O       0         Polling or Timer Mode (Date/Time)       Start Time         Start Time       Start Time         Stop Time       Stop Time	Clear Statistic       vet     Responses       Total Packet Size (Bytes)     17       %     Packet Quantity Received     1       Polling Mode Timing (ms)     Average       Max     0     Average       Min     1000     000
[Byte0] [Byte1] [Byte2] [Byte3] [Byte4] [Byt 1 2 0 0 0 6 1 4 0 0 0 4 [Byte0] [Byte1] [Byte2] [Byte3] [Byte4] [Byt 01 02 00 00 00 06> 01 04 00 00 00 04	te5] [Byte0] [Byte1] [Byte2] [ 01 02 00 00 00 08> 01	[Byte3] 04 08 0C BA 00 10 00 00 D5 F0
Clear	Lists	EXIT Program

(5) Parse the modbus response data.

Response Data => 01 04 08 0C BA 00 10 00 00 D5 F0

Register data => <u>OC BA 00 10 00 00 D5 F0</u>

Because the unit of HART-711' s database is byte and the unit of Modbus register is word and the Modbus register is composed of database' s byte and the order is low byte first.

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

So we need to change the byte order.

So the data will be <u>BA 0C</u> <u>10 00</u> <u>00 00</u> <u>F0 D5</u>.

And we have set the swap mode to Word & Byte, so the data transform into 00 10 OC BA D5 FO 00 00.

According to the data count is 7, so the actual data will be <u>00 10</u> <u>OC</u> <u>BA D5 F0 00</u>

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

Request Data Bytes		0	0		
Response Data Bytes		2 + 5	2 + 5 = 7		
Byte Index	Format		Desciption		
0	Uint8		Response Code 1		
1	Uint8		Response Code 2		

2	Uint8	Unit code
3~6	Float	Primary Variable

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

Response code1 = 0x00

Response code2 = 0x10

```
Primary Variable Unit code = 0x0C (kPA)
```

Primary Variable = 0xB5 0xD5 0xF0 0x00 (-0.001632 => IEEE754)

### Q06 : How to read HART device command 3 data with standard

### format by Modbus?

(1) When adding a new HART device to HRT-711, the "Default CMD(3)" will be added automatically. The Modbus start address and length of the "Default CMD(3)" will show in the "Cmd In address" and "Cmd In size" field. In the example they are 1236 (For MB Addr = 618 = 0x026A) and 26 (byte count=26 => word count=13).

Device Configuration		
- HRT-711 - System - HART Device 0 - Default CMD(0) - Default CMD(2) User CMD(1)	Item Commnad Name HART Device Index Command No. Command Mode Command Format Cmd In Size Cmd Out Size Cmd Out Size Cmd In Address Cmd Out Address	Value Default CMD(3) 0 3 Polling Normal 26 0 1236 0
	Operation Load From File Loa Save to File Sa	d From Device Load Default Setting we to Device

(2) The below demo will use the free MBTCP tool provided by ICP DAS to show HART command 1 data. (Download from <a href="http://ftp.icpdas.com.tw/pub/cd/8000cd/napdos/modbus/modbus\_utility/">http://ftp.icpdas.com.tw/pub/cd/8000cd/napdos/modbus/modbus\_utility/</a>)

(3) Run "MBTCP" tool. Fill the settings (IP and Port) and then click "Open" button to connect to HRT-711

(4) Input "01 04 02 6A 00 0D" in "Command" field and click "Send Command" button to send the modbus command. The HART command 3 data will be received in "Responses" field => "01 04 1A 10 00 7F 40 A0 E7 BB 0C F4 00 20 00 CE 41 E8 2D BC 39 58 18 00 00 00 00 00 00"

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

Get Response : 01 04 1A 40 7F 00 10 0C BB E6 64 00 20 03 94 FA 51 41 CD 20 0F 39 BC 00 00 00 00 00 00 00

B. 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 D0 [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       Interval     5tart         Start     Stop	Statistic       Clear Statistic         Commands       in Packet         Total Packet Size (Bytes)       12         Packet Quantity       0.00 %         Packet Quantity Sent       1         0       0         Polling or Timer Mode (Date/Time)       Polling Mode Timing (ms)         Start Time       Start Time         Stop Time       Stop Time
[Byte0] [Byte1] [Byte2] [Byte3] [Byte4] [By [1 2 0 0 0 6 1 4 2 6a 0 0d [Byte0] [Byte1] [Byte2] [Byte3] [Byte4] [By 01 02 00 00 00 05 → 01 04 02 6A 00 0D	te5] Send Command te5] [Byte0] [Byte1] [Byte2] [Byte3] 01 02 00 00 00 1D -> 01 04 1A 40 7F 00 10 0C BB E6 64 00 20 03 94 FA 51 41 CD 20 0F 39 BC 00 00 00 00 00 00
Clear	r Lists EXIT Program

(5) Parse the modbus response data.

```
Response Data => 01 04 1A 40 7F 00 10 0C BB E6 64 00 20 03 94 FA 51 41 CD 20 0F 39 BC 00 00 00 00 00 00 00 00
```

Register data => <u>40 7F 00 10 0C BB E6 64 00 20 03 94 FA 51 41 CD 20 0F 39 BC 00 00 00 00 00 00 00 00</u>

Because the unit of HART-711' s database is byte and the unit of Modbus register is word and the Modbus register is composed of database' s byte and the order is low byte first.

