EMERSON 3HRT04 HART Input Output Module Installation Guide

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For Part Numbers:

- 3HRT04
- 3HTSG4

Contents

Device Safety Considerations

- **Reading these Instructions**

  Before operating the device, read these instructions carefully and understand their safety implications. In some situations, improperly using this device may result in damage or injury. Keep this manual in a convenient location for future reference.

  Note that these instructions may not cover all details or variations in equipment or cover every possible situation regarding installation, operation, or maintenance. Should problems arise that are not covered sufficiently in the text, immediately contact Customer Support for further information?
- **Protecting Operating Processes**

  A failure of this device – for whatever reason — may leave an operating process without appropriate protection and could result in possible damage to property or injury to persons. To protect against this, you should review the need for additional backup equipment or provide alternate means of protection (such as alarm devices, output limiting, fail-safe valves, relief valves, emergency shutoffs, emergency switches, etc.). Contact Remote Automation Solutions for additional information.
- **Returning Equipment**

  If you need to return any equipment to Remote Automation Solutions, it is your responsibility to ensure that the equipment has been cleaned to safe levels, as defined and/or determined by applicable federal, state, and/or local law regulations or codes. You also agree to indemnify Remote Automation Solutions and hold Remote Automation Solutions harmless from any liability or damage which Remote Automation Solutions may incur or suffer due to your failure to ensure device cleanliness.
- **Grounding Equipment**

  Ground metal enclosures and exposed metal parts of electrical instruments in accordance with OSHA rules and regulations as specified in Design Safety Standards for Electrical Systems, 29 CFR, Part 1910, Subpart S, dated: April 16, 1981 (OSHA rulings are in agreement with the National Electrical Code). You must also ground mechanical or pneumatic instruments that include electrically operated devices such as lights, switches, relays, alarms, or chart drives.

  Important: Complying with the codes and regulations of authorities having jurisdiction is essential to ensuring personnel safety. The guidelines and recommendations in this manual are intended to meet or exceed applicable codes and regulations.

If differences occur between this manual and the codes and regulations of authorities having jurisdiction, those codes and regulations must take precedence.

- **Protecting from Electrostatic Discharge (ESD)**

  This device contains sensitive electronic components which be damaged by exposure to an ESD voltage. Depending on the magnitude and duration of the ESD, it can result in erratic operation or complete failure of the equipment. Ensure that you correctly care for and handle ESD-sensitive components.

System Training

A well-trained workforce is critical to the success of your operation. Knowing how to correctly install, configure, program, calibrate, and troubleshoot your Emerson equipment provides your engineers and technicians with the skills and confidence to optimize your investment. Remote Automation Solutions offers a variety of ways for your personnel to acquire essential system expertise. Our full-time professional instructors can conduct classroom training at several of our corporate offices, at your site, or even at your regional Emerson office. You can also receive the same quality training via our live, interactive Emerson Virtual Classroom and save on travel costs. For our complete schedule and further information, contact the Remote Automation Solutions Training Department at 800-338-8158 or email us at education@emerson.com.

Ethernet Connectivity

This automation device is intended to be used in an Ethernet network that does not have public access. The inclusion of this device in a publicly accessible Ethernet-based network is not recommended.

HART® Input/Output Channels (3HRT04/3HTSG4)

The FB3000 RTU supports a HART® (Highway Addressable Remote Transducer) module with four (4) channels. This allows the FB3000 to communicate with external HART devices such as transmitters.

DANGER
Ensure the RTU is in a non-hazardous area. Never open the enclosure in a hazardous area.

DANGER
EXPLOSION HAZARD: Ensure the area in which you perform this operation is non-hazardous.
Performing this operation in a hazardous area could result in an explosion.

Insert the 3HRT04 module in any base chassis slot except slot 1 and insert its corresponding 3HTSG4 module below it.

Note: The 3HRT04 module requires a chassis of Revision H or newer.
The 3HRT04/3HTSG4 modules cannot be used in an extension chassis.
You can configure a channel for point-to-point operation in which case it communicates with a single HART device. Alternatively, you can configure a channel for multi-drop operation in which it communicates with up to five (5) HART devices in parallel.

HART Characteristics

Type	Number Supported	Characteristics
HART channel	1 to 4	An individual HART channel can be configured in FBxConnect as either an input or an output, but not both. A HART input supports either point-to-point or multi-drop mode A HART output supports only point-to-point mode; in multi-drop mo de, there is no analog signal output available.

Removing/Replacing the 3HRT04 Module

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DANGER
EXPLOSION HAZARD: Ensure the area in which you perform this operation is non-hazardous.
Performing this operation in a hazardous area could result in an explosion.

