ROC800-Series HART® Module

The HART® (Highway Addressable Remote Transducer) module allows a ROC800-Series Remote Operations Controller (ROC800) to communicate with HART devices using the HART protocol. The HART module receives signals from and transmits signals to HART devices.

With the addition of a HART Pass-Through license key, a HART module provides the ROC800 with Plantweb® Remote Automation functionality. This includes the ability to pass HART data bi-directionally through the network to AMS™ Device Manager software.

The module has four input/output channels. Software configurable switches on the Series 2 HART module with the black faceplate and hardware switches on Series 1 HART module with the gray faceplate allow each channel to be set as an input or output channel. A channel set as an input can be configured for use in point-to-point or multi-drop mode. A channel set as an output can be configured for use in point-to-point mode only. Each channel has analog input capability intended for diagnostic and primary process variable measurement.

HART superimposes Frequency Shift Keying (FSK) signals on an analog signal. This technique allows digital information to be passed to and from the HART device on a 4 to 20 mA analog signal.

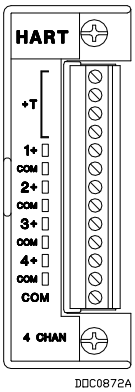
In point-to-point mode, the analog signal is still representative of the measured variable. This mode allows communications with one HART device per channel.

In multi-drop mode, as many as five HART devices can be connected (in parallel) to each channel. Like the point-to-point mode, digital communications are superimposed on the analog signal that is used for powering the HART devices. Each HART device in multi-drop mode requires 4mA and the current does not represent any measured variable value. With all four channels in the multi-drop mode, the ROC800 can support a maximum of twenty HART devices.

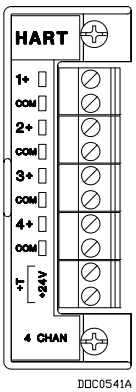
Performance and speed are greatly improved by a separate FSK modem for each channel. The FSK transmission is channel independent. The scan time for one channel does not affect the scan time of any other channel. Point-to-point mode with one second updates meets API 21 requirements.

The Series 2 HART module has a software selectable 250 Ohm resistor on each channel. This ensures that the required 250 Ohm resistor is present on all channels. You can disengage the resistor through ROCLINK™ 800 Configuration Software if you are connecting to a device with a 250 Ohm resistor already present.

The modules have removable terminal blocks for convenient wiring and servicing. The terminal blocks can accommodate from size 16 to 22 American Wire Gauge (AWG).



Series 2 HART Module



Series 1 HART Module

D301203X012

A ROC800 unit equipped with a Series 2 HART module is considered to be a HART Host (primary master) interface with a Class 1 Conformance classification. The Series 2 HART module can also be configured with ROCLINK 800 Configuration Software for use as a secondary master in redundant applications.

Most Universal and some Common Practice commands are supported. For a list of the commands, refer to the specifications tables starting on page 5. The supported commands conform to HART Universal Command Specification Revision 5.1 and Common Practice Command Specification Revision 7 (HCF SPEC 127 & 151). Refer to *www.hartcomm.org* for more information on the specifications.

Compatibility and Installation

Modules can easily be installed or removed from the module slots at any time by removing the two captive screws accessible from the front of the unit.

Series 2 HART modules can be installed in the following module slots:

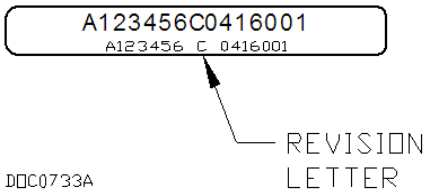
	Series 1 ROC809	Series 1 ROC827	Series 2 ROC809	Series 2 ROC827
Slot	None	None	Any	Any

Note: ROC800 firmware version 3.10 or higher is required to recognize the HART 2 module.

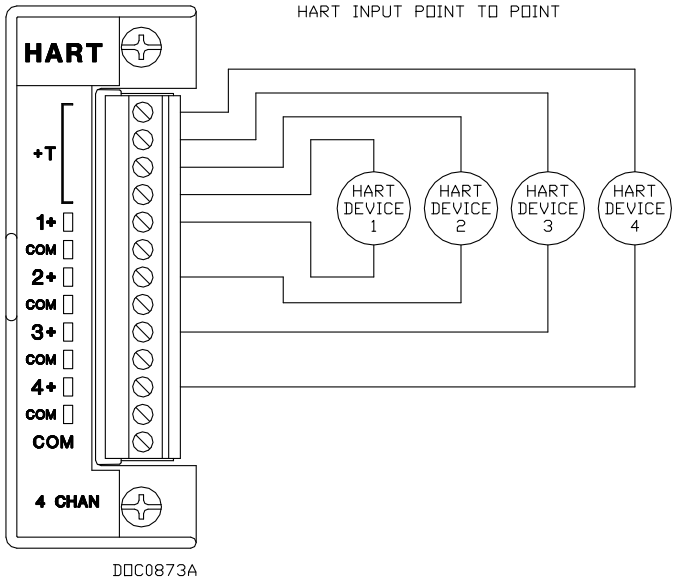
Series 1 HART modules can be installed in the following module slots:

