

**Errata Sheet
for**

FIELDVUE® DVC2000 Series Digital Valve Controller Instruction Manual,
Form 5772, September 2006
and
FIELDVUE® DVC2000 Series Digital Valve Controller Quick Start Guide,
Form 5789, July 2006

This errata sheet includes updated electromagnetic compatibility (EMC) information for Fisher® FIELDVUE® DVC2000 Series digital valve controllers.

- Replace the section titled **Electromagnetic Interference (EMI)** found in *Table A-1. Specifications* (instruction manual) or *Specifications* (page 4-1, quick start guide), with the following updated information.

Electromagnetic Compatibility

Meets EN 61326-1 (First Edition)
Immunity—Industrial locations per Table 2 of the EN 61326-1 standard. Performance is shown in table A-2 (instruction manual) or table 4-1 (quick start guide) below.
Emissions—Class A
ISM equipment rating: Group 1, Class A

- Replace *Table A-2. Immunity Performance* (instruction manual) or *Table 4-1. Immunity Performance* (quick start guide), with the updated table below.

Note

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Table A-2. EMC Summary Results—Immunity
Table 4-1. EMC Summary Results—Immunity

PORT	PHENOMENON	BASIC STANDARD	TEST LEVEL	PERFORMANCE CRITERIA ⁽¹⁾
Enclosure	Electrostatic discharge (ESD)	IEC 61000-4-2	4 kV contact 8 kV air	B
	Radiated EM field	IEC 61000-4-3	80 to 1000 MHz @ 10V/m with 1 kHz AM at 80% 1400 to 2000 MHz @ 3V/m with 1 kHz AM at 80% 2000 to 2700 MHz @ 1V/m with 1 kHz AM at 80%	A
	Rated power frequency magnetic field	IEC 61000-4-8	30 A/m at 50 Hz, 60 sec	A
I/O signal/control	Burst (fast transients)	IEC 61000-4-4	± 1 kV	A
	Surge	IEC 61000-4-5	± 1 kV (line to ground only, each)	B
	Conducted RF	IEC 61000-4-6	150 kHz to 80 MHz at 4 Vrms	A

Performance criteria is + / - 1% effect.
1. A = No degradation during testing. B = Temporary degradation during testing, but is self-recovering.



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FIELDVUE® DVC2000 Series Digital Valve Controllers

Using This Guide	1
Installation	2
Basic Setup and Calibration	3
Specifications and Related Documents	4
Loop Schematics/Nameplates	5



Note

This guide provides installation, and initial setup and calibration information for DVC2000 Series digital valve controllers. See the FIELDVUE® DVC2000 Series Digital Valve Controllers Instruction Manual - Form 5772, available from your Emerson Process Management™ sales office, for additional information, or visit our website at www.FIELDVUE.com.

Note:  This guide applies to:

DVC2000 Series			Model 375 Field Communicator	Model 275 HART® Communicator	
Device Revision	Firmware Revision	Hardware Revision	Device Description Revision	Device Description Revision	Memory Module (Mb)
1	1 & 2	1	1	1	4, 8 & 12



DVC2000 Series

Model 375 Field Communicator Fast-Key Sequence (DVC2000 Series Instrument Level AC)

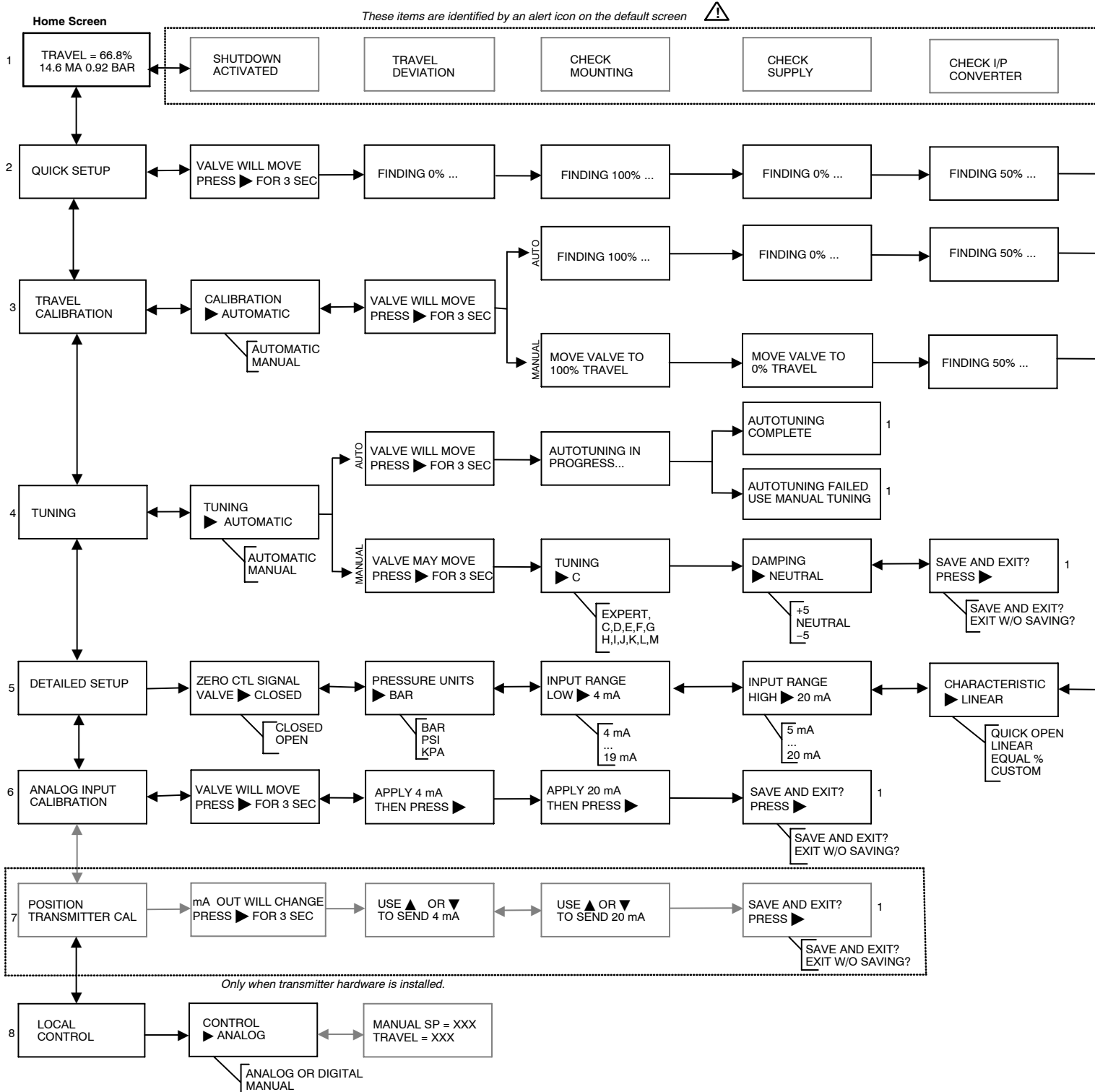
Function/Variable	Fast-Key Sequence	Coordinates ⁽¹⁾	Function/Variable	Fast-Key Sequence	Coordinates ⁽¹⁾
Analog Input Calibration	1-3-1	3-E	Integral Gain	1-2-3-6-2	5-F
Analog Input Units	1-2-2-1	4-E	Integral Settings	1-2-3-6	5-F
Auto Calibrate Travel	1-3-2	3-E	LUI Language	1-2-1-8	4-E
Auto Setup	1-1-1	3-B	LUI Pressure Units	1-2-2-5	4-E
Auto Tuner	1-1-1-3	3-B	Manual Calibrate Travel	1-3-3	3-E
Basic Setup	1-1	2-B	Manual Setup	1-1-2	3-C
Calibrate	1-3	3-E	Measured Variable	1-2-2	4-E
Damping Factor	1-1-1-4-2	4-B	Main Electronics Revision	2-1-5	3-F
Date	1-2-1-4	4-D	Maximum Supply Pressure	1-1-2-2-3	4-C
Descriptor	1-2-1-3	4-D	Message	1-2-1-2	4-D
Detailed Setup	1-2	3-D	Polling Address	1-2-1-7	4-E
Device Description Revision	2-2	2-E	Pressure Units	1-2-2-4	4-E
Device Identification	2-1-9	3-F	Protection	Hot Key	1-A
Device Information	2-1	3-F	Secondary Electronics Revision	2-1-6	3-F
Device Revision	2-1-2	3-F	Sensor Serial Number	2-1-7	3-F
Display	2	2-E	Setup Wizard	1-1-1-1	3-B
Enable Integral Control	1-2-3-6-1	5-F	Switch 1 Closed ⁽²⁾	1-2-4-2	4-G
Expert Tuning Gains	1-1-1-4-3	5-B	Switch 1 Trip Point ⁽²⁾	1-2-4-1	4-G
Firmware Date	2-1-4	3-F	Switch 2 Closed ⁽²⁾	1-2-4-4	4-G
Firmware Revision	2-1-3	3-F	Switch 2 Trip Point ⁽²⁾	1-2-4-3	4-G
HART Tag	1-2-1-1	4-D	Transmitter Action ⁽²⁾	1-2-4-5	4-G
HART Universal Revision	2-1-1	3-F	Transmitter Calibration ⁽²⁾	1-3-4	3-E
Input Characterization	1-2-3-4	4-F	Travel Cutoff High	1-2-3-5-1	5-F
Input Range High	1-2-2-2	4-E	Travel Cutoff Low	1-2-3-5-2	5-F
Input Range Low	1-2-2-3	4-E	Tuning	Hot Key	1-A
Instrument Level	2-1-8	3-F	Tuning Set	1-1-1-4-1	4-B
Instrument Mode	Hot Key	1-A	Valve Serial Number	1-2-1-5	4-D
Instrument Serial Number	1-2-1-6	4-E	Zero Control Signal	1-1-2-2-4	4-C
Integral Dead Zone	1-2-3-6-3	5-F			

- Coordinates are to help locate the item on the menu tree on the facing page.
- Available only if the instrument has a transmitter and limit switches installed.

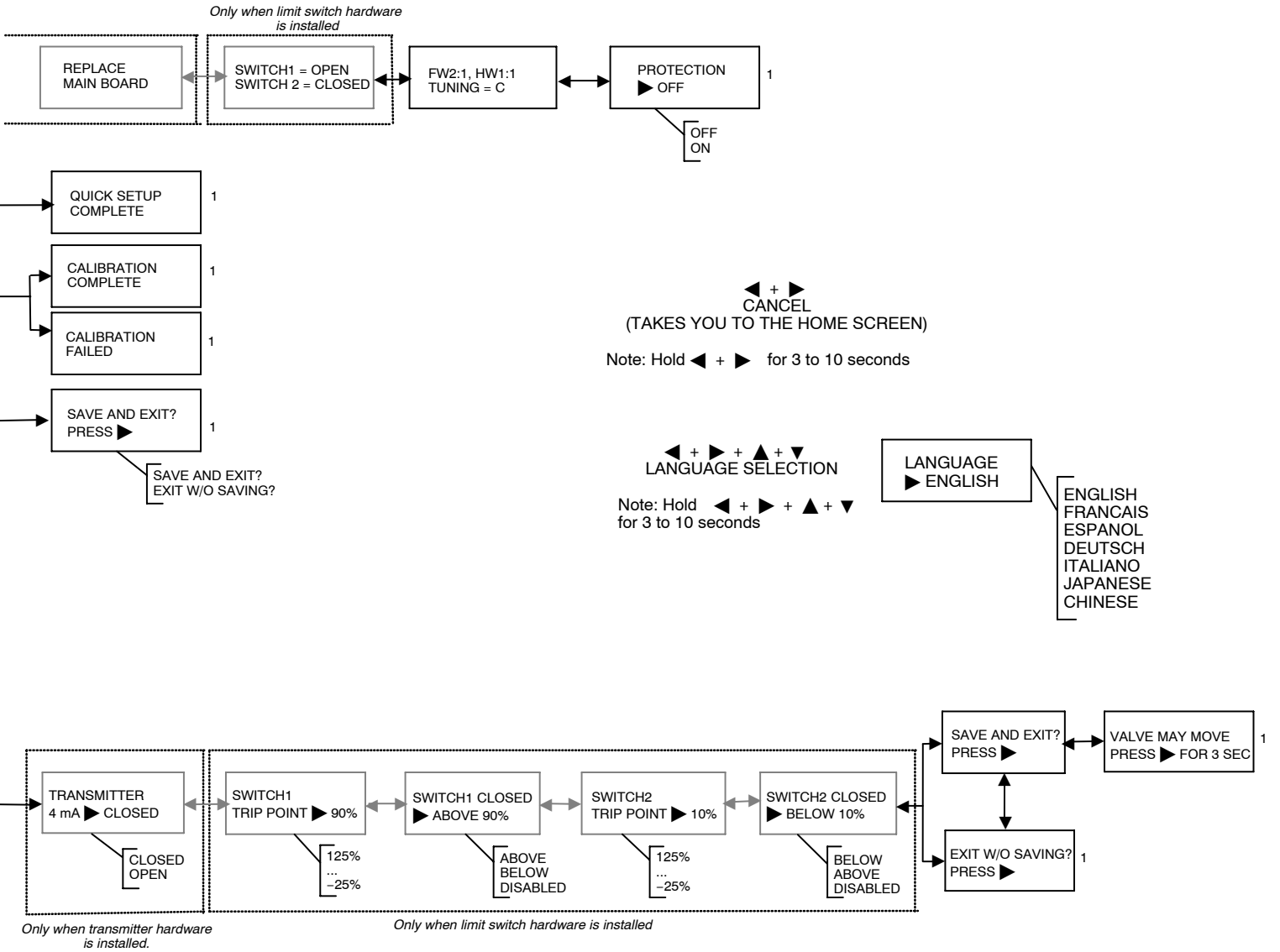
**(Unfold this sheet to see
the Local Interface
Flow Chart)**

DVC2000 Series

Local Interface Flow Chart



DVC2000 Series



DVC2000 Series

Model 375 Field Communicator Fast-Key Sequence (DVC2000 Series Instrument Level HC, AD and PD)