Notes:

- You can/remove or replace any I/O module without removing power.
- If you replace a 3HRT04 module with another 3HRT04 module, on insertion the new module uses the configuration of the 3HRT04 module it replaced.
- If replacing a module of a different type, for example replacing a 3MIX12 with a 3HRT04, on insertion you will see a mismatch in FBxConnect. You will need to redefine the module in FBxConnect as the new module type.
- If you have an empty slot that has had no modules defined, on insertion the new module assumes factory defaults and you must then configure it in FBxConnect.

  1. Depress the orange tabs at the top and bottom of the 3HRT04 module to release the module and slide it straight out of the slot.
  2. Press the new replacement module into the slot until it is properly seated.

Removing/Replacing the 3HTSG4 Module

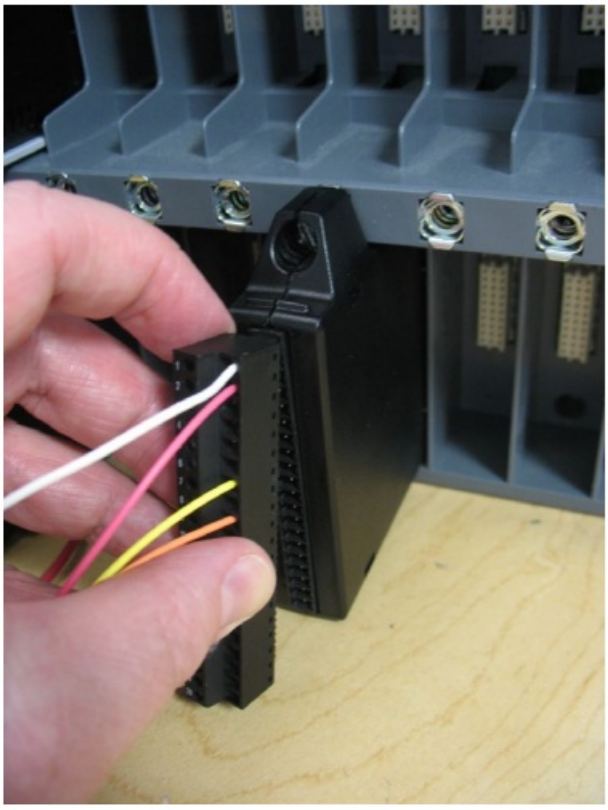
DANGER
Ensure the RTU is in a non-hazardous area. Never open the enclosure in a hazardous area.

DANGER
EXPLOSION HAZARD: Ensure the area in which you perform this operation is non-hazardous.
Performing this operation in a hazardous area could result in an explosion.

1. If you are replacing an existing personality module that is already wired with an identical personality module, and if there is no fault with the terminal block, leave wiring connected to the terminal block, and disconnect the terminal block from the personality module by gently rocking the terminal block from side to side until it pops

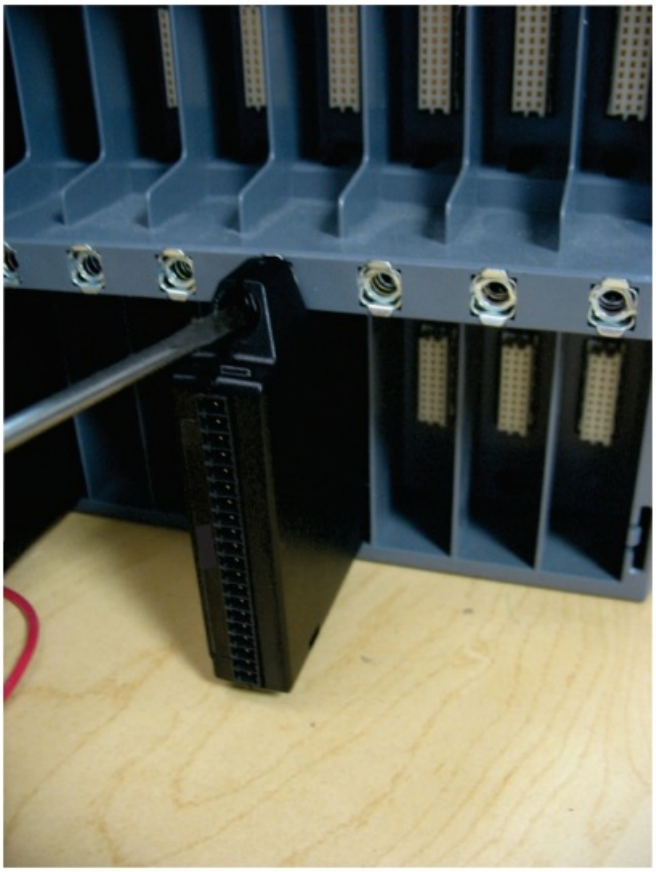
out. Conversely, if there is a fault with the terminal block, label wires coming in so you can transfer the wires to the correct positions on the new terminal block. To wire an all-new module, see Wiring the Module.

