Ovation® Interim Publication Update

Date: 03/03
IPU No. 237

PUBLICATION TITLE

Ovation I/O Reference Manual

Revision 3, March 2003

Publication No. R3-1150

This publication adds the HART High Performance Analog Input module to the Ovation I/O Reference Manual. It should be placed between Sections 14 and 15.

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SECTION 14. HART HIGH PERFORMANCE ANALOG INPUT MODULE

14.1 DESCRIPTION

The HART (Highway Addressable Remote Transducer) High Performance (HP) Analog Input module is a standard Ovation I/O Module that provides eight galvanically isolated 4-20 mA analog inputs with HART transceivers. Each transceivers provides optically isolated communication to a dedicated UART, thereby, maximizing HART communication throughout.

Each channel may be individually configured for field powered or local powered transmitters via user accessible jumpers on the Personality Module.

HART is a digital communication protocol designed for industrial process measurement applications. Field measurement devices (transmitters) interface for a process control system via an analog 4-to-20 mA current loop. HART uses a low-level frequency-shift-keyed sine wave signal that is superimposed on the standard 4-to-20 mA process measurement current loop. Since the HART sine wave signal is small and its average value is zero, the current loop analog 4-to-20 mA signal is not significantly affected by the presence of the HART signal. Using HART allows a field device to provide more than one measurement, which is a feature not available when using only the 4-to-20mA analog current signal.

“Smart” field devices may be described as field devices in which the analog 4-to-20 mA signal, digital communication, and sometimes power, co-exist on the same pair of wires. The Ovation HART High Performance Analog Input (IAH) module is a standard form factor Ovation I/O module, which will permit Ovation to communicate with HART devices.

Note:

See Section 3. I/O Modules for environmental, installation, wiring and fuse information.

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14.2 MODULE GROUPS

14.2.1 ELECTRONICS MODULE

There is one Electronics Module group for the HART HP Analog Input Module:

- 5X00106G01 interfaces to eight current loop signals with an input range of 4-20 mA.

14.2.2 PERSONALITY MODULE

There is one Personality Module group for the HART HP Analog Input Module.

- 5X00109G01 contains a single printed circuit board assembly with eight fused input and user accessible jumpers that configure the channels for field powered or local powered transmitters on an individual basis.

Table 14-1. HART HP Analog Input Subsystem (16 Bit)

Range	Channels	Electronic Module	Personality Module
4-20 mA	8	5X00106G01	5X00109G01

Local Powered or Field Powered transmitter interface.

14.3 MODULE BLOCK DIAGRAM AND FIELD CONNECTION WIRING DIAGRAM

The Ovation HART HP Analog Input Module subsystem consists of two modules, an electronics module containing a logic printed circuit board (LIH) and a field printed circuit board (FIH). The electronics module is used in conjunction with a personality module, which contains a single printed circuit board (PIHA). The block diagram for HART HP Performance Analog Input subsystem is shown in Figure 14-1.