Function/Variable	Fast-Key Sequence	Coordinates ⁽¹⁾	Function/Variable	Fast-Key Sequence	Coordinates ⁽¹⁾
Actuator Style	1-2-5-2	4-E	Minimum Closing Time	1-2-6-8-2	5-E
Alert Record	1-2-7-6	4-G	NVM Fail	1-2-8-5	4-H
Analog Input	2	1-E	Operational Status	7-3	2-F
Analog Input Calibration	1-4-1	2-E	Polling Address	1-2-3-7	4-D
Analog Input Range High	1-2-4-2	4-D	Pressure	6	1-E
Analog Input Range Low	1-2-4-3	4-E	Pressure Calibration	1-4-4	2-E
Analog Input Units	1-2-4-1	4-D	Pressure Sensor Failure	1-2-8-7	4-H
Auto Calibrate Travel	1-4-2	2-E	Pressure Units	1-2-4-4	4-E
Auto Setup	1-1-1	2-B	Protection	Hot Key	1-A
Auto Tuner	1-1-1-3	3-B	Reference Voltage Failure	1-2-8-3	4-H
Basic Setup	1-1	2-B	Response Control	1-2-6	4-F
Burst	1-2-1-5	4-C	Restart	1-2-1-4	3-C
Calibrate	1-4	2-E	Restart Control Mode	1-2-1-3	3-C
Control Mode	1-2-1-2	3-C	Secondary Electronics Revision	1-3-2-6	2-H
Custom Characteristic Table	1-2-6-5	4-F	Self Test Shutdown	1-2-8	3-D
Cycle Count	1-2-7-4-4	5-H	Sensor Serial Number	1-3-2-7	2-H
Cycle Count Alert	1-2-7-4	5-H	Set Point Filter Time	1-2-6-6	4-F
Cycle Count Alert Enable	1-2-7-4-1	5-H	Setup Wizard	1-1-1-1	3-B
Cycle Count Alert Point	1-2-7-4-2	5-H	Stroke Valve	1-5	1-D
Cycle Count Deadband	1-2-7-4-3	5-H	Switch 1 Closed ⁽²⁾	1-2-9-2	4-I
Damping Factor	1-1-2-3-2	4-C	Switch 1 Trip Point ⁽²⁾	1-2-9-1	4-I
Date	1-2-3-4	4-D	Switch 2 Closed ⁽²⁾	1-2-9-4	4-I
Descriptor	1-2-3-3	4-D	Switch 2 Trip Point ⁽²⁾	1-2-9-3	4-I
Device Description Revision	1-3-3	2-D	Temperature	1-3-1-1	2-G
Device Identification	1-3-2-9	2-I	Temperature Comp Fail	1-2-8-2	4-H
Device Information	1-3-2	2-D	Temperature Sensor Failure	1-2-8-6	4-H
Device Revision	1-3-2-2	2-H	Temperature Units	1-2-4-6	4-E
Drive Alert Enable	1-2-7-5-1	5-I	Transmitter Action ⁽²⁾	1-2-9-5	4-I
Drive Current Fail	1-2-8-4	4-H	Transmitter Calibration ⁽²⁾	1-4-6	2-E
Drive Signal	5	1-E	Travel	3	1-E
Enable Integral Control	1-2-6-9-1	5-F	Travel Accumulator	1-2-7-3-4	5-H
Expert Tuning Gains	1-1-1-4-3	5-B	Travel Accumulator Alert Enable	1-2-7-3-1	5-H
Failure Alerts	7-2	2-F	Travel Accumulator Alert Point	1-2-7-3-2	5-H
Failure Group Enable	1-2-7-6-4-2	6-I	Travel Accumulator Dead Band	1-2-7-3-3	5-H
Firmware Date	1-3-2-4	2-H	Travel Alert Deadband	1-2-7-1-7	6-G
Firmware Revision	1-3-2-3	2-H	Travel Alert High Point	1-2-7-1-3	6-G
Flash Rom Failure	1-2-8-1	4-H	Travel Alert High High Point	1-2-7-1-5	6-G
HART Tag	1-2-3-1	4-C	Travel Alert Low Point	1-2-7-1-4	6-G
HART Universal Revision	1-3-2-1	2-H	Travel Alert Low Low Point	1-2-7-1-6	6-G
Input Characterization	1-2-6-4	4-F	Travel Cutoff Low	1-2-6-7-4	5-E
Instrument Level	1-3-2-8	2-H	Travel Cutoff High	1-2-6-7-3	5-E
Instrument Mode	Hot Key	1-A	Travel Deviation Alert Enable	1-2-7-2-1	5-G
Instrument Serial Number	1-2-3-6	4-D	Travel Deviation Alert Point	1-2-7-2-2	5-G
Instrument Status	7	1-E	Travel Deviation Time	1-2-7-2-3	5-G
Integral Dead Zone	1-2-6-9-3	5-F	Travel High / Low Enable	1-2-7-1-1	6-G
Integral Gain	1-2-6-9-2	5-F	Travel High High / Low Low Enable	1-2-7-1-2	6-G
Integral Settings	1-2-6-9	5-F	Travel Limit High	1-2-6-7-1	5-E
Limit Switch Stat Enable	1-2-7-6-4-3	6-I	Travel Limit Low	1-2-6-7-2	5-E
LUI Language	1-2-3-8	4-D	Travel Sensor Failure	1-2-8-8	4-H
LUI Pressure Units	1-2-4-5	4-E	Travel Setpoint	4	1-E
Main Electronics Revision	1-3-2-5	2-H	Tuning	Hot Key	1-A
Manual Calibrate Travel	1-4-3	2-E	Tuning Set	1-1-2-3-1	4-C
Manual Setup	1-1-2	3-B	Valve Group Enable	1-2-7-6-4-1	6-I
Maximum Supply Pressure	1-2-5-1	4-B	Valve Style	1-2-5-3	4-E
Message	1-2-3-2	4-D	Valve Serial Number	1-2-3-5	4-D
Minimum Opening Time	1-2-6-8-1	5-E	Zero Control Signal	1-2-5-4	4-E

1. Coordinates are to help locate the item on the menu tree on the following page.
2. Available only if the instrument has a transmitter and limit switches installed.

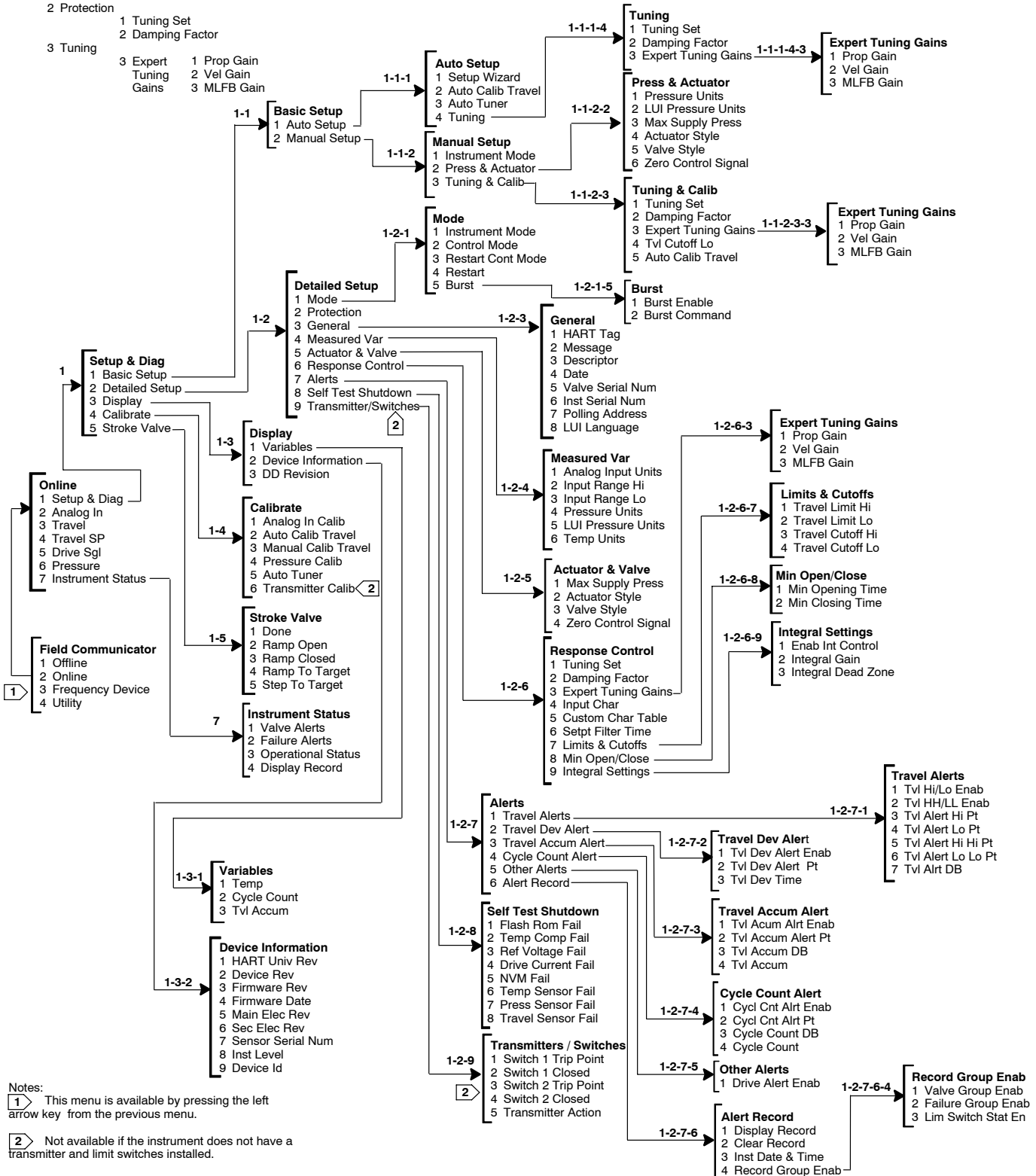
DVC2000 Series

Model 375 Field Communicator Menu Tree for FIELDVUE® DVC2000 Instrument Levels HC, AD and PD



Hot Key

- 1 Instrument Mode
- 2 Protection
 - 1 Tuning Set
 - 2 Damping Factor
- 3 Tuning
 - 3 Expert Tuning Gains
 - 1 Prop Gain
 - 2 Vel Gain
 - 3 MLFB Gain



Notes:

1 This menu is available by pressing the left arrow key from the previous menu.

2 Not available if the instrument does not have a transmitter and limit switches installed.

A

B

C

D

E

F

G

H

I

1

2

3

4

5

6

DVC2000 Series



W8861



THE FIELDVUE[®] DVC2000 SERIES DIGITAL VALVE CONTROLLER IS A CORE COMPONENT OF THE PLANTWEB DIGITAL PLANT ARCHITECTURE. THE DIGITAL VALVE CONTROLLER POWERS PLANTWEB BY CAPTURING AND DELIVERING VALVE DIAGNOSTIC DATA. COUPLED WITH AMS VALVELINK[®] SOFTWARE, THE DVC2000 PROVIDES USERS WITH AN ACCURATE PICTURE OF VALVE PERFORMANCE, INCLUDING ACTUAL STEM POSITION, INSTRUMENT INPUT SIGNAL AND PNEUMATIC PRESSURE TO THE ACTUATOR. USING THIS INFORMATION, THE DIGITAL VALVE CONTROLLER DIAGNOSES NOT ONLY ITSELF, BUT ALSO THE VALVE AND ACTUATOR TO WHICH IT IS MOUNTED.

FIELDVUE[®] DVC2000 Series Digital Valve Controller, and
Design GX Control Valve and Actuator

✓ Installation and Basic Setup Check List

Installation

Mounting

- Valve-mounted instrument correctly mounted on the actuator. See installation instructions provided with the mounting kit.
- Magnet Array properly installed. See installation instructions provided with the mounting kit.

Pneumatic Connections and Air Supply

- Air supply connected and at proper pressure. Connect supply as described on page 2-8. Also see specifications on page 4-1.
- Instrument output connected to the actuator. Connect instrument output as described on page 2-8.

Electrical Connections

- Loop wiring properly connected to the LOOP + and – terminals in the terminal box. Connect loop wiring as described on page 2-8.
- Limit Switch and Transmitter terminals (if available) wiring properly connected to the appropriate terminals in the terminal box as described on page 2-9.

Basic Setup and Calibration

- Basic setup complete. Perform Quick Setup procedure on page 3-3 to automatically calibrate and tune the instrument.
- Final control element correctly responds to a setpoint change and is stable. If necessary, perform Manual Tuning on page 3-5.

Final control element is ready to be placed on line.



This product is intended for a specific range of application specifications. Incorrect configuration of a positioning instrument could result in the malfunction of the product, property damage or personal injury.

DVC2000 Series



Figure 1-1. Type DVC2000 Series Digital Valve Controller



Note

No person may install, operate, or maintain a DVC2000 Series digital valve controller without first • being fully trained and qualified in valve, actuator and accessory installation, operation and maintenance, and • carefully reading and understanding the contents of this manual. If you have any questions regarding these instructions, contact your Emerson Process Management sales office before proceeding.

Product Description

DVC2000 Series digital valve controllers (figure 1-1) are communicating, microprocessor-based current-to-pneumatic valve positioners.

In addition to the traditional function of converting an input current signal (4–20mA) to a pneumatic output pressure, the DVC2000 Series digital valve controller communicates via a local display panel and/or via the

HART® protocol. An option is available which provides isolated circuitry for two (2) integrated limit switches (for open/close valve indication) and a valve position transmitter (for separate valve position feedback).

DVC2000 Series digital valve controllers are designed to replace standard pneumatic and electro-pneumatic valve positioners.

1

Use of this Guide

This guide describes how to install, setup, and calibrate DVC2000 Series digital valve controllers. Additional information for installing, operating, and maintaining the DVC2000 Series digital valve controllers can be found in the related documents listed on page 4-2.

This guide describes basic instrument setup and calibration using the DVC2000 local operator interface. The interface consists of a liquid crystal display, four pushbuttons, and a switch for position transmitter configuration. There are seven languages supported, namely English, French, German, Italian, Spanish, Chinese and Japanese. To configure the language, follow the procedure outlined in the Basic Setup section. The instrument must be powered with at least 8.5 volts and 3.5 mA to operate the local interface. Certain procedures require up to 20 mA of current.

You can also setup and calibrate the instrument using a Field Communicator, a personal computer with AMS ValveLink Software or AMS™ Suite: Intelligent Device Manager. For information on using the software with a FIELDVUE instrument, refer to the appropriate user guide or help.



Note

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Installation



Note

The DVC2000 is not designed to correct for significant stem rotation on sliding stem actuators.



WARNING

Avoid personal injury or property damage from sudden release of process pressure or bursting of parts. Before mounting the DVC2000 Series digital valve controller:

- Always wear protective clothing, gloves, and eyewear when performing any installation procedures to avoid personal injury.
- Disconnect any operating lines providing air pressure, electric power, or a control signal to the actuator. Be sure the actuator cannot suddenly open or close the control valve.
- Use bypass valves or completely shut off the process to isolate the control valve from process pressure. Relieve process pressure from both sides of the control valve.
- Vent the pneumatic actuator loading pressure and relieve any actuator spring precompression.
- Use lock-out procedures to be sure that the above measures stay in effect while you work on the equipment.
- Check with your process or safety engineer for any additional measures that must be taken to protect against process media.

Special Instructions for Safe Use and Installations in Hazardous Locations

Certain nameplates may carry more than one approval, and each approval may have unique installation requirements and/or conditions of safe use. Special instructions are listed by agency/approval.

After reading and understanding these special conditions of use, proceed with valve and actuator mounting.



WARNING

Failure to follow these conditions of safe use could result in personal injury or property damage from fire or explosion, or area re-classification.

CSA

Special Conditions of Safe Use

No special conditions for safe use.

Refer to table 4-2 for approval information, figure 5-1 for the CSA loop schematic, and figure 5-3 for the CSA and FM approvals nameplate.

FM

Special Conditions of Safe Use

No special conditions for safe use.

Refer to table 4-3 for approval information, figure 5-2 for the FM loop schematic, and figure 5-3 for the CSA and FM approvals nameplate.

ATEX Intrinsic Safety

Special Conditions for Safe Use

The equipment is an intrinsically safe equipment. It can be mounted in hazardous area.

The terminal blocks can be only connected to certified intrinsically safe equipments and these combinations must be compatible as regard intrinsic safety rules.

The equipment shall be connected in accordance with with manufacturer's installation instructions (see drawing GE14685).