Detaching the Terminal Block with Wires Still Attached



2. Using a ¼” slotted blade screwdriver, loosen the captive fastening screw at the top of the personality module and slide the module straight out of the slot.

   Removing a Personality Module



3. Press the new replacement personality module into the slot until it is properly seated, then tighten the captive fastening screw.

Replacing a Personality Module

4. If you replaced an existing personality module with an identical replacement and were able to re-use the terminal blocks, reattach the terminal block by pressing it into place; otherwise, wire the new terminal block as required.

Reattaching the Terminal Block

Wiring the Module

DANGER
Ensure the RTU is in a non-hazardous area. Never open the enclosure in a hazardous area.

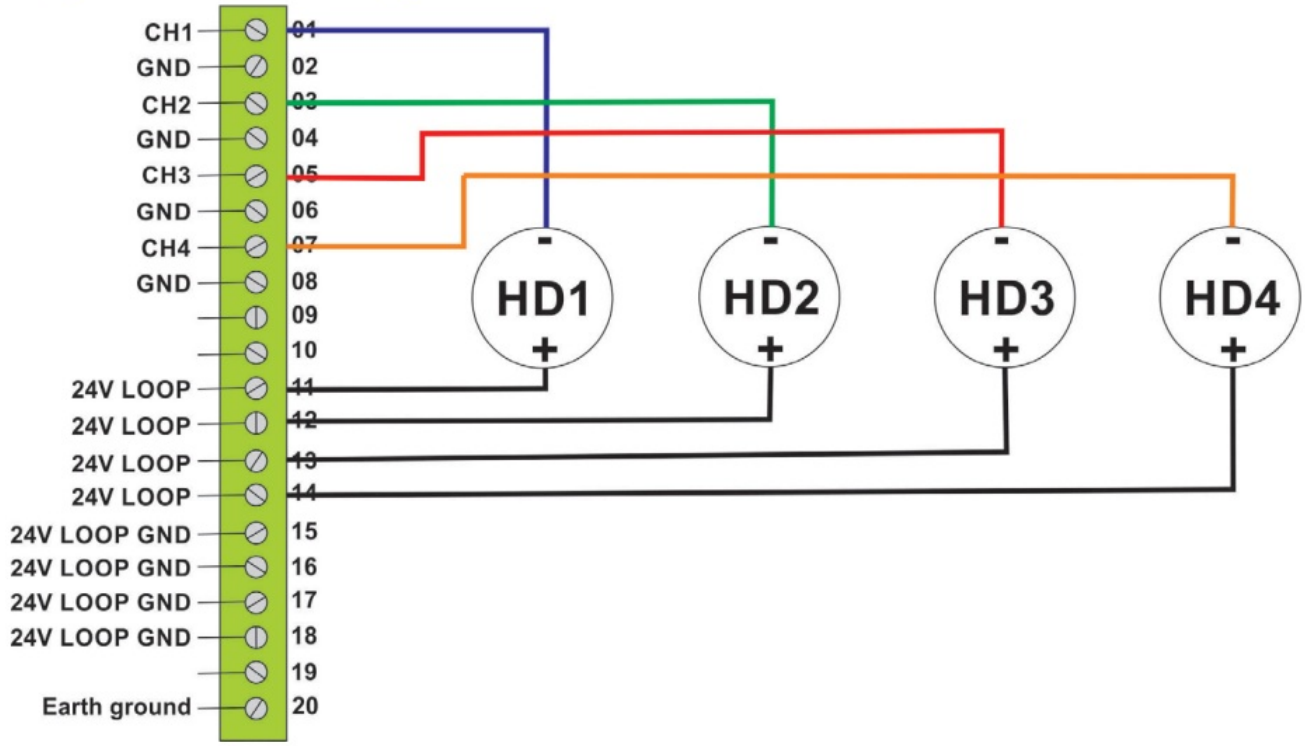
DANGER
EXPLOSION HAZARD: Ensure the area in which you perform this operation is non-hazardous.
Performing this operation in a hazardous area could result in an explosion.

You can wire HART channels for different modes of operation.

Point-to-Point Mode

In Point-to-Point mode, the HART link allows both a 4-20mA analog current mode signal as well as the modulated HART digital signal riding on top of it. Depending upon the HART device connected, you can configure the channel as an AI (which means the 250-ohm resistor is enabled) or an AO (which means the 250-ohm resistor is disabled).
Figure 1 shows how to wire all four HART channels in point-to-point mode. In this case, each HART channel only communicates to a single HART device. You choose whether a given channel serves as an input or output in FBxConnect. The 24V internal loop power supply powers the HART devices.
The HART interface only sinks current, it cannot source current. As an output, each channel simultaneously provides an analog current signal output (sink current only at 4-20 mA) and a HART signal modulated on top of it.