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

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

7F 40 10 00 BB 0C 64 E6 20 00 94 03 51 FA CD 41 0F 20 BC 39 00 00 00 00 00 00 00

According to the swap setting, we set the Word and Byte swap in this example, so the data will be transformed into.

00 10 40 7F E6 64 0C BB 03 94 00 20 41 CD FA 51 39 BC 20 0F 00 00 00 00 00 00

Request Dat	a Bytes	0			
Response Da	Response Data Bytes 2 + 2		24 = 26		
Byte Index	Format		Desciption		
0	Uint8		Response Code 1		
1	Uint8		Response Code 2		
2~5	Float		Primary Variable Current		
6	Uint8		Primary Variable Unit code		
7~10	Float		Primary Variable		
11	Uint8		Secondary Variable Unit code		
12~15	Float		Secondary Variable		
16	Uint8		Tertiary Variable Unit code		
17~20	Float		Tertiary Variable		
21	Uint8		Quaternary Variable Unit code		
22~25	Float		Quaternary Variable		

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

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

- Response code1 = 0x00
- Response code2 = 0x10

Primary Variable Current = 0x40 0x7F 0xE6 0x64 (3.998437)

- Primary Variable Unit code = 0x0C (kPA)
- Primary Variable = 0xBB 0x03 0x94 0x00 (-0.0020077229)
- Secondary Variable Unit code = 0x20 (degC)
- Secondary Variable = 0x41 0xCD 0xFA 0x51 (25.747225)
- Tertiary Variable Unit code = 0x39 (Percent)
- Tertiary Variable = 0xBC 0x20 0x0F 0x00 (-0.009769201)
- Quaternary Variable Unit code = 0x00 (???)
- Quaternary Variable = 0x00 0x00 0x00 0x00 (0)

# Q07 : How to know the connection status between HRT-711 and

# HART devices ?

The communication status description of HART command in HRT-711 is as below.

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
0	The communication with HART slave device has some error and the error
5	messages are recorded in the responses codes

#### [ Ex1 => The Default CMD(3) of "Module 0" is Polling Mode ]

By using the high byte value of MB address 1000 (unit: WORD) (refer to sector 4.2 – Modbus / HART Mapping Table), users can get the communication status of the Default CMD(3) in "Module 0".



The status of the Default CMD(3) in Module 0 is 0x02. It means that the HART device for the Default CMD(3) is disconnected from HRT-711. (The status of the Default CMD(0) is 0x02, too.)

#### [ Ex2 => The User CMD Index = 0 is Polling Mode ]

By using the low and high byte value of MB address 1050 (unit: WORD) (refer to sector 4.2 – Modbus / HART Mapping Table), users can get the communication status of the User CMD Index = 0 and 1.



The status of the User CMD Index = 0 and 1 are 0x02. It means that the HART device for the User CMD Index = 0 and 1 is disconnected from HRT-711.

### Q08 : How to integrate Active and Passive HART devices in

### multi-drop network?

1. If there are more than 7 HART devices in the HART network, users need to disable the internal resistor (250 Ohm, 1/4W) of HRT-711 (adjust JP4 to be pin2 and pin3, refer to the section 2.6 for detailed). Then add the external resistor (250 Ohm, 1W) in HART network.

2. The HART wiring of the Active and Passive HART devices, please refer the following figure.



# Q09 : How to integrate multiple HRT-711 modules in the same

# project ?

#### [ Case Example ]

1. A user wants to integrate 20 HART devices (Ultrasonic Water Level) in the same project via Modbus TCP communication and HART wiring will be point to point.

[Solution]

#### < Hardware >

1. We suggest the user to use 20 HRT-711 modules to connect to 20 HART devices with point to point wiring.

< Software >

1. The HRT-711 is a Modbus TCP server, if users need to multiple HRT-711, users follow section 5.4 to configure the Ethernet. After configuring HRT-711' s Ethernet and connecting to Ethernet switch, all HRT-711 can be indentified by the IP address.

