

# Using FIELDVUE™ Instruments with the Smart HART® Loop Interface and Monitor (HIM)

Fisher™ FIELDVUE instruments can be used in conjunction with a HART interface module, such as the Smart HART Loop Interface and Monitor (HIM) from Moore Industries, to provide additional diagnostic coverage to non-HART hosts. Installed transparently across the 4-20 mA instrument loop, the HIM receives the HART digital process data and converts the digital information into up to three scalable, isolated analog (4-20 mA) process signals and two relay outputs that are readily accepted by an existing control system, such as a DCS or PLC. For additional information on the HIM, refer to Smart HART Loop Interface and Monitor [documentation](#) or the Moore Industries web site at [www.miinet.com](http://www.miinet.com).

The relay outputs are configurable within the HIM and can be used to indicate instrument status and detailed alert information. For example, when a DVC6200 SIS digital valve controller in a Safety Instrumented System (SIS) application instructs the safety valve to move during the partial stroke test, the HART interface module receives the digital signal representing valve position. The HIM reads this signal, and, depending on the Fail Safe mode, energizes a relay at a configured trip point (such as 90%). The relay output is sent to the control system verifying the desired position has been achieved.

When the digital valve controller instructs the valve to return to the open position, the HIM energizes a second relay when the valve is fully open. This allows the control system to verify and report that the valve is fully reopened and the test is complete. Depending on how the HIM is wired to the control system, the relay outputs may be normally open (NO) or normally closed (NC) contacts. In this example, the relay outputs are configurable in the HIM, and do not reflect the status byte configuration in the FIELDVUE instrument.

Figure 1. Moore Industries HART Loop Monitor

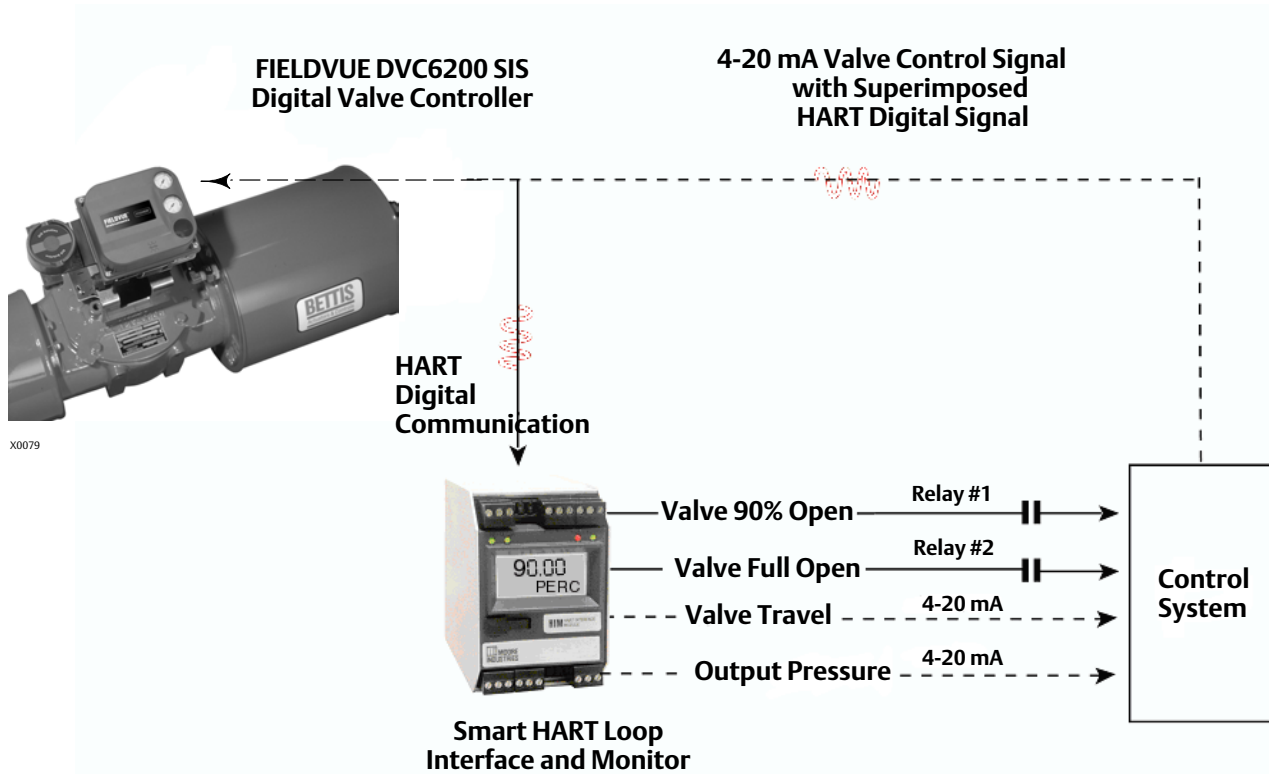


Additionally, the discrete relay output could also be used for various other alerts generated by the DVC6200 SIS, such as “Diagnostics in Progress, “Valve Stuck Alert” etc.

The HIM operates from an external 24 volts DC  $\pm$  10% voltage source and connects to the 4-20 mA control signal lines.