	Series 1 ROC809	Series 1 ROC827	Series 2 ROC809	Series 2 ROC827
Slot	Any	1, 2, 3	Any	Any

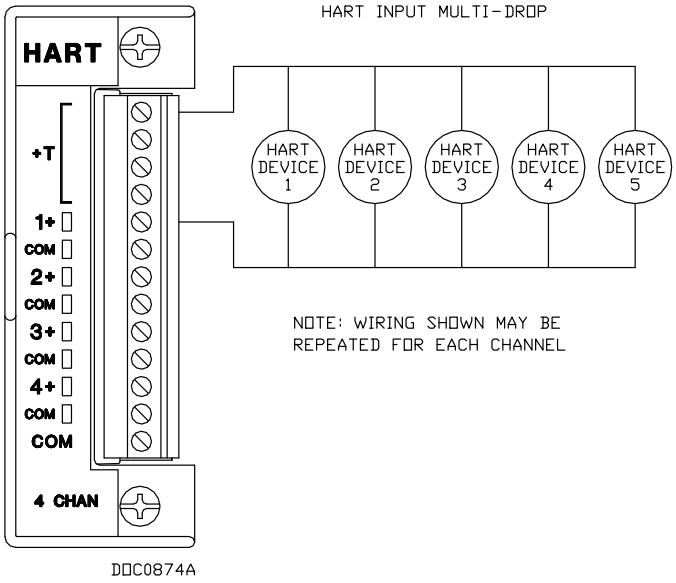
All Series 2 HART modules and Series 1 HART modules (Rev. E or later) are hot-swappable, meaning the module can be removed and another module of the same kind can be installed under power. All Series 2 HART modules and Series 1 HART modules (Rev. E or later) are hot-pluggable, meaning they may be installed directly into unused module slots under power. The modules are also self-identifying via ROCLINK 800 Configuration Software. To determine the revision level of your module, locate the label on the module's circuit board. The label consists of a single letter surrounded by two letter/number sequences.



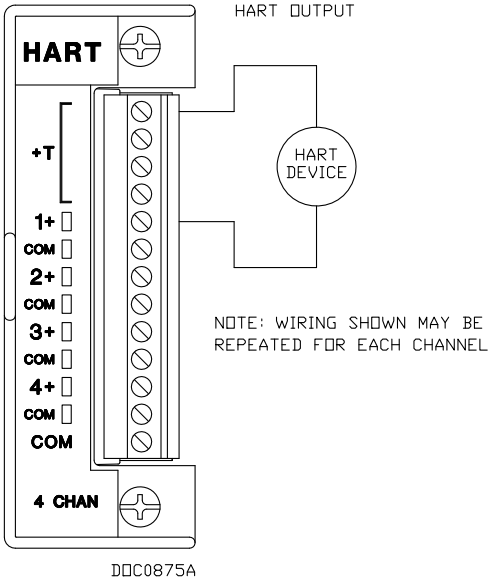
Module Revision Letter



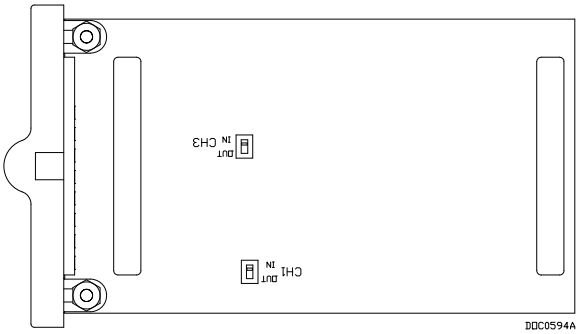
Series 2 HART Module
Input Point-to-Point Wiring Diagram



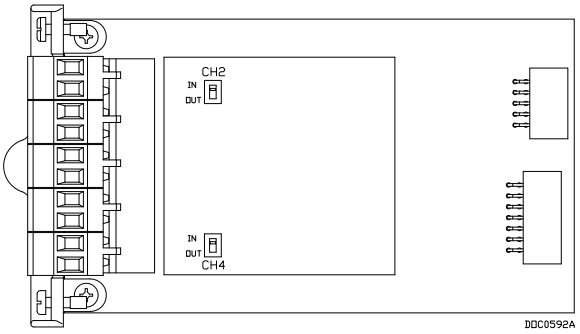
Series 2 HART Module
Input Multi-Drop Wiring Diagram



