# I-7570
# Serial To HART Converter

## User's Manual

Warranty

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

Warning

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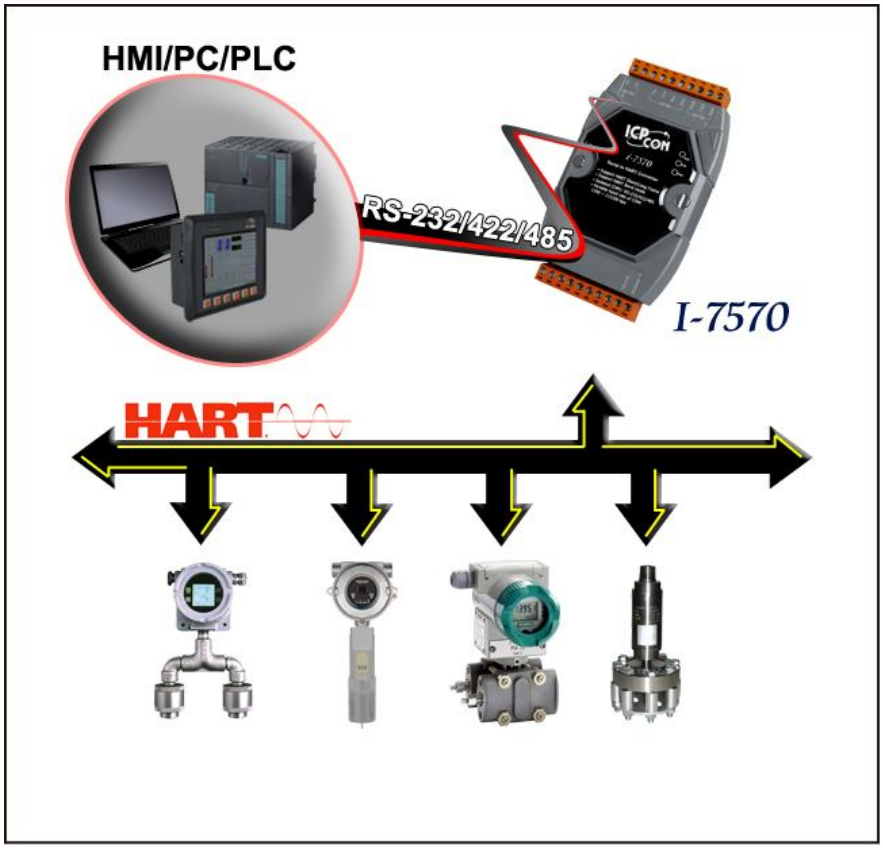
# 1. Introduction

The I-7570 is a Serial to HART converter specially designed for the master device of HART protocol. It allows users to access the HART slave by using RS-232/RS-422/RS-485. These HART slave devices may be a transmitter, an actuator, a current output device and so forth. In addition, we also provide the utility tool for users to configure the I-7570.

The following is the application for the Serial/HART modules:




## 1.1 Features

- Support HART Short/Long frame
- Allow two HART masters
- Working in point-to-point or multi-drop HART mode
- Connecting up to 15 HART modules

- Provide utility tool for module configuration
- Isolated COM 1: RS-232/422/485
- Provide PWR / TxD / RxD indication LED
- 4KV ESD Protection
- Built-in Watchdog
- Selectable 250Ω load resistor

## 1.2 Specifications

**[ Serial specs: ]**

- Input port **:** RS-232/RS-422/RS-485 (USB Type B)

**[ HART specs: ]**

- HART interface connector: 10-pin terminal-block
- HART Baud Rate **:** 1200bps
- Isolation Voltage **:** 3KVDC on the HART side

**[ Module specs: ]**

- Dimensions **:** 108mm x 72mm x 35mm (H x W x D)
- Operating temperature **:** -25 to 75°C (-13 to 167°F);
- Storage temperature **:** -40 to 80°C (-40 to 176°F);
- Humidity **:** 5 to 95%, non-condensing;
- LEDs **:** PWR LED for power
  TxD LED for HART frame from Serial port
  RxD LED for HART frame from HART device

**[ Software Utility Tool: ]**

- Easily and quickly installation
- Easily search HART devices
- Provide user-defined HART frame
- Provide simple Data logger

**[ Application: ]**

- Current Measuring;
- Petrochemical Industry Application;
- Environment Monitoring;
- Tunnel Monitoring;
- Monitor system;
- Building Monitoring etc.;

# 2. Hardware


Figure 2-1: Hardware externals of I-7570

## 2.1 Block Diagram

Figure 2-2 is a block diagram illustrating the functions on the I-7570 module. It provides the 3000Vrms Isolation in the HART interface site.