The HIM requests information from the FIELDVUE instrument. The FIELDVUE instrument responds by sending the appropriate data. Figure 2 shows a typical installation of a FIELDVUE instrument with the HIM. The HIM is not recommended for FIELDVUE instrument applications involving split ranging.

Figure 2. FIELDVUE DVC6200 SIS Digital Valve Controller Installed with a Moore Industries HART Loop Monitor



## Installation Considerations

The HIM design allows two different DIN-rail mounting options:

- 32mm (EN50035) G rail
- 35mm (EN50022) top hat rail

The HIM dimensions are shown in figure 3.

Figure 3. HIM HART Loop Monitor Dimensions

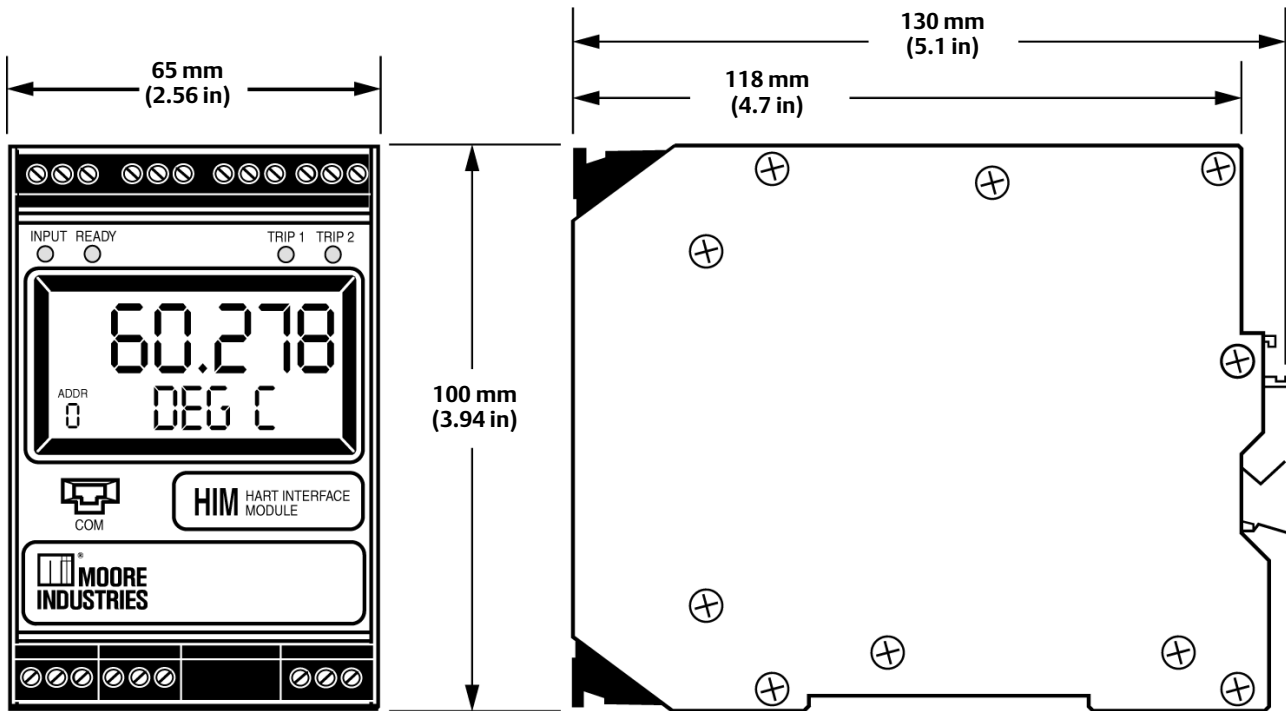
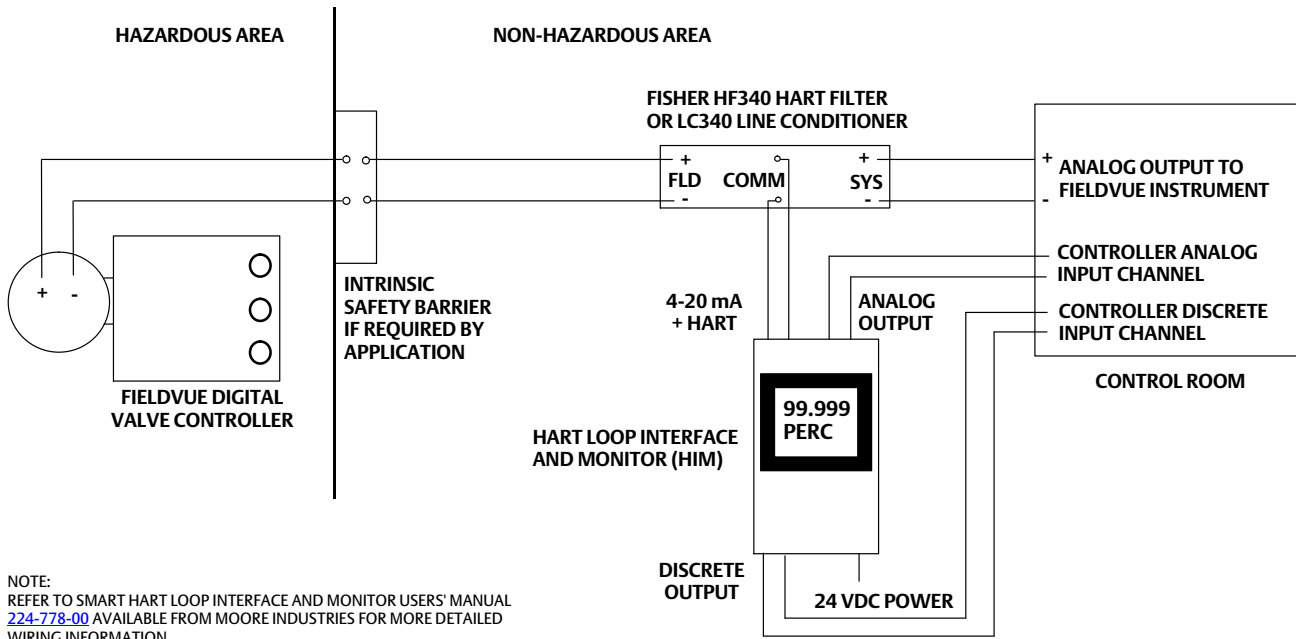