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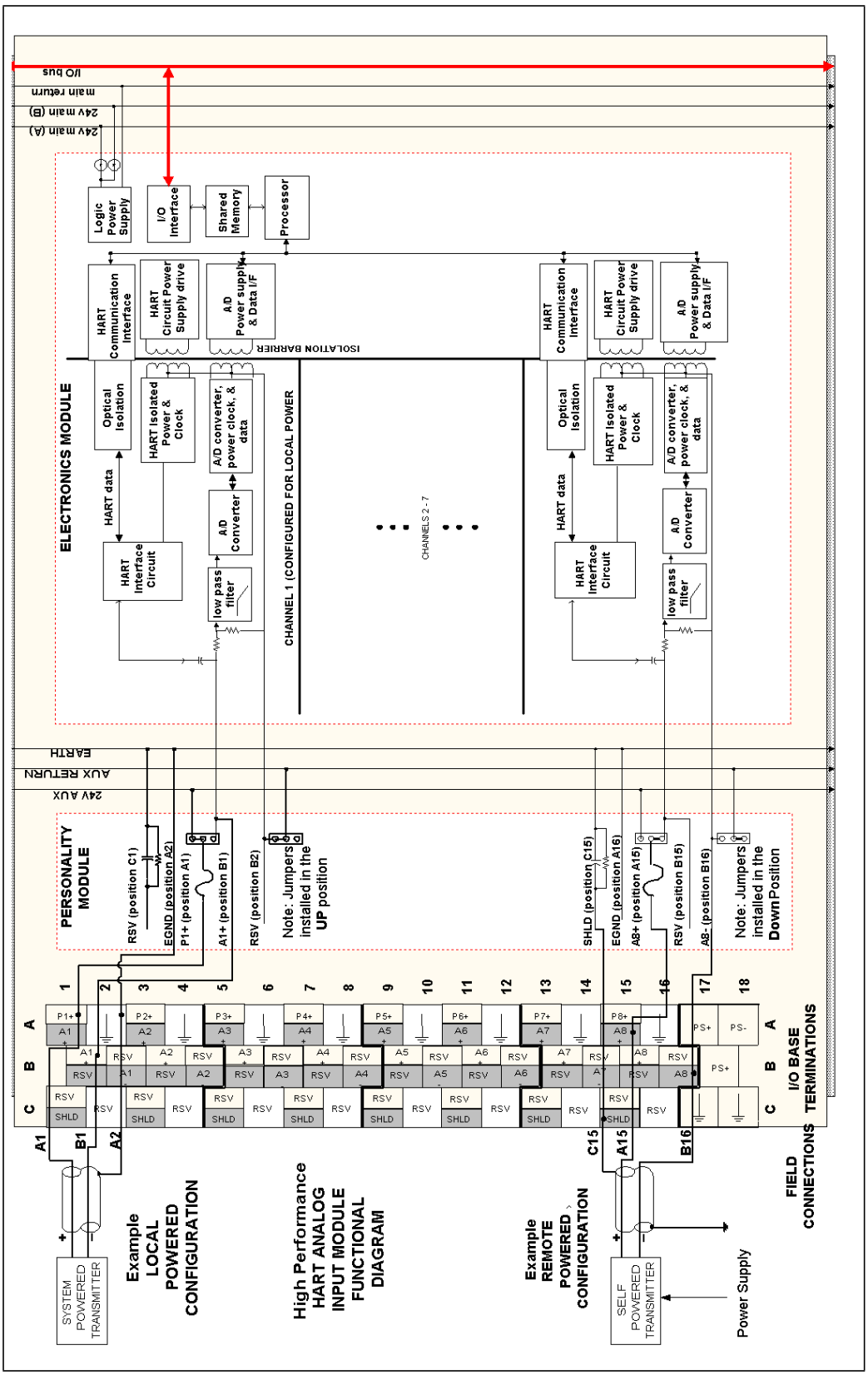


Figure 14-1. HART HP Analog Input Subsystem Block Diagram

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14.4 EXTERNAL POWER SUPPLIES

Note:

*Module power specifications (main and auxiliary) refer to the actual power drawn by the module from the 24 VDC main power supply and from the +24 VDC auxiliary power supply and **NOT** from the AC or DC mains.*

The HART HP Analog Input Module utilizes the standard +24V Ovation main power supply to provide the power required for the logic circuitry.

The HART HP Analog Input Module utilizes a +24 auxiliary power supply to provide the power required for the field circuitry. This includes all 4-20 mA loop power, A/D conversion, and the remaining output channel components. This power supply may be the standard +24V Ovation Auxiliary Supply or a user supplied external power supply.

It is recommended that the HART Analog Input module utilize the Ovation cabinet's Auxiliary +24V DC power that is obtained from the standard Ovation DIN Rail power supply auxiliary output.

However, if an external auxiliary power supply is utilized by the HART HP analog input module to supply power, it is recommended that it have a low noise (≤ 1.2Vrms), due to the low signal levels of the HART communications.

Table 14-2. Power Supply Noise Output

Noise	All Rated Loads (500 HZ to 10 kHZ)	2.2 mV RMS Max.

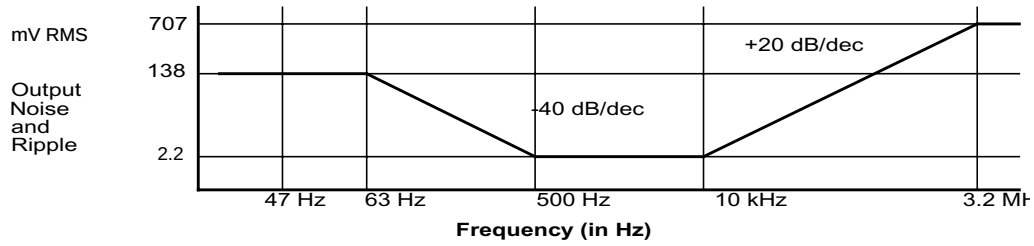


Figure 14-2. Power Supply Output Noise Requirements

In addition, all modules utilizing the auxiliary power supplies, including the HART modules, **MUST** utilize shielded I/O cables in order to suppress coupled noise and transients into the HART modules. This includes modules on the same branch utilizing the auxiliary power, or modules on other branches utilizing the same auxiliary power. This recommendation applies regardless of the type of power supply chosen by the user.