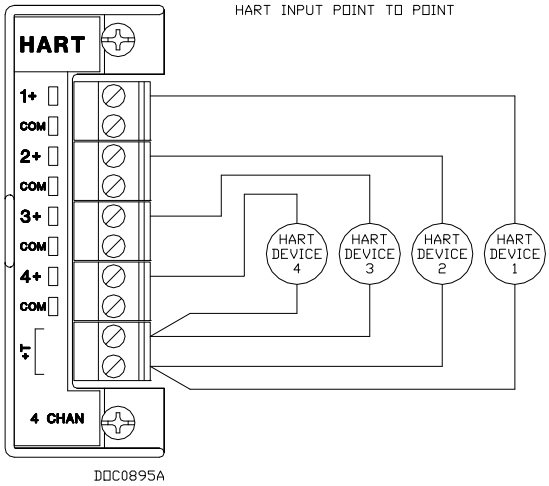
Series 2 HART Module
Output Wiring Diagram



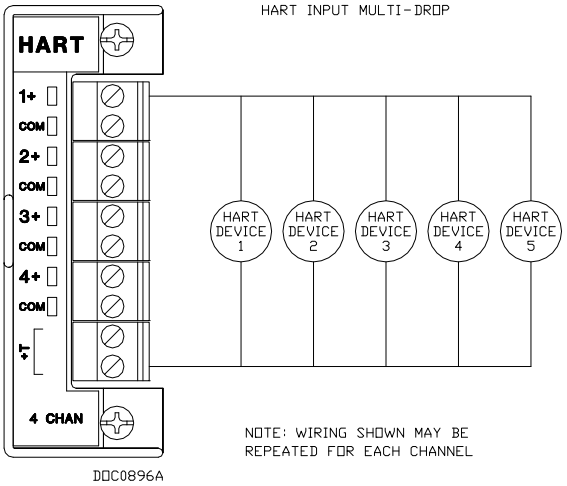
Series 1 HART Module
Channel 1 and 3 I/O Switches



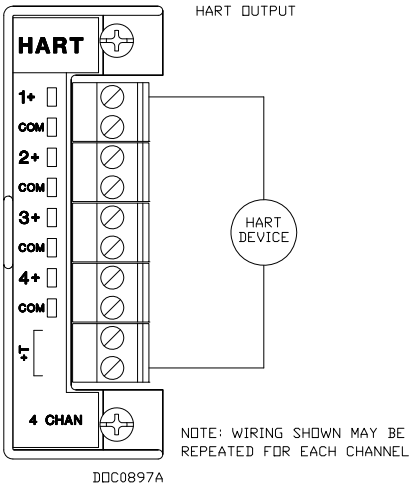
Series 1 HART Module
Channel 2 and 4 I/O Switches



Series 1 HART Module
Input Point-to-Point Wiring Diagram



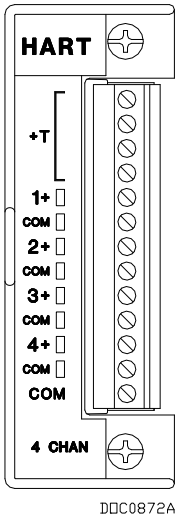
Series 1 HART Module
Input Multi-Drop Wiring Diagram



Series 1 HART Module
Output Wiring Diagram

ROC800-Series 2 HART Module

Field Wiring Terminals



Terminal	Label	Definition
1	+T	Loop Power
2	+T	Loop Power
3	+T	Loop Power
4	+T	Loop Power
5	1+	Channel 1 input or output
6	COM	Common
7	2+	Channel 2 input or output
8	COM	Common
9	3+	Channel 3 input or output
10	COM	Common
11	4+	Channel 4 input or output
12	COM	Common
13	COM	Common

Inputs/Outputs

Quantity	4 total channels, software selectable as inputs or outputs

HART Channels

Protocol	Serial HART and FSK over 4 to 20 mA current loop
Mode	Half-duplex
Connection	Multi-drop up to five HART devices per channel
Data Rate	1200 bps
Modulation	Phase coherent, Frequency Shift Keyed (FSK) per Bell 202
Carrier Frequencies	Mark 1200 Hz, Space 2200 Hz, +0.1%
Update Rate	1 second update per primary device

Supported Commands

Universal	Read unique identifier; read primary variable; read primary variable and current; read dynamic variable and current; write polling addresses; read unique identifier associated with tag; read message; read tag; descriptor and date; read primary variable sensor information; read device information; write message; write tag, descriptor and date.
Common Practice	Read transmitter variables