Figure 1. HART Wiring – Point-to-Point Mode



Multi-Drop Mode

In Multi-Drop Mode, only the HART digital signaling (FSK – Frequency Shift Keying) is present and no 4-20mA analog current signal is permitted (no AO allowed). Each device can support a maximum 4mA bias current. Because the maximum rated output (sink) current of any 3HRT04 Module channel is 20mA, and each device can draw 4mA, a HART channel in multidrop mode supports a total of 5 HART devices. With each of the 5 HART devices permitted to draw 4mA, the sum of the currents is 20mA – the maximum current.

Figure 2 shows how to wire a HART channel for multi-drop mode. Multi-drop mode only supports inputs, you cannot have multi-drop outputs.
You can wire each channel the same way to allow for up to 20 HART devices (5 per channel).

Figure 2. HART Wiring – Multi-Drop Mode on Channel 1

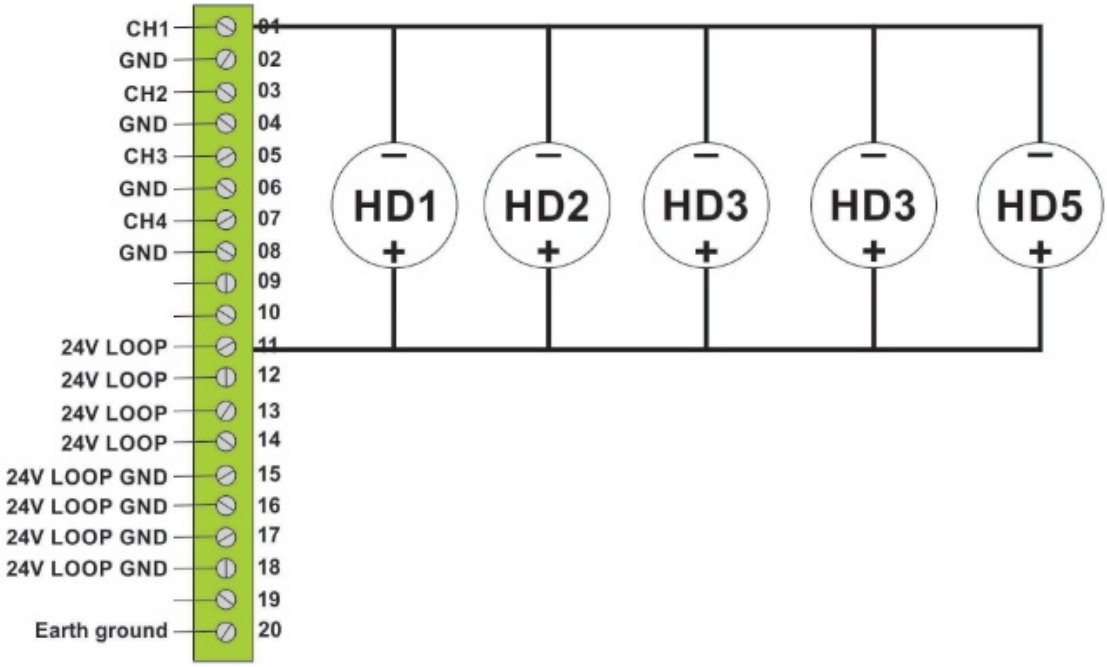
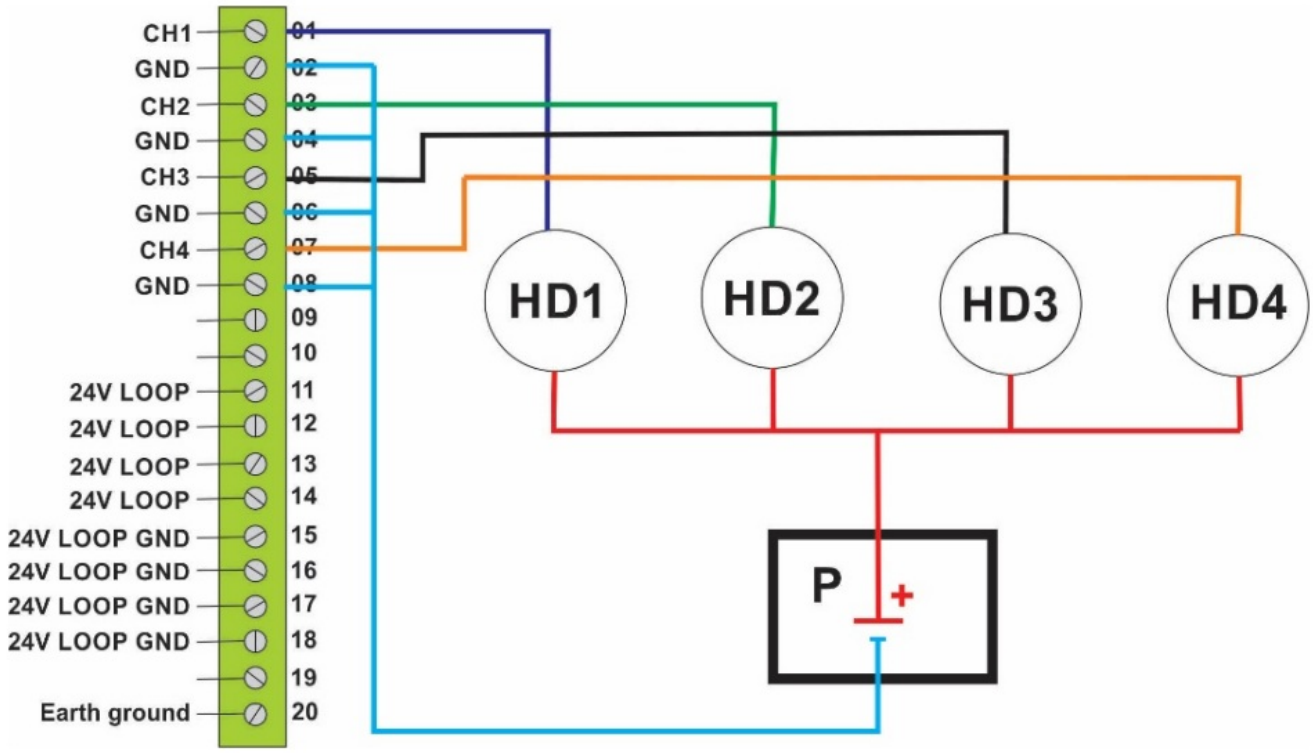