Figure 4 shows the proper installation of a FIELDVUE digital valve controller with the HIM. The schematic depicts a Fisher HF340 HART filter in the loop when the digital valve controller is operating with a 4-20 mA control signal. If the digital valve controller is operating from a 24 volt DC source, a Fisher LC340 line conditioner is substituted for the HART filter. The necessity of a HART filter for 4-20 mA operation depends upon the control system; the HIM does not add a requirement for a filter. Refer to the appropriate FIELDVUE instrument quick start guide or instruction manual for detailed installation instructions. For instructions on installing the HART filter, refer to instruction manual [D102796X012](#). For instructions on installing the LC340 line conditioner, refer to instruction manual [D102797X012](#). See Related Fisher Documents on page 13.

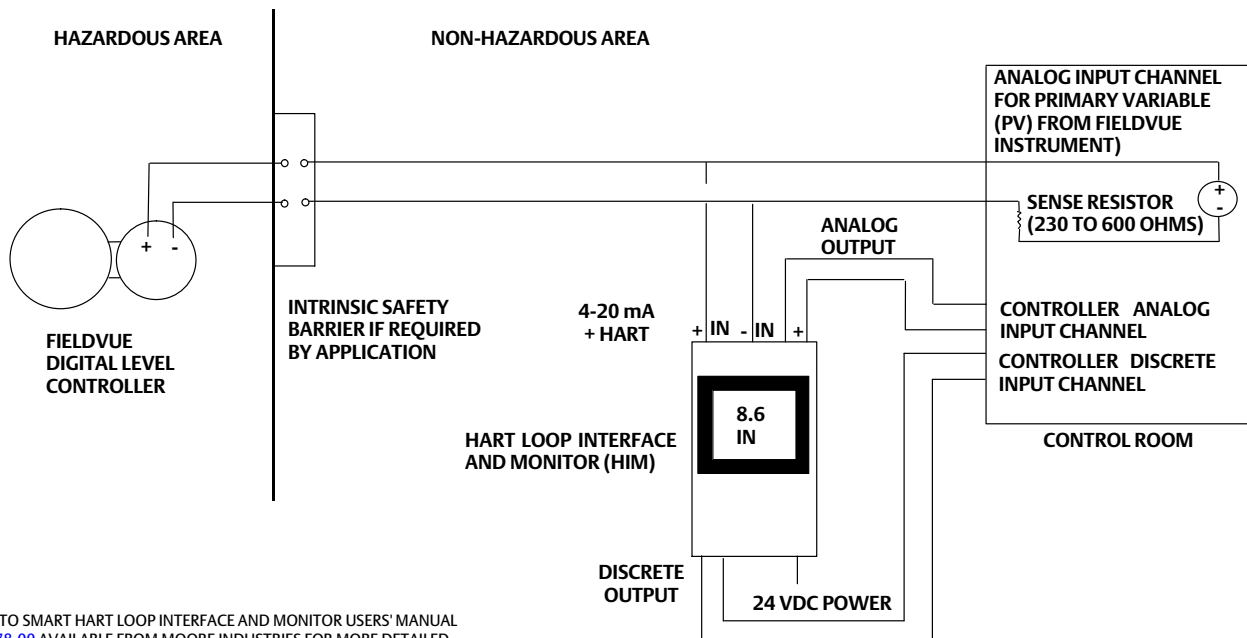
In addition to performing the designed function, the filter or line conditioner also provides a convenient method for connecting field wiring between the control system, the signal converter, and the FIELDVUE instrument. If no filter or conditioner is required, the HF341 communication tap is available. This device provides the connection convenience but without filter action (straight-through). When a DLC3010 digital level controller is used with the HIM, a HART filter or line conditioner is not required (see figure 5). However, the HF341 communication tap may be used for connection convenience.

Figure 4. Example HIM Smart HART Loop Interface and Monitor Installation with a FIELDVUE Digital Valve Controller



NOTE:  
REFER TO SMART HART LOOP INTERFACE AND MONITOR USERS' MANUAL  
224-778-00 AVAILABLE FROM MOORE INDUSTRIES FOR MORE DETAILED  
WIRING INFORMATION.