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14.5 SPECIFICATIONS

Electronics Module (5X00106)
Personality Module (5X00109)

Table 14-3. HART HP Analog Input Module Specifications

Description	Value
Number of channels	8
Input range	2.5 to 25 mA with under-range and over-range checking.
A/D Resolution	14 bits
Reference accuracy (@ 25^{o}C)	+/-0.1% of full scale value (20mA) @ 99.7% confidence
Accuracy over temperature	+/-0.24% of full scale value (20mA) over the full operating temperature range
Sampling rate (per second)	20 when configured for 60 Hz rejection 25 when configured for 50 Hz rejection
Dielectric isolation: Channel to channel Channel to logic	 1000 VAC/VDC for one minute 1000 VAC/VDC for one minute
Operating temperature range	0^{o} to 60^{o}C (32^{o}F to 140^{o}F)
Humidity (non-condensing)	0% to 95%
Module power	Drawn from Main: 4.1W typical. 4.5W maximum Drawn from Aux.: 3.84W typical (20mA X 8 loops X 24V) Dissipation in module: 5.06W typ. (Emod + Pmod)
Input Impedance	300 ohms
Normal Mode Rejection	60 dB @50 Hz ± 1/2% or @60 Hz ± 1/2% (when properly configured) 30 dB (typical) @50 Hz ± 5% or @60 Hz ± 5% (when properly configured)
Common mode rejection	120 dB @ DC or @ the nominal (50/60 Hz) line frequency ± 1/2% and harmonics. 100 dB (typical) for nominal line frequency ± 5% and harmonics.

14.6 HART HP Analog Input Personality Module Information

Each Personality module provides a 1/20 A fuse on each channel for loop protection. Additionally, each channel provides a pair of user accessible jumpers for configuring each channel for local powered transmitters or field powered transmitters. This configuration is on a per channel basis. The fuses and jumpers are accessible through the top of the module. The label, shown in figure Figure 14-3, on the top of the module indicates how to position the jumpers. Note that there are two jumpers per channel and they must be positioned together.

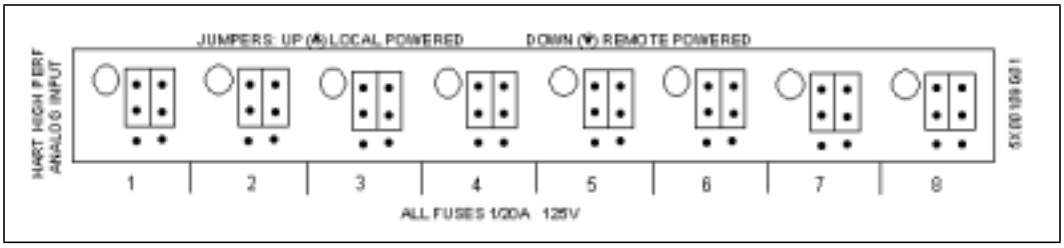


Figure 14-3. HART HP Analog Input Personality Module

Note:

Jumpers shown in Figure 14-3 are shown in the local powered configuration for all channels.

14.7 HART HP Analog Input Terminal Block Wiring Information

Each Personality module has a simplified wiring diagram label on its side which appears above the terminal block. This diagram indicates how the wiring from the field is to be connected to the terminal block in the base unit. Note that there are two wiring configurations for each channel dependant upon whether the channel is configured for Local or Field powered transmitters.

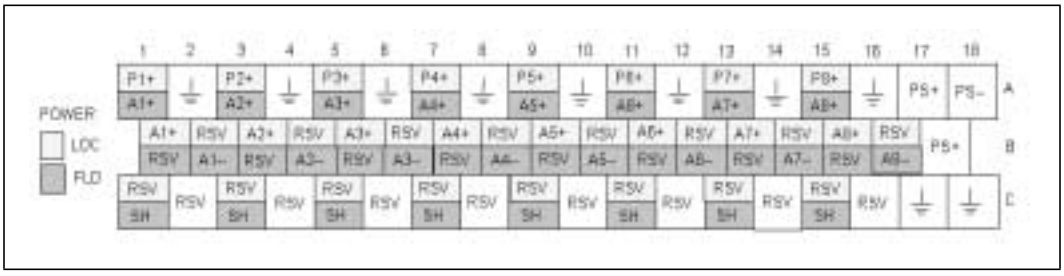


Figure 14-4. Wiring Diagram Label

The diagrams for the HART HP Analog Input Personality modules are illustrated in Figure 14-1. The following table lists and defines the abbreviations used in those diagrams.

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Table 14-4. Wiring Diagram Label Definitions

Abbreviation	Abbreviation
A1 - A8 +	Analog Input terminal connection (connected to the negative terminal of a local powered transmitter or the positive terminal of field powered transmitter).
A1 - A8 -	Analog Input negative terminal connection (field powered configuration only).
P1 - P8 +	Loop power output terminals (for local powered configuration only. Connected to the positive).
SH1 - SH8	Shield terminal connection. (For landing shields where the shield is to be grounded at the transmitter).
	Earth ground terminals. (For landing shields where the shield is to be grounded at the module.
PS+, PS-	External Auxiliary power supply terminals.
RSV	Reserved terminal. No connections are allowed on these terminals.

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