Analog Inputs

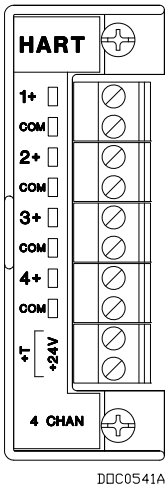
Type	Internally or externally sourced 4 to 20 mA current loop
Resolution	12 bit
Loop Power	100 mA loop supply for up to 20 transmitters
Input impedance	250 Ohm
Input Filtering	2 Hz to filter FSK signal
Accuracy[1]	1.5% of span at 25ºC (77ºF) 3.0% of span -40ºC to 75ºC (-40ºF to 167ºF)
Settling time	600 milliseconds to 0.1% of input

Analog Outputs		
Type	4 to 20 mA current sink	
Resolution	10 bit	
Accuracy[1]	0.2% of span at 25ºC (77ºF)	
	1.5% of span -40ºC to 75ºC (-40ºF to 167ºF)	
Settling Time	200 milliseconds to 99.9% of setpoint	
Power		
Consumption	440 mW (idle) with no HART devices connected	
Additional loading applies for each device connected	Current draw at +T terminal (see Loop Power)	
Loop Power	+T Sensor Supply Voltage	24 Vdc (isolated from ROC power)
	+T Sensor Supply Current	100 mA maximum at 24 Vdc (each HART device typically uses 4 mA in multi-drop mode and 4 to 20 mA in point-to-point mode)
Over-Voltage Protection	±30 Vdc, surge on any channel	
Surge Suppression	30 Vdc transorb between signal and ground	
Isolation	1500 Vdc channel to bus	
Physical		
LED Indicators	One transmit and one receive per channel	
Dimensions	26 mm W by 75 mm H by 133 mm D (1.03 in. W by 2.96 in. H by 5.24 in. D)	
Weight	68 g (2.4 oz.)	
Wiring	Size 12 to 22 AWG at the removable terminal block	
Environmental		
Same as the ROC800 in which it is installed		
Approvals		
Same as the ROC800 in which it is installed		

1. Accuracy Includes: Linearity, Hysteresis, Repeatability, Stability, Gain, and Offset error.

ROC800-Series 1 HART Module

Field Wiring Terminals



Terminal	Label	Definition
1	1+	Channel 1 input or output
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3	2+	Channel 2 input or output
4	COM	Common
5	3+	Channel 3 input or output
6	COM	Common
7	4+	Channel 4 input or output
8	COM	Common
9	+T	Loop Power
10	+T	Loop Power

Inputs/Outputs	
Quantity	4 total channels, software selectable as inputs or outputs
HART Channels	
Protocol	Serial HART and FSK over 4 to 20 mA current loop
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Modulation	Phase coherent, Frequency Shift Keyed (FSK) per Bell 202
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Supported Commands	
Universal	Read unique identifier; read primary variable; read primary variable and current; read dynamic variable and current; write polling addresses; read unique identifier associated with tag; read message; read tag; descriptor and date; read primary variable sensor information; read device information; write message; write tag, descriptor and date.
Common Practice	Read transmitter variables
Analog Inputs	
Type	Internally or Externally sourced 4 to 20 mA current loop
Resolution	14 bit
Loop Power	100 mA loop supply for up to 20 transmitters
Input impedance	250 Ohm
Input Filtering	2 Hz to filter FSK signal
Accuracy[1]	1.52% of span at 25ºC (77ºF) 3.0% of span -40ºC to 75ºC (-40ºF to 167ºF)
Settling time	600 milliseconds to 0.1% of input

Analog Outputs		
Type	4 to 20 mA current sink	
Resolution	10 bit	
Accuracy[1]	0.2% of span at 25ºC (77ºF)	
	1.5% of span -40ºC to 75ºC (-40ºF to 167ºF)	
Settling Time	200 milliseconds to 99.9% of setpoint	
Power		
Consumption	440 mW (idle) with no HART devices connected	
Additional loading applies for each device connected	Current draw at +T terminal (see Loop Power)	
Loop Power	+T Sensor Supply Voltage	24 Vdc (isolated from ROC power)
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Over-Voltage Protection	±30 Vdc, surge on any channel	
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Isolation	2500 Vdc channel to bus	
Physical		
LED Indicators	One transmit and one receive per channel	
Dimensions	26 mm W by 75 mm H by 133 mm D (1.03 in. W by 2.96 in. H by 5.24 in. D)	
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Emerson Process Management
Remote Automation Solutions
Marshalltown, IA 50158 U.S.A.
Houston, TX 77041 U.S.A.
Pickering, North Yorkshire UK Y018 7JA

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