Temperature Classification:

T4 at $T_a \leq 80^\circ\text{C}$

T5 at $T_a \leq 40^\circ\text{C}$

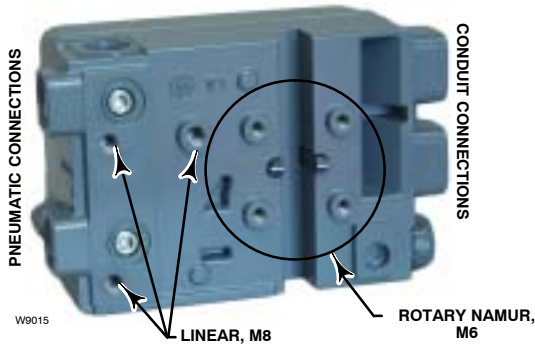
Refer to table 4-4 for additional approval information, figure 5-4 for the ATEX loop schematic, and figure 5-5 for the ATEX nameplate.

DVC2000 Series

2

HOUSINGS FOR LINEAR AND ROTARY ACTUATORS

- CONNECTIONS AVAILABLE:
- M20 CONDUIT AND G1/4 PNEUMATIC
 - 1/2-INCH NPT CONDUIT AND 1/4-INCH NPT PNEUMATIC



HOUSINGS FOR FISHER GX ACTUATORS

- CONNECTIONS AVAILABLE:
- M20 CONDUIT AND G1/4 PNEUMATIC
 - 1/2-INCH NPT CONDUIT AND 1/4-INCH NPT PNEUMATIC

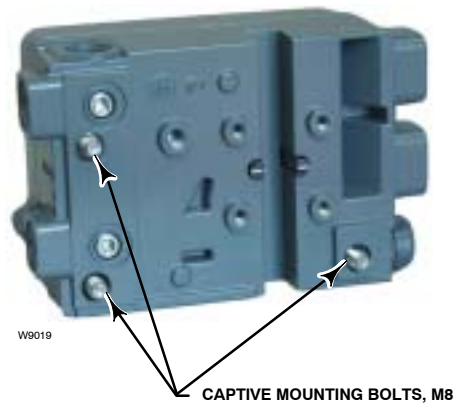


Figure 2-1. DVC2000 Housing Variations

IECEX Intrinsic Safety

Conditions of Certification

This equipment shall be connected in accordance with the manufacturer's installation instructions to intrinsic safety barriers that satisfy the following parameters for each set of terminals.

Main 4–20 mA:	$U_i = 30\text{ V}$, $I_i = 130\text{ mA}$, $P_i = 1\text{ W}$, $L_i = 0.55\text{ mH}$, $C_i = 5\text{ nF}$
XMTR circuit:	$U_i = 28\text{ V}$, $I_i = 100\text{ mA}$, $P_i = 1\text{ W}$, $L_i = 0\text{ mH}$, $C_i = 5\text{ nF}$
Limit Switch 1 (LS1):	$U_i = 16\text{ V}$, $I_i = 76\text{ mA}$, $P_i = 1\text{ W}$, $L_i = 0\text{ mH}$, $C_i = 5\text{ nF}$
Limit Switch 2 (LS2):	$U_i = 16\text{ V}$, $I_i = 76\text{ mA}$, $P_i = 1\text{ W}$, $L_i = 0\text{ mH}$, $C_i = 5\text{ nF}$

Refer to table 4-5 for additional approval information, figure 5-6 for the IECEx loop schematic, and figure 5-7 for the IECEx nameplate.

Valve / Actuator Mounting

If ordered as a part of a control valve assembly, the factory will mount the digital valve controller on the actuator and calibrate the instrument. If you purchased the digital valve controller separately, you will need a mounting kit to mount the digital valve controller on the

actuator. The following procedures are general guidelines you should consider when mounting the digital valve controller. See the instructions that come with the mounting kit for detailed information on mounting the digital valve controller to a specific actuator model.

The DVC2000 housing is available in four different configurations, depending on the actuator mounting method and threaded connection style. Figure 2-1 shows the available configurations.

The feedback system for the Type DVC2000 Series digital valve controller utilizes a magnetic field for true linkage-less, non-contacting position measurement. In order to prevent inadvertent stem movement while the instrument is in operation, magnetic tools (such as a magnetic-tipped screwdriver) should not be used.

CAUTION

The magnet material has been specifically chosen to provide a long-term stable magnetic field. However, as with any magnet, care must be taken when handling the magnet assembly. Another high powered magnet placed in close proximity (less than 25 mm) can cause permanent damage. Potential sources of damaging equipment: transformers, DC motors, stacking magnet arrays, magnetic tipped screwdrivers.

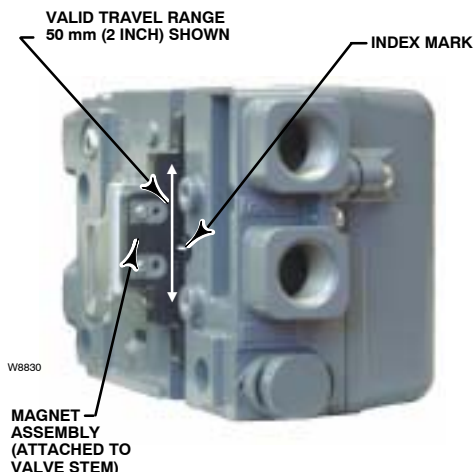
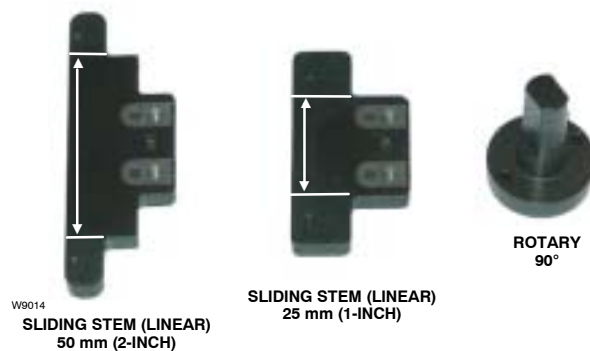


Figure 2-2. Travel Range



NOTE: VALID TRAVEL RANGE INDICATED BY WHITE ARROWS

Figure 2-3. Magnet Assemblies



Note

As a general rule, do not use less than 50% of the magnet array for full travel measurement. Performance will decrease gradually as the array is increasingly subranged.

The linear magnet arrays have a valid travel range indicated by arrows molded into the piece. This means that the hall sensor (on the back of the DVC2000 housing) has to remain within this range throughout the entire valve travel. See figure 2-2.

The linear magnet arrays are symmetrical. Either end may be up.

There are a variety of mounting brackets and kits that are used to mount the DVC2000 to different actuators. However, despite subtle differences in fasteners, brackets, and connecting linkages, the procedures for mounting can be categorized as follows:

- Air-to-open sliding stem (linear) actuators.
- Air-to-close sliding stem (linear) actuators.
- Air-to-open Fisher GX actuator.
- Air-to-close Fisher GX actuator.
- Rotary actuators with travel up to 90 degrees.

See figure 2-3 for the different travel feedback magnet pieces.

WARNING

Refer to the Installation WARNING at the beginning of this section.

1. Attach the mounting bracket to the actuator.
2. Loosely attach the feedback pieces and magnet assembly to the valve stem connector. Do not tighten the fasteners because fine adjustment is required.

CAUTION

Do not install a magnet array that is shorter than the physical travel of the actuator. Loss of control will result from the magnet array moving outside the range of the index mark in the feedback slot of the DVC2000 housing.

3. Using the alignment template (supplied with the mounting kit), position the feedback array inside the retaining slot.
4. Vertically align the magnet array such that the center line of the alignment template is lined up as close as possible with the upper extreme of the valid travel range on the feedback array. See figure 2-4.
5. Tighten the bolts and remove the alignment template.
6. Mount the digital valve controller to the mounting bracket, using the mounting bolts. See figure 2-5.
7. Check for clearance between the magnet assembly and the DVC2000 feedback slot. The magnet

DVC2000 Series

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Figure 2-4. Air-to-Open Magnet Array Alignment

assembly should be positioned such that the index mark in the feedback slot of the DVC2000 housing is between the valid range on the magnet assembly throughout the range of travel. See figure 2-2.

8. Install tubing between the actuator casing and the pneumatic positioner output connection that has the arrow pointing away from the opening. See figure 2-7.

Air-to-Close Sliding Stem (Linear) Actuators (e.g. Fisher Type 657)

WARNING

Refer to the Installation WARNING at the beginning of this section.

1. Attach the mounting bracket to the actuator.
2. Loosely attach the feedback pieces and magnet assembly to the valve stem connector. Do not tighten the fasteners because fine adjustment is required.

CAUTION

Do not install a magnet array that is shorter than the physical travel of the actuator. Loss of control will result from the magnet array moving outside the range of the index mark in the feedback slot of the DVC2000 housing.

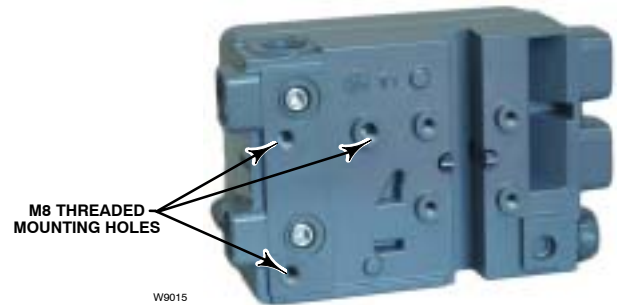


Figure 2-5. Mounting Holes for Linear Actuators

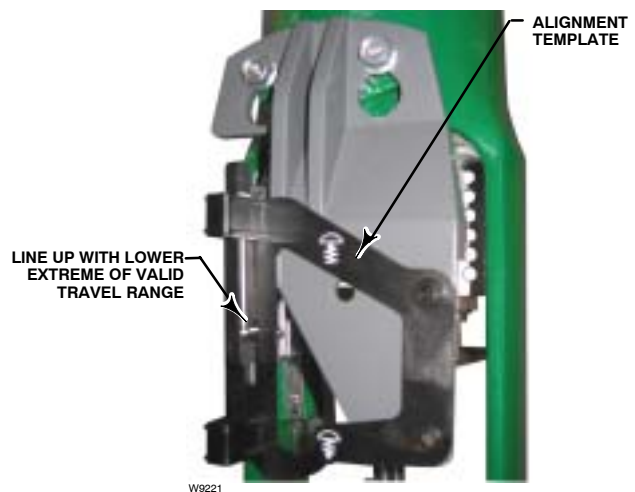


Figure 2-6. Air-to-Close Magnet Array Alignment

3. Using the alignment template (supplied with the mounting kit), position the feedback array inside the retaining slot.
4. Vertically align the magnet array such that the center line of the alignment template is lined up as close as possible with the lower extreme of the valid travel range on the feedback array. See figure 2-6.
5. Tighten the bolts and remove the alignment template.
6. Mount the digital valve controller to the mounting bracket, using the mounting bolts. See figure 2-5.
7. Check for clearance between the magnet assembly and the DVC2000 feedback slot. The magnet assembly should be positioned such that the index mark in the feedback slot of the DVC2000 housing is between the valid range on the magnet assembly throughout the range of travel. See figure 2-2.
8. Install tubing between the actuator casing and the pneumatic positioner output connection that has the arrow pointing away from the opening. See figure 2-7.

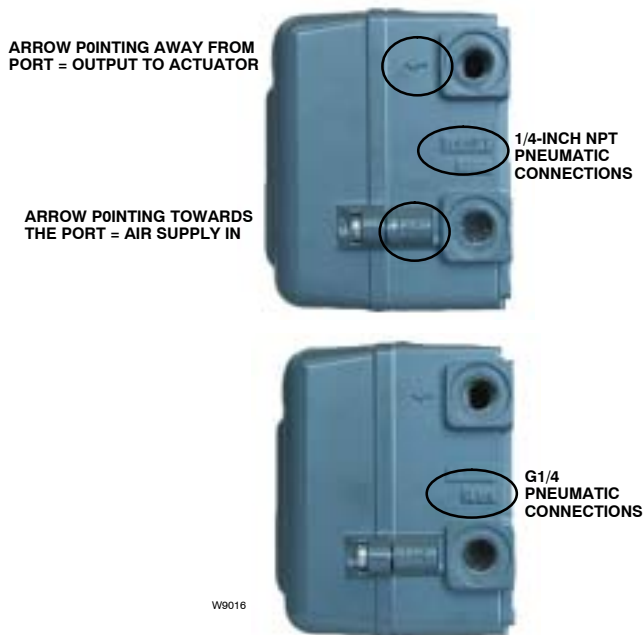


Figure 2-7. Conduit and Pneumatic Thread Variations

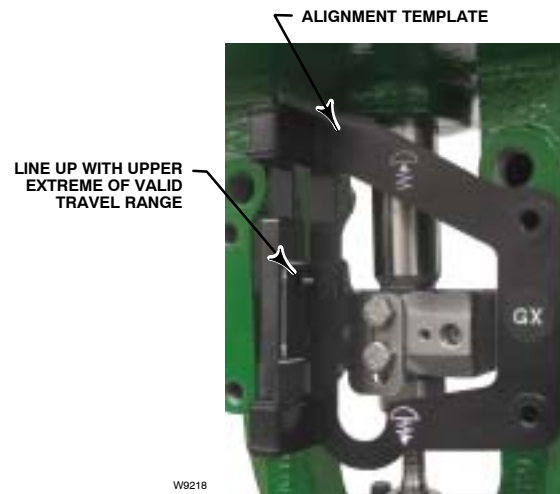


Figure 2-8. Air-to-Open Fisher GX Magnet Array Alignment

CAUTION

Do not install a magnet array that is shorter than the physical travel of the actuator. Loss of control will result from the magnet array moving outside the range of the index mark in the feedback slot of the DVC2000 housing.

Mounting on Fisher GX Actuators

WARNING

Refer to the Installation WARNING at the beginning of this section.

The DVC2000 digital valve controller mounts directly on the Fisher Design GX actuator without the need for a mounting bracket.

Identify the yoke side to mount the DVC2000 digital valve controller based on the actuator fail mode. Refer to the Design GX Control Valve and Actuator System instruction manual – Form 5770.

Air-to-Open Fisher Design GX Actuators

1. Loosely attach the feedback pieces and magnet assembly to the valve stem connector. Do not tighten the fasteners because fine adjustment is required.

2. Using the alignment template (supplied with the mounting kit), position the feedback array inside the retaining slot.
3. Vertically align the magnet array such that the center line of the alignment template is lined up as close as possible with the upper extreme of the valid travel range on the feedback array. See figure 2-8.
4. Tighten the bolts and remove the alignment template.
5. Remove the top plug (R1/8) from the back of the DVC2000 housing. This pneumatic output port on the DVC2000 lines up with the integral GX actuator pneumatic port. See figure 2-9.
6. Install the plug (either G1/4 or 1/4NPT, included in the mounting kit) to the external output pneumatic port.
7. Remove the digital valve controller's cover.
8. Using a 6 mm hex wrench, attach the digital valve controller to the GX actuator mounting pad on the side that has the open pneumatic port. Be sure to place the O-ring between the digital valve controller's pneumatic output and the actuator mounting pad. Pneumatic tubing is not required because the air passages are internal to the actuator.
9. Check for clearance between the magnet assembly and the DVC2000 feedback slot. The magnet

DVC2000 Series

2

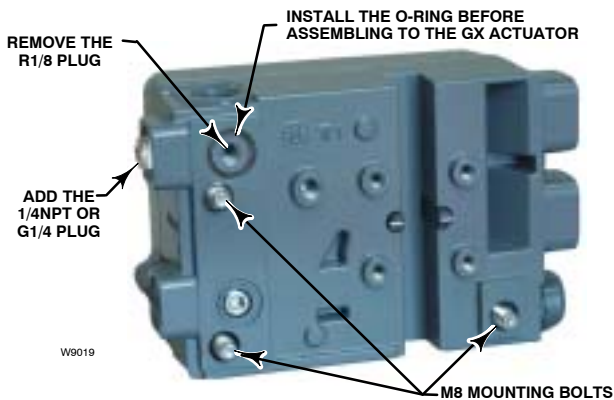


Figure 2-9. Modifications for Fisher GX Actuator – Air-to-Open Construction Only

assembly should be positioned such that the index mark in the feedback slot of the DVC2000 housing is between the valid range on the magnet assembly throughout the range of travel. See figure 2-2.

