Fisher® FIELDVUE™ DVC6000 SIS Digital Valve Controllers for Safety Instrumented System (SIS) Solutions

Contents

This guide applies to:
DVC6010 SIS, DVC6020 SIS, and
DVC6030 SIS digital valve controllers

Device Type	*03*	*03*
Device Revision	*1*	*2*
Hardware Revision	*1*	*1*
Firmware Revision	*2-6*	*7, 9, 10 & 11*
DD Revision	*4*	*8*

Note

This guide provides installation, and initial setup and calibration information for DVC6000 SIS digital valve controllers.

The following documents are also required when installing and setting up a DVC6000 SIS digital valve controller:

- FIELDVUE DVC6000 SIS Digital Valve Controllers for Safety Instrumented System (SIS) Solutions Instruction Manual (D103230X012)
- Safety Manual for FIELDVUE DVC6000 Digital Valve Controllers for Safety Instrumented System (SIS) Solutions 0-20 mA or 0-24 VDC (D103035X012) *or*
- Safety Manual for FIELDVUE DVC6000 Digital Valve Controllers for Safety Instrumented System (SIS) Solutions 4-20 mA (D103294X012)

Contact your Emerson Process Management sales office for additional information, or visit our website at www.FIELDVUE.com.

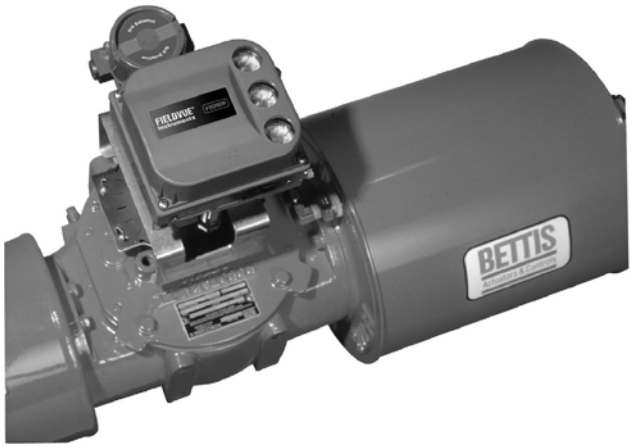
PlantWeb
HART COMMUNICATION PROTOCOL
FISHER

EMERSON
Process Management

Product Description

DVC6000 SIS digital valve controllers (figure 1) are communicating, microprocessor-based current-to-pneumatic instruments. The DVC6000 SIS digital valve controller monitors the health of final control elements and solenoid valves; the primary function of the DVC6000 SIS digital valve controller is to actuate its pneumatic outputs in response to a demand signal from a logic solver, which should move the valve to the configured safe state. Using HART communications protocol, the DVC6000 SIS allows easy access to information critical to process operation.

Figure 1. FIELDVUE DVC6030 SIS Digital Valve Controller Mounted on a Quarter-Turn Actuator



W8308-3 SIS

Using DVC6000 SIS instruments permits partial stroking of the valve to minimize the chance of valve failure upon a safety demand and, consequently, the possibility of catastrophic situations. A partial stroke test verifies valve movement with a small ramp to the input. This ramp is small enough not to disrupt production, but is large enough to confirm that the valve is working. DVC6000 SIS instruments also provide state-of-the-art testing methods, which reduce testing and maintenance time, improve system performance, and provide diagnostic capabilities.

Using the HART protocol, information from the field can be integrated into control systems or be received on a single loop basis.

Use of this Guide

This guide describes how to install, setup, and calibrate DVC6000 SIS digital valve controllers. Additional information for installing, operating, and maintaining the DVC6000 SIS can be found in the related documents listed on page 50. Refer to table 1 for details on the capabilities of the DVC6000 SIS.

Table 1. DVC6000 SIS Capabilities

Auto Calibration
Custom Characterization
Alerts
Step Response, Drive Signal Test & Dynamic Error Band
Advanced Diagnostics (Valve Signature)
Performance Tuner
Performance Diagnostics(1)
Solenoid Valve Health Monitoring(1)
Partial Stroke Testing
1. Available in Firmware Revision 7 and higher.

This guide describes instrument setup and calibration using a 475 Field Communicator. For information on using the Field Communicator, see the 475 Field Communicator User's Manual, available from your Emerson Process Management sales office.

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

Do not install, operate, or maintain a DVC6000 SIS digital valve controller without being fully trained and qualified in valve, actuator, and accessory installation, operation, and maintenance. **To avoid personal injury or property damage, it is important to carefully read, understand, and follow all contents of this quick start guide, including all safety cautions and warnings.** If you have any questions about these instructions, contact your Emerson Process Management sales office before proceeding.

Displaying the Field Communicator Device Description Revision Number

Device Description (DD) revision identifies the version of the Fisher Device Description that resides in the Field Communicator. The device description defines how the Field Communicator interacts with the user and instrument. You can display the DD revision from the Offline or Online menu.

Offline Menu—To see the Field Communicator device description revision number from the Offline menu, select *Utility*, *Simulation*, *Fisher Controls*, and *DVC6000*.

Online Menu—To see the Field Communicator device description revision number from the Online menu, connect the Field Communicator to an instrument connected to a source supplying a 4 to 20 mA signal. From the Online menu, select *Overview* and *DD Information*.

Displaying the FIELDVUE Instrument Firmware Revision Number

To view the instrument firmware revision, connect the Field Communicator to an instrument connected to a source supplying a 4-20 mA signal. From the Online menu, select *Overview, Device Information*, and *Firmware Revision*.

Installation

The DVC6000 SIS can be used with either air or natural gas as the supply medium. If using natural gas as the pneumatic supply medium, natural gas will be used in the pneumatic output connections of the DVC6000 SIS to any connected equipment. In normal operation the unit will vent the supply medium into the surrounding atmosphere unless it is remotely vented. When using natural gas as the supply medium, in a non-hazardous location in a confined area, remote venting of the unit is required. Failure to do so could result in personal injury, property damage, and area re-classification. For hazardous locations remote venting of the unit may be required, depending upon the area classification, and as specified by the requirements of local, regional, and national codes, rules and regulations. Failure to do so when necessary could result in personal injury, property damage, and area re-classification.

⚠ WARNING

Avoid personal injury or property damage from sudden release of process pressure or bursting of parts. Before proceeding with any Installation procedures:

- **Always wear protective clothing, gloves, and eyewear to prevent personal injury or property damage.**
- **Check with your process or safety engineer for any additional measures that must be taken to protect against process media.**

  If installing into an existing application:
- **Do not remove the actuator from the valve while the valve is still pressurized.**
- **Personal injury or property damage may result from fire or explosion if natural gas is used as the supply medium and appropriate preventive measures are not taken. Preventive measures may include, but are not limited to, one or more of the following: Remote venting of the unit, re-evaluating the hazardous area classification, ensuring adequate ventilation, and the removal of any ignition sources. For information on remote venting of this controller, refer to page 20.**
- **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 valve.**
- **Use bypass valves or completely shut off the process to isolate the valve from process pressure. Relieve process pressure from both sides of the valve.**
- **Use lock-out procedures to be sure that the above measures stay in effect while you work on the equipment.**
- **Vent the pneumatic actuator loading pressure and relieve any actuator spring precompression so the actuator is not applying force to the valve stem; this will allow for the safe removal of the stem connector.**

⚠ WARNING

To avoid static discharge from the plastic cover when flammable gases or dust are present, do not rub or clean the cover with solvents. To do so could result in a spark that may cause the flammable gases or dust to explode, resulting in personal injury or property damage. Clean with a mild detergent and water only.

⚠ WARNING

This unit vents the supply medium into the surrounding atmosphere. When installing this unit in a non-hazardous (non-classified) location in a confined area, with natural gas as the supply medium, you must remotely vent this unit to a safe location. Failure to do so could result in personal injury or property damage from fire or explosion, and area re-classification.

When installing this unit in a hazardous (classified) location remote venting of the unit may be required, depending upon the area classification, and as specified by the requirements of local, regional, and national codes, rules and regulations.

Failure to do so when necessary could result in personal injury or property damage from fire or explosion, and area re-classification.

Vent line piping should comply with local and regional codes and should be as short as possible with adequate inside diameter and few bends to reduce case pressure buildup.

In addition to remote venting of the unit, ensure that all caps and covers are correctly installed. Failure to do so could result in personal injury or property damage from fire or explosion, and area re-classification.

Hazardous Area Classifications and 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/wiring requirements and/or conditions of safe use. These special instructions for "safe use" are in addition to, and may override, the standard installation procedures. Special instructions are listed by approval.

⚠ 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.

Note

This information supplements the nameplate markings affixed to the product.

Always refer to the nameplate itself to identify the appropriate certification. Contact your Emerson Process Management sales office for approval/certification information not listed here.

Approval information is for both aluminum and stainless steel constructions.

CSA

No special conditions for safe use.

Refer to table 2 for approval information, figure 28 for the CSA loop schematic, and figure 29 for a typical CSA/FM nameplate.

Table 2. Hazardous Area Classifications—CSA (Canada)

Certification Body	Certification Obtained	Entity Rating	Temperature Code	Enclosure Rating
CSA	Ex ia Intrinsically Safe Class I,II,III Division 1 GP A,B,C,D,E,F,G per drawing GE42818 Natural Gas Approved	Vmax = 30 VDC Imax = 226 mA Ci = 5 nF Li = 0.55 mH Pi = 1.4 W	T5(Tamb ≤ 80°C) T6(Tamb ≤ 75°C)	Type 4X, IP66 Single Seal Device
	Explosion-proof Class I Division 1 GP B,C,D Natural Gas Approved	---	T5(Tamb ≤ 80°C) T6(Tamb ≤ 75°C)	Type 4X, IP66 Single Seal Device
	Class I Division 2 GP A,B,C,D Class II Division 1 GP E,F,G Class II Division 2 GP F,G Class III Natural Gas Approved	---	T5(Tamb ≤ 80°C) T6(Tamb ≤ 75°C)	Type 4X, IP66 Single Seal Device

FM

Special Conditions of Safe Use

Intrinsically Safe, Explosion-proof, Non-incendive, Dust Ignition-proof

1. When product is used with natural gas as the pneumatic medium, the maximum working pressure of the natural gas supply shall be limited to 145 psi.
2. When product is used with natural gas as the pneumatic medium the product shall not be permitted in a Class I, Division 2, Group A, B, C, D location without the proper venting installation as per the manufacturer's instruction manual.
3. The apparatus enclosure contains aluminum and is considered to constitute a potential risk of ignition by impact or friction. Care must be taken into account during installation and use to prevent impact or friction.
4. Parts of the enclosure are constructed from plastic. To prevent risk of electrostatic sparking, the plastic surface should only be cleaned with a damp cloth.

Refer to table 3 for additional approval information, figure 30 for the FM loop schematic, and figure 29 for a typical CSA/FM nameplate.