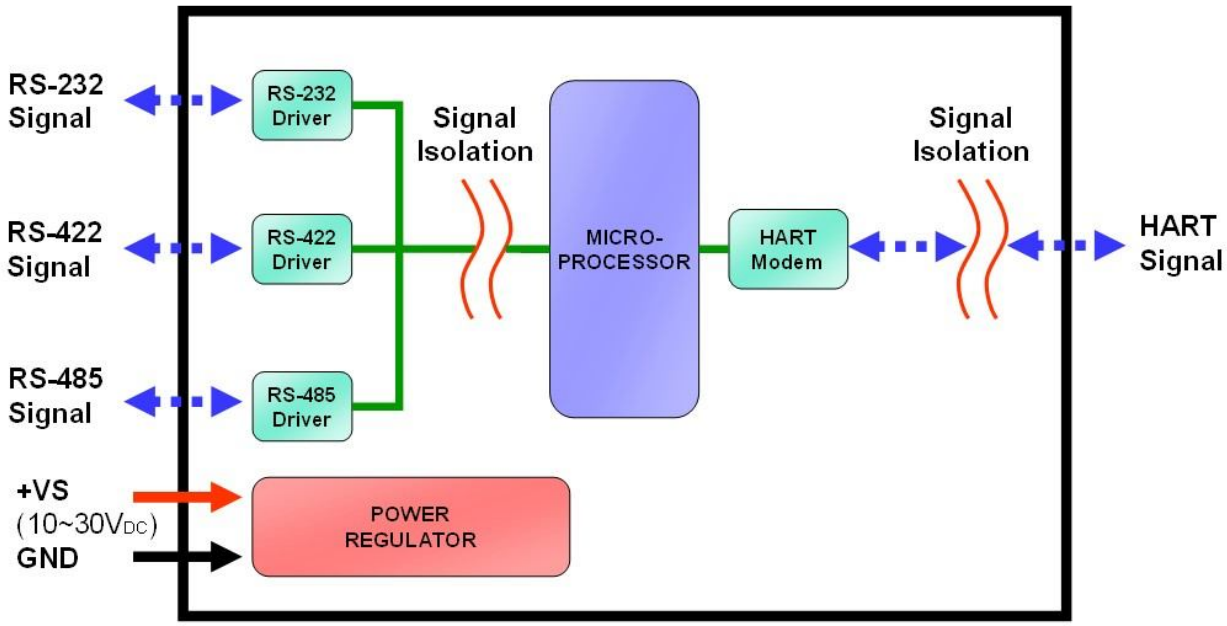



Figure 2-2: Block diagram of I-7570

## 2.2 Pin Assignment of I-7570

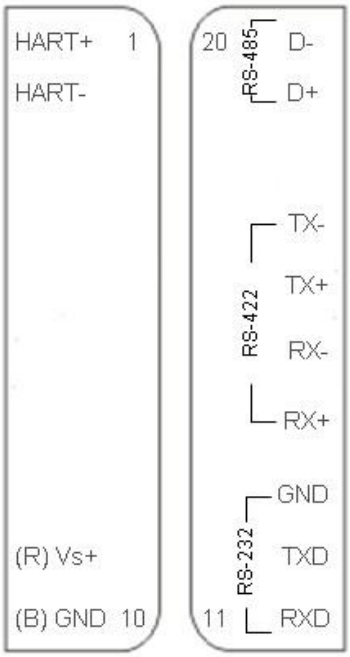



Figure 2-3: Pin Assignment on I-7570

## 2.3 Terminator Resistor Settings

There is a Jumper (JP4) at the I-7570 module, as shown in Figure 2-4. The jumper can provide HART network with 250 Ω (1/4 W) resistor. When the pin 1&2 of JP4 is closed, the resistor will connect to HART network. When the pin 2&3 ofJP4 is closed, it will disconnect the resistor from HART network. By default, the pin1&2 of JP4 is closed.