10. Install a vent in the port on the upper diaphragm casing's air supply connection on the actuator yoke leg.

Air-to-Close Fisher Design GX Actuators

1. Loosely attach the feedback pieces and magnet assembly to the valve stem connector. Do not tighten the fasteners because fine adjustment is required.

CAUTION

Do not install a magnet array that is shorter than the physical travel of the actuator. Loss of control will result from the magnet array moving outside the range of the index mark in the feedback slot of the DVC2000 housing.

2. Using the alignment template (supplied with the mounting kit), position the feedback array inside the retaining slot.

3. Vertically align the magnet array such that the center line of the alignment template is lined up as

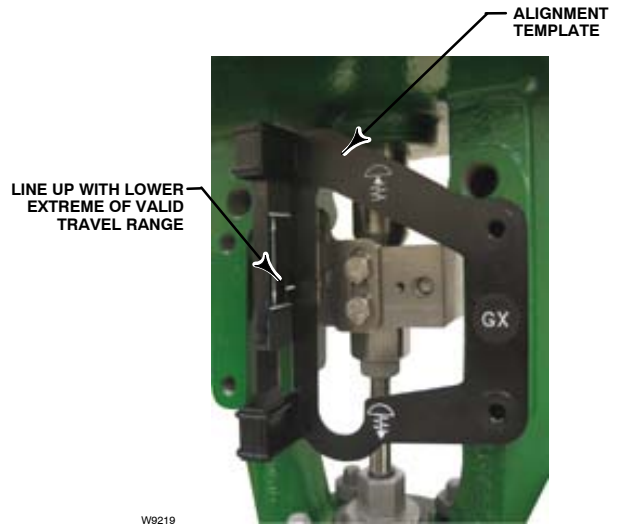


Figure 2-10. Air-to-Close Fisher GX Magnet Array Alignment

close as possible with the lower extreme of the valid travel range on the feedback array. See figure 2-10.

4. Tighten the bolts and remove the alignment template.

5. Remove the digital valve controller's cover.

6. Using a 6 mm hex wrench, attach the digital valve controller to the GX actuator mounting pad.



Note

The O-ring and G1/4 or 1/4NPT plugs (supplied in the mounting kit) are not used with this actuator construction.

7. Check for clearance between the magnet assembly and the DVC2000 feedback slot. The magnet assembly should be positioned such that the index mark on the pole pieces (back of the positioner housing) is between the valid range on the magnet assembly throughout the range of travel. See figure 2-2.

8. Install tubing between the actuator casing and the pneumatic positioner output connection that has the arrow pointing away from the opening. See figure 2-7.

9. Install a vent in the port on the lower diaphragm casing.



Note

When field converting a GX actuator from fail-open to fail-closed (or vice-versa), you will need to change the plugs for the pneumatic passages in the DVC2000 housing.

- To convert to fail-closed, remove the R1/8 pneumatic plug on the back of the DVC2000 housing and install an O-ring. Plug the external pneumatic output with a 1/4NPT or G1/4 plug (depending on the housing version). Refer to figure 2-9.

- To convert to fail-open, remove the external pneumatic plug (1/4NPT or G1/4 plug depending on the housing version). Install an R1/8 plug on the back of the DVC2000 housing. Install tubing between the pneumatic output connection of the DVC2000 to the pneumatic output connection of the DVC2000 to the pneumatic port on top of the actuator casing.

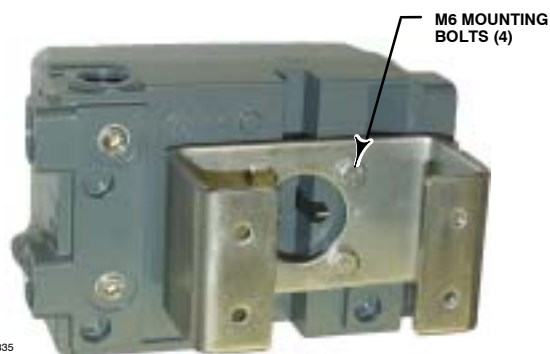


Figure 2-11. For Rotary Actuators (with Typical Mounting Bracket Shown)

be parallel to the channel on the back of the DVC2000 housing, as shown in figure 2-12.

2. Install the mounting bracket on the actuator.
3. Attach the digital valve controller to the mounting bracket using the 4 mounting bolts, as shown in figure 2-11.
4. Check for clearance between the magnet assembly and the positioner feedback slot.
5. Install tubing between the actuator casing and the pneumatic positioner output connection that has the arrow pointing away from the opening. See figure 2-7.

Guidelines for Mounting on Quarter-Turn (Rotary) Actuators

WARNING

Refer to the Installation WARNING at the beginning of this section.

The DVC2000 digital valve controller can be mounted to any quarter-turn (rotary) actuator, as well as those that comply with the NAMUR guidelines. A mounting bracket and associated hardware are required. Refer to figure 2-11.

1. Attach the magnet assembly to the actuator shaft. At mid-travel, the flats on the magnet assembly must

Electrical and Pneumatic Connections

WARNING

Refer to the Installation WARNING at the beginning of this section.

The electrical and pneumatic connections on the digital valve controller are available with the following combinations:

- 1/4-inch NPT supply and output with 1/2-inch NPT conduit connections
- G1/4 supply and output with M20 conduit connections

DVC2000 Series

2

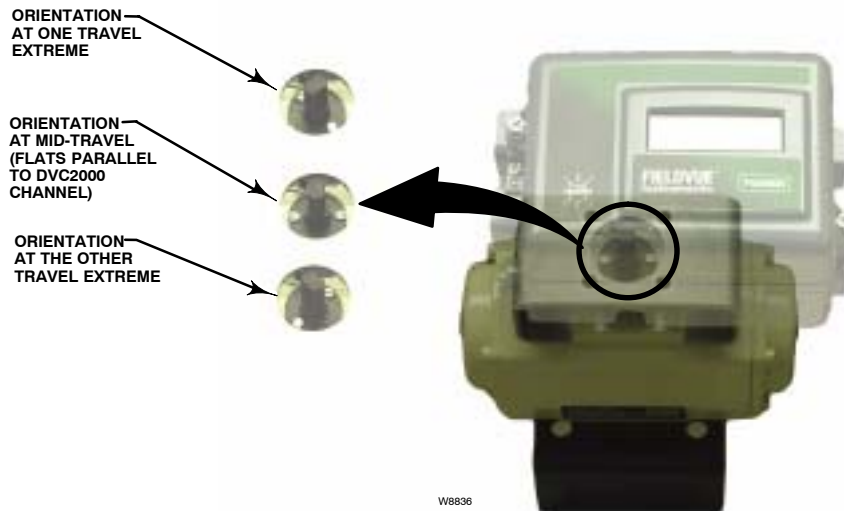


Figure 2-12. Magnetic Assembly Orientation on Quarter-Turn Actuators

Supply Connections

WARNING

Severe personal injury or property damage may occur from process instability if the instrument air supply is not clean, dry and oil-free. While use and regular maintenance of a filter that removes particles larger than 40 microns in diameter will suffice in most applications, check with an Emerson Process Management field office and industry instrument air quality standards for use with corrosive air or if you are unsure about the proper amount or method of air filtration or filter maintenance.

Supply pressure must be clean, dry air or noncorrosive and nonflammable gas that meets the requirements of ANSI/ISA Standard 7.0.01.

A Fisher Type 67CFR filter regulator, or equivalent, may be used to filter and regulate supply air. If pressure regulation is not required, a Fisher Type P594 filter may be used.

Connect the nearest suitable supply source to the connection with the arrow pointing towards the opening (see figure 2-7).

Electrical Connections

WARNING

Select wiring and/or cable glands that are rated for the environment of use (hazardous area, ingress protection and temperature). Failure to use properly rated wiring and/or cable glands can result in personal injury or property damage from fire or explosion.

The digital valve controller is normally powered by a control system output card. The use of shielded cable will ensure proper operation in electrically noisy environments. Wire size requirements are 14 AWG maximum, 26 AWG minimum.

Be sure to follow the appropriate I.S. circuit guidelines when installing field wiring to the loop terminals as well as the limit switch and transmitter terminals.

Wire the digital valve controller as follows:

1. Remove the main instrument cover.
2. Route the field wiring into the terminal box through the conduit connection. When applicable, install conduit using local and national electrical codes that apply to the application.
3. Connect the control system output card positive wire "current output" to the +11 terminal. Connect the control system output card negative (or return) wire "current output" to the -12 terminal.
4. Two ground terminals are available for connecting a safety ground, earth ground, or drain wire. These

ground terminals are electrically identical. Make connections to these terminals following national and local codes and plant standards.

5. Replace the cover if the local interface is not being used for configuration or calibration.

Options Boards

All three options circuits (transmitter, switch 1 and switch 2) control current from an external power source similar to the operation of a 2-wire transmitter.

Limit Switches

On units that are supplied with integral limit switches, additional terminals provide the field wiring connection point. The limit switches are isolated from each other and from the digital valve controller's primary feedback. If only one switch is to be used, you must use channel 1. Although electrically isolated per Intrinsic Safety requirements, channel 2 derives its power from channel 1. Therefore channel 2 cannot be used alone.

Wire the limit switches as follows:

1. Remove the main instrument cover.
2. Route the field wiring into the terminal box through the conduit connection. When applicable, install conduit using local and national electrical codes that apply to the application.
3. Connect the control system input card positive wire "switch input" to the +41 terminal. Connect the control system input card negative wire "switch input" to the -42 terminal. Refer to figure 2-13.
4. If a second switch is to be used, connect the control system input card positive wire "switch input" to the +51 terminal. Connect the control system input card negative wire "switch input" to the -52 terminal.
5. Proceed to the Basic Setup section to configure the switch action.
6. Replace the cover if the local interface is not being used for configuration or calibration.

Position Transmitter

On units that are supplied with an integral valve position transmitter, additional terminals provide the field wiring connection point. The position transmitter circuit in the DVC2000 derives its operating power from the 4–20 mA control system input in the same

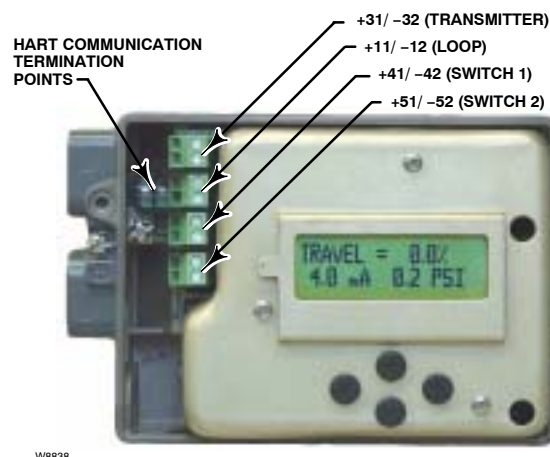


Figure 2-13. Loop, Transmitter, and Limit Switch Terminals

manner as a 2-wire transmitter. In addition, the transmitter function gets position information (through an opto-isolator) from the digital valve controller so the 4–20 mA position control loop must also be powered in order for the position transmitter to provide an output representing the valve position.



Note

In an Intrinsically Safe installation with the options in use, the wire pairs must be shielded. Additionally, to prevent cross-wiring, the individual wires must not be exposed beyond the terminal barrier walls.

Wire the position transmitter as follows:

1. Remove the main instrument cover.
2. Route the field wiring into the terminal box through the conduit connection. When applicable, install conduit using local and national electrical codes that apply to the application.
3. Connect the control system input card positive wire "current input" to the +31 terminal. Connect the control system input card negative wire "current input" to the -32 terminal. Refer to figure 2-13.
4. Replace the cover if the local interface is not being used for configuration or calibration.

DVC2000 Series

Vent

By design, the instrument exhausts supply air into the area under the cover. The vent should be left open to prevent pressure buildup under the cover and to drain any moisture that may accumulate in the housing. The control valve assembly should be installed such that the primary vent provides gravitational draining.

If a remote vent is required, the vent line must be as short as possible with a minimum number of bends and elbows.

2

Communications Connections

A HART communicating device, such as a Model 375 Field Communicator or a personal computer running AMS ValveLink Software communicating through a HART modem, interfaces with the DVC2000 Series digital valve controller. You can connect at any point on the 4–20 mA loop. Alternatively, convenient termination points are located on the termination board (figure 2-13). The instrument must be powered before digital communication will commence.

✓ Installation Check List

Mounting

- Is the valve-mounted instrument correctly mounted on the actuator? If not, refer to the installation instructions provided with the mounting kit.
- Is the Magnet Array properly installed? If not, refer to the installation instructions provided with the mounting kit.

2

Pneumatic Connections and Air Supply

- Is the air supply connected and at proper pressure? If not, connect supply as described on page 2-8. Also see specifications on page 4-1.
- Is the instrument output connected to the actuator? If not, connect instrument output as described on page 2-8.

Electrical Connections

- Is the Loop wiring properly connected to the LOOP + and – terminals in the terminal box? If not, connect loop wiring as described on page 2-8.
- Is the Limit Switch and Transmitter terminals (if available) wiring properly connected to the appropriate terminals in the terminal box? If not, connect wiring as described on page 2-9.

You are ready to perform Basic Setup and Calibration in the next section.

Basic Setup and Calibration

The local operator interface is available on all DVC2000 Series digital valve controllers. The interface consists of a liquid crystal display, four pushbuttons, and a switch for position transmitter configuration. There are seven languages supported including English, French, German, Italian, Spanish, Chinese and Japanese. To configure the language, follow the procedure outlined in the Basic Setup section. The instrument must be powered with at least 8 Volts and 3.5 mA to operate the local interface. Certain procedures require up to 20 mA of current.

CAUTION

When accessing the terminals or pushbuttons, proper means of electrostatic discharge protection is required. Failure to provide appropriate protection can cause the valve to move, resulting in valve/actuator instability.

Status Information

The first (home) screen on the LCD that is displayed after applying power to the instrument contains basic

status information. On an instrument that is calibrated and operating properly, the flow chart in figure 3-1 shows the available information by pressing the right (▶) arrow key.

TRAVEL=##.##%—Current valve travel in percent of calibrated travel.

##.# MA—Current input signal applied to the instrument in mA.

##.## BAR—Current pressure output to the actuator in the configured units (BAR, PSI or MPA).

SWITCH1—Current status of the optional limit switch wired to terminals +41 and -42.

SWITCH2—Current status of the optional limit switch wired to terminals +51 and -52.

FW#—Version of firmware running in the device.

HW#—Version of electronics hardware installed. The first number (# : #) represents the main board, the second number (# : #) represents the secondary electronics.

TUNING = X—Current tuning set parameters configured in the device.

PROTECTION—Indicates whether the local interface is protected or not. With protection ON, the instrument can not be configured or calibrated with the local pushbuttons.