Figure 3 shows how to wire a HART channel for devices that do not use loop power but get power from an external power supply.

Figure 3. HART Wiring – External Power Supply

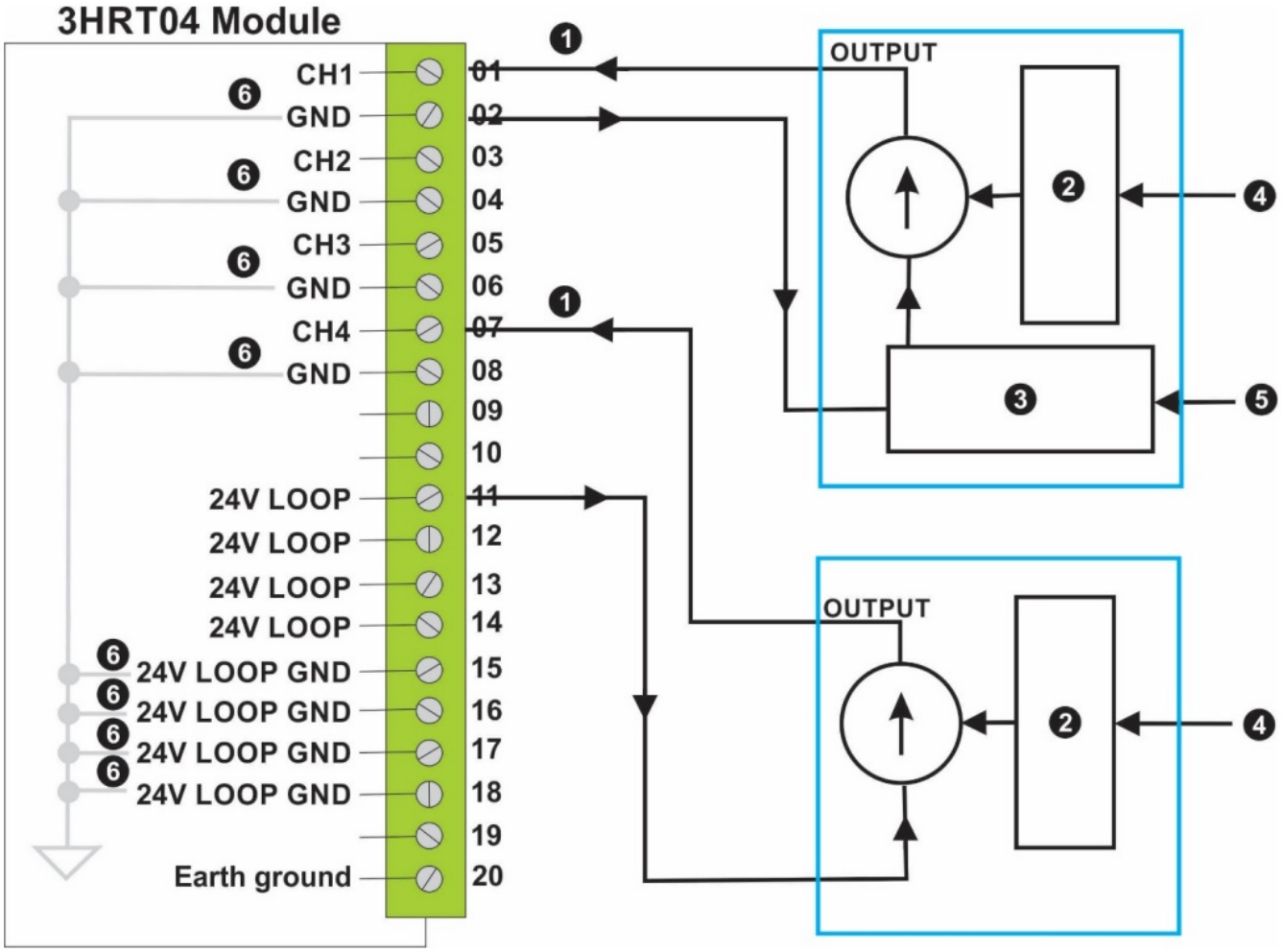


HD HART Device
P External 24V Power Supply

Analog Input Mode (HART Communication Disabled)

If you have an unused HART channel, you can use it as a 4-20mA analog input (AI current mode).
In FBxConnect, you must Enable the 250 Ohm Termination Resistor and set the HART Comm Mode to Disabled.
Figure 4 shows two examples for wiring a HART channel as a 4-20mA analog input. In the figure, an externally powered current loop transmitter connects to Channel 1 and a loop-powered current loop transmitter connects to Channel 4.

Figure 4. Methods for Connecting 4mA to 20mA Analog Inputs to 3HRT04 Channel (No HART communications)