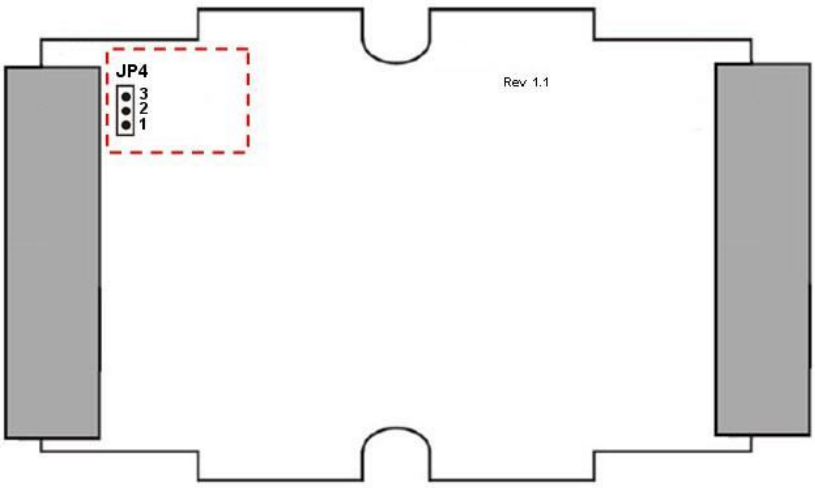



Figure 2-4: Internal Resistor

## 2.4 Default / Normal Dip-switch

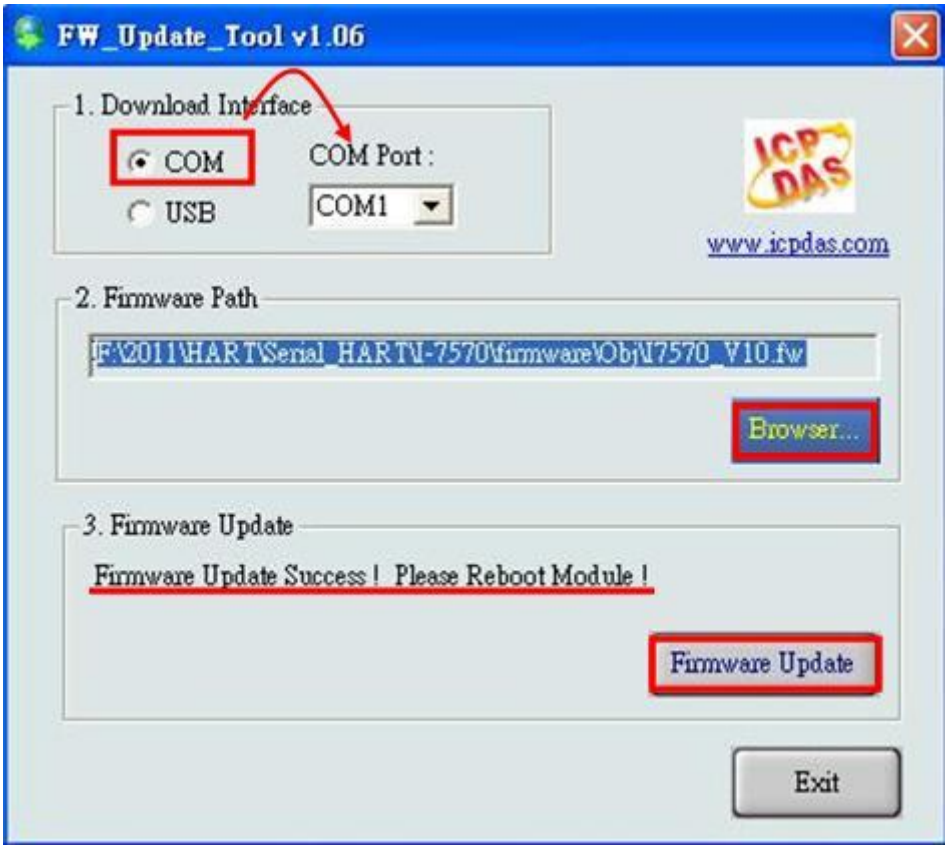
There is a DIP Switch on the back of the I-7570 module, as shown in Figure 2-5. In the Firmware Operation Mode, user needs to set the DIP Switch to the “Normal” position. If the user needs to update the firmware of I-7570, the user can set the DIP Switch to the “Default” position.