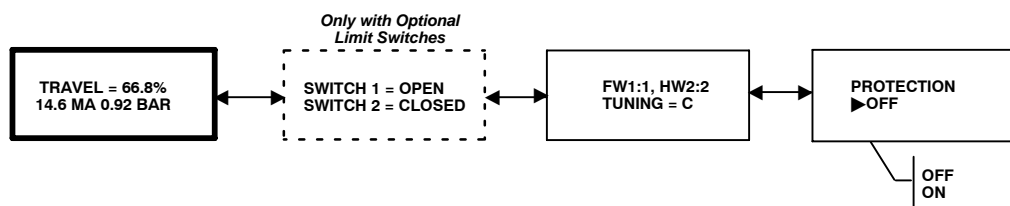


Figure 3-1. Home Screen on the LCD

DVC2000 Series

Basic Setup



WARNING

Changes to the instrument setup may cause changes in the output pressure or valve travel. Depending on the application, these changes may upset process control which may result in personal injury or property damage.

3

When the DVC2000 Series digital valve controller is ordered as part of a control valve assembly, the factory mounts the digital valve controller and sets up the instrument as specified on the order. When mounting to a valve in the field, the instrument needs to be setup to match the instrument to the valve and actuator.

Before beginning basic setup, be sure the instrument is correctly mounted and powered electrically and pneumatically.

Selecting the Language

The instrument can be configured to display any of seven different languages including English, French, German, Italian, Spanish, Chinese and Japanese (see figure 3-2). To access the language selection screen, press the four arrow keys simultaneously for three (3) seconds.

Use the UP or DOWN (▲ or ▼) arrow keys to select the appropriate language. Press the RIGHT (▶) arrow key to confirm your selection.

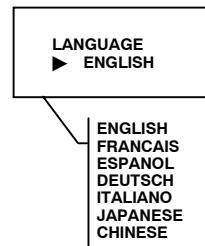


Figure 3-2. Accessing the Language Screen

Basic Setup and Calibration

Quick Setup

When installing the DVC2000 Series digital valve controller on an actuator for the first time, the quick setup procedure will calibrate and tune the instrument automatically. Table 3-1 lists the values that are preconfigured at the factory.

WARNING

During calibration the valve will move full stroke. Changes to the tuning set may also cause the valve to stroke. To avoid personal injury and property damage caused by the release of pressure or process fluid, provide some temporary means of control for the process.



Note

If optional limits switches are being used, power must be applied to the switch circuits throughout the quick setup routine.

Table 3-1. DVC2000 Factory Default Settings Accessible from the Local Interface

Setup Parameter	Default Setting
Zero Control Signal	Open ⁽¹⁾
Pressure Units	BAR or PSIG
Input Range Low	4 mA
Input Range High	20 mA
Characteristic	Linear
Transmitter (optional feature)	4 mA = Valve Closed
Switch 1 Trip Point (optional feature)	90%
Switch 1 Closed (optional feature)	Above 90%
Switch 2 Trip Point (optional feature)	10%
Switch 2 Closed (optional feature)	Below 10%

1. If the instrument is shipped mounted on an actuator, these values depend upon the actuator on which the instrument is mounted.

3

Refer to the DETAILED SETUP procedure for further explanation of the parameters.

To access the QUICK SETUP routine from the home screen, press the DOWN (▼) arrow key and then the RIGHT (▶) arrow key. A warning will advise you that this procedure will cause the valve to move. Another RIGHT (▶) button press will begin the calibration process. Pressing the LEFT (◀) arrow key will bring you back to the main menu.

This procedure will automatically calibrate the instrument and apply tuning parameters specifically fit for the size of the actuator.

To abort the procedure at any time, press the RIGHT (▶) and LEFT (◀) arrow keys together for 3 seconds.

When the procedure is complete, press the RIGHT (▶) arrow key to return to the status screen. If the RIGHT (▶) button is not pressed within 30 seconds, the device will revert back to the status screen automatically.

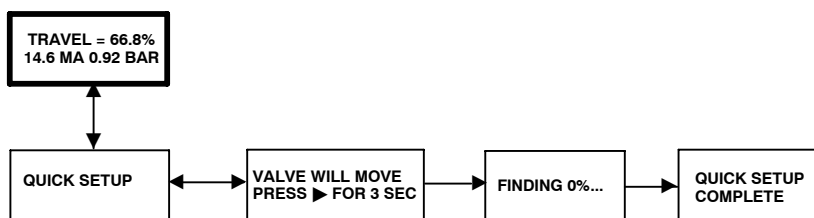


Figure 3-3. Quick Setup

DVC2000 Series

Travel Calibration

WARNING

During calibration the valve will move full stroke. To avoid personal injury and property damage caused by the release of pressure or process fluid, provide some temporary means of control for the process.

3



Note

If optional limits switches are being used, power must be applied to the switch circuits throughout the automatic or manual calibration routine.

To manually calibrate the instrument or automatically calibrate the instrument without changing the tuning

values, the TRAVEL CALIBRATION routine is available. To access this procedure from the home screen, press the DOWN (▼) arrow key two times and then the RIGHT (▶) arrow key once. From there follow the prompts as illustrated in figure 3-4.



Note

If the valve is manually calibrated to travel less than the physical travel stops allow, manual tuning (page 3-5) may be required to optimize the valve response.

Automatic calibration will provide status information as the procedure is running. Manual calibration will require you to first adjust the input current to move the valve and then to press the RIGHT (▶) arrow key. After manual calibration is complete, you will have the choice to save the calibration or exit the procedure without saving. If you exit without saving, the last saved calibration data will be restored.

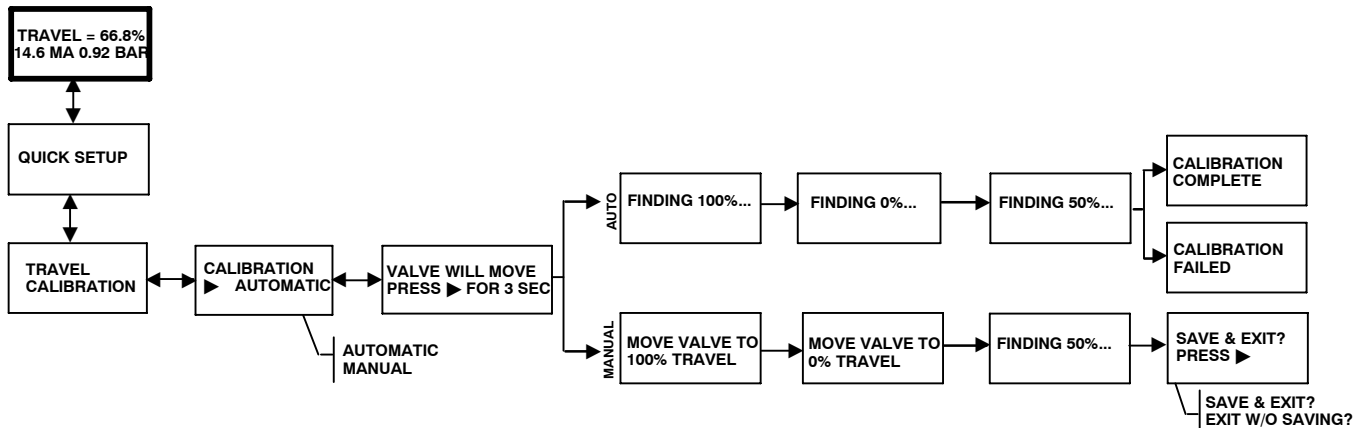


Figure 3-4. Travel Calibration

Basic Setup and Calibration

Tuning

WARNING

Changes to the tuning set may cause the valve/actuator assembly to stroke. To avoid personal injury or property damage caused by the release of pressure or process fluid, provide some temporary means of control for the process.

To manually tune the instrument or automatically tune the instrument without changing the calibration values, the TUNING routine is available. To access this procedure from the home screen, press the DOWN (▼) arrow key three times and then the RIGHT (▶) arrow key once.

From there follow the prompts as illustrated in figure 3-5 below.

Automatic tuning will provide status information as the procedure is running. Manual tuning will require you to input values. This procedure is only recommended when the automatic tuning procedure results in failure.

A typical starting point for most small actuators is “C”. Using the UP (▲) and DOWN (▼) arrow keys will apply the values immediately. You can then change the input current to observe the response. When you are satisfied with the response, press the RIGHT (▶) arrow key to fine tune the instrument. The UP (▲) and DOWN (▼) arrow keys will apply more or less damping to fine tune the overshoot after a step input change.

After manual tuning is complete, you will have the choice to save the tuning data or exit the procedure without saving. If you exit without saving, the last saved tuning data will be restored.

3

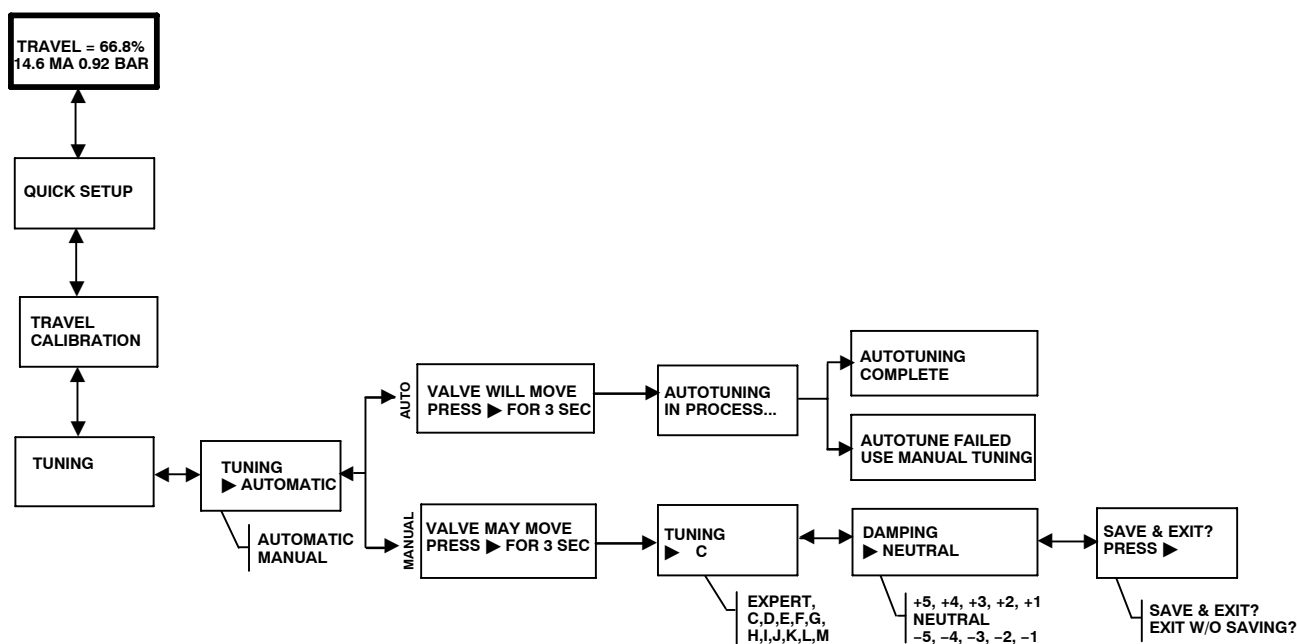


Figure 3-5. Tuning

DVC2000 Series

Detailed Setup

If the factory default configuration values need to be changed, the DETAILED SETUP procedure provides access. See figure 3-6 for the flowchart showing the sequence of screens. To access this procedure from the home screen, press the DOWN (▼) arrow key four times. The RIGHT (▶) arrow key brings you into the configuration items. Once you are in a particular configuration item, use the UP (▲) and DOWN (▼) arrow keys to select the appropriate choice.

3

To exit this procedure, press the RIGHT (▶) arrow key and view the remaining configuration items until you reach the exit screen. If you exit without saving, the last saved configuration data will be restored.

Below is an explanation of the configuration items.

Zero Control Signal—Identifies whether the valve is fully OPEN or fully CLOSED when the input is 0%. If you are unsure how to set this parameter, disconnect the current source to the instrument. The resulting valve travel is the Zero Control Signal. This corresponds to setting the output pressure to zero.

Pressure Units—Defines the pressure units in either PSI, BAR, or KPA.

Input Range Low—This will correspond to 0% travel if the Zero Control Signal is configured as closed. If the Zero Control Signal is configured as open, this will correspond to 100% travel.

Input Range High—This will correspond to 100% travel if the Zero Control Signal is configured as closed. If the Zero Control Signal is configured as open, this will correspond to 0% travel.

Characteristic—Defines the relationship between the travel target and the ranged set point. Ranged set point is the input to the characterization function. If the Zero Control Signal is closed, then a set point of 0% corresponds to a ranged input of 0%. If the Zero Control Signal is open, a set point of 0% corresponds to a ranged input of 100%. Travel target is the output from the characterization function.



Note

Travel cutoffs are enabled by default on all units.

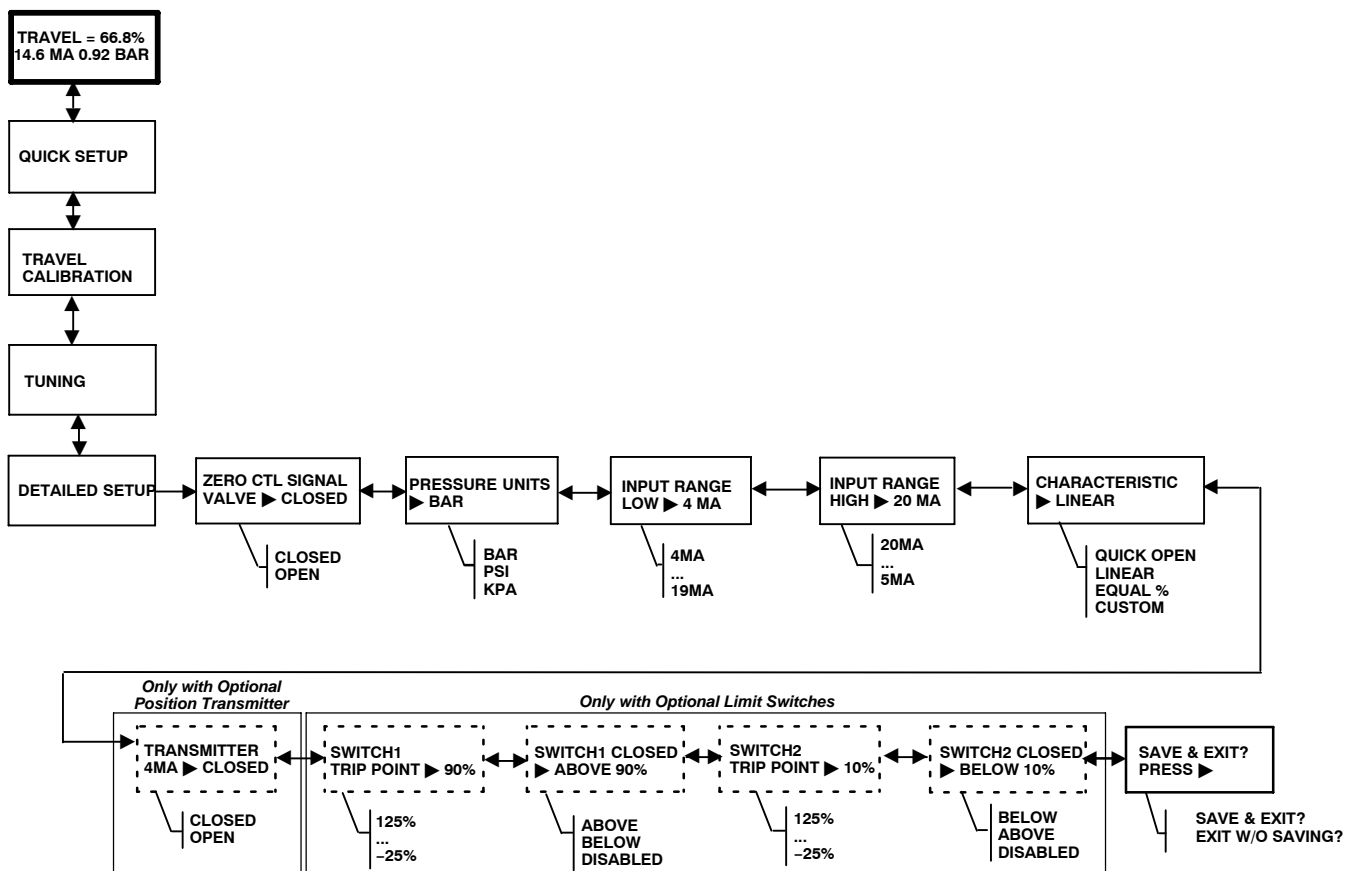


Figure 3-6. Detailed Setup Flow Chart

Basic Setup and Calibration

The factory default characteristic is LINEAR. You can also use a QUICK OPEN, EQUAL %, or CUSTOM function. However, the custom function is initially configured linear, unless you use a HART based host to reconfigure the custom points. Custom configuration can be selected, but the curve can not be modified with the local interface.