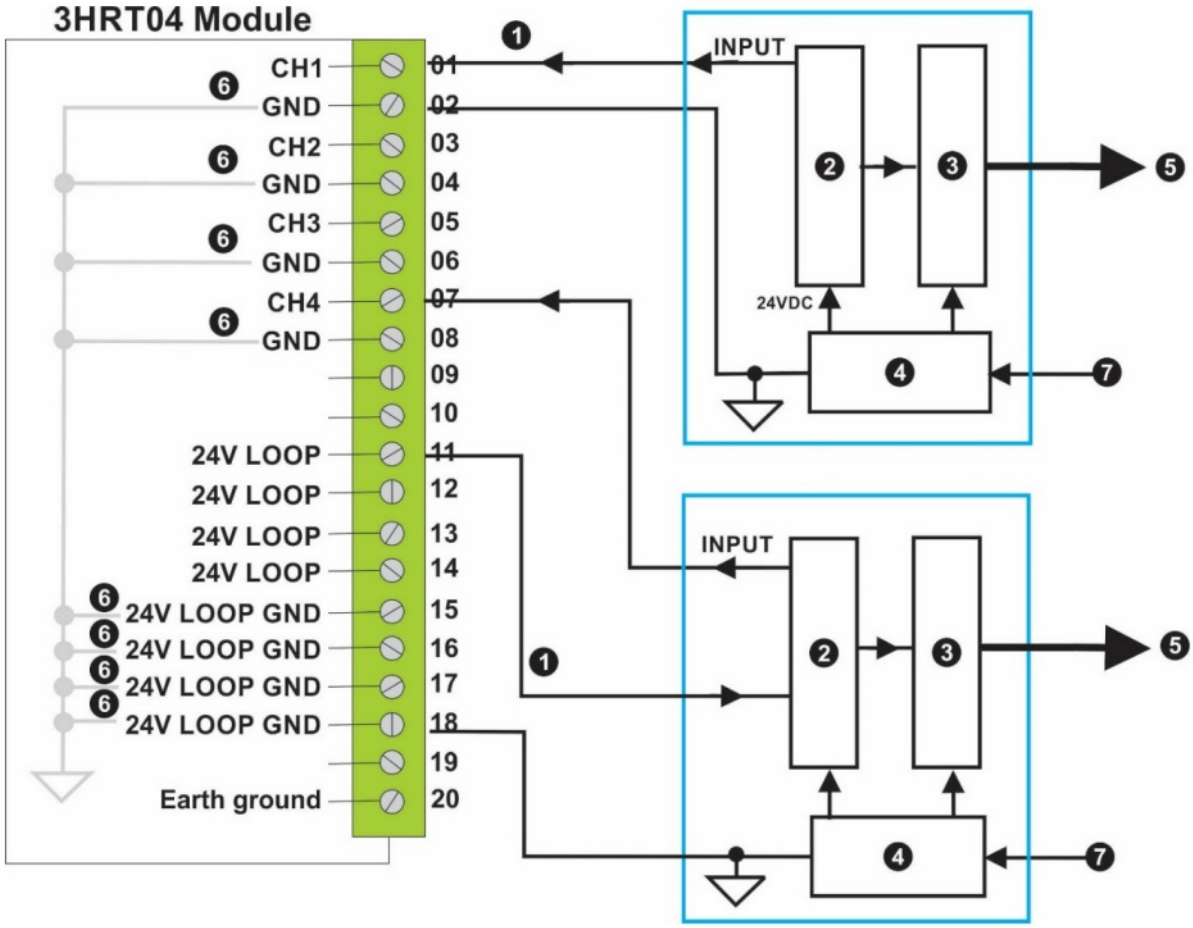


1. 4-20mA Analog Signal Loop
2. Transducer
3. Power Supply
4. Sensor Input
5. External Power Source
6. 3HSTG4 Module internal ground connections (for information only; not visible to the user)

Analog Output Mode (HART Communication Disabled)

If you have an unused HART channel, you can use it as a 4-20mA current sinking analog output.
In FBxConnect, you must Disable the 250 Ohm Termination Resistor and set the HART Comm Mode to Disabled.