Figure 2-5: Firmware Updating

### 2.4.1 Firmware Update Mode

Please set the Dip-switch to the “Default” position. Then the I-7570 will work in the “Firmware Update Mode” after the power of the module has been turned on again. In this mode, users can update the firmware of the I-7570 module via RS-232.

Users just need to execute “Firmware_Update_Tool.exe” and follow the below steps to complete the firmware updating process.
[1] Choose “COM” interface and “COM Port”.
[2] Click “**Browser**” button to choose firmware file. (like **I7570_v1.00.fw**)
[3] Click “**Firmware Update**” button to start the process.
The result will show in “Firmware Update” field.




The Firmware_Update_Tool program can be downloaded from http://ftp.icpdas.com/pub/cd/fieldbus_cd/HART/converter/I-7570/software/tool

### 2.4.2 Firmware Operation Mode

In operation mode, users need to set the Dip-switch to the Normal position. In this mode, users can send / receive HART frame via serial port.

## 2.5 LED Indication

There are three LEDs provided to indicate to users what situation the I-7570 is in. The following is the illustration of these three LEDs and the position of these three LEDs shows as Figure 2-6.


Figure 2-6**:** LED position of I-7570

2.5.1 LED function

**(1) PWR LED :**

It is used to help users to check whether the I-7570 is standby. If the module is working in “firmware operation” mode, the PWR LED is always turned on. However, when the module is working in the “firmware updating” mode, the PWR LED will flash.

**(2) Tx LED :**

It is used to show whether the I-7570 is receiving HART frame from serial port. The Tx LED will flash whenever a HART frame is receiving from PC.

**(3) Rx LED :**

It is used to show whether the I-7570 is receiving HART frame from HART device. The Rx LED will flash whenever a HART frame is receiving from HART device.

### 2.5.2 LED indication

| LED Name | Power off | Firmware Updating | Firmware Operation | Receiving HART Frame from PC | Receiving HART Frame from HART Device |
|---|---|---|---|---|---|
| **PWR LED** | off | flash | on | on | on |
| **Tx LED** | off | flash | off | flash | off |
| **Rx LED** | off | flash | off | off | flash |

## 2.6 Cable Selection

The HART bus is a balanced (differential) 2-wire interface running over either a Shielded Twisted Pair (STP), Un-shielded Twisted Pair (UTP), or Ribbon cable. How to decide a cable type, cable length, and terminator in the HART bus network, please refer to the following table.

| No. Network Devices | Cable Capacitance – pf/ft (pf/m) | | | |
|---|---|---|---|---|
| | 20 pf/ft (65 pf/m) | 30 pf/ft (95 pf/m) | 50 pf/ft (160 pf/m) | 70 pf/ft (225 pf/m) |
| 1 | 9,000 ft (2,769 m) | 6,500 ft (2,000 m) | 4,200 ft (1,292 m) | 3,200 ft (985 m) |
| 5 | 8,000 ft (2,462 m) | 5,900 ft (1,815 m) | 3,700 ft (1,138 m) | 2,900 ft (892 m) |
| 10 | 7,000 ft (2,154 m) | 5,200 ft (1,600 m) | 3,300 ft (1,015 m) | 2,500 ft (769 m) |
| 15 | 6,000 ft (1,846 m) | 4,600 ft (1,415 m) | 2,900 ft (892 m) | 2,300 ft (708 m) |

Allowable cable lengths for 1.0 mm (#18 AWG) shield twisted pair

Note: The AWG means a standard method used to measure wire. The numbering system works backwards from what people would think, the thicker (heavier) the wire, the lower the number.