Table 3. Hazardous Area Classifications—FM (United States)

Certification Body	Certification Obtained	Entity Rating	Temperature Code	Enclosure Rating
FM	IS Intrinsically Safe Class I,II,III Division 1 GP A,B,C,D,E,F,G per drawing GE42819 Natural Gas Approved	Vmax = 30 VDC Imax = 226 mA Ci = 5 nF Li = 0.55 mH Pi = 1.4 W	T5(Tamb ≤ 80°C) T6(Tamb ≤ 75°C)	Type 4X, IP66 Single Seal Device
	XP Explosion-proof Class I Division 1 GP B,C,D NI Non-incendive Class I Division 2 GP A,B,C,D DIP Dust Ignition-proof Class II, III Division 1 GP E,F,G S Suitable for Use Class II, III Division 2 GP F,G Natural Gas Approved	---	T5(Tamb ≤ 80°C) T6(Tamb ≤ 75°C)	Type 4X, IP66 Single Seal Device

ATEX

Special Conditions for Safe Use

Intrinsically Safe

1. This apparatus can only be connected to an intrinsically safe certified equipment and this combination must be compatible as regards the intrinsically safe rules.
2. The electrical parameters of this equipment must not exceed any following values:
   Uo ≤ 30 V; Io ≤ 226 mA; Po ≤ 1.4 W
3. Operating ambient temperature: -52°C or -40°C to + 80°C
4. For the model with aluminum body: the apparatus must not be submitted to frictions or mechanical impacts.
5. Covered by standards EN 60079-0 (2009), EN 60079-11 (2012), EN 60079-26 (2007).
6. Install per drawing GE60771.

Flameproof

Operating ambient temperature: -52°C or -40°C to + 85°C

Type n

Operating ambient temperature: -52°C or -40°C to + 80°C

Refer to table 4 for additional approval information, figure 31 for the ATEX loop schematic and figure 32 for typical ATEX nameplates.

Table 4. Hazardous Area Classifications—ATEX

Certificate	Certification Obtained	Entity Rating	Temperature Code	Enclosure Rating
ATEX	⟨Ex⟩ II 1 G & D Intrinsically Safe Gas Ex ia IIC T5/T6 Ga Dust Ex ia IIIC T85°C (Ta ≤ +73°C), T92°C (Ta ≤ +80°C) Da Per drawing GE60771 Natural Gas Approved	Ui = 30 VDC Ii = 226 mA Ci = 5 nF Li = 0.55 mH Pi = 1.4 W	T5(Tamb ≤ 80°C) T6(Tamb ≤ 75°C)	IP66 Single Seal Device
	⟨Ex⟩ II 2 G Flameproof Gas Ex d IIC T5/T6 Gb Natural Gas Approved	- - -	T5(Tamb ≤ 85°C) T6(Tamb ≤ 80°C)	IP66 Single Seal Device
	⟨Ex⟩ II 3 G & D Type n Gas Ex nCnL IIC T5/T6 Dust Ex tD A22 IP66 T85°C (Tamb ≤ 80°C) Ex tD A22 IP66 T80°C (Tamb ≤ 75°C) Natural Gas Approved	- - -	T5(Tamb ≤ 80°C) T6(Tamb ≤ 75°C)	IP66 Single Seal Device

IECEx

Conditions of Certification

Intrinsically Safe, Flameproof, Type n

Ex ia /Ex nC / Ex d

⚠ WARNING

Electrostatic charge hazard. Do not rub or clean with solvents. To do so could result in an explosion.

Ex nC / EX d

Do not open while energized.

Refer to table 5 for additional approval information, figure 34 for the IECEx loop schematic and figure 33 for a typical IECEx nameplate.

Table 5. Hazardous Area Classifications—IECEx

Certificate	Certification Obtained	Entity Rating	Temperature Code	Enclosure Rating
IECEx	Intrinsically Safe Gas Ex ia IIC T5/T6 per drawing GE42990 Natural Gas Approved	Ui = 30 VDC Ii = 226 mA Ci = 5 nF Li = 0.55 mH Pi = 1.4 W	T5(Tamb ≤ 80°C) T6(Tamb ≤ 75°C)	IP66 Single Seal Device
	Flameproof Gas Ex d IIC T5/T6 Natural Gas Approved	---	T5(Tamb ≤ 80°C) T6(Tamb ≤ 75°C)	IP66 Single Seal Device
	Type n Gas Ex nC IIC T5/T6 Natural Gas Approved	---	T5(Tamb ≤ 80°C) T6(Tamb ≤ 75°C)	IP66 Single Seal Device

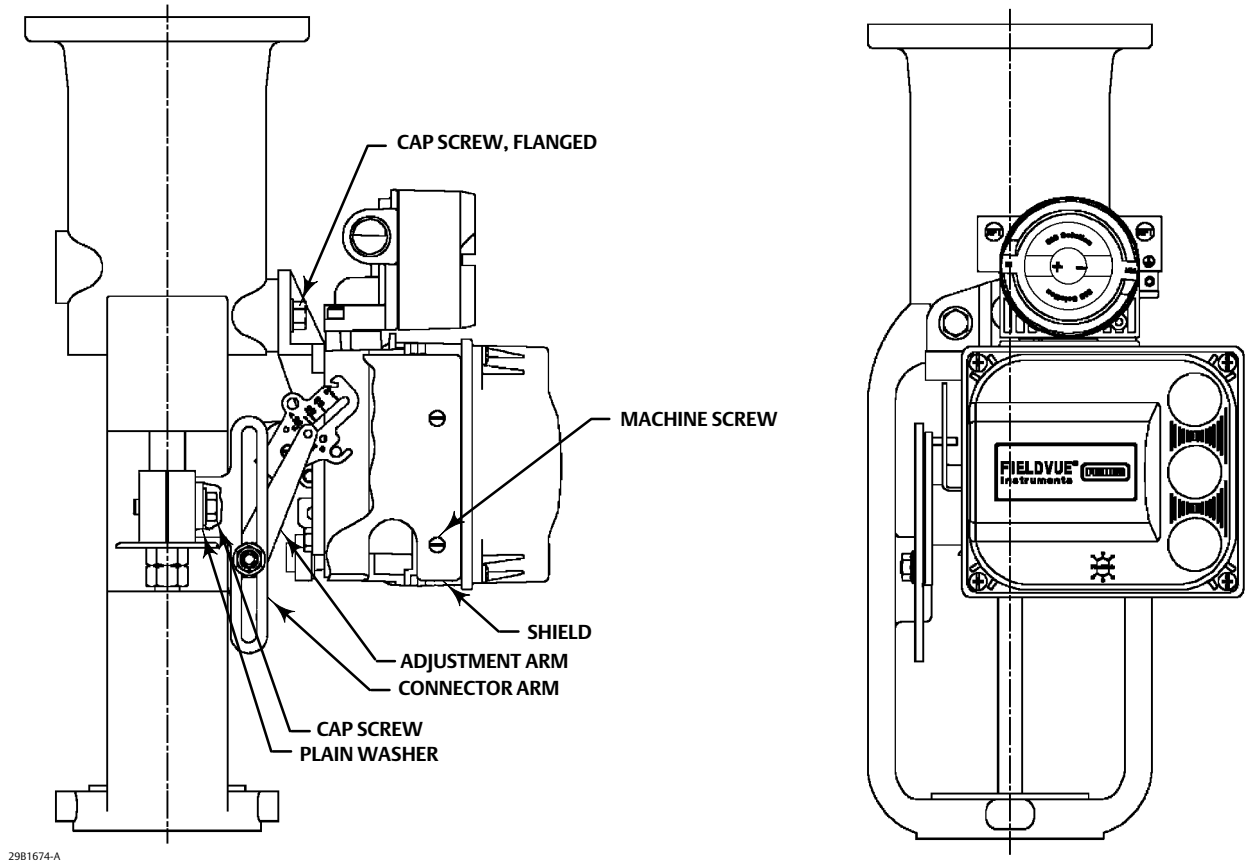
Mounting Standard DVC6000 SIS Digital Valve Controllers

If ordered as part of a control valve assembly, the factory mounts the digital valve controller on the actuator, makes pneumatic connections to the actuator, sets up, and calibrates 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. See the instructions that come with the mounting kit for detailed information on mounting the digital valve controller to a specific actuator model.

Guidelines for Mounting DVC6010 SIS on Sliding-Stem Actuators Up to 102 mm (4 Inches) of Travel

The DVC6010 SIS digital valve controller mounts on sliding-stem actuators with up to 102 mm (4 inch) travel. Figure 2 shows a typical mounting on an actuator with up to 51 mm (2 inch) travel. Figure 3 shows a typical mounting on actuators with 51 to 102 mm (2 to 4 inch) travel. For actuators with greater than 102 mm (4 inch) travel, see the guidelines for mounting a DVC6020 SIS digital valve controller.

Figure 2. FIELDVUE DVC6010 SIS Digital Valve Controller Mounted on Sliding-Stem Actuators with up to 2 Inches Travel



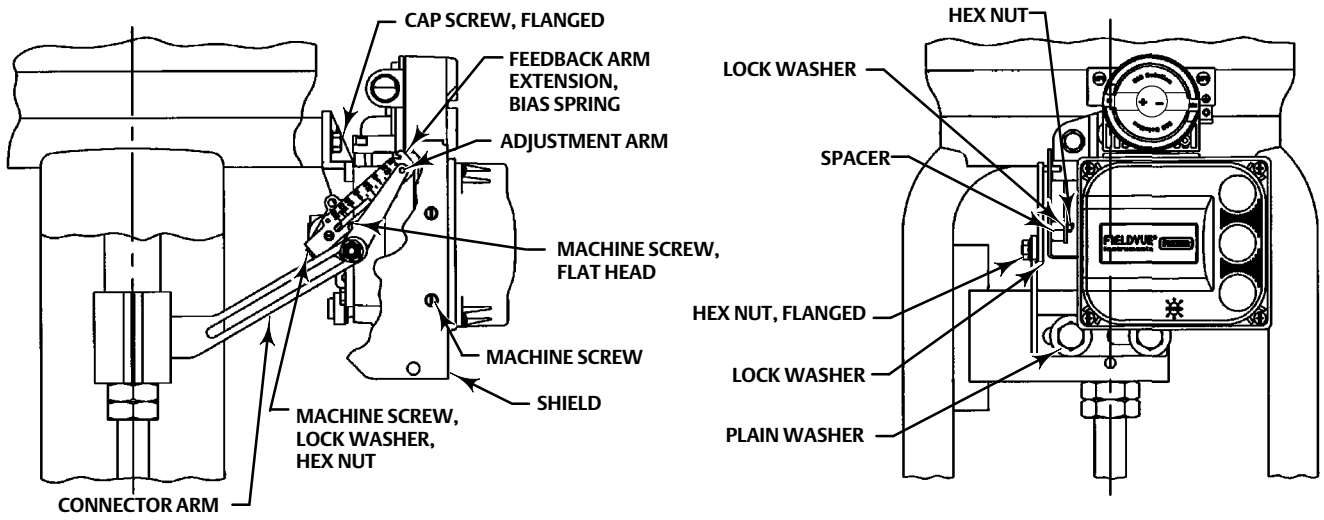
Note

Do not use the stainless steel DVC6010S SIS in high vibration service where the mounting bracket uses standoffs (spacers) to mount to the actuator.

Refer to the following guidelines when mounting on sliding-stem actuators with up to 4 inches of travel.

1. Isolate the control valve from the process line pressure and release pressure from both sides of the valve body. Shut off all pressure lines to the actuator, releasing all pressure from the actuator. Use lock-out procedures to be sure that the above measures stay in effect while you work on the equipment.
2. Attach the connector arm to the valve stem connector.
3. Attach the mounting bracket to the digital valve controller housing.
4. If valve travel exceeds 2 inches, a feedback arm extension is attached to the existing 2-inch feedback arm. Remove the existing bias spring from the 2-inch feedback arm. Attach the feedback arm extension to the feedback arm as shown in figure 3.