Figure 5 shows two examples for wiring a HART channel as a 4-20mA analog output. In the figure, an externally powered current loop receiver connects to Channel 1 and a 24VDC loop supply-powered current loop receiver connects to Channel 4.

Figure 5. Methods for Connecting 4mA to 20mA Analog Outputs to 3HRT04 Channel (No HART communications)

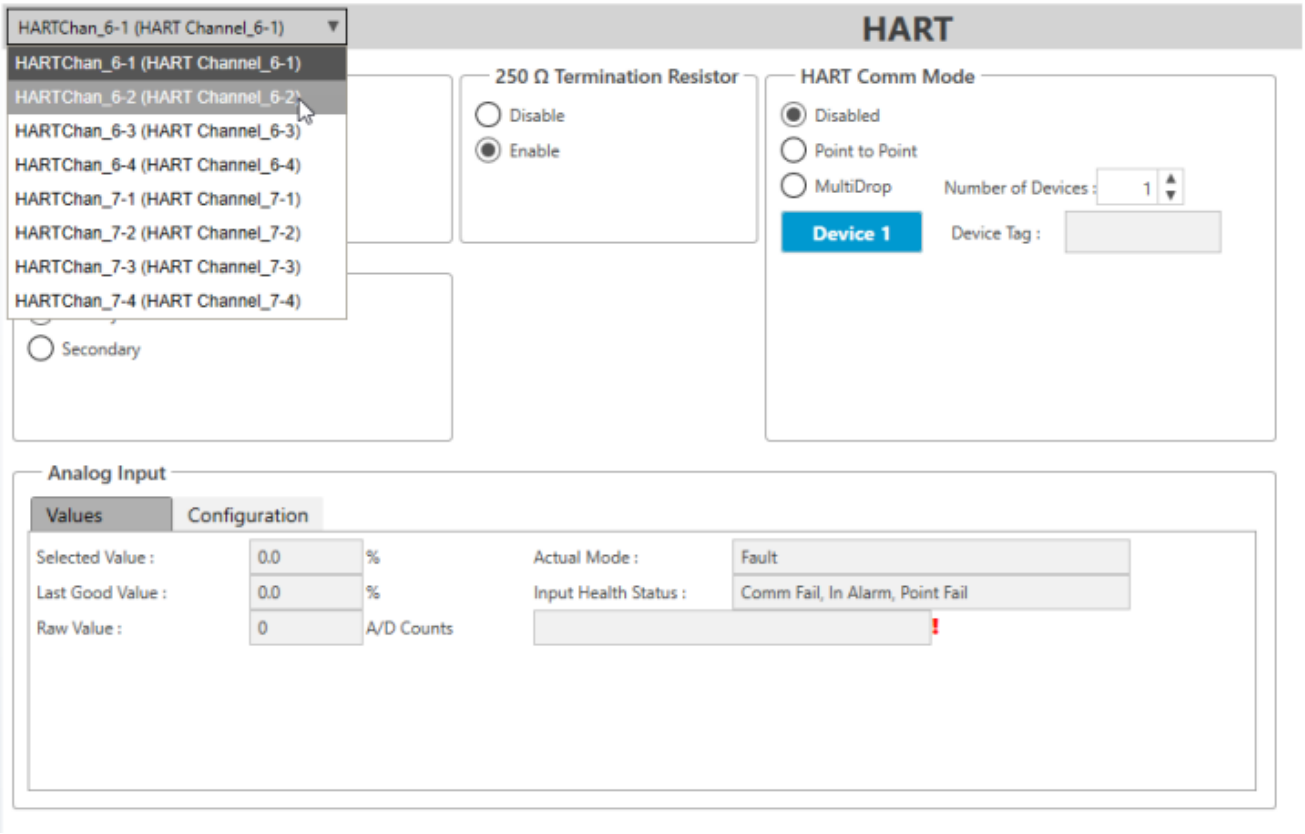


1. 4-20mA Analog Signal Loop
2. Transducer
3. Driver
4. Power Supply
5. Actuator
6. 3HSTG4 Module internal ground connections (for information only; not visible to the user)
7. External Power Source