# 3. HART Converter Utility

I-7570 Utility is provided by ICP DAS to transmit / receive HART frame for HART bus communication testing easily and quickly. I-7570 Utility can be downloaded from the ICP DAS web site **:** http://ftp.icpdas.com/pub/cd/fieldbus_cd/hart/converter/I-7570/software/utility. The following is the main functions provided by I-7570 Utility.

## 3.1 Run Utility

Run the "I-7570 Utility" HC_Tool.exe, and then click the "Settings" of menu to configure the parameters of communication like Figure 3-1.If users can't run "HC_Tool.exe", please install .NET Framework 3.5 and then run utility again.

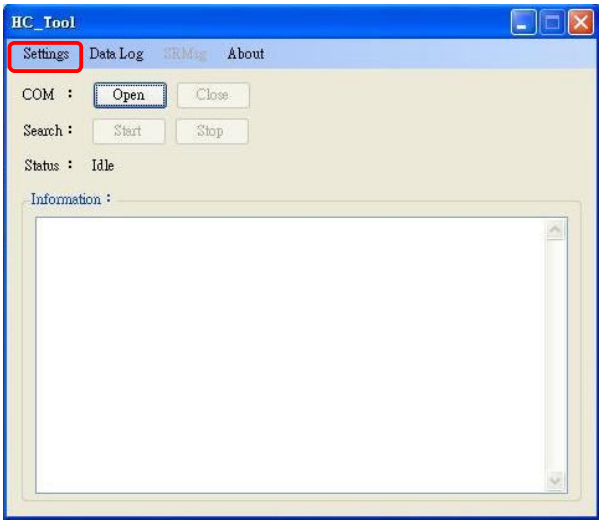



Figure 3-1**:** Open the "Settings" of menu

## 3.2 Communication Settings and HART Frame Settings

Please refer to the section 3.2.1 to set com port and the section 3.2.2 to configure the HART frame.

### 3.2.1 Communication Settings

Please select serial port.


Figure 3-2: Set Port Name

### 3.2.2 HART Frame Settings

The “Hart” index offers the format of short or long frame to transmit

Auto Configure: Select Automatic or Manual mode to send HART frame.

Frame type: Select the format of short frame or long frame.

Master type: Select Primary master or Secondary master

Preambles: 5~20 bytes (0xFF)

Address: Polling Address(0~15)

Manufacturer ID: Manufacturer Identification Code

Device type: Manufacturer’s Device Type Code

Device ID: Device Identification Number

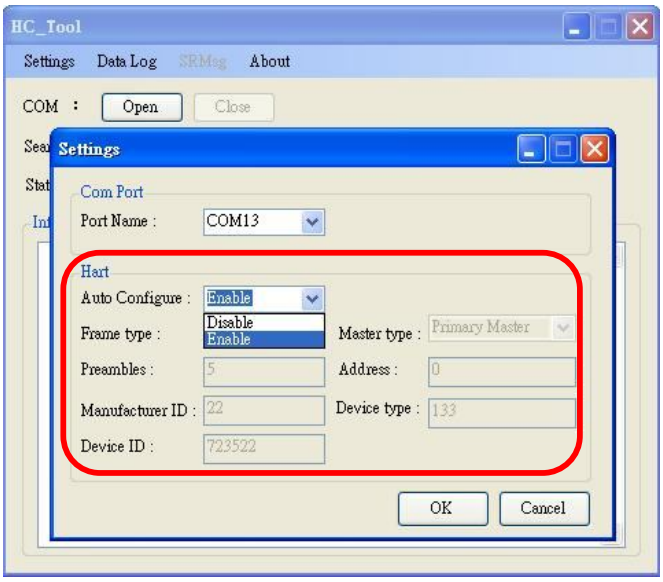



Figure 3-3: Set the format of HART frame

How to configure the HART frame via the utility? Users can modify "Auto Configure" to select "Disable" or "Enable". If it is "Enable", the utility will use the short frame format to polling HART device (Figure 3-4).


Figure 3-4: Set Auto Configure to Enable

When "Auto Configure" is "Disable", users must refer to the "Frame type" option to set the format of "Short" frame or "Long" frame. If it is "Short" frame, users only set Master type, Preambles, Address (Figure 3-5). Otherwise, users must set about Frame type, Master type, Preambles, Manufacturer ID, Device type, Device ID (Figure 3-6).