Figure 3. FIELDVUE DVC6010 SIS Digital Valve Controller Mounted on Sliding-Stem Actuators with 2 to 4 Inches Travel



5. Mount the digital valve controller on the actuator as described in the mounting kit instructions.
6. Set the position of the feedback arm on the digital valve controller to the no air position by inserting the alignment pin through the hole on the feedback arm as follows:

- For air-to-open actuators (i.e., the actuator stem retracts into the actuator casing or cylinder as air pressure to the casing or lower cylinder increases), insert the alignment pin into the hole marked “A”. For this style actuator, the feedback arm rotates counterclockwise, from A to B, as air pressure to the casing or lower cylinder increases.

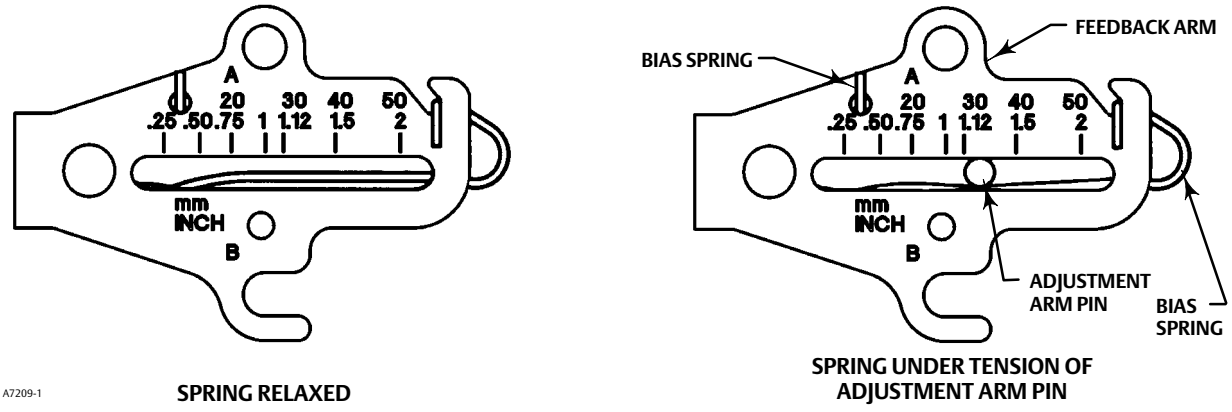
- For air-to-close actuators (i.e., the actuator stem extends from the actuator casing or cylinder as air pressure to the casing or upper cylinder increases), insert the alignment pin into the hole marked “B”. For this style actuator, the feedback arm rotates clockwise, from B to A, as air pressure to the casing or upper cylinder increases.

Note

When performing the following steps, ensure there is enough clearance between the adjustment arm and the feedback arm to prevent interference with the bias spring.

7. Apply anti-seize to the pin of the adjustment arm. As shown in figure 4, place the pin into the slot of the feedback arm or feedback arm extension so that the bias spring loads the pin against the side of the arm with the valve travel markings.
8. Install the external lock washer on the adjustment arm. Position the adjustment arm in the slot of the connector arm and loosely install the flanged hex nut.
9. Slide the adjustment arm pin in the slot of the connector arm until the pin is in line with the desired valve travel marking. Tighten the flanged hex nut.
10. Remove the alignment pin and store it in the module base next to the I/P assembly.
11. After calibrating the instrument, attach the shield with two machine screws.

Figure 4. Locating Adjustment Arm Pin in Feedback Arm



Guidelines for Mounting DVC6020 SIS Sliding-Stem Actuators and Rotary Actuators

DVC6020 SIS digital valve controllers use a cam (designed for linear response) and roller as the feedback mechanism. Figure 5 shows the DVC6020 SIS mounted on rotary actuators.

Note

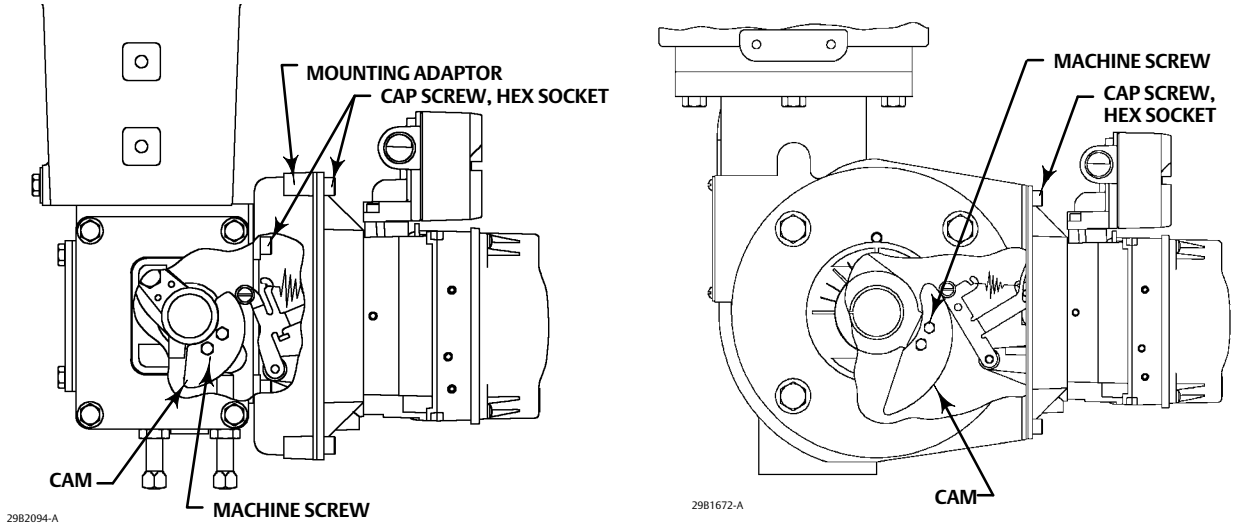
All cams supplied with FIELDVUE mounting kits are characterized to provide a linear response.

Note

Do not use the stainless steel DVC6020S SIS in high vibration service where the mounting bracket uses standoffs (spacers) to mount to the actuator.

As shown in figure 5, two feedback arms are available for the digital valve controller. Installations on Fisher 1051 size 33 and 1052 size 20 and 33 actuators use the short feedback arm [54 mm (2.13 inches) from roller to pivot point]. Most other use the long feedback arm. Make sure the correct feedback arm is installed on the digital valve controller before beginning the mounting procedure.

Figure 5. FIELDVUE DVC6020 SIS Digital Valve Controller Mounted on Rotary Actuators



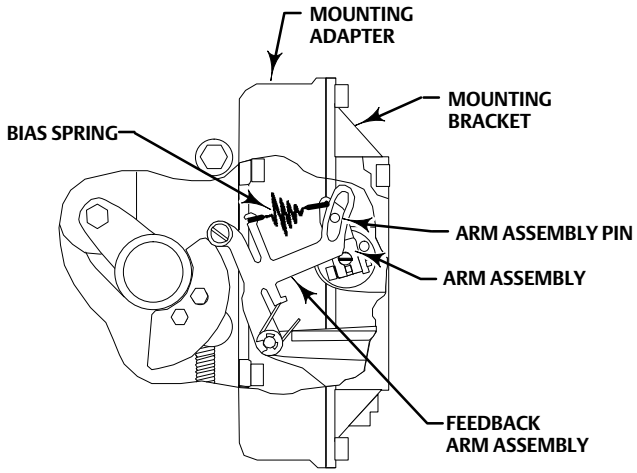
TYPICAL MOUNTING WITH SHORT FEEDBACK ARM (FISHER 1052 SIZE 33 ACTUATOR SHOWN)

TYPICAL MOUNTING WITH LONG FEEDBACK ARM (FISHER 1061 SIZE 30-68 ACTUATOR SHOWN)

Refer to figure 5 for parts locations. Refer to the following guidelines when mounting on rotary actuators:

1. Isolate the control valve from the process line pressure and release pressure from both sides of the valve body. Shut off all pressure lines to the pneumatic actuator, releasing all pressure from the actuator. Use lock-out procedures to be sure that the above measures stay in effect while working on the equipment.
2. If a cam is not already installed on the actuator, install the cam as described in the instructions included with the mounting kit.
3. If a mounting plate is required, fasten the mounting plate to the actuator.
4. For applications that require remote venting, a pipe-away bracket kit is available. Follow the instructions included with the kit to replace the existing mounting bracket on the digital valve controller with the pipe-away bracket and to transfer the feedback parts from the existing mounting bracket to the pipe-away bracket.
5. Apply anti-seize to the pin of the adjustment arm as shown in figure 6.

Figure 6. Locating Adjustment Arm Pin in Feedback Arm of a FIELDVUE DVC6020 SIS Digital Valve Controller



6. Mount the DVC6020 SIS on the actuator as follows:

- If required, a mounting adaptor is included in the mounting kit. Attach the adaptor to the actuator as shown in figure 5. Then attach the digital valve controller assembly to the adaptor. The roller on the digital valve controller feedback arm will contact the actuator cam as it is being attached.

- If no mounting adaptor is required, attach the digital valve controller assembly to the actuator or mounting plate. The roller on the digital valve controller feedback arm will contact the actuator cam as it is being attached.

Guidelines for Mounting DVC6030 SIS on Quarter-Turn Actuators

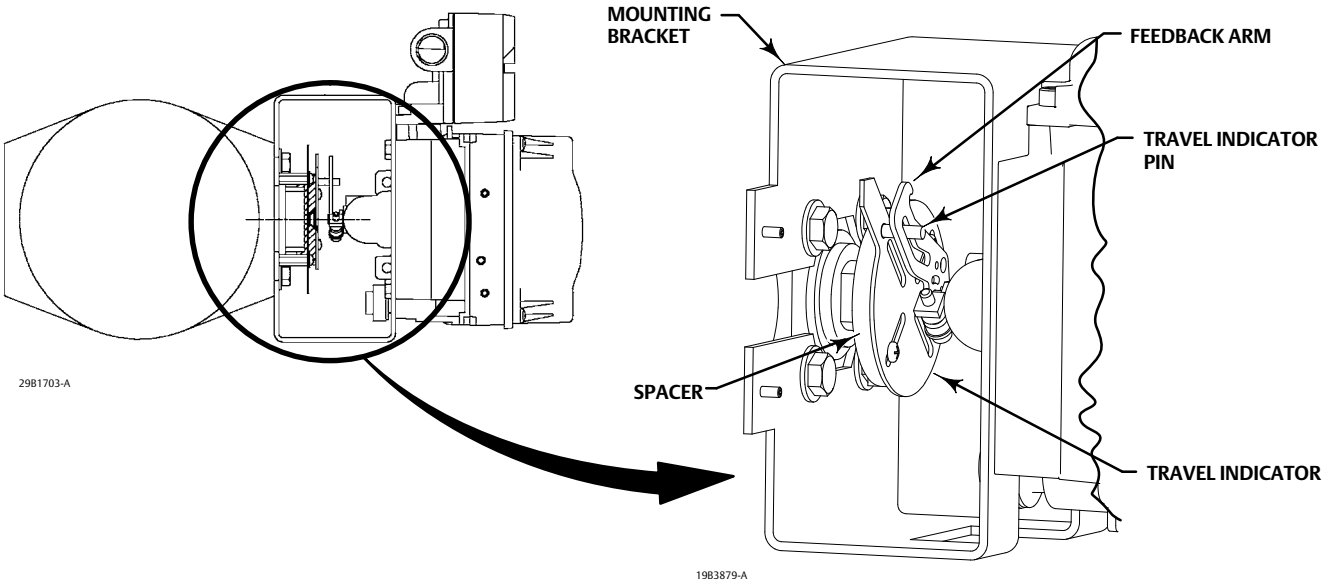
Figure 7 shows the DVC6030 SIS digital valve controller mounted on a quarter-turn actuator. Refer to figure 7 for parts locations. Refer to the following guidelines when mounting on quarter-turn actuators:

Note

Due to NAMUR mounting limitations, do not use the stainless steel DVC6030S SIS in high vibration service.