Software Configuration

Consult the FBxConnect online help for full details. What follows is an overview of the steps:

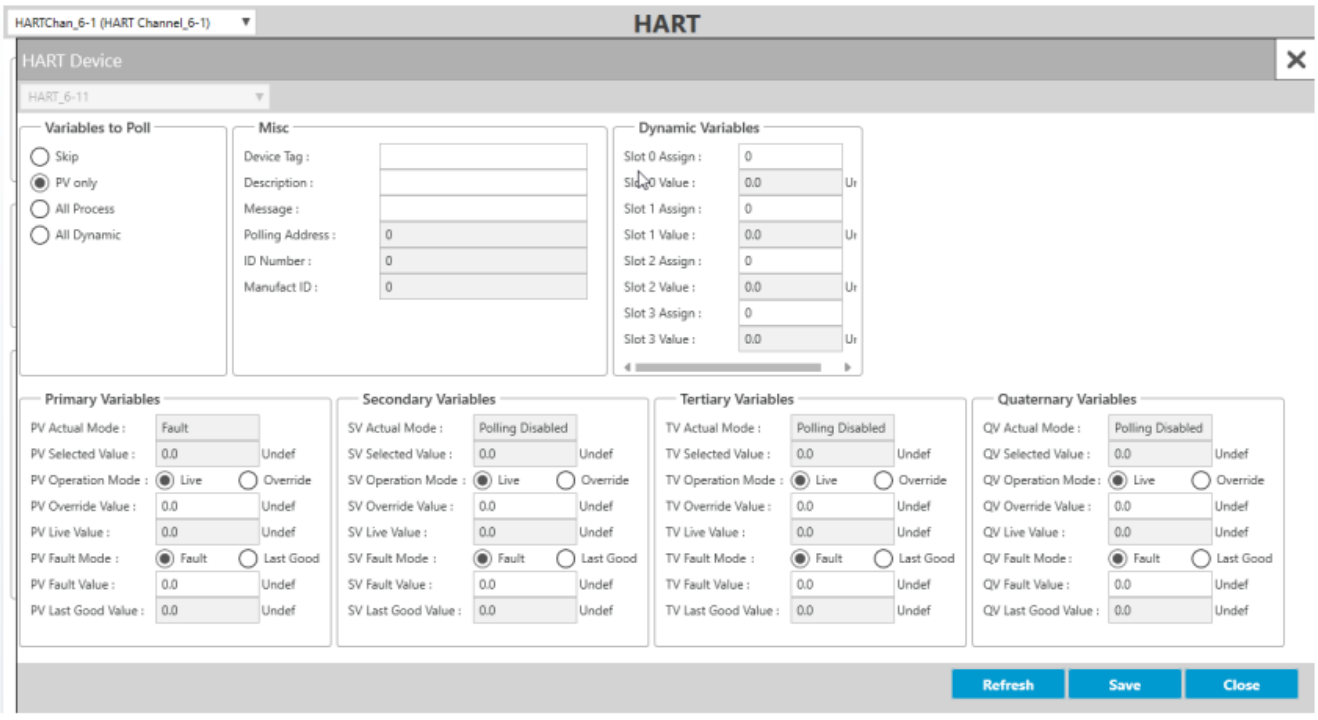
1. From the Configure tab in FBxConnect, click I/O Setup > HART.



2. Select the HART channel you want to configure; there are four HART channels per module.
3. If this channel is an analog input, click the Configuration tab to configure the AI.
4. Specify whether this is a Primary or Secondary HART Master in the HART Master Type field.
5. Enable the Termination Resistor if required.
6. Choose the HART Comm Mode:

   If you have a single HART device on the channel, select Point to Point

   If multiple devices are multi-dropped on the channel, select Multidrop and specify the **Number of Devices.**
7. Click Save. If you chose Multidrop, the HART menu creates a button for each of the devices.
8. Click on the Device button to configure the HART device on this channel.



9. Select the variables you want to poll from the device, then click Save and Close the screen.

If this channel uses multi-drop, repeat steps 8 and 9 for any unconfigured devices.

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Documents / Resources

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