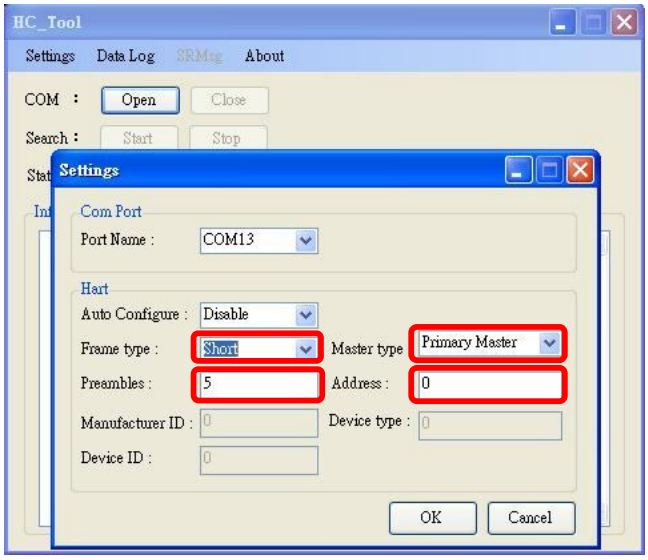



Figure 3-5: Short frame settings

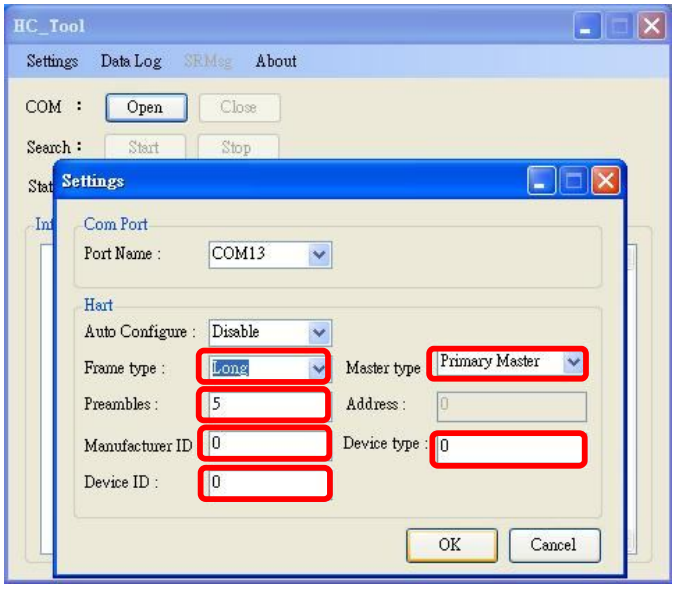



Figure 3-6: Long frame settings

If Communication and HART frame settings have set up, please click the "OK" button.

## 3.3 Search the HART device via the I-7570

If users have finished above the settings, please refer to the following steps to search the HART device via sending Command #0.

Step 1: Click the "Open" button to connect com port (Figure 3-7).

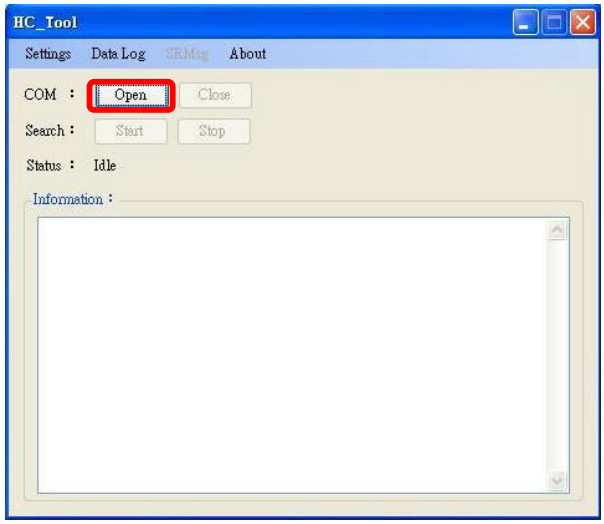



Figure 3-7: Click “Open” button

If the screen showed the error message after clicking “Open” button, please check the port number and reset Port Name.

Step 2: Click the “Start” button to search HART device with HART bus (Figure 3-8).