Figure 5. Example HIM Smart HART Loop Interface and Monitor Installation with a FIELDVUE Digital Level Controller



NOTE:  
REFER TO SMART HART LOOP INTERFACE AND MONITOR USERS' MANUAL  
224-778-00 AVAILABLE FROM MOORE INDUSTRIES FOR MORE DETAILED  
WIRING INFORMATION.

IN ORDER TO MEET THE HART LOOP IMPEDANCE REQUIREMENT, THERE MUST  
BE BETWEEN 230 AND 600 OHMS IN SERIES WITH THE VOLTAGE SOURCE.

## HIM Configuration

The HIM Operating Parameters can be configured using HIM PC Configuration Software. The software is composed of the following sections as shown in figure 6.

1. **HIM Status and Information Section** The left side of the screen includes seven boxes that display the different settings of the attached HIM.

**Program Status**—Displays the activity of the connected HIM. It indicates if the unit is Idle, Uploading, Downloading, Monitoring or Searching.

**HIM Device Info**—Displays the individual characteristics of the attached HIM, such as its identity, hardware and software revisions, and the last date that the device was configured.

**HIM Tag**—A phrase used to identify the HIM.

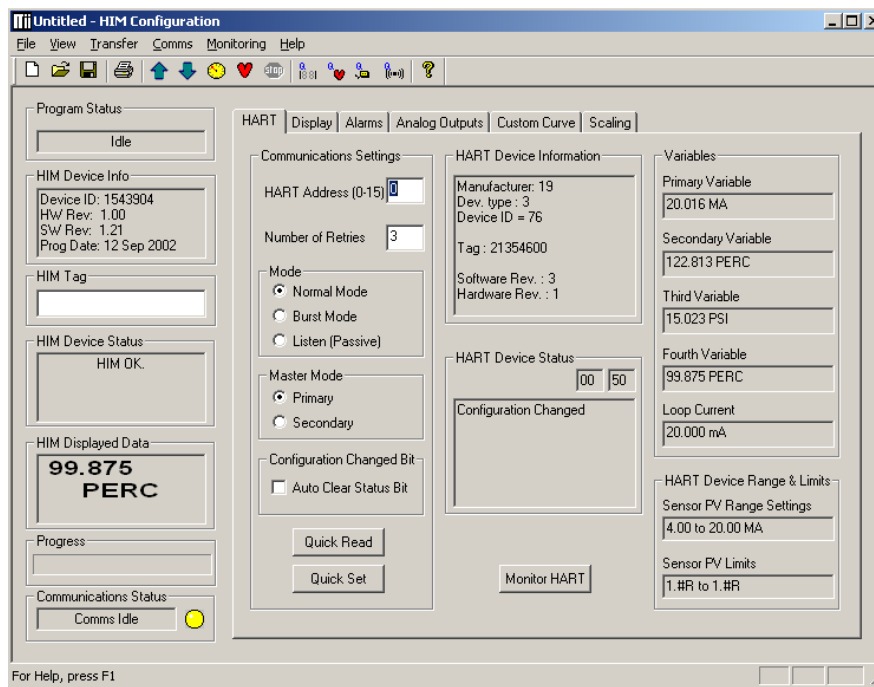
**HIM Device Status**—Displays functioning of the HIM. OK is displayed if it is operating normally, otherwise an error message is displayed.

**HIM Displayed Data**—This shows what appears on the display at the front of the HIM. This information is programmed on the Display page.

**Progress**—This bar stays in motion any time the HIM is monitoring, uploading or downloading.

**Communication Status**—Monitors the PC software's ability to communicate with the HIM.

Figure 6. The HART Menu Sets the HART Communications Parameters Using the HIM PC Configuration Software



2. HART/Display/Alarms/Analog Outputs/Custom Curve/Scaling Tabs Clicking these tabs brings up the corresponding page on the right side of the screen. Each page permits setting up the appropriate part of the HIM's configuration. Refer to the HIM users manual for more details. For recommended application guidelines see table 1.

After making the necessary configuration changes on each page, click the Quick Set button to send entered values to the HIM.

Table 1. HIM Application Guidelines

Page	HIM Output	Parameter	DVC6200 / DVC6000 / DVC2000		DVC6200 SIS DVC6000 SIS	DLC3010	
HART	Mode	---	Normal	Burst	Normal	Normal	Burst
	Master Mode	---	Primary	---	Primary	Primary	---
	HART Address	---	0	---	0	0	---
Display	Display Source	---	FV <sup>(3)</sup>	FV <sup>(3)</sup>	FV <sup>(3)</sup>	PV	PV
	Custom Label	---	PERC	PERC	PERC		
Alarm	Alarm 1	User's Choice, See table 2 <sup>(2)</sup>	Field Device Fault Alarm - Device Malfunction	Field Device Fault Alarm - Device Malfunction	Trip Alarm Low FV 91%	User's Choice	User's Choice
	Alarm 2	User's Choice, See table 2 <sup>(2)</sup>	Field Device Fault Alarm - More Status Available <sup>(4)</sup>	Field Device Fault Alarm - More Status Available <sup>(4)</sup>	Trip Alarm High FV 99%	User's Choice	User's Choice
	Delay and Fail Safe	---	Set delay to 0 and Select Fail Safe Alarm	Set Delay to 0 and Select Fail Safe Alarm	Set Delay to 0 and Select Fail Safe Alarm	User's Choice	User's Choice
Analog Outputs <sup>(1)</sup>	AO1	---	FV <sup>(5)</sup>	FV <sup>(5)</sup>	FV	SV	SV
	AO2	---	SV	SV	(2)	TV <sup>(6)</sup>	TV <sup>(6)</sup>