Transmitter—This configures the relationship between the valve travel and the position transmitter output signal. If you select CLOSED, the transmitter will send 4 mA when the valve is closed. If you select OPEN, the transmitter will send 4 mA when the valve is open.

A switch is located on the options board to select the transmitter fail signal (high+ or low-). High+ will result in a current output of > 22.5 mA upon transmitter failure. Low- will result in a current output of < 3.6 mA. Refer to figure 3-7 for location and switch selection.

Switch #1 Trip Point—Defines the threshold for the limit switch wired to terminals +41 and -42 in percent of calibrated travel.

Switch #1 Closed—Configures the action of the limit switch wired to terminals +41 and -42. Selecting ABOVE configures the switch to be closed when the travel is above the trip point. Selecting BELOW configures the switch to be closed when the travel is below the trip point. Selecting DISABLED removes the icons and status from the display.

Switch #2 Trip Point—Defines the threshold for the limit switch wired to terminals +51 and -52 in percent of calibrated travel.

Switch #2 Closed—Configures the action of the limit switch wired to terminals +51 and -52. Selecting ABOVE

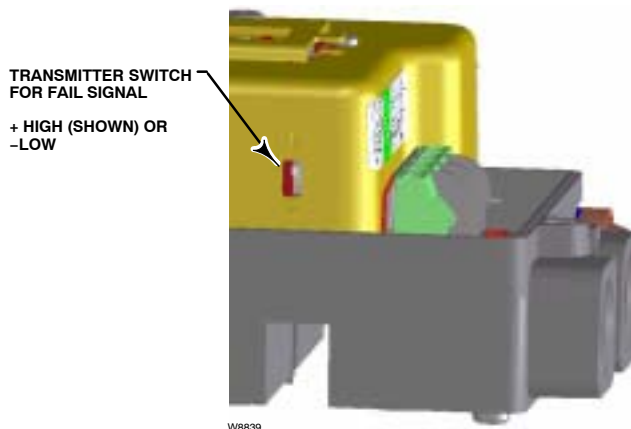


Figure 3-7. XMTR Switch

configures the switch to be closed when the travel is above the trip point. Selecting BELOW configures the switch to be closed when the travel is below the trip point. Selecting DISABLED removes the icons and status from the display.



Note

Switch #2 is only operational if power is applied to switch #1 also. Switch #2 cannot be used alone.

DVC2000 Series

Analog Input Calibration

WARNING

During calibration you will be asked to move the valve full stroke. To avoid personal injury and property damage caused by the release of pressure or process fluid, provide some temporary means of control for the process.

3

The DVC2000 Series digital valve controller is shipped from the factory with the analog input already calibrated. You do not normally need to perform this procedure. However, if you suspect that this needs

adjustment, follow the procedure below, and refer to figure 3-8.

Connect a variable current source to the instrument +11 and -12 terminals. From the home screen, press the DOWN (▼) arrow key five times and then press the RIGHT (▶) arrow key. Acknowledge the warning if you are sure that you want to proceed.

1. Adjust the variable current source to 4 mA.
2. Press the RIGHT (▶) arrow key
3. Adjust the variable current source to 20 mA.
4. Press the RIGHT (▶) arrow key.

If you want to keep this calibration, select SAVE AND EXIT. If you exit without saving, the last saved configuration data will be restored.

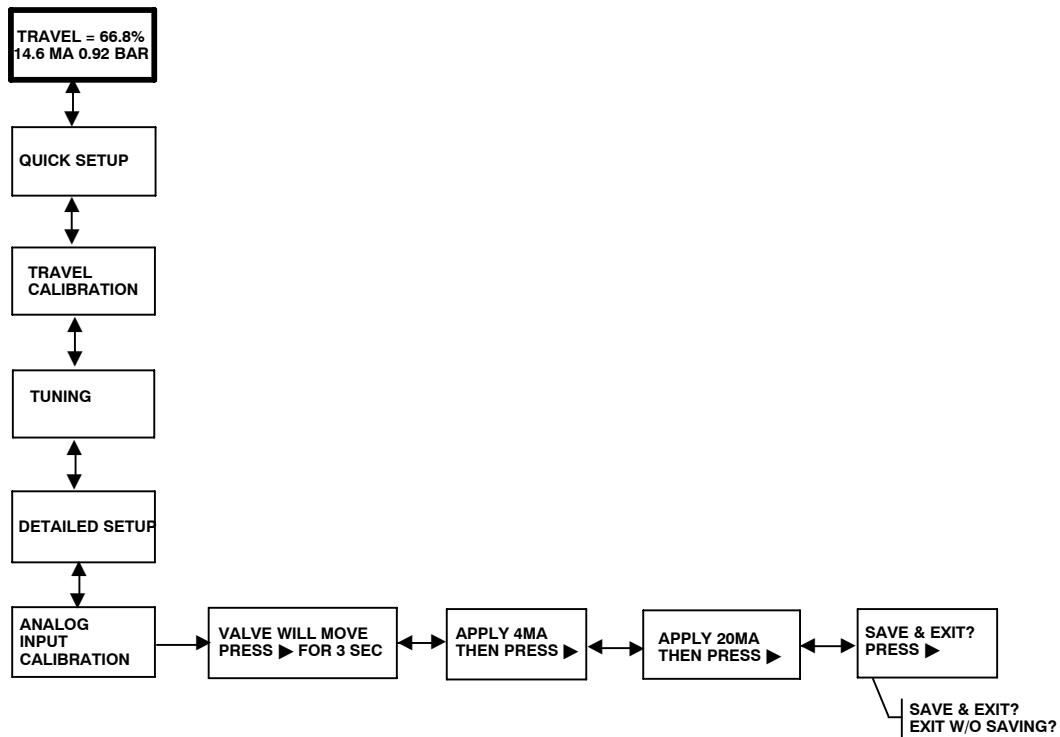


Figure 3-8. Analog Input Calibration

Basic Setup and Calibration

Position Transmitter Calibration



Note

This procedure will not move the control valve. The instrument will simulate an output for calibration purposes only.

This procedure is only available on units that have the optional position transmitter hardware installed. The DVC2000 Series digital valve controller is shipped from the factory with the position transmitter already calibrated. You do not normally need to perform this procedure. However, if you suspect that this needs

adjustment, follow the procedure below and refer to figure 3-9.

Connect a current meter in series with the transmitter output terminals (+31 & -32) and a voltage source (such as the DCS analog input channel). From the home screen, press the DOWN (▼) arrow key six times and then press the RIGHT (▶) arrow key.

1. Use the UP (▲) and DOWN (▼) arrow keys to manipulate the output current read by the current meter. When 4 mA is read by the meter, press the RIGHT (▶) arrow key.

2. Again, use the UP (▲) and DOWN (▼) arrow keys to manipulate the output current read by the current meter. When 20 mA is read by the meter, press the RIGHT (▶) arrow key.

If you want to keep this calibration, select SAVE AND EXIT. If you exit without saving, the last saved configuration data will be restored.

3

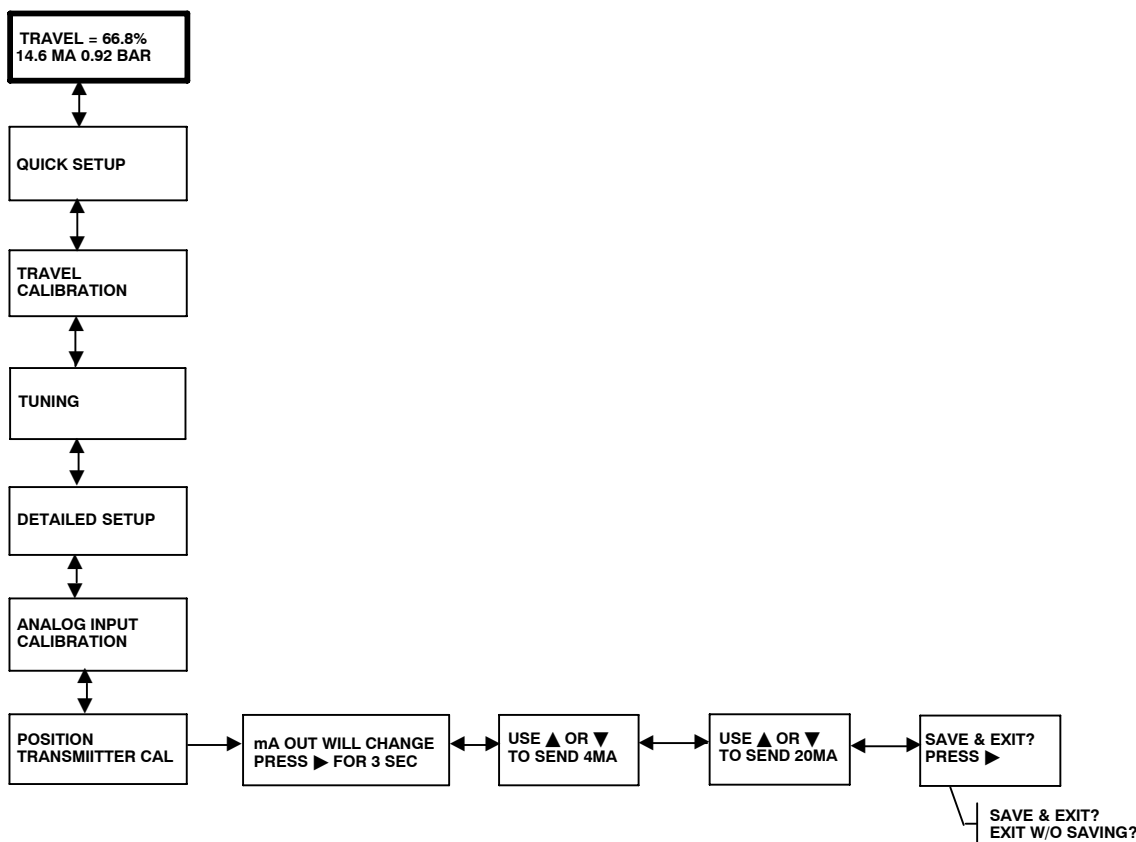


Figure 3-9. Position Transmitter Calibration

DVC2000 Series

Local Control

This procedure allows the user to manually control the position of the valve (see figure 3-10). To enter this procedure from the home screen, press the DOWN (▼) arrow key seven times and then press the RIGHT (▶) arrow key.

If you select ANALOG, you will return to the home screen and the digital valve controller will respond to the loop current. If you select MANUAL, you will move to the screen that shows the travel setpoint and the actual valve travel. The UP (▲) and DOWN (▼) arrow keys will allow you to change the setpoint and therefore move the valve manually. To exit the manual mode, use the LEFT (◀) arrow key to return to the choice list. Select ANALOG.

3



Note

When placing the instrument back into ANALOG, the valve will step back to the position commanded by the input current.

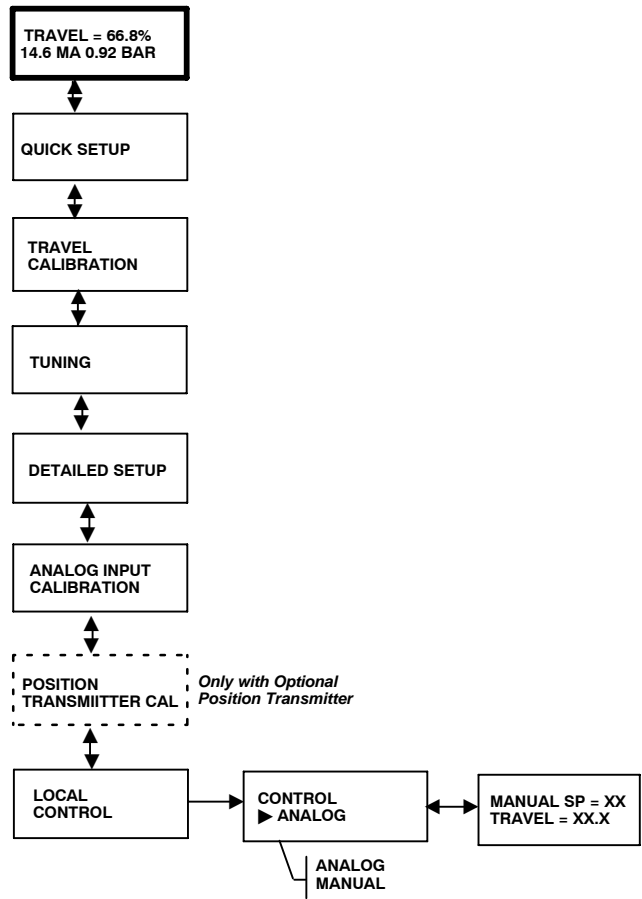



Figure 3-10. Local Control

Diagnostic Messages, Codes and Details

The DVC2000 Series digital valve controller is constantly diagnosing itself for abnormal conditions while powered-up. The following messages will appear on the local user interface if a fault condition exists (identified on the default screen by the alert symbol ).

SWITCH 1 ???

SWITCH 2 ???—The alert symbol in conjunction with the above text indicates that limit switch circuit 1 is not powered, or at least one of the switches is enabled. In order for either of the switches to work, switch circuit 1 must be powered. Switch 2 cannot be used alone. To eliminate the alert symbol, you can either apply 5 to 30 VDC to switch circuit 1 or disable both switches (refer to the Installation section).

Once switch circuit 1 is powered properly, question marks (???) will indicate that the corresponding switch is disabled.

Shutdown Activated— This screen appears if the positioner has shut down and no air is being delivered to the actuator. Therefore, the valve is at its fail-safe position. An example of a source of this error is corrupt firmware code upon start-up. The factory default setting for this error is disabled. Therefore, this alert will only be enabled by actively configuring it with a HART based host (eg. Field Communicator, AMS ValveLink Software).

Travel Deviation— This error message indicates that there is a difference between the input signal (after characterization) and the actuator travel reading from the position feedback element. The default setting is 7% for 5 seconds. These settings can be configured through a HART communicating host on any HC tier or higher. Possible sources of this error are insufficient air supply or excessive valve friction.

Replace Main Board— A problem with the electronics has been detected. Sources of this error may include hardware or firmware problems. If this error is

detected, the instrument may be operational, but performance will be degraded.

Check Mounting— The valve position feedback reading is valid, but it is outside the operating range. Sources of this error include loose or bent mounting brackets or a misaligned magnet array. This error does not identify faulty components, but rather faulty installation or alignment. This alert is also called a Travel Sensor Failure.