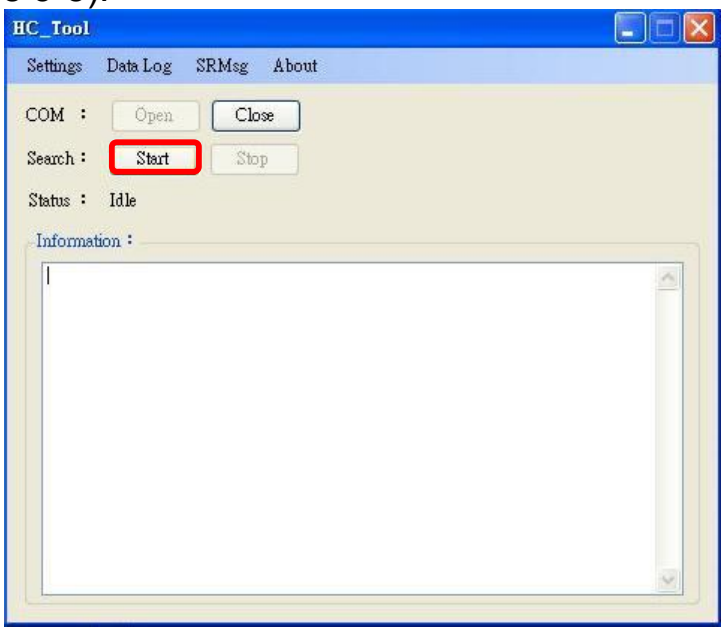



Figure 3-8: Click “Start” button

Users can find the related information of HART device after clicking(Figure 3-9).

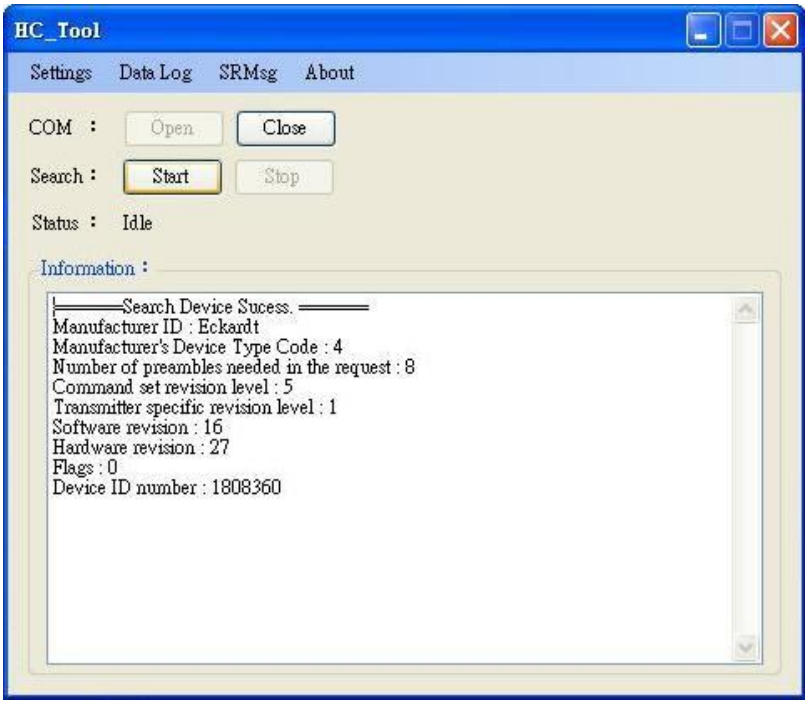



Figure 3-9: Find HART device

If the utility showed error information (Figure 3-10), users must check the communication of HART bus, the format of HART device frame.