1. We recommend the HIM unit with 2 Analog Outputs and 2 Discrete Outputs.  
 2. Refer to the appropriate Field Device Specification instruction manual supplement for Additional Device Status bits and Command 3 variables. See Related Fisher Documents on page 13.  
 3. FV (QV) is always valve travel in the DVC2000, DVC6000, DVC6000 SIS, and DVC6200 HW1. However, in the DVC6200 HW2 and DVC6200 SIS, the SV, TV, and FV (QV) variables can be configured to Travel, Travel Setpoint, Pressure A, Pressure B, Pressure AB, Supply Pressure, Drive Signal, or Analog Input; be sure to map the variable configured for travel in the HIM.  
 4. While Status Available is the recommended selection for Alarm 2, any of the Field Device Fault Alarms may be selected. Refer to table 2 and the appropriate Field Device Specification. See Related Fisher Documents on page 13.  
 5. See selection display in figure 10 for Fail Mode options.  
 6. This variable is suggested if an RTD is installed with the DLC3010 digital level controller for the purpose of monitoring process temperature.

## Programming the HART Parameters

Click the HART tab to display the page for entering HART parameters. Normal or Burst are the most common choices for Mode (see figure 6). In Normal mode, the HIM polls the HART instrument twice per second, with a command 3 and receives the dynamic variables from the FIELDVUE instrument. Refer to the appropriate HART Field Device Specification instruction manual supplement for Command 3 variables (see Related Fisher Documents on page 13).

In Burst mode, the monitored HART instrument is programmed to continuously send a command 3 message. The HIM receives the same information. Note that if Burst mode is selected the data will not be sent during any diagnostic tests run with ValveLink™ software. Table 1 includes recommendations on using Burst Mode.

**Note**

For SIS applications, set the HIM mode to Normal.

The HIM can be configured to operate as either a Primary or Secondary Master. The recommendation is to set the HIM Master Mode to Primary and configure any other HART device in the loop as a Secondary Master.

The HART Address is the address of the FIELDVUE instrument that the HIM is monitoring. Typically the address is 0.

## Programming the Display Function

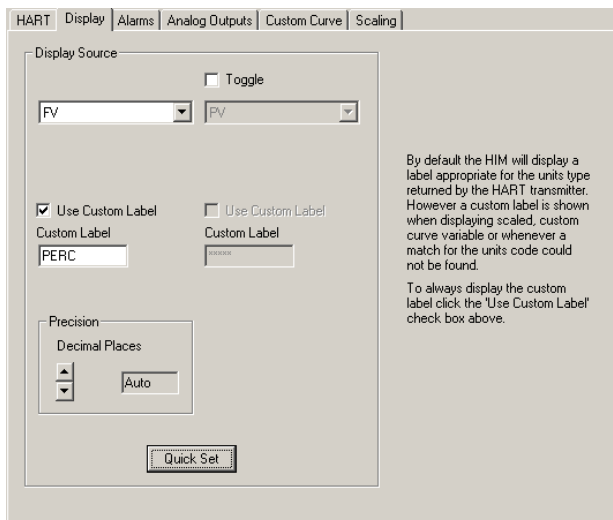
Click the Display tab (figure 7) to access the page for configuring the HIM's LCD display. To program the Display parameters, change the settings in the Display Source box. To display valve travel, enter FV in this box.

### Note

FV (QV) is always valve travel in the DVC2000, DVC6000, DVC6000 SIS, and DVC6200 HW1. However, in the DVC6200 HW2 and DVC6200 SIS, the SV, TV, and FV (QV) variables can be configured to Travel, Travel Setpoint, Pressure A, Pressure B, Pressure AB, Supply Pressure, Drive Signal, or Analog Input; be sure to map the variable configured for travel in the HIM.

To indicate that the valve travel is in percent, enter PERC for the custom label. Only alphanumeric characters (A-Z and 1-0) may be entered for the custom label.

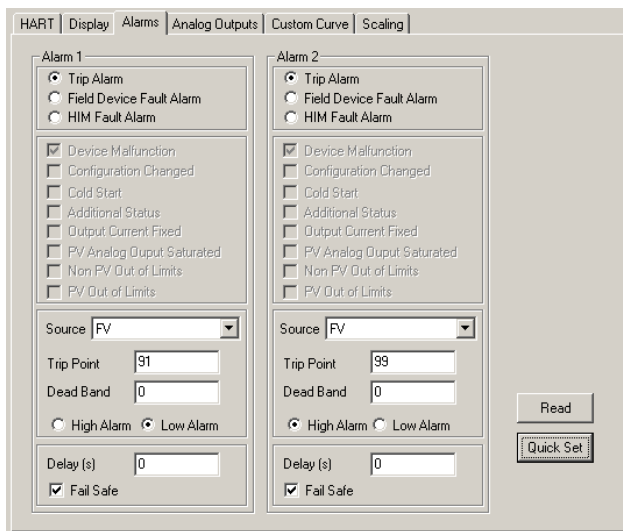
Figure 7. Click the Display Tab to Configure the HIM's Display Parameters



## Programming the Alarms Parameters

Click the Alarms tab to configure the programmable alarms (see figure 8). The two alarms energize two relays within the HIM. Alarm 1 is associated with relay 1, Alarm 2 is associated with relay 2. Depending on the Fail Safe selection, the relay will be either energized or de-energized when the alarm is active.