Check Supply— The valve is not able to reach its target position due to insufficient supply pressure. This error will most likely occur in conjunction with the Travel Deviation error.

Check I/P Converter— A problem relating to the I/P converter has been detected. Sources of this error include:

- Electronics problems indicated by the drive current read back being out of range
- Low supply pressure indicated by an active drive signal alert
- A stuck valve resulting in integrator wind-up.

Device Locked by HART— Another HART host (e.g. AMS ValveLink Software, AMS Suite: Intelligent Device Manager, or the 375 Field Communicator) is communicating with the DVC2000. Typically this means that the instrument is “out of service”.

Pressure = ???—The actuator pressure reading is greater than 125% of the configured maximum supply pressure. For example, if the supply pressure range was set to 35 psi and the actual supply pressure was 45 psi, you will see ???'s when the DVC2000 is delivering full supply pressure to the actuator. If you reduce the supply pressure, or stroke the valve closed (air-to-open/fail closed setup), eventually there will be a point where numerical values appear.

This configuration parameter can be changed through the Field Communicator (1-1-2-2-3) or AMS ValveLink Software (Detailed Setup – Pressure).

✓ Basic Setup and Calibration Check List

- Is basic setup complete? If not, perform the Quick Setup procedure on page 3-3 to automatically calibrate and tune the instrument.
- Does the final control element correctly respond to a setpoint change and is it stable? If not, perform Manual Tuning on page 3-5.

Final control element is ready to be placed on line.

Specifications and Related Documents

Specifications

Available Configurations

- Integral mounting to the Design GX actuator
- Sliding stem applications
- Quarter-turn rotary applications

DVC2000 Series positioners can also be mounted on other actuators that comply with IEC 60534-6-1, IEC 60534-6-2, VDI/VDE 3845 and NAMUR mounting standards.

Input Signal

Analog Input Signal: 4–20 mA dc, nominal; split ranging available.

Minimum Voltage: Voltage available at instrument terminals must be 8.5 volts for analog control, 9.0 volts for HART communication.

Maximum Voltage: 30 volts dc

Minimum Control Current: 4.0 mA (below 3.5 mA may cause microprocessor restart)

Overcurrent Protection: Input circuitry limits current to prevent internal damage.

Reverse Polarity Protection: No damage occurs from reversal of loop current.

Output Signal

Pneumatic signal as required by the actuator, up to 95% of supply pressure

Minimum Span: 0.5 bar (7 psig)

Maximum Span: 7 bar (101 psig)

Action: Single Acting, direct

Supply Pressure⁽¹⁾

Recommended: 0.5 bar (7 psig) greater than the maximum actuator requirements

Maximum: 7 bar (101 psig)

Temperature Limits⁽¹⁾

–40 to 85°C (–40 to 185°F). LCD may not be readable below –20°C (–4 °F).

Air Consumption⁽²⁾

Supply pressure:

At 1.5 bar (22 psig)⁽³⁾: 0.06 normal m³/h (2.3 scfh)

At 4 bar (58 psig)⁽⁴⁾: 0.12 normal m³/h (4.4 scfh)

Air Capacity⁽²⁾

Supply pressure:

At 1.5 bar (22 psig)⁽³⁾: 4.48 normal m³/h (167 scfh)

At 4 bar (58 psig)⁽⁴⁾: 9.06 normal m³/h (338 scfh)

Independent Linearity

±0.5% of output span

Electromagnetic Interference (EMI)

Tested per IEC 61326-1 (Edition 1.1). Complies with European EMC Directive. Meets emission limits for class A equipment (industrial locations) and class B equipment (domestic locations). Meets immunity requirements for industrial locations (Table A.1 in the IEC specification document). Immunity performance is shown in table 4-1.

Electrical Classification

Hazardous Area:



Intrinsic Safety and Non-incendive



Intrinsic Safety and Non-incendive

ATEX Intrinsic Safety

IECEX Intrinsic Safety

Refer to the Special Instructions for Safe Use and Installations in Hazardous Locations, tables 4-2, 4-3, 4-4, and 4-5, and figures 5-1, 5-2, 5-3, 5-4, 5-5, 5-6 and 5-7 for additional information.

Electrical Housing: Designed to meet IP66⁽⁵⁾

Connections

Standard

Supply and Output Pressure: G1/4 female

Electrical: M20 female

Optional

Supply and Output Pressure: 1/4- inch NPT female

Electrical: 1/2-inch NPT female

Materials of Construction

Housing and Cover: ASTM B85 A03600 low copper aluminum alloy

Elastomers: nitrile, fluorosilicone

Stem Travel

Minimum: 8 mm (0.3125 inch)

Maximum: 50 mm (2-inches)

4

–continued–

DVC2000 Series

Specifications (continued)

Shaft Rotation

- Minimum: 45°
- Maximum: 90°

Mounting

Designed for direct actuator mounting. For weatherproof housing capability, the vent must be positioned at the lowest point of the instrument.

Weight

1.5 kg (3.3 lbs)

Options

- **Airset:** Type 67CFR with filter
- **Language:** German, French, Italian, Spanish, Chinese, Japanese, English
- **Pipe-away vent**
- **Limit Switches:** Two isolated switches, configurable throughout calibrated travel range

Supply Voltage: 5–30 VDC
OFF State: 0.5 to 1.0 mA
ON State: 3.5 to 4.5 mA (above 5V)
Referency Accuracy: 2% of travel span⁽⁶⁾
 ■ **Transmitter:** 4–20 mA output, isolated
Supply Voltage: 8–30 VDC
Fault Indication: offrange high or low
Reference Accuracy: 1% of travel span⁽⁶⁾

Declaration of SEP

Fisher Controls International LLC declares this product to be in compliance with Article 3 paragraph 3 of the Pressure Equipment Directive (PED) 97 / 23 / EC. It was designed and manufactured in accordance with Sound Engineering Practice (SEP) and cannot bear the CE marking related to PED compliance.

However, the product *may* bear the CE marking to indicate compliance with *other* applicable EC Directives.

1. The pressure/temperature limits in this document and any applicable standard or code limitation should not be exceeded. Note: Temperature limits vary based on hazardous area approval.
 2. Normal m³/hour – Normal cubic meters per hour at 0°C and 1.01325 bar, absolute. Scfh – Standard cubic feet per hour at 60°F and 14.7 psia.
 3. Low pressure relay: 0 to 3.4 bar (0 to 50 psig).
 4. High pressure relay: 3.5 to 7.0 bar (51 to 102 psig).
 5. Approval pending. Contact your Emerson Process Management sales office for information on pending approvals.
 6. Typical values when calibrated at temperature.

Table 4-1. Immunity Performance

Port	Phenomenon	Basic Standard	Performance Criteria ⁽¹⁾
Enclosure	Electrostatic discharge (ESD)	IEC 61000-4-2	B
	Radiated EM field	IEC 61000-4-3	A
	Rated power frequency magnetic field	IEC 61000-4-8	A
I/O signal/control	Burst (fast transients)	IEC 61000-4-4	A
	Surge	IEC 61000-4-5	B
	Conducted RF	IEC 61000-4-6	A

Performance criteria is + / - 1% effect.
 1. A = No degradation during testing. B = Temporary degradation during testing, but is self-recovering.

Related Documents

Other documents containing information related to the DVC2000 Series digital valve controller include:

- FIELDVUE DVC2000 Series Digital Valve Controller (Bulletin 62.1:DVC2000)
- FIELDVUE DVC2000 Series Digital Valve Controllers Instruction Manual – Form 5772
- Supplement to HART[®] Based FIELDVUE[®] Digital Valve Controller Instruction Manuals—FIELDVUE[®] Digital Valve Controller Split Ranging – Form 5808
- Supplement to HART[®] Based FIELDVUE[®] Instrument Instruction Manuals—Using FIELDVUE[®]

Instruments with the Smart HART[®] Loop Interface and Monitor (HIM) – Form 5809

- Supplement to HART[®] Based FIELDVUE[®] Instrument Instruction Manuals— Audio Monitor for HART[®] Communications – Form 5811
- Supplement to HART[®] Based FIELDVUE[®] Instrument Instruction Manuals— HART[®] Field Communication Protocol – Form 5812
- Supplement to HART[®] Based FIELDVUE[®] Instrument Instruction Manuals— Using the HART[®] Tri-Loop™ HART[®] -to-Analog Signal Converter with FIELDVUE[®] Digital Valve Controllers – Form 5813

These documents are available from your Emerson Process Management sales office. Also visit our website at www.FIELDVUE.com.

Specifications and Related Documents

Table 4-2. Hazardous Area Classifications for Canada—CSA

CERTIFICATION BODY	CERTIFICATION OBTAINED	ENTITY RATINGS	TEMPERATURE CODE	ENCLOSURE RATING
CSA	(Intrinsic Safety) Zone Ex ia IIC T4/T5 Class/Division Class I Division 1 GP A,B,C,D per drawing GE12444	(Main Circuit) $V_{max} = 30 \text{ Vdc}$ $I_{max} = 130 \text{ mA}$ $P_i = 1.0 \text{ W}$ $C_i = 5 \text{ nF}$ $L_i = 0.55 \text{ mH}$	T4($T_{amb} < 80\text{C}$) T5($T_{amb} < 40\text{C}$)	---
	Class I Division 2 GP A,B,C,D	---	T5($T_{amb} < 80\text{C}$)	---

Table 4-3. Hazardous Area Classifications for United States—FM

CERTIFICATION BODY	CERTIFICATION OBTAINED	ENTITY RATINGS	TEMPERATURE CODE	ENCLOSURE RATING
FM	(Intrinsic Safety) Class/Division Class I Division 1 GP A,B,C,D per drawing GE10683	(Main Circuit) $V_{max} = 30 \text{ Vdc}$ $I_{max} = 130 \text{ mA}$ $P_i = 1.0 \text{ W}$ $C_i = 5 \text{ nF}$ $L_i = 0.55 \text{ mH}$	T4($T_{amb} < 80\text{C}$) T5($T_{amb} < 40\text{C}$)	---
	Class I Division 2 GP A,B,C,D	---	T5($T_{amb} < 80\text{C}$)	---

4

Table 4-4. Hazardous Area Classifications—ATEX

CERTIFICATION	CERTIFICATION OBTAINED	ENTITY RATINGS	TEMPERATURE CODE	ENCLOSURE RATING
ATEX	Ⓔ II 1 G Gas EEx ia IIC T4/T5—Intrinsic Safety	(Main Circuit) $V_{max} = 30 \text{ Vdc}$ $I_{max} = 130 \text{ mA}$ $P_i = 1.0 \text{ W}$ $C_i = 5 \text{ nF}$ $L_i = 0.55 \text{ mH}$	T4($T_{amb} < 80\text{C}$) T5($T_{amb} < 40\text{C}$)	---

Table 4-5. Hazardous Area Classifications—IECEX

CERTIFICATION	CERTIFICATION OBTAINED	ENTITY RATINGS	TEMPERATURE CODE	ENCLOSURE RATING
IECEX	Gas Ex ia IIC T4/T5—Intrinsic Safety	(Main Circuit) $V_{max} = 30 \text{ Vdc}$ $I_{max} = 130 \text{ mA}$ $P_i = 1.0 \text{ W}$ $C_i = 5 \text{ nF}$ $L_i = 0.55 \text{ mH}$	T4($T_{amb} < 80\text{C}$) T5($T_{amb} < 40\text{C}$)	---

Educational Services

For information on available courses for the DVC2000 Series digital valve controller, as well as a variety of other products, contact:

Emerson Process Management
Educational Services, Registration
P.O. Box 190; 301 S. 1st Ave.
Marshalltown, IA 50158-2823
Phone: 800-338-8158 or
Phone: 641-754-3771
FAX: 641-754-3431
e-mail: education@emersonprocess.com

Loop Schematics/Nameplates

This section includes loop schematics required for wiring of intrinsically safe installations. It also contains the approvals nameplates. If you have any questions, contact your Emerson sales office.

- 1 EQUIPMENT SHALL BE INSTALLED IN ACCORDANCE WITH THE CANADIAN ELECTRICAL CODE (CEC) PART I.
- 2 BARRIERS MUST BE CSA APPROVED WITH ENTITY PARAMETERS AND ARE TO BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S I.S. INSTALLATION INSTRUCTIONS.
- 3 THE ENTITY CONCEPT ALLOWS INTERCONNECTION OF INTRINSICALLY SAFE APPARATUS TO ASSOCIATED APPARATUS, NOT SPECIFICALLY EXAMINED IN SUCH COMBINATION. THE CRITERIA FOR INTERCONNECTION IS THAT THE VOLTAGE (V_{max}) AND THE CURRENT (I_{max}) OF THE INTRINSICALLY SAFE APPARATUS MUST BE EQUAL TO OR GREATER THAN THE VOLTAGE (V_{oc}) AND CURRENT (I_{sc}) DEFINED BY THE ASSOCIATED APPARATUS. IN ADDITION, THE SUM OF THE MAXIMUM UNPROTECTED CAPACITANCE (C_i) AND INDUCTANCE (L_i) OF EACH INTRINSICALLY SAFE APPARATUS, AND THE INTERCONNECTING WIRING, MUST BE LESS THAN THE ALLOWABLE CAPACITANCE (C_a) AND INDUCTANCE (L_a) DEFINED BY THE ASSOCIATED APPARATUS. IF THESE CRITERIA ARE MET, THEN THE COMBINATION MAY BE CONNECTED.
 FORMULAS- $V_{max} > V_{oc}$, $I_{max} > I_{sc}$, $C_i + C_{cable} < C_a$, $L_i + L_{cable} < L_a$

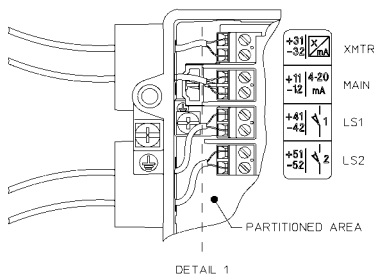
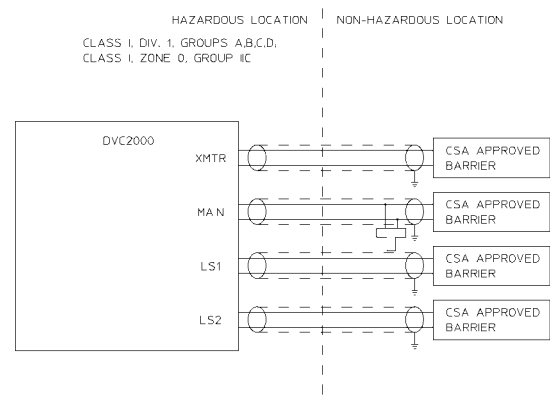
4 ENTITY PARAMETERS FOR EACH I.S. CIRCUIT ARE AS FOLLOWS:

CIRCUIT	V_{max} (V)	I_{max} (I)	C_i	L_i	P_{max}
XMTR	28Vdc	100mA	5nF	0mH	1W
MAIN	30Vdc	130mA	5nF	0.55mH	1W
LS1	16Vdc	76mA	5nF	0mH	1W
LS2	16Vdc	76mA	5nF	0mH	1W

5 WHERE MULTIPLE IS CIRCUITS ARE USED:

- EACH I.S. CIRCUIT MUST USE SHIELDED TWISTED PAIR CABLE.
- I.S. CIRCUITS MUST ENTER ENCLOSURE VIA CONDUIT ENTRIES AS SPECIFIED IN DETAIL 1.
- CABLE INSULATION AND SHIELD MUST EXTEND TO WITHIN PARTITIONED AREA (SEE DETAIL 1).
- XMTR, LS1, AND LS2 CIRCUITS ARE OPTIONAL.