1. Isolate the control valve from the process line pressure and release pressure from both sides of the valve body. Shut off all pressure lines to the pneumatic actuator, releasing all pressure from the actuator. Use lock-out procedures to be sure that the above measures stay in effect while working on the equipment.
2. If necessary, remove the existing hub from the actuator shaft.
3. If a positioner plate is required, attach the positioner plate to the actuator as described in the mounting kit instructions.

Figure 7. Mounting a FIELDVUE DVC6030 SIS Digital Valve Controller on a Rotary Actuator (Fisher 1032 Size 425A Shown)



4. If required, attach the spacer to the actuator shaft.

Refer to figures 8 and 9. The travel indicator assembly can have a starting position of 7:30 or 10:30. Determine the desired starting position then proceed with the next step. Considering the top of the digital valve controller as the 12 o'clock position, in the next step attach the travel indicator, so that the pin is positioned as follows:

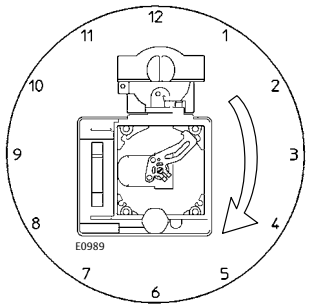
- If increasing pressure from the digital valve controller output A rotates the potentiometer shaft clockwise (as viewed from the back of the instrument), mount the travel indicator assembly so that the arrow is in the 10:30 position, as shown in figure 8.
- If increasing pressure from the digital valve controller output A rotates the potentiometer shaft counterclockwise (as viewed from the back of the instrument), mount the travel indicator assembly so that the arrow is in the 7:30 position, as shown in figure 9.

Note

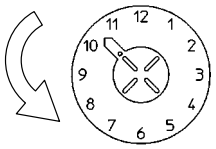
ValveLink software and the Field Communicator use the convention of clockwise (figure 8) and counterclockwise (figure 9) when viewing the potentiometer shaft from the back of the FIELDVUE instrument.

5. Attach the travel indicator to the shaft connector or spacer as described in the mounting kit instructions.
6. Attach the mounting bracket to the digital valve controller.

Figure 8. Explanation of FIELDVUE DVC6030 SIS Travel Indicator Starting Position and Movement, if Clockwise Orientation is Selected for "Travel Sensor Motion" in ValveLink Software or the Field Communicator



DVC6030 SIS FEEDBACK ARM MOVEMENT

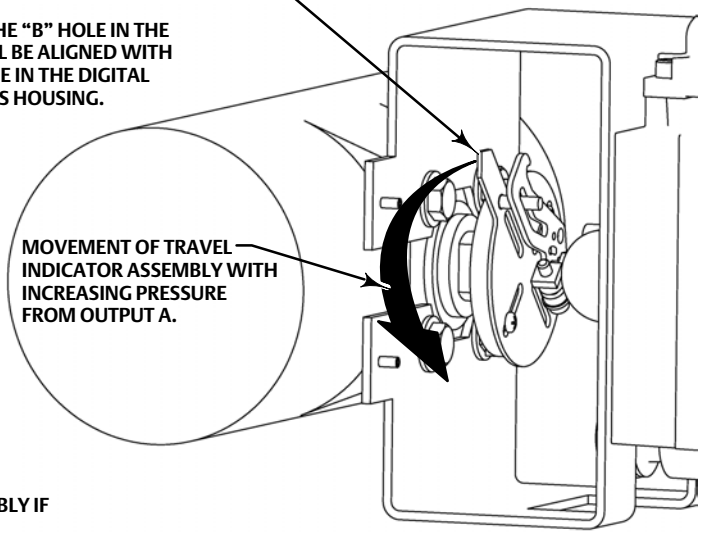


ACTUATOR SHAFT MOVEMENT

STARTING POSITION OF TRAVEL INDICATOR ASSEMBLY (DIGITAL VALVE CONTROLLER OUTPUT A AT 0 PSI.)

IN THIS POSITION, THE "B" HOLE IN THE FEEDBACK ARM WILL BE ALIGNED WITH THE REFERENCE HOLE IN THE DIGITAL VALVE CONTROLLERS HOUSING.

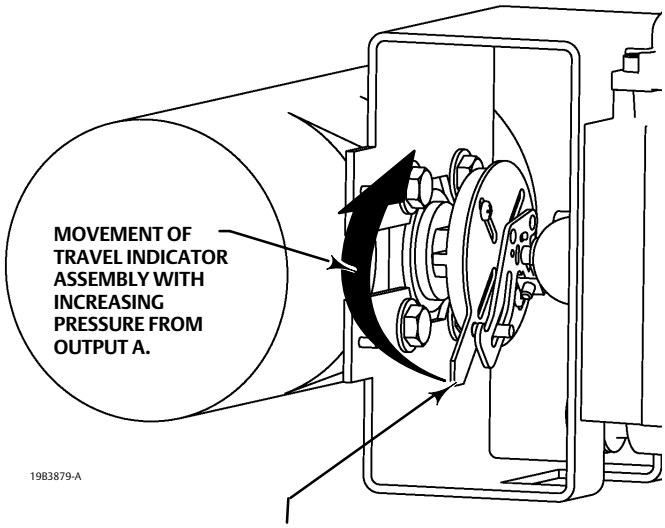
MOVEMENT OF TRAVEL INDICATOR ASSEMBLY WITH INCREASING PRESSURE FROM OUTPUT A.



STARTING POSITION OF THE ACTUATOR TRAVEL INDICATOR ASSEMBLY IF INCREASING PRESSURE FROM OUTPUT A DRIVES THE INDICATOR COUNTERCLOCKWISE (THE POTENTIOMETER SHAFT WILL ROTATE CLOCKWISE AS VIEWED FROM THE BACK OF THE FIELDVUE INSTRUMENT)

NOTE: DVC6030 SIS TRAVEL COUNTS (CLOCKWISE) = 3400 ± 200

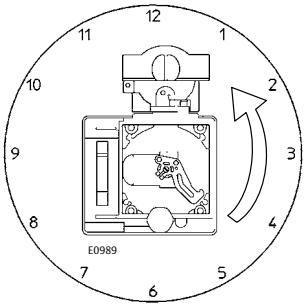
Figure 9. Explanation of FIELDVUE DVC6030 SIS Travel Indicator Starting Position and Movement if Counterclockwise Orientation is Selected for "Travel Sensor Motion" in ValveLink Software or the Field Communicator



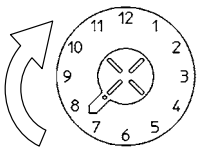
STARTING POSITION OF TRAVEL INDICATOR ASSEMBLY (DIGITAL VALVE CONTROLLER OUTPUT A AT 0 PSI).

IN THIS POSITION, THE "A" HOLE IN THE FEEDBACK ARM WILL BE ALIGNED WITH THE REFERENCE HOLE IN THE DIGITAL VALVE CONTROLLERS HOUSING.

NOTE: DVC6030 SIS TRAVEL COUNTS (COUNTERCLOCKWISE) = 600 ± 200



DVC6030 SIS FEEDBACK ARM MOVEMENT

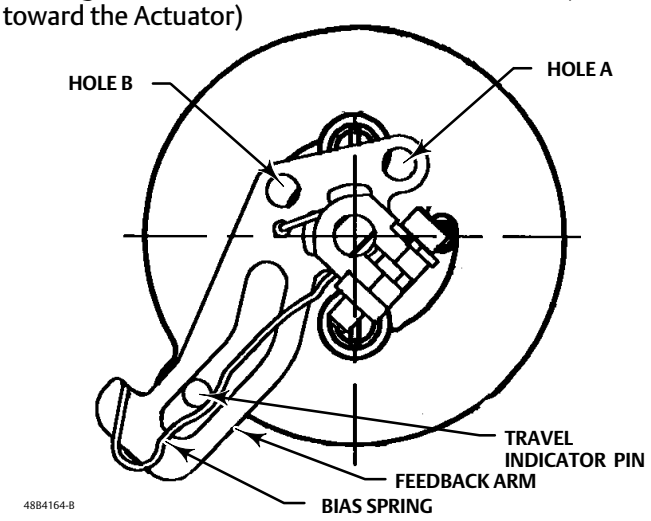


ACTUATOR SHAFT MOVEMENT

STARTING POSITION OF THE TRAVEL INDICATOR ASSEMBLY IF INCREASING PRESSURE FROM OUTPUT A DRIVES THE INDICATOR CLOCKWISE THE POTENTIOMETER SHAFT WILL ROTATE COUNTERCLOCKWISE AS VIEWED FROM THE BACK OF THE FIELDVUE INSTRUMENT.

7. Position the digital valve controller so that the pin on the travel indicator, engages the slot in the feedback arm and that the bias spring loads the pin as shown in figure 10. Attach the digital valve controller to the actuator or positioner plate.
8. If a travel indicator scale is included in the mounting kit, attach the scale as described in the mounting kit instructions.

Figure 10. Positioning Travel Indicator Pin in the Feedback Arm (Viewed as if Looking from the FIELDVUE DVC6030 SIS toward the Actuator)



Mounting for Remote Mount DVC6000 SIS Instruments

Refer to the FIELDVUE DVC6000 SIS Digital Valve Controller for Safety Instrumented System Solutions instruction manual (D103230X012).

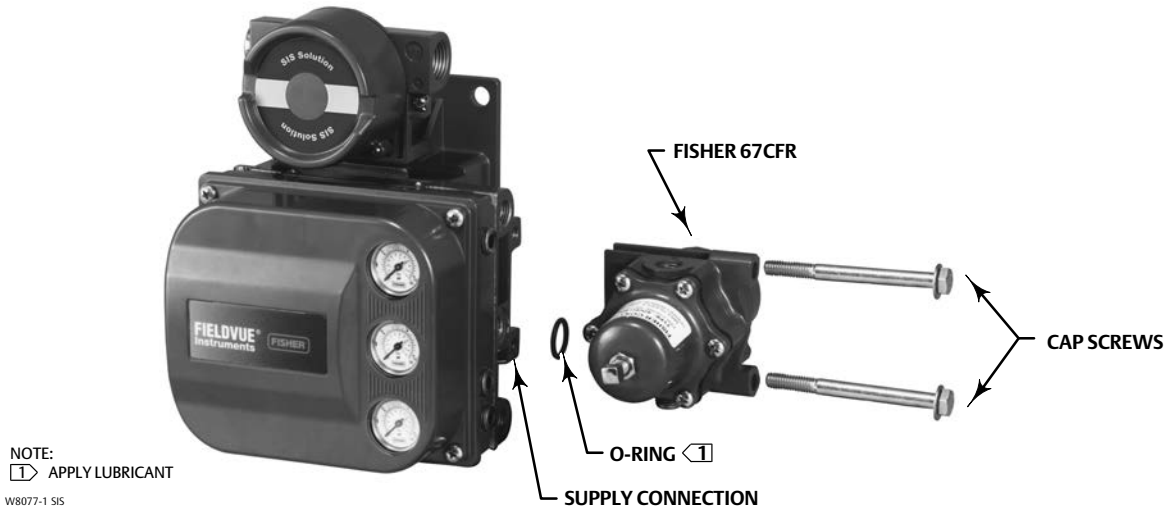
Mounting the 67CFR Filter Regulator

A 67CFR filter regulator, when used with the DVC6000 SIS digital valve controllers, can be mounted three ways.

Integral-Mounted Regulator

Refer to figure 11. Lubricate an O-ring and insert it in the recess around the SUPPLY connection on the digital valve controller. Attach the 67CFR filter regulator to the side of the digital valve controller. Thread a 1/4-inch socket-head pipe plug into the unused outlet on the filter regulator. This is the standard method of mounting the filter regulator.

Figure 11. Mounting the Fisher 67CFR Regulator on a FIELDVUE DVC6000 SIS Digital Valve Controller



Yoke-Mounted Regulator

Mount the filter regulator with 2 cap screws to the pre-drilled and tapped holes in the actuator yoke. Thread a 1/4-inch socket-head pipe plug into the unused outlet on the filter regulator. No O-ring is required.

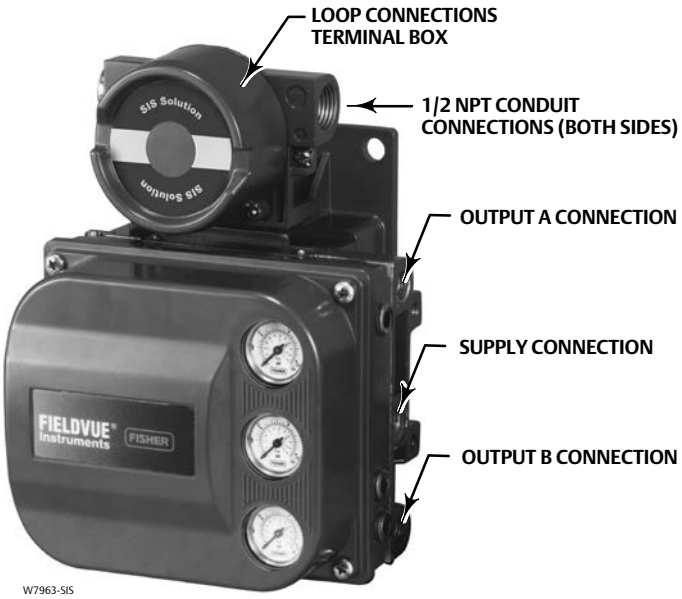
Casing-Mounted Regulator

Use the separate 67CFR filter regulator casing mounting bracket provided with the filter regulator. Attach the mounting bracket to the 67CFR and then attach this assembly to the actuator casing. Thread a 1/4-inch socket-head pipe plug into the unused outlet on the filter regulator. No O-ring is required.

Pressure Connections

Pressure connections are shown in figure 12. All pressure connections on the digital valve controller are 1/4 NPT internal connections. Use at least 10 mm (3/8-inch) tubing for all pressure connections. If remote venting is required, refer to the vent subsection.

Figure 12. Pressure Connections



Supply Connections

⚠ WARNING

To avoid personal injury and property damage resulting from bursting of parts, do not exceed maximum supply pressure.

Personal injury or property damage may result from fire or explosion if natural gas is used as the supply medium and appropriate preventive measures are not taken. Preventive measures may include, but are not limited to, one or more of the following: Remote venting of the unit, re-evaluating the hazardous area classification, ensuring adequate ventilation, and the removal of any ignition sources. For information on remote venting of this controller, refer to page 20.

Severe personal injury or property damage may occur from an uncontrolled process if the instrument supply medium is not clean, dry, oil-free, and noncorrosive. While use and regular maintenance of a filter that removes particles larger than 40 micrometers 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 amount of air filtration or filter maintenance.

⚠ WARNING

When using natural gas as the supply medium, or for explosion proof applications, the following warnings also apply:

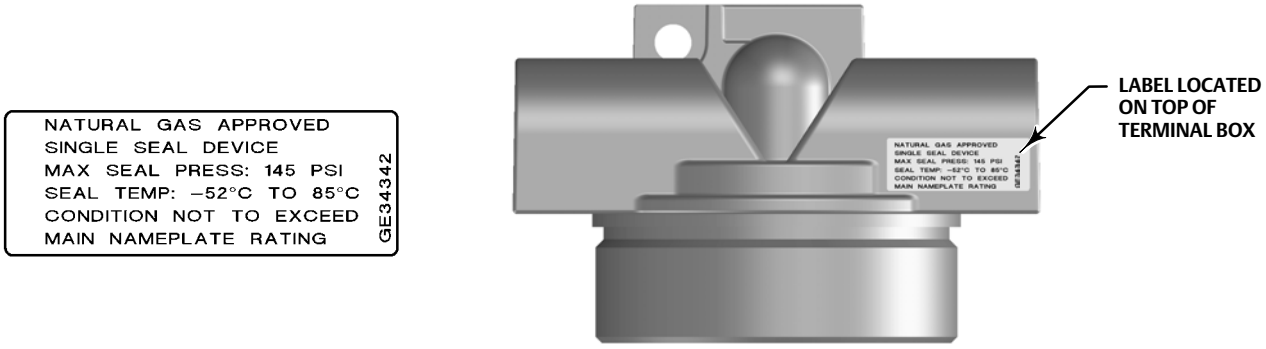
- **Remove electrical power before removing the housing cap. Personal injury or property damage from fire or explosion may result if power is not disconnected before removing the cap.**
- **Remove electrical power before disconnecting any of the pneumatic connections.**
- **When disconnecting any of the pneumatic connections or any pressure retaining part, natural gas will seep from the unit and any connected equipment into the surrounding atmosphere. Personal injury or property damage may result from fire or explosion if natural gas is used as the supply medium and appropriate preventive measures are not taken. Preventive measures may include, but are not limited to, one or more of the following: ensuring adequate ventilation and the removal of any ignition sources.**

- **Ensure that the cover is correctly installed before putting this unit back into service. Failure to do so could result in personal injury or property damage from fire or explosion.**

The DVC6000 SIS can be used with air or natural gas as the supply medium. If using natural gas as the pneumatic supply medium, natural gas will be used in the pneumatic output connections of the DVC6000 SIS to any connected equipment. In normal operation the unit will vent the supply medium into the surrounding atmosphere unless it is remotely vented.

Gas Certified, Single Seal instruments can be identified by the natural gas approval label shown in figure 13. The Natural Gas Certified, Single Seal device option simplifies conduit sealing requirements. Read and follow all local, regional, and federal wiring requirements for natural gas installations. Contact your Emerson Process Management sales office for information on obtaining a Natural Gas Certified, Single Seal DVC6000 SIS digital valve controller.

Figure 13. Label for Natural Gas Certified Terminal Box



Supply pressure must be clean, dry air that meets the requirements of ISA Standard 7.0.01.

Alternatively, natural gas must be clean, dry, oil-free, and noncorrosive. H_2S content should not exceed 20 ppm.

A maximum 40 micrometer particle size in the air system is acceptable. Filtration down to 5 micrometer particle size in the air system is recommended. Lubricant content is not to exceed 1 ppm weight (w/w) or volume (v/v) basis. Condensation in the air supply should be minimized.

For additional information on air quality refer to the appropriate safety manual:

- Safety Manual for FIELDVUE DVC6000 Digital Valve Controllers for Safety Instrumented System (SIS) Solutions 0-20 mA or 0-24 VDC (D103035X012) ***or***
- Safety Manual for FIELDVUE DVC6000 Digital Valve Controllers for Safety Instrumented System (SIS) Solutions 4-20 mA (part number D103294X012)

If you are using a 67CFR filter regulator with standard 5 micrometer filter, or equivalent, connect the supply line to the 1/4 NPT IN connection and attach tubing from the output connection on the filter regulator to the SUPPLY connection on the instrument. If you are using an integral mounted 67CFR filter regulator, connect the supply to the IN connection on the regulator.

Output Connection

A factory mounted digital valve controller has its output piped to the supply connection on the actuator. If mounting the digital valve controller in the field, connect the 1/4 NPT digital valve controller output connection to the pneumatic actuator input connection.

Single-Acting Actuators

When using a single-acting direct digital valve controller (relay type A or C) on a single-acting actuator, connect OUTPUT A to the actuator pneumatic input.

When using a single-acting reverse digital valve controller (relay type B) on a single-acting actuator, connect OUTPUT B to the actuator pneumatic input.

Double-Acting Actuators

DVC6000 SIS digital valve controllers on double-acting actuators always use relay type A. With no input current, OUTPUT A is at 0 pressure and OUTPUT B is at full supply pressure when the relay is properly adjusted.

To have the actuator stem extend from the cylinder with increasing input signal on a vertically mounted sliding-stem valve with a piston actuator, connect OUTPUT A to the upper actuator cylinder connection. Connect OUTPUT B to the lower cylinder connection. Figure 14 shows the digital valve controller connected to a double-acting piston actuator.

To have the actuator stem retract into the cylinder with increasing input signal, connect OUTPUT A to the lower actuator cylinder connection. Connect OUTPUT B to the upper cylinder connection.

Figure 14. FIELDVUE DVC6010 SIS Digital Valve Controller Mounted on Fisher 585C Piston Actuator

W9131-1 SIS

Vent

⚠ WARNING

Personal injury or property damage can occur from cover failure due to overpressure. Ensure that the housing vent opening is open and free of debris to prevent pressure buildup under the cover.

This unit vents the supply medium into the surrounding atmosphere. When installing this unit in a non-hazardous (non-classified) location in a confined area, with natural gas as the supply medium, you must remotely vent this unit to a safe location. Failure to do so could result in personal injury or property damage from fire or explosion, and area re-classification.

When installing this unit in a hazardous (classified) location remote venting of the unit may be required, depending upon the area classification, and as specified by the requirements of local, regional, and national codes, rules and regulations.

Failure to do so when necessary could result in personal injury or property damage from fire or explosion, and area re-classification.

Vent line piping should comply with local and regional codes and should be as short as possible with adequate inside diameter and few bends to reduce case pressure buildup.

In addition to remote venting of the unit, ensure that all caps and covers are correctly installed. Failure to do so could result in personal injury or property damage from fire or explosion, and area re-classification.

The relay output constantly bleeds a small amount of supply medium into the area under the cover. The vent openings at the back of the housing should be left open to prevent pressure buildup under the cover. If a remote vent is required, the vent lines must be as short as possible with a minimum number of bends and elbows.

Wiring and Electrical Connections

⚠ WARNING

To avoid personal injury resulting from electrical shock, do not exceed maximum input voltage specified in table 12 of this quick start guide, or on the product nameplate. If the input voltage specified differs, do not exceed the lowest specified maximum input voltage.

To avoid personal injury or property damage caused by fire or explosion, remove power to the instrument before removing the terminal box cover in an area which contains a potentially explosive atmosphere or has been classified as hazardous.

Personal injury or property damage caused by fire or explosion may occur if this connection is attempted in a potentially explosive atmosphere or in an area that has been classified as hazardous. Confirm that area classification and atmosphere conditions permit the safe removal of the terminal box cover before proceeding.

Select wiring and/or cable glands that are rated for the environment of use (such as 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.

Wiring connections must be in accordance with local, regional, and national codes for any given hazardous area approval. Failure to follow the local, regional, and national codes could result in personal injury or property damage from fire or explosion.

The valve may move in an unexpected direction when power is applied to the digital valve controller. To avoid personal injury and property damage caused by moving parts,keep hands, tools, and other objects away from the valve/actuator assembly when applying power to the instrument.

4-20 mA Loop Connections

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.

Note

Connect the digital valve controller to a 4-20 mA current source for operation in the point-to-point wiring mode. In the point-to-point wiring mode, the digital valve controller will not operate when connected to a voltage source.

Wire the digital valve controller as follows, refer to figure 15:

1. Remove the loop connections terminal box cap (see figure 12).
2. Route the field wiring into the terminal box. When applicable, install conduit using local and national electrical codes which apply to the application.
3. Connect the control system output card positive wire "current output'" to the LOOP + screw terminal in the terminal box. Connect the control system output card negative (or return) wire to the LOOP - screw terminal in the terminal box.

⚠ WARNING

Personal injury or property damage, caused by fire or explosion, can result from the discharge of static electricity. Connect a 14 AWG (2.08 mm^2) ground strap between the digital valve controller and earth ground when flammable or hazardous gases are present. Refer to national and local codes and standards for grounding requirements.

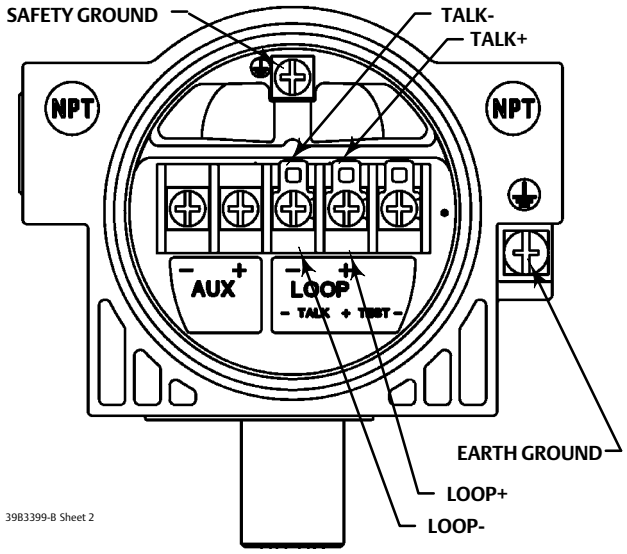
To avoid static discharge from the plastic cover when flammable gases or dust are present, do not rub or clean the cover with solvents. To do so could result in a spark that may cause the flammable gases or dust to explode, resulting in personal injury or property damage. Clean with a mild detergent and water only.

4. As shown in figure 15, two ground terminals are available for connecting a safety ground, earth ground, or drain wire. The safety ground is electrically identical to the earth ground. Make connections to these terminals following national and local codes and plant standards.
5. Replace and hand tighten the terminal box cap. When the loop is ready for startup, apply power to the control system output card.

Note

When the DVC6000 SIS is operating under normal conditions at 4 mA (trip condition is 20 mA) be sure to apply no less than 4 mA.

Figure 15. Loop Connections Terminal Box



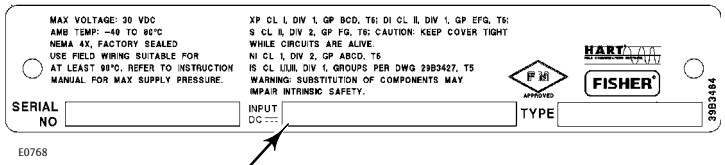
Installation in a Safety Instrumented System

A DVC6000 SIS instrument may be used in a Safety Instrumented System (SIS) to control operation of a safety block valve or vent valve. The actuator may be either single-acting or double-acting with spring return. DVC6000 SIS instruments will have the SIS label as shown in figure 14 on the terminal box cover.

The digital valve controller may be installed with a solenoid valve in either a 4-wire system, (figure 18), in a 2-wire system (figure 19), or a 2-wire system without a solenoid valve (figure 20). The digital valve controller ships from the factory with the DIP switch on the printed wiring board (see figure 17) set to the correct position per the ordered option.

When operating with a 4-20 mA current signal, the digital valve controller must be setup for point-to-point operation. When operating with a voltage signal, the digital valve controller must be setup for multi-drop operation. The operational mode is determined by a DIP switch on the printed wiring board. As shown in figure 16, the nameplate indicates the operational mode set on the printed wiring board at the factory.

Figure 16. Typical Digital Valve Controller Nameplate



Note

For the digital valve controller to operate with a 4-20 mA control signal, the DIP switch must be in the point-to-point loop position, as shown in table 6.

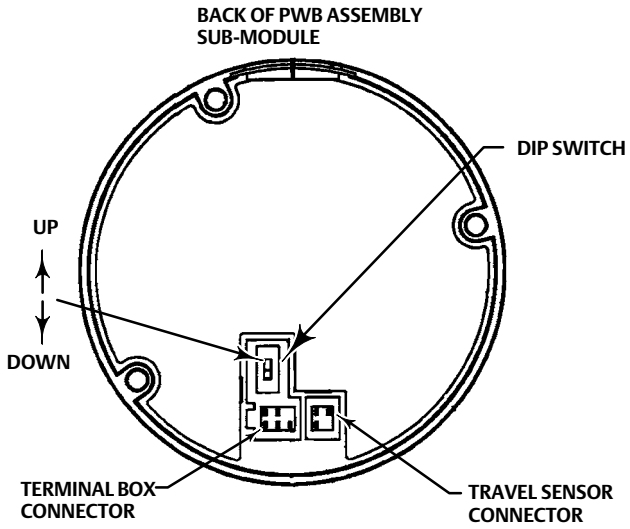
For the digital valve controller to operate with a 24 VDC voltage control signal, the DIP switch must be in the multi-drop loop position, as shown in table 6.

Table 6. DIP Switch Configuration(1)

Operational Mode	Switch Position
Multi-drop Loop	UP
Point-to-Point Loop	DOWN

1. Refer to figure 17 for switch location.

Figure 17. DIP Switch Location



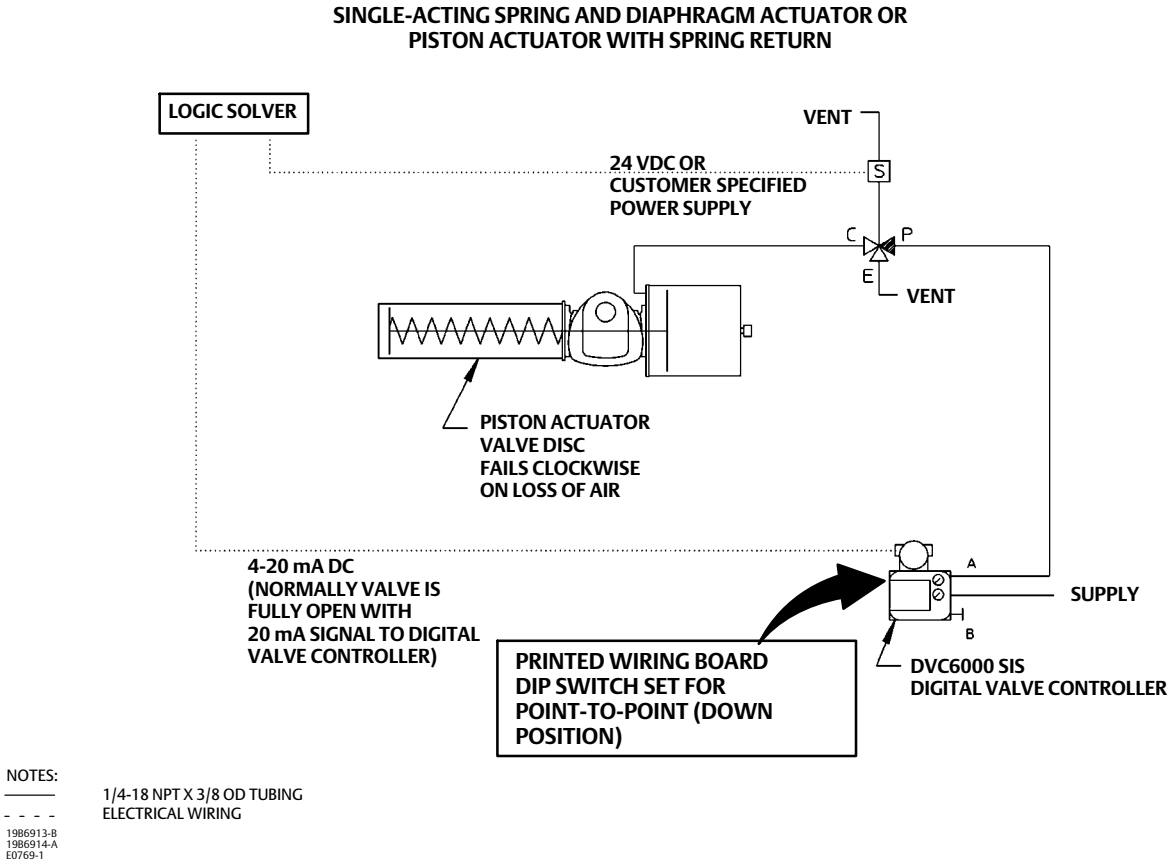
Installation in a 4-Wire System

Figure 18 is an example of the digital valve controller installed in a 4-wire system. In this installation, two separate signals are used: a 4-20 mA DC signal (from the Logic Solver or DCS) for the digital valve controller and a 24 VDC signal (from the Logic Solver) for the solenoid valve.

Note

When a solenoid valve operated by an independent power supply is used pneumatically in series with a DVC6000 SIS, the power source could be 24/48 VDC, 110/220 VAC, etc. Power supply is dependent on customer specifications.

Figure 18. Example of FIELDVUE DVC6000 SIS Digital Valve Controller Installed in a 4-Wire SIS System



The digital valve controller control mode is set to “analog”. When a shutdown condition exists, the logic solver (or DCS) activates the solenoid valve and also cuts the current to the digital valve controller to 0 or 4 mA, thus causing the valve to move to its zero travel position. In this installation, the switch on the digital valve controller printed wiring board must be set for point-to-point operation.

To set the digital valve controller control mode in an SIS 4-wire system, from the *Online* menu select *Configure, Guided Setup,* and *Setup Wizard.*

The Setup Wizard will automatically setup the instrument for a 4-wire installation based upon the printed wiring board DIP switch setting.

Note

Using the digital valve controller in a 4-wire system with an ASCO™ low-power solenoid valve, model EF8316G303 or EF8316G304 (or an equivalent low-power solenoid valve) requires a separate external air supply for pilot. Ensure that the solenoid valve's “selection gasket” is in the “External Position”.

The use of external piloting requires the pilot pressure to be at least 15 psig higher than the main line pressure. For more information, refer to the ASCO catalog or contact your Emerson Process Management sales office.

Table 7. Maximum Loop Wire Resistance per Logic Solver Output Voltage(1)

Logic Solver Output Voltage (VDC)	Maximum Loop Wire Resistance (Ohms)	Maximum Wire Length (feet)(2)			
		22 AWG	20 AWG	18 AWG	16 AWG
24.00	32.0	952	1429	2381	3175
23.75	27.0	804	1205	2009	2679
23.50	22.0	655	982	1637	2183
23.25	17.0	506	759	1265	1687
23.00	12.0	357	536	893	1190
22.75	7.0	208	313	521	694
22.50	2.0	60	89	149	198

1. Maximums in this table assume a line conditioner and a solenoid that requires a minimum of 20.4 V and 42 mA to engage.
2. Wire length includes both wires in a twisted pair.

Installation in a 2-Wire System

Figures 19 and 20 are examples of the digital valve controller installed in a 2-wire system. In these installations the logic solver provides a single 24 VDC signal that powers both the digital valve controller and the optional solenoid valve (a low-power consumption model such as the ASCO EF8316G303 or EF8316G304). The digital valve controller's control mode is set to “digital”. When a shutdown condition exists, the logic solver cuts power to both the digital valve controller and the solenoid valve (if connected), causing the valve to move to its zero travel position. An LC340 line conditioner is required to allow HART communications over the segment. Alternatively, an impedance boosting multiplexer (available from MTL, Pepperl+Fuchs/Elcon and others), may be used, eliminating the need for a line conditioner when installed as per figure 20.

Note

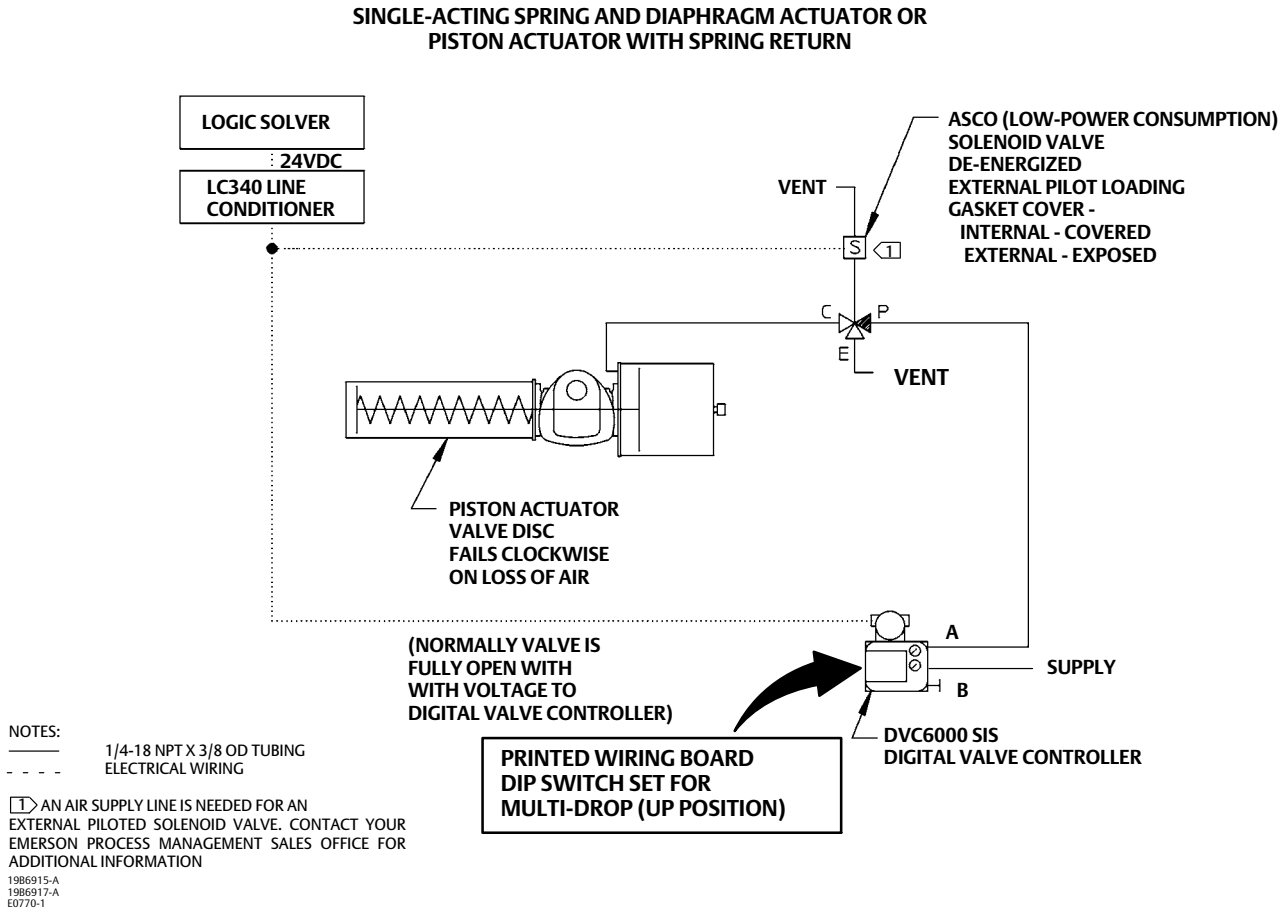
Use of a solenoid valve is optional, and dependent on stroking speed and other operating conditions.

The line conditioner introduces an approximate 2.0 volt drop in the SIS system wiring with a 50 mA load. If used with a low-power solenoid valve (such as the ASCO Model EF8316G303 or EF8316G304) the guaranteed engagement voltage at maximum temperature must be ensured.

The ASCO EF8316 solenoid valve (if connected) requires up to 42 mA to pull in. The digital valve controller set for multidrop operation draws approximately 8 mA. Based on these conditions, table 7 lists the maximum loop wire resistance permitted for various logic solver output voltages. The table also lists maximum length of wire of various gauges that may be used.

The line conditioner is intended for installation in a control or marshalling cabinet near the logic solver field wiring terminals. In some installations, such as shown in figure 20, where no solenoid is used, an impedance boosting multiplexer may be used in place of a line conditioner. The LC340 line conditioner will be needed when a low-power solenoid is connected to the same 2-wire loop as the digital valve controller as shown in figure 19.

Figure 19. Example of FIELDVUE DVC6000 SIS Digital Valve Controller Installed in a 2-Wire SIS System



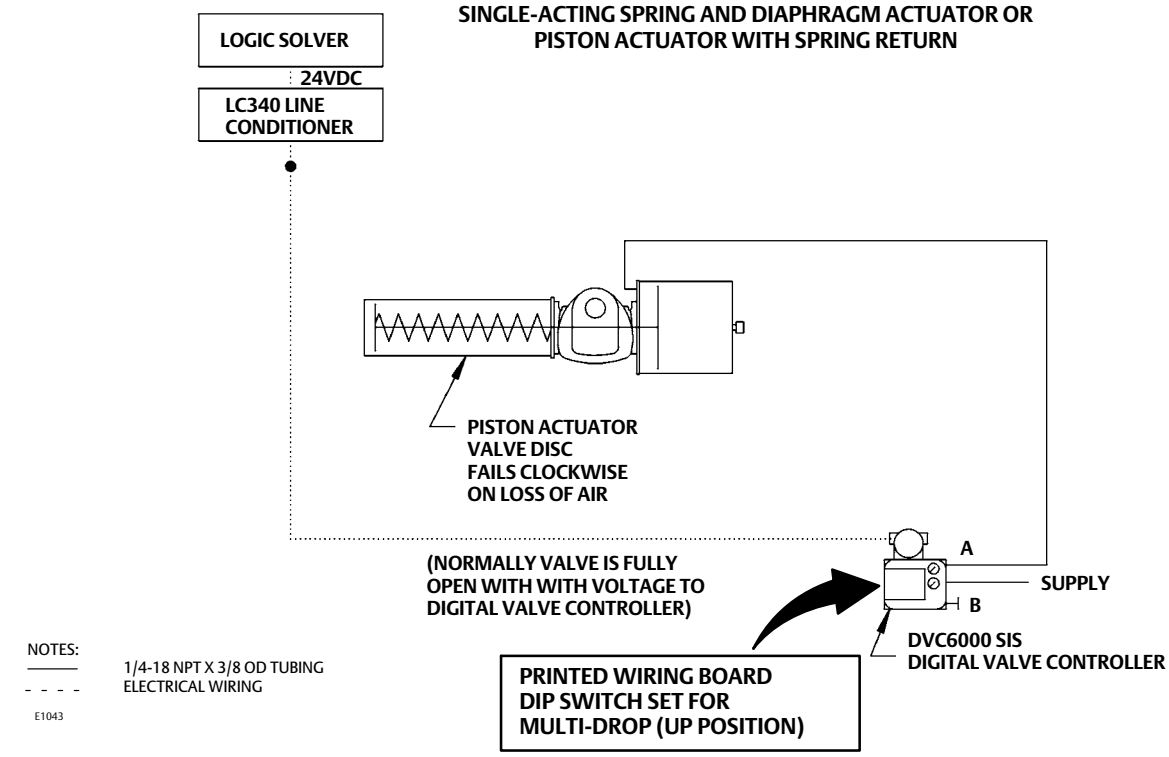
Make connections to the line conditioner as follows (refer to figure 21):

CAUTION

Do not overtighten the wiring connection terminals or subject them to heavy lateral (pushing) loads. This could damage the line conditioner.

1. Be sure the digital valve controller DIP switch is set for multidrop operation.
2. Connect the digital valve controller LOOP + terminal to the line conditioner FLD + terminal.
3. Connect the digital valve controller LOOP - terminal to the line conditioner FLD - terminal.
4. Connect the solenoid valve field terminals to the line conditioner FLD + and - terminals.

Figure 20. Example of FIELDVUE DVC6000 SIS Digital Valve Controller Installed in a 2-Wire SIS System (without a Solenoid Valve)



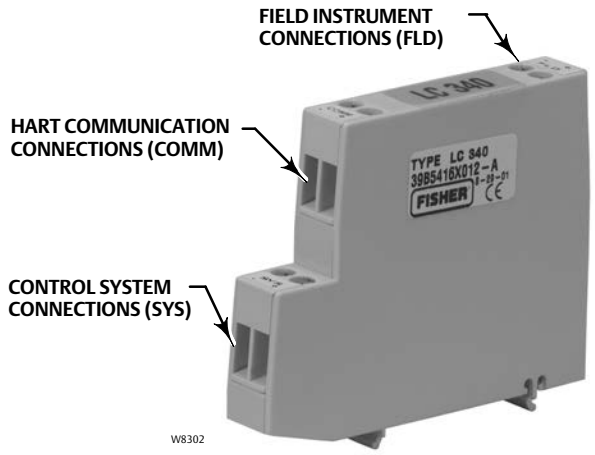
5. Connect the logic solver output to the line conditioner SYS + and - terminals.

Note

Using the digital valve controller in a 2-wire system (multi-drop operation) with an ASCO low-power solenoid valve, model EF8316G303 or EF8316G304 (or an equivalent low-power solenoid valve) requires a line conditioner. Using a low-power piloted solenoid valve requires a separate air supply.

Ensure that the solenoid valve's “selection gasket” is in the “External Position”. The use of external piloting requires the pilot pressure to be at least 15 psig higher than the main line pressure. For more information, refer to the ASCO catalog or contact your Emerson Process Management sales office.

Figure 21. Fisher LC340 Line Conditioner Connections



NOTE:
CONNECTIONS ARE THE SAME FOR THE HF340 HART COMMUNICATOR

See the separate FIELDVUE LC340 Line Conditioner Instruction Manual (D102797X012) for detailed installation information.

To set the digital valve controller Control Mode for operation in an SIS 2-wire system select *Configure, Guided Setup,* and *Setup Wizard* from the *Online* menu.

The Setup Wizard will automatically setup the instrument for a 2-wire installation based upon the printed wiring board DIP switch setting.

Note

To ensure correct installation, follow the Basic Setup procedures as described in the next section.

Installation Check List

Mounting

☐ Is the instrument correctly mounted on the actuator? If not, refer to appropriate mounting procedure and see installation instructions provided with the mounting kit.

☐ Is the feedback linkage properly connected? If not, see installation instructions provided with the mounting kit.

Pneumatic Connections and Air Supply

☐ Is the regulator correctly mounted? If not, perform one of the regulator mounting procedures on page 16.

☐ Is the air supply connected and at proper pressure? If not, connect supply as described on page 18. Also see specifications on page 47.

☐ Is the instrument output connected to the actuator? If not, connect instrument output as described on page 19.

Wiring and Electrical Connections

☐ If necessary, is the conduit properly installed? If not, refer to local and national electrical codes.

☐ Is the loop wiring properly connected to the LOOP + and - terminals in the terminal box? If not, connect loop wiring as described on page 21.

Installation in a Safety Instrumented System

☐ Installing in a 4-Wire System? Install the digital valve controller as described on page 24.

Refer to the appropriate Safety Manual for FIELDVUE DVC6000 Digital Valve Controllers for Safety Instrumented System (SIS) Solutions (0-20 mA or 0-24 VDC [D103035X012] or 4-20 mA [D103294X012]). The check list contained in the appropriate document must be thoroughly reviewed and implemented as part of the safety lifecycle.

☐ Installing in a 2-Wire System? Install the digital valve controller as described on page 26.

Refer to the appropriate Safety Manual for FIELDVUE DVC6000 Digital Valve Controllers for Safety Instrumented System (SIS) Solutions (0-20 mA or 0-24 VDC [D103035X012] or 4-20 mA [D103294X012]). The check list contained in the appropriate document must be thoroughly reviewed and implemented as part of the safety lifecycle.

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

Basic Setup and Calibration

Connecting the Field Communicator to the DVC6000 SIS Digital Valve Controller

The Field Communicator may be connected to the 4-20 mA loop wiring or directly to the digital valve controller TALK terminals, as shown in figure 15.

If the Field Communicator is connected directly to the digital valve controller, attach the clip-on wires provided with the Field Communicator to the TALK terminals, or the LOOP + and - terminals, in the digital valve controller terminal box. The TALK terminals are the same as the LOOP + and - terminals.

The Field Communicator may also be connected at the logic solver termination panel, or, if the LC340 line conditioner (0-24 VDC applications) or the HF340 HART filter (4-20 mA applications) is used, at the COMM terminals per figure 21.

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.

⚠ WARNING

To avoid personal injury or equipment damage caused by the release of process pressure, always use the Setup Wizard to perform setup and calibration before placing the DVC6000 SIS instrument in operation as an SIS solution for the first time. The Setup Wizard sets up the required parameters for SIS solutions.

Note

In the event of a power failure the DVC6000 SIS automatically restores the device to In Service upon restoration of power. This is to provide greater availability of the safety function.

If power is inadvertently interrupted while performing set up or maintenance, you may need to return the DVC6000 SIS to out of service if the interrupted task requires that mode of operation.

When the DVC6000 SIS 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.

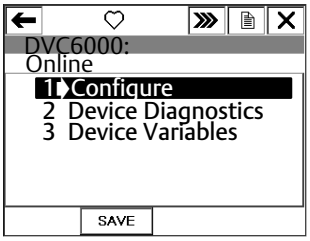
Before beginning Basic Setup, be sure the instrument is correctly mounted as described in the Installation section. Refer to the installation instructions supplied with the mounting kit.

Setup Wizard (1-1-1)

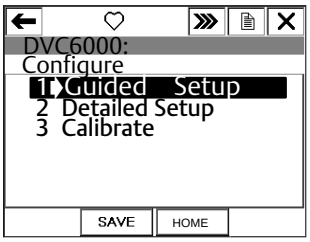
Note

The Setup Wizard must be run for first time installations before placing the DVC6000 SIS in service.

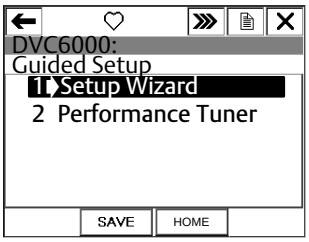
Figure 22. Accessing Setup Wizard on the Field Communicator



From the DVC6000 SIS Online menu, select Configure



From the Configure menu, select Guided Setup.



From the Guided Setup menu, select Setup Wizard and follow the on-line instructions

Typical Actuators

Use the Setup Wizard to setup the digital valve controller for operation in an SIS solution. The Setup Wizard automatically sets up the instrument using specified actuator information. To access the Setup Wizard, from the *Online* Menu select *Configure, Guided Setup,* and *Setup Wizard* (refer to figure 22) .

1. When prompted by the Setup Wizard, enter the pressure units (psi, bar, kPa, or kg/cm^2).
2. Enter the maximum instrument supply pressure.

After entering the maximum instrument supply pressure, the Setup Wizard prompts you for actuator information.

3. Enter the partial stroke test start point.
4. Indicate if the DVC6000 SIS is connected to an LCP100.
5. Enter the manufacturer of the actuator on which the instrument is mounted. If the actuator manufacturer is not listed, select Other (see Non-Typical Actuators below for additional setup information).
6. Enter the actuator model or type. If the actuator model is not listed, select Other (see Non-Typical Actuators below for additional setup information).
7. Enter the actuator size.
8. Enter the relay type.
9. Select whether the valve is open or closed under the zero power condition, if prompted.

Note

When completing steps 3 through 9, refer to table 8 for possible configurations for a digital valve controller operated by a 4-20 mA input current (point-to-point mode), and table 9 for possible configurations for a digital valve controller operated by a 0-24 VDC power supply (multi-drop mode).

Table 8. Possible Configurations for a FIELDVUE DVC6000 SIS Digital Valve Controller operated by 4-20 mA

Setup Wizard Configuration			Operating Conditions		Status Monitoring	
Relay Type	**Partial Stroke Start Point**	**Zero Power Condition**	**Input Current**	**Actual Valve Travel**	**Travel Set Point**	**Travel**
A or C	Open	Close	Common Application			
			20 mA	Open	100%	100%
		Open	Less Common Application			
			4 mA	Open	100%	100%
	Close	Close	Less Common Application			
			4 mA	Close	0%	0%
		Open	Common Application			
			20 mA	Close	0%	0%
B	Open	Close	Less Common Application			
			20 mA	Open	100%	100%
		Open	Common Application			
			4 mA	Open	100%	100%
	Close	Close	Common Application			
			4 mA	Close	0%	0%
		Open	Less Common Application			
			20 mA	Close	0%	0%

Table 9. Possible Configurations for a FIELDVUE DVC6000 SIS Digital Valve Controller operated by 0-24 VDC

Setup Wizard Configuration			Operating Conditions		Status Monitoring	
Relay Type	**Partial Stroke Start Point**	**Zero Power Condition**	**Power Supply**	**Actual Valve Travel**	**Travel Set Point**	**Travel**
A or C	Open	Close	Common Application			
			24 VDC	Open	100%	100%
		Open(1)	Less Common Application			
			24 VDC	Open	100%	100%
	Close	Close(1)	Less Common Application			
			24 VDC	Close	0%	0%
		Open	Common Application			
			24 VDC	Close	0%	0%
B	Open	Close	Less Common Application			
			24 VDC	Open	100%	100%
		Open(1)	Common Application			
			24 VDC	Open	100%	100%
	Close	Close(1)	Common Application			
			24 VDC	Close	0%	0%
		Open	Less Common Application			
			24 VDC	Close	0%	0%

1. In these configurations, the DVC6000 SIS is used as a diagnostic device, the safety function is provided by other devices in the pneumatic loop, e.g. a solenoid valve.

10. Indicate if a volume booster or quick release is present.

Note

The use of a Quick Exhaust Valve (QEV) is not recommended for safety instrumented system applications. The use of a QEV in an SIS application may cause the valve to cycle.

11. Specify if factory defaults should be used for basic setup. If you select YES for factory default, the Field Communicator sets the setup parameters to the values listed in table 10. If you select NO for the factory defaults, the setup parameters listed in the table remain at their previous settings.

Table 10. FIELDVUE DVC6000 SIS Factory Default Settings

Setup Parameter	Default Setting
Analog Input Units(1) Analog In Range High(1) Analog In Range Low(1) Control Mode Restart Control Mode	mA 20.0 mA 4.0 mA Analog(1) Digital(2) Analog(1) Digital(2)
Lag Time Input Characteristic Travel Limit High Travel Limit Low	0 secs Linear 125% -25%
Travel Cutoff High Travel Cutoff Low Travel Deviation Alert Point Travel Deviation Time Set Point Rate Open(3) Set Point Rate Close(4) Polling Address	50% 50% 5.0% 10.0 seconds 0%/sec 0%/sec 0
Pressure Deviation Alert Pt Pressure Deviation Alert Time	5.0 psi(5) 30.0 seconds
Command #3 (Trending) Pressure For double-acting actuators For single-acting actuators	 differential output pressure actuator pressure
Valve Set Point(2)	100% if ZPC = Open 0% if ZPC = Closed
Restart Travel Set Point(2)	100% if ZPC = Open 0% if ZPC = Closed
Self-Test Shutdown(2)	All Failures Disabled

1. Analog mode only - DIP switch set to Pt-Pt.
2. Digital mode only. - DIP switch set to Multi.
3. In firmware 3 thru 6 this parameter is labeled Minimum Opening Time. In firmware 10 and below this parameter should be set to zero.
4. In firmware 3 thru 6 this parameter is labeled Minimum Closing Time. In firmware 10 and below this parameter should be set to zero.
5. Adjust to bar, kPa, or kg/cm^2 if necessary.

Non-Typical Actuators

Typically the Setup Wizard determines the required setup information based upon the actuator manufacturer and model specified. However, if you enter other for the actuator manufacturer or the actuator model, then you will be prompted for setup parameters such as:

- **Actuator Style** select spring & diaphragm, piston single-acting with spring, piston double-acting with spring
- **Valve Style** select the valve style, rotary or sliding stem
- **On Loss of Instrument Signal, (valve opens or closes)** the position of the valve (open or closed) when the electrical power to the instrument is removed. Zero Power Condition (ZPC) is determined by relay and actuator action as shown in figure 27.
- **Feedback Connection** select Rot-All, SS-roller, or SStem-Standard. For rotary valves, enter Rotary - All, SStem - Roller. For sliding-stem valves, if the feedback linkage consists of a connector arm, adjustment arm, and feedback arm (similar to figure 23), enter SStem - Standard. If the feedback linkage consists of a roller that follows a cam (similar to figure 24), enter Rotary All, SStem - Roller.
- **Partial Stroke Start Point** select the start point for the Partial Stroke Test; either Valve Open or Valve Close.
- **LCP100 Local Control Panel** indicate if the instrument is connected to an LCP100 local control panel.

Figure 23. Feedback Connection for Typical Sliding-Stem Actuator (Up to 4-inch Travel)

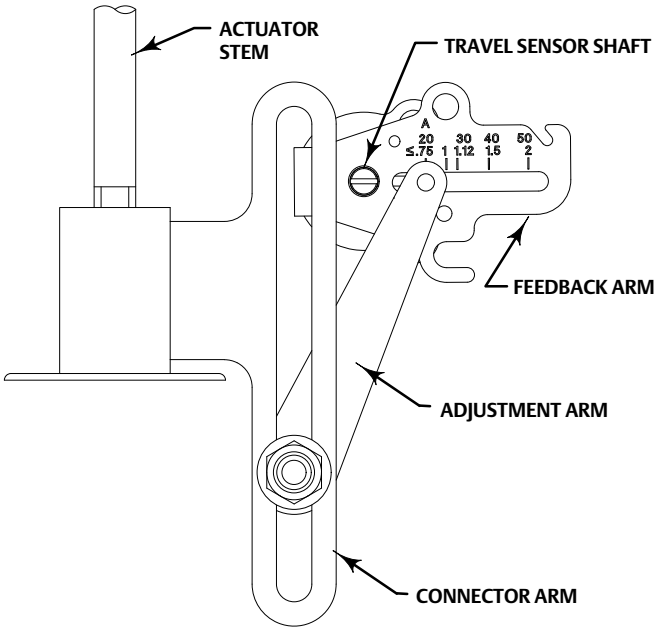