Figure 8. Click the Alarms Tab to Configure the HIM's Alarm Relay Parameters



The relays can be configured to respond to various inputs. Depending on the application, these relays can be used in a number of different ways, or they may not be used at all.

If Trip Alarm is selected, the HIM monitors the source variable and the alarm is active either when the variable exceeds the Trip Point, if High Alarm is selected, or when the variable falls below the Trip Point, if Low Alarm is selected. The Deadband indicates how far past the trip point the variable has to go before the alarm condition returns to normal.

Field Device Fault Alarm, if selected, monitors the FIELDVUE instrument. This fault alarm will trip depending on the status of any of eight malfunctions. The recommended selection for this alarm is Device Malfunction. With Device Malfunction selected, the alarm will be active whenever a hardware error or failure in the connected FIELDVUE instrument is detected.

In most situations, any of the malfunctions under the Field Device Fault Alarm can be chosen for Alarm 2. For more detailed information on these malfunctions, refer to table 2.



Table 2. Field Device Fault Alarm; Malfunctions (refer to figure 9)

Malfunction	Relay Trips Whenever:
Device Malfunction	it detects that a hardware error or failure has occurred in the HART device.
Configuration Changed	it detects that a connected HART device has had its configuration changed
Cold Start	it detects that the power to the HART device is interrupted, or during a HART Master Reset or Self Test Command.
Additional Status	the connected HART device reports a condition requiring HART Command #48, (Read Additional Information), indicating that the instrument needs attention from a device with full HART command capability.
Output Current Fixed	the HIM detects that the connected HART device's output is no longer responding to changes in its input, and is being held at a predefined level.
PV Analog Output Saturated	it detects that both its analog and digital representations of the Primary Variable are outside rated operating limits, and no longer reflect the true sensor input.
Non-PV Out of Limits	one of the HART ancillary variables (second, third, or fourth), is operating outside the limits that can be effectively measured.
PV Out of Limits	the HART Primary Variable is operating outside the limits that can be effectively measured <sup>(1)</sup> .

1. This malfunction does not cause a relay trip in the DLC3010 digital level controller when firmware 8 is being used.

The Delay box lets you specify how long (in seconds) the alarm condition needs to exist before the alarm trips. When Fail Safe is checked, the relay is de-energized when the alarm is active. When Fail Safe is not checked, active alarms energize the relay.

## Programming the Alarms Parameter for a DVC6200 SIS Digital Valve Controller

For SIS applications, set Alarm 1 as a Trip Alarm. Select FV as the source and Low Alarm. If the partial stroke test is for 10% travel, a trip point of 91% is suggested to indicate when the valve is at 90% travel.

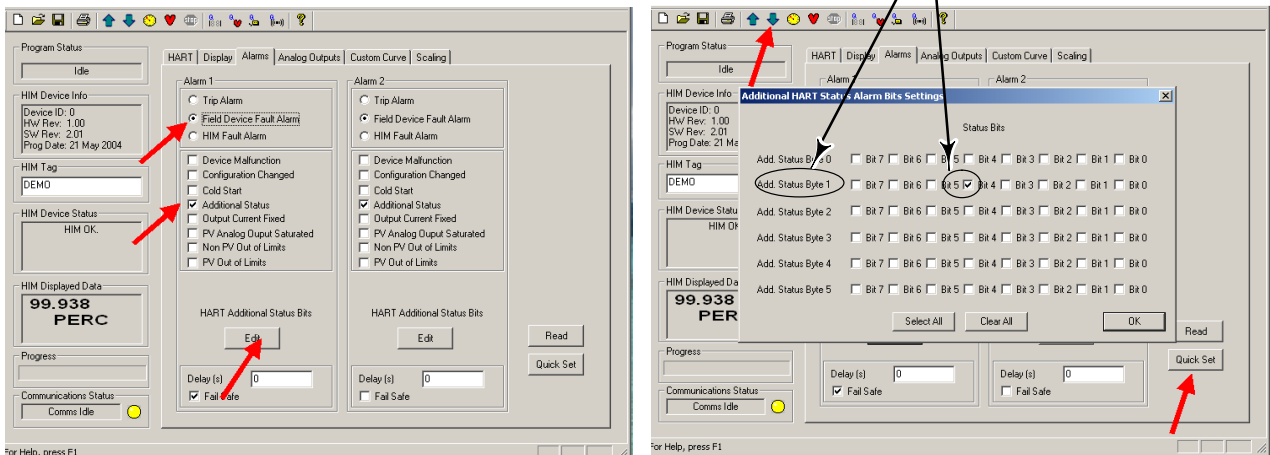
Select Trip Alarm for Alarm 2. Select FV as the Source, and High alarm. A suggested Trip Point might be 99% to indicate when the valve is fully open.

## Additional HART Status Alarm Bits Settings for DVC6200, DVC6200 SIS, DVC6000, and DVC6000 SIS Digital Valve Controllers

Refer to the appropriate Field Device Specification instruction manual supplement for a complete listing of alerts available from DVC6200, DVC6200 SIS, DVC6000, and DVC6000 SIS digital valve controllers (see Related Fisher Documents on page 13).

These alerts are available by checking the “Field Device Fault Alarm” as shown in figure 9, selecting “Additional Status, and then clicking on “Edit”.

Figure 9. Setting the Field Device Fault Alarm



**For DVC6200 SIS and DVC6000 SIS applications the following status bits are beneficial:**

- “Diagnostic in Progress” (Additional Status Byte 1, Bit 4)—Indicates that the Partial Stroke Test is in progress. Refer to figure 9.

The alert “Diagnostics in Progress” provides an additional advantage, enabling a PLC to record the partial stroke test when it begins.

- “PST Abnormal” (Additional Status Byte 3, Bit 6)—The digital valve controller's indication that it is unable to move the valve to the desired travel target.

Should the valve be found in the stuck condition, a “Valve Stuck Alert” provides valuable information for plant operators/technicians.

**For DVC6200 and DVC6000 (non-SIS) applications the following status bits are beneficial:**

- “Travel Deviation Alert” (Additional Status Byte 4, Bit 3)—The Travel Deviation Alert must be configured as “Enabled” in the digital valve controller before use. When enabled, this alert checks the difference between the travel target and the actual travel. If the difference exceeds the Travel Deviation Alert Point for more than the Travel Deviation Time, the Travel Deviation Alert is set.
- “Drive Signal Alert” (Additional Status Byte 4, Bit 0)—The Drive Signal Alert must be configured as “Enabled” in the digital valve controller before use. When enabled, this alert indicates that the digital valve controller has generated the maximum or minimum drive signal for an excessive amount of time, but the valve is not responding. It also indicates a healthy digital valve controller unsuccessfully struggling to overcome a valve/actuator problem.
- “Alert Event Record not Empty” (Additional Status Byte 1, Bit 7)—The Alert must be enabled to record the desired alert categories. Configurable valve alerts need to be enabled as well. This alert indicates that the Alert Record has been populated with at least one event.

## Programming the Alarms Parameters for a DLC3010 Digital Level Controller

If using the HIM with a DLC3010 digital level controller the alarms can be configured to monitor one or more of the bits in the HART status word, or they may be set up as Trip Alarms to locally monitor the PV, SV or TV by setting appropriate trip points in the HIM.

When using the DLC3010 in a high temperature installation, monitoring the electronics temperature may be useful as temperatures above 85°C (185°F) will damage the transmitter. Set the digital level controller electronics temperature Hi alarm trip point at 80°C (176°F), enable the alarm, and set up one of the HIM alarms to monitor the Field Device HART Status Bit 1 (Non-PV out of limits).

If the maximum recommended process temperature for a spring of its respective material is exceeded, the 249 torque tube can incur excessive permanent drift. If the process RTD is installed and configured, the digital level controller can monitor this temperature. In the digital level controller configure the Process Temperature Hi alarm to trip when the torque tube material operating limit is exceeded. Field Device HART Status Bit 1 would then be set if the process temperature exceeds the respective limit.

---

### Note

Because the long term effects of the two conditions differ, it may be advantageous to monitor the Electronics Temperature and the Process Temperature separately, using individual Trip Alarms in the HIM. Using the Field Device Fault Alarm setting will not allow the system to distinguish between these two conditions, since either or both will set Status Bit 1.

---

## Additional HART Status Alarm Bits Settings for a DLC3010 Digital Level Controller

In the DLC3010 HART implementation of additional status only bytes 0 and 1 contain information. These bytes are returned in the HART command #48 response.

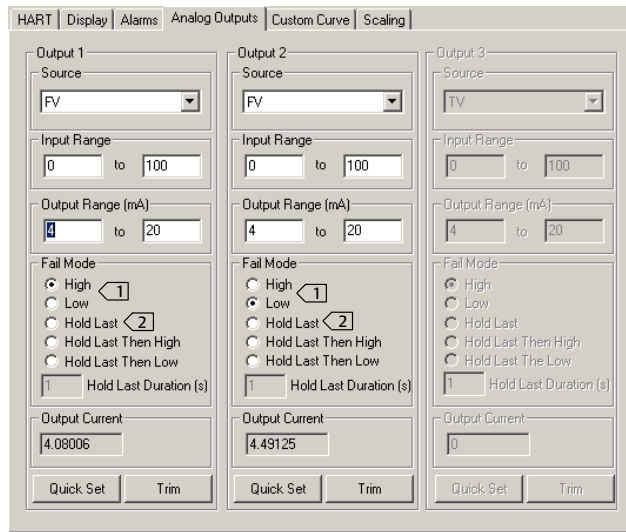
Refer to the DLC3010 Field Device Specification instruction manual supplement for a complete listing of alerts available from the DLC3010 digital level controller (see Related Fisher Documents on page 13).