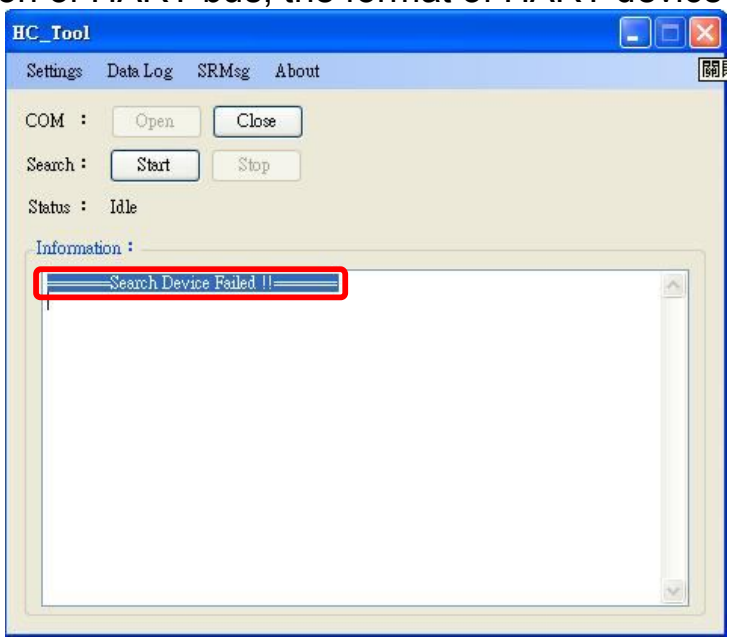
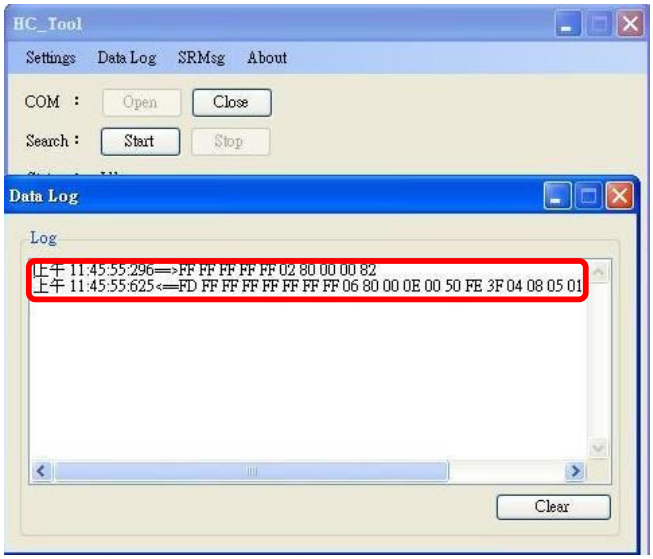



Figure 3-10: Search Device Failed

## 3.4 Data logger

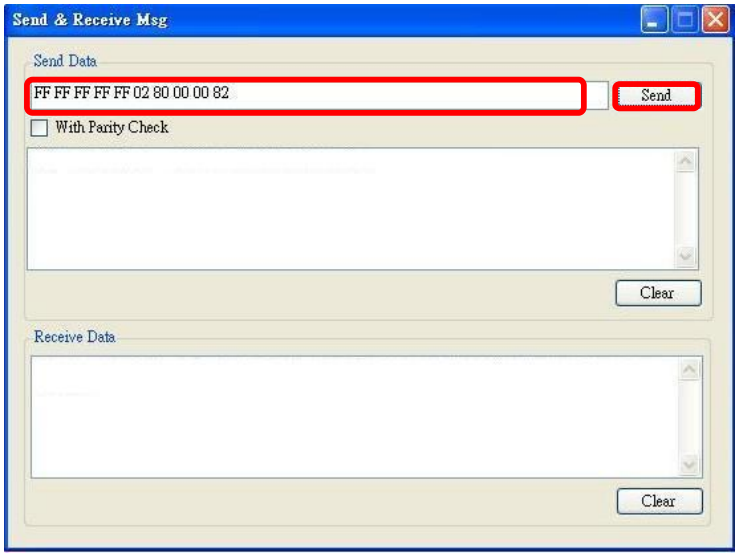
When users click “Start” button or run the “SRMsg” of menu, the utility will start to record HART frame from PC or HART device. But close the utility, the information of Data logger will disappear.




## 3.5 Send/Receive HART Frame

Users can send and receive HART command directly by the following window.

Step 1: Set HART command to “Send Data” field, and then click the “Send” button.




Step 2: The response data of HART device will be showed in the “Receive Data” field. When the “Receive Data” is showed empty, please check the format of HART frame from the “Send Data” or HART communication.