# Q10 : How to integrate HART communication device with RS-232

# hardware interface ?

#### [ Case Example ]

1. A user wants to integrate HART communication device (Flowmeter, Mobrey MCU900) with RS-232 hardware interface.

#### [Solution]

< Hardware >

1. We suggest the user to use HRT-711 and I-7570 to do that and the wiring for this case.



< Software >

1. Please refer to the steps in the Q01, Q02 and Q03 of HRT-711 FAQ to integrate HART device information to SCADA.

# Q11 : How to add the HART Device-Specific command to

### HRT-711?

[ Case Example ]

1. An user wants to get the HART command No.149 data from Emerson 8800D HART device.

[Solution]

#### < Software >

1. Users must get the HART Device-Specific command first. The HART command No.149 format of Emerson 8800D.



2. Add the HART command No.149 to HRT-711.

evice Configura	tion	_	
HRT-711		Item	Value
HART De		UADT Device Name	HART Device 0
Defau	Edit	Channel	0
i Defau	Delete	nfiguration	Enable
	Add Command	1	Point to Point
l		Lommand (U)	Initial Delliner
		Derault Commana(3)	round
New Com	mand		
Comma			
Comma	na and Num. : 149	Mode : Polling	▼ Format : Normal ▼
Comma Comma	and Num. : 149 In Size : 5	Mode : Polling Out Size : 0 🗲	Format : Normal     Format - Request Data Byte

3. After the setting is finished, in the Device Configuration screen, please click the Save to Device button to save the parameters to HRT-711.

Image: HRT-711       Item       Value         Image: HART Device 0       Default CMD(0)       Module Name       HRT-711         Image: Default CMD(3)       Image: Default CMD(149)       Firmware Version       V1.01         Image: Version       V1.01       Operation       Image: Default Setting         Image: Version       Image: Default Setting       Save to File       Save to Device

- 4. Get the Modbus address for the HART command No.149 data.
  - (1) Open the Address Map screen and click the UserCMD(149) item.
    - [1] In the Modbus AO area, the light blue grid means the Modbus address for data sending.
    - [2] In the Modbus AI area, the light blue grid means the Modbus address for data receiving.
  - => In the case, the HART command No.149 is used for reading data. Therefore, the light blue grid just show in Modbus AI|| area and the Modbus address for receiving data is from 0 to 2.

Address Map (For User CMD)	_				$\Leftrightarrow$			x
HRT-711	Color availa	ble	una	vailable	for current	cmd 📘	sel	ected
User CMD(149)	Modbus A(	)			Modbus A	I		
	Addr	LB	HB	<u> </u>	Addr	LB	HB	
	0				0			
	1				1			
	2				2			
	3				3			
	4				4			
	5				5			
	6				6			
	7				7			
	8				8			
	9				9			
	10				10			
	11			Ŧ	11			Ŧ

(2) Users can use the Modbus Function Code 4 and address from 0 to 2 to get the HART command No.149 data. (Ex: Request Cmd => 0x01 0x04 0x00 0x00 0x00 0x03)

### Q12 : How to set HART device address by HRT-711 utility ?

- 1. Add the UserCMD(6) to HRT-711 :
  - (1) Run HRT-711 Utility and connect to HRT-711.
  - (2) Open the Device Configuration page.
  - (3) Add UserCMD(6) and choose Manual option in Mode field.
  - (4) Click Save to Device button.

Command		
Command Num. : 6	Mode : Manual	• Format : Normal 👻
In Size : 3	Out Size : 1	

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

- 2. Set HART device address and send the UserCMD(6) :
  - (1) Open Device Information page.
  - (2) Right click on the UserCMD(6) item and choose the Basic Operation.
  - (In the demo, the command index is 0 for the UserCMD(6).
  - (3) Input the HART device address value and click the Send button.

(In the demo, HART device address will be set to be 2. Now the setting value is just saved in HRT-711 not sent out yet.)

Device Information			
HRT-711	Item		Value
HART Device 0	Com	ımnad Name	User CMD(6)
Default CMD(0)	HAR	T Device Index	0
Default CMD(3)	User	Command Index	0
Regis operation		No.	6
Basic operation		Mode	Manual
Advanced oper	ation	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 AddressRequ	est			
Polling Address (0~15) : 2				
	Send			
Information : Write Polling AddressRespo	inse			
Polling Address : 0				
	Update			

- (4) Right click on the System item and choose the Basic Operation.
- (5) After finishing the below settings, click Send Data button to send the UserCMD(6) to HART device.
  - [1] Auto Polling field => Disable
  - [2] Manual Trigger field => Enable
  - [3] Trigger Index of User Command field => Input 0 (UserCMD(6) Index)

Device Info	ormation			
⊟ HR T-7	11	Item	_	Value
📄 - H.	Basic operation		le Name	System
	Advanced operatio	n	ystem Info ]	
	User CMD(6)	HAR	T 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				

3. Now the HART device address should be set to be 2. Then please reboot HRT-711.

(After changing device address, please also remember to modify the device address in the Device Configuration)