These alerts are available by checking the “Field Device Fault Alarm” as shown in figure 9, selecting “Additional Status, and then clicking on “Edit”.

## Programming the Analog Outputs Parameters

Click the Analog Outputs tab to view this page. When the HIM Mode is set to Normal, Analog Output 1 (figure 10) is typically used to indicate Travel. Refer to the appropriate Field Device Specification instruction manual supplement for other values that may be indicated (see Related Fisher Documents on page 13).

Figure 10. Click the Analog Output Tab to Configure the HIM's Analog Output Parameters



NOTE:

1 > IF USING THE HIM TO REPLACE TRI-LOOP FUNCTIONALITY, SELECT HIGH OR LOW FAIL MODE, DEPENDING UPON REQUIREMENT.

2 > HOLD LAST MAY BE APPROPRIATE, DEPENDING ON THE PROCESS, BUT VISIBILITY OF THE TRUE DIGITAL VALVE CONTROLLER OUTPUT IS LOST WHEN THIS OPTION IS SELECTED.

If using a DVC6000 SIS, enter FV for the Source to indicate valve travel. For travel, the Input Range is typically 0 to 100% and the Output Range is 4 to 20 milliamps.

If HART communication is lost, the HIM outputs, based on the Fail mode configuration in the Analog Output menu, will go to their set value. If the Fail mode is set to HIGH, the analog output will be approximately 23.6 mA. If the Fail mode is set to LOW, the analog output will be approximately 3.6 mA.

## Related Fisher Documents

### DVC6200 and DVC6200 SIS

- DVC6200 Series Digital Valve Controller Quick Start Guide ([D103556X012](#))
- DVC6200 HW2 Digital Valve Controller Instruction Manual ([D103605X012](#))
- HART Field Device Specification for DVC6200 Digital Valve Controller ([D103639X012](#))
- DVC6200 HW1 Digital Valve Controller Instruction Manual (Supported) ([D103409X012](#))
- HART Field Device Specification for DVC6000 and DVC6200 HW1 Digital Valve Controller ([D103649X012](#))
- DVC6200 SIS Digital Valve Controller Instruction Manual ([D103557X012](#))
- HART Field Device Specification for DVC6200 SIS Digital Valve Controller ([D103638X012](#))

### DVC6000 HW2

- DVC6005 Series Remove Mount Digital Valve Controller Quick Start Guide ([D103784X012](#))
- DVC6200 HW2 Digital Valve Controller Instruction Manual ([D103785X012](#))
- HART Field Device Specification for DVC6000 HW2 Digital Valve Controller ([D103782X012](#))

### DVC2000

- DVC2000 Digital Valve Controller Quick Start Guide ([D103203X012](#))
- DVC2000 Digital Valve Controller Instruction Manual ([D103176X012](#))
- HART Field Device Specification for DVC2000 Digital Valve Controller ([D103783X012](#))

### Miscellaneous

- HF340 Filter Instruction Manual ([D102796X012](#))
- LC340 Line Conditioner instruction manual ([D102797X012](#))

### DLC3010

- DLC3010 Digital Level Controller Quick Start Guide ([D103214X012](#))
- DLC3010 Digital Level Controller Instruction Manual ([D102748X012](#))
- HART Field Device Specification for DLC3010 Digital Level Controller ([D104329X012](#))

## DVC6000 (Supported)

- DVC6000 Digital Valve Controllers Instruction Manual ([D102794X012](#))
- HART Field Device Specification for DVC6000 and DVC6200 HW1 Digital Valve Controller ([D103649X012](#))

## DVC6000 SIS (Supported)

- DVC6000 SIS Digital Valve Controllers for Safety Instrumented System (SIS) Solutions Instruction Manual ([D103230X012](#))
- HART Field Device Specification for DVC6000 and DVC6200 HW1 Digital Valve Controller ([D103649X012](#))
- Control and Safety Valve Diagnostics Unleashed: Enable Valve Alert Reporting on Non-Smart Communicating Systems ([D103395X012](#))

Documents are available from your [Emerson sales office](#) or at Fisher.com.

Neither Emerson, Emerson Process Management, nor any of their affiliated entities assumes responsibility for the selection, use or maintenance of any product. Responsibility for proper selection, use, and maintenance of any product remains solely with the purchaser and end user.

Fisher, FIELDVUE, and ValveLink are marks owned by one of the companies in the Emerson Automation Solutions business unit of Emerson Electric Co. Emerson Process Management, Emerson, and the Emerson logo are trademarks and service marks of Emerson Electric Co. HART is a registered trademark of FieldComm Group. All other marks are the property of their respective owners.

The contents of this publication are presented for informational purposes only, and while every effort has been made to ensure their accuracy, they are not to be construed as warranties or guarantees, express or implied, regarding the products or services described herein or their use or applicability. All sales are governed by our terms and conditions, which are available upon request. We reserve the right to modify or improve the designs or specifications of such products at any time without notice.

Emerson Automation Solutions  
Marshalltown, Iowa 50158 USA  
Sorocaba, 18087 Brazil  
Cernay, 68700 France  
Dubai, United Arab Emirates  
Singapore 128461 Singapore

[www.Fisher.com](http://www.Fisher.com)