6 IF HAND-HELD COMMUNICATOR OR MULTIPLEXER IS USED, IT MUST BE CSA CERTIFIED WITH ENTITY PARAMETERS AND INSTALLED PER THE MANUFACTURER'S CONTROL DRAWING.



GE12444

DETAIL 1

Figure 5-1. CSA Loop Schematic

DVC2000 Series

1. INSTALLATION MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE (NEC) AND ANSI/ISA RP12.6.
2. BARRIERS MUST BE CONNECTED PER MANUFACTURER'S INSTALLATION INSTRUCTIONS.
3. THE ENTITY CONCEPT ALLOWS INTERCONNECTION OF INTRINSICALLY SAFE APPARATUS TO ASSOCIATED APPARATUS, NOT SPECIFICALLY EXAMINED IN SUCH COMBINATION. THE CRITERIA FOR INTERCONNECTION IS THAT THE VOLTAGE (V_{max}) AND THE CURRENT (I_{max}) OF THE INTRINSICALLY SAFE APPARATUS MUST BE EQUAL TO OR GREATER THAN THE VOLTAGE (V_{oc}) AND CURRENT (I_{sc}) DEFINED BY THE ASSOCIATED APPARATUS. IN ADDITION, THE SUM OF THE MAXIMUM UNPRODUCED CAPACITANCE (C_i) AND INDUCTANCE (L_i) OF EACH INTRINSICALLY SAFE APPARATUS, AND THE INTERCONNECTING WIRING, MUST BE LESS THAN THE ALLOWABLE CAPACITANCE (C_o) AND INDUCTANCE (L_o) DEFINED BY THE ASSOCIATED APPARATUS. IF THESE CRITERIA ARE MET, THEN THE COMBINATION MAY BE CONNECTED.
 $V_{max} > V_{oc}$ or V_i $C_i + C_{cable} < C_o$ $I_{max} > I_{sc}$ or I_i $L_i + L_{cable} < L_o$

4. ENTITY PARAMETERS FOR EACH I.S. CIRCUIT ARE AS FOLLOWS:

CIRCUIT	V_{max} (V)	I_{max} (A)	C_i	L_i	P_{max}
XMTR	28Vdc	100mA	5nF	0mH	1W
MAIN	30Vdc	130mA	5nF	0.55mH	1W
LS1	16Vdc	76mA	5nF	0mH	1W
LS2	16Vdc	76mA	5nF	0mH	1W

5. WHERE MULTIPLE IS CIRCUITS ARE USED:

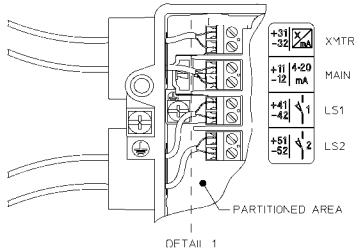
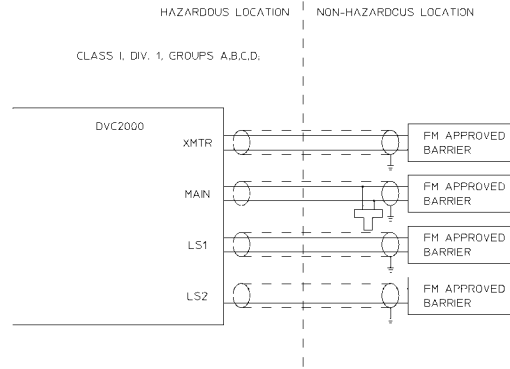
- EACH I.S. CIRCUIT MUST USE SHIELDED TWISTED PAIR CABLE.
- I.S. CIRCUITS MUST ENTER ENCLOSURE VIA CONDUIT ENTRIES AS SPECIFIED IN DETAIL 1.
- CABLE INSULATION AND SHIELD MUST EXTEND TO WITHIN PARTITIONED AREA (SEE DETAIL 1).
- XMTR, LS1, AND LS2 CIRCUITS ARE OPTIONAL.

6. CLASS I, DIV 2 APPLICATIONS MUST BE INSTALLED AS SPECIFIED IN NEC ARTICLE 501-4(B). EQUIPMENT AND FIELD WIRING IS NON-INDUCTIVE WHEN CONNECTED TO APPROVED BARRIERS WITH ENTITY PARAMETERS.

7. MAXIMUM SAFE AREA VOLTAGE SHOULD NOT EXCEED 250 V_{rms} .

8. RESISTANCE BETWEEN BARRIER GROUND AND EARTH GROUND MUST BE LESS THAN ONE OHM.

9. IF HAND-HELD COMMUNICATOR OR MULTIPLEXER IS USED, IT MUST BE FM APPROVED WITH ENTITY PARAMETERS AND INSTALLED PER THE MANUFACTURER'S CONTROL DRAWING.



GE10683

Figure 5-2. FM Loop Schematic

TYPE DVC2000

SN

MAX CURRENT: 30mA MAX VOLTAGE: 30VDC
 MAX SUPPLY: 100psi AMBIENT TEMP: -40°..80°C

FM

CSA
 CL I DIV 2 GP ABCD T5
 Ex ia INTRINSICALLY SAFE
 CL I DIV 1 GP ABCD PER DWG GE12444
 Ex ia IIC T4(Tamb ≤ 80°C), T5(Tamb ≤ 40°C)
 PER DWG GE12444

FISHER CONTROLS INTL LLC
 MARSHALLTOWN, IOWA, USA
 MFG LOCATION:

APPROVED
 NI: CL I DIV 2 GP ABCD T5
 IS: CL I DIV 1 GP ABCD PER DWG GE10683

WARNING:
 SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY AND/OR SUITABILITY FOR DIVISION 2.
 DO NOT DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF.

REFER TO MANUAL FOR ADDITIONAL WARNINGS AND LIMITS

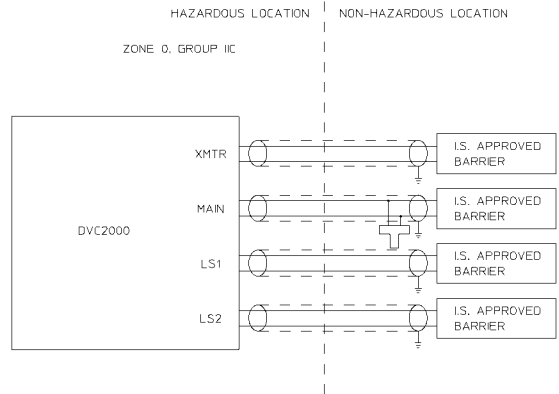
GE13850

Figure 5-3. CSA and FM Approvals Nameplate; Intrinsic Safety, Class I Division 2, Zone 0

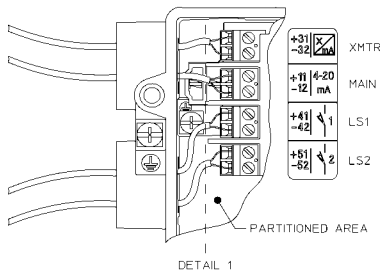
Loop Schematics/Nameplates

- 1 INSTALLATION MUST BE IN ACCORDANCE WITH THE NATIONAL WIRING PRACTICES OF THE COUNTRY IN USE.
- 2 BARRIERS MUST BE CONNECTED PER MANUFACTURER'S INSTALLATION INSTRUCTIONS.
- 3 INTRINSICALLY SAFE APPARATUS MAY BE CONNECTED TO ASSOCIATED APPARATUS NOT SPECIFICALLY EXAMINED IN SUCH COMBINATION. THE CRITERIA FOR INTERCONNECTION IS THAT THE VOLTAGE (U_i) AND THE CURRENT (I_i) OF THE INTRINSICALLY SAFE APPARATUS MUST BE EQUAL TO OR GREATER THAN THE VOLTAGE (U_o) AND CURRENT (I_o) DEFINED BY THE ASSOCIATED APPARATUS. IN ADDITION, THE SUM OF THE MAXIMUM UNPROTECTED CAPACITANCE (C_i) AND INDUCTANCE (L_i) OF EACH INTRINSICALLY SAFE APPARATUS, AND THE INTERCONNECTING WIRING, MUST BE LESS THAN THE ALLOWABLE CAPACITANCE (C_o) AND INDUCTANCE (L_o) DEFINED BY THE ASSOCIATED APPARATUS. IF THESE CRITERIA ARE MET, THEN THE COMBINATION MAY BE CONNECTED.
 FORMULAS
 $U_i > U_o$
 $I_i > I_o$
 $C_i + C_{cable} < C_o$
 $L_i + L_{cable} < L_o$
 $P_i > P_o$
- 4 ENTITY PARAMETERS FOR EACH I.S. CIRCUIT ARE AS FOLLOWS:

CIRCUIT	U_i	I_i	C_i	L_i	P_i
XMTR	28Vdc	100mA	5nF	0mH	1W
MAIN	30Vdc	130mA	5nF	0.55mH	1W
LS1	16Vdc	76mA	5nF	0mH	1W
LS2	16Vdc	76mA	5nF	0mH	1W
- 5 WHERE MULTIPLE I.S. CIRCUITS ARE USED:
 - EACH I.S. CIRCUIT MUST USE SHIELDED TWISTED PAIR CABLE.
 - I.S. CIRCUITS MUST ENTER ENCLOSURE VIA CONDUIT ENTRIES AS SPECIFIED IN DETAIL 1.
 - CABLE INSULATION AND SHIELD MUST EXTEND TO WITHIN PARTITIONED AREA (SEE DETAIL 1).
 - XMTR, LS1, AND LS2 CIRCUITS ARE OPTIONAL.
- 6 RESISTANCE BETWEEN BARRIER GROUND AND EARTH GROUND MUST BE LESS THAN ONE OHM.
- 7 IF HAND-HELD COMMUNICATOR OR MULTIPLEXER IS USED, IT MUST BE APPROVED WITH ENTITY PARAMETERS AND INSTALLED PER THE MANUFACTURER'S CONTROL DRAWING.



5



GE14685

Figure 5-4. ATEX Loop Schematic

TYPE DVC2000 **HART**
FIELD COMMUNICATING TECHNOLOGY

SN **FISHER**[®]

MAX CURRENT: 30mA --- MAX VOLTAGE: 30VDC ---
 MAX SUPPLY: 100psi --- AMBIENT TEMP: -40°.80°C

CE 1180 EX II 1 G

LCIE 05 ATEX 6009X
EEx ia IIC T4(Tamb ≤ 80°C), T5(Tamb ≤ 40°C)
INSTALL PER DRAWING GE14685

WARNING:
 SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY.

REFER TO MANUAL FOR ADDITIONAL WARNINGS AND LIMITS GE14381

Figure 5-5. ATEX Nameplate; Intrinsic Safety

DVC2000 Series

- 1 INSTALLATION MUST BE IN ACCORDANCE WITH THE NATIONAL WIRING PRACTICES OF THE COUNTRY IN USE.
- 2 BARRIERS MUST BE CONNECTED PER MANUFACTURER'S INSTALLATION INSTRUCTIONS.
- 3 INTRINSICALLY SAFE APPARATUS MAY BE CONNECTED TO ASSOCIATED APPARATUS NOT SPECIFICALLY EXAMINED IN SUCH COMBINATION. THE CRITERIA FOR INTERCONNECTION IS THAT THE VOLTAGE (U_i) AND THE CURRENT (I_i) OF THE INTRINSICALLY SAFE APPARATUS MUST BE EQUAL TO OR GREATER THAN THE VOLTAGE (U_o) AND CURRENT (I_o) DEFINED BY THE ASSOCIATED APPARATUS. IN ADDITION, THE SUM OF THE MAXIMUM UNPROTECTED CAPACITANCE (C_i) AND INDUCTANCE (L_i) OF EACH INTRINSICALLY SAFE APPARATUS, AND THE INTERCONNECTING WIRING, MUST BE LESS THAN THE ALLOWABLE CAPACITANCE (C_o) AND INDUCTANCE (L_o) DEFINED BY THE ASSOCIATED APPARATUS. IF THESE CRITERIA ARE MET, THEN THE COMBINATION MAY BE CONNECTED.

FORMULAS
 $U_i > U_o$
 $I_i > I_o$
 $C_i + C_{cable} < C_o$
 $L_i + L_{cable} < L_o$
 $P_i > P_o$

- 4 ENTITY PARAMETERS FOR EACH I.S. CIRCUIT ARE AS FOLLOWS:

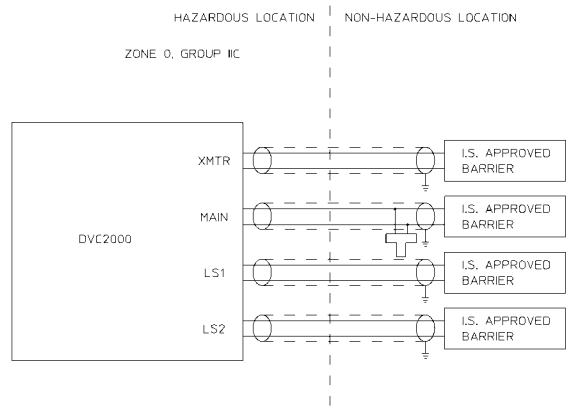
CIRCUIT	U _i	I _i	C _i	L _i	P _i
XMTR	28Vdc	100mA	5nF	0mH	1W
MAIN	30Vdc	130mA	5nF	0.55mH	1W
LS1	16Vdc	76mA	5nF	0mH	1W
LS2	16Vdc	76mA	5nF	0mH	1W

- 5 WHERE MULTIPLE I.S. CIRCUITS ARE USED:

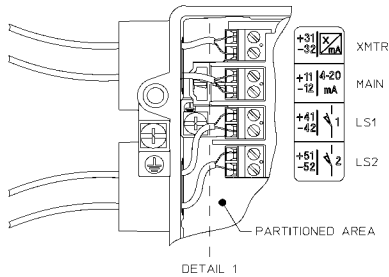
- EACH I.S. CIRCUIT MUST USE SHIELDED TWISTED PAIR CABLE.
- I.S. CIRCUITS MUST ENTER ENCLOSURE VIA CONDUIT ENTRIES AS SPECIFIED IN DETAIL 1.
- CABLE INSULATION AND SHIELD MUST EXTEND TO WITHIN PARTITIONED AREA (SEE DETAIL 1).
- XMTR, LS1, AND LS2 CIRCUITS ARE OPTIONAL.

- 6 RESISTANCE BETWEEN BARRIER GROUND AND EARTH GROUND MUST BE LESS THAN ONE OHM.

- 7 IF HAND-HELD COMMUNICATOR OR MULTIPLEXER IS USED, IT MUST BE APPROVED WITH ENTITY PARAMETERS AND INSTALLED PER THE MANUFACTURER'S CONTROL DRAWING.



5



GE14581

Figure 5-6. IECEx Loop Schematic

TYPE DVC2000

SN

MAX CURRENT: 30mA --- MAX VOLTAGE: 30VDC ---
 MAX SUPPLY: 100psi --- AMBIENT TEMP: -40°.80°C

FISHER[®]

FISHER CONTROLS INTL LLC
 MARSHALLTOWN, IOWA, USA
 MFG LOCATION:

IECEx CSA 05.0006X
Ex ia IIC T4(Tamb ≤ 80°C), T5(Tamb ≤ 40°C)
INSTALL PER DRAWING GE14581

WARNING:
 SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY.

REFER TO MANUAL FOR ADDITIONAL WARNINGS AND LIMITS

GE14380

Figure 5-7. IECEx Nameplate; Intrinsic Safety

DVC2000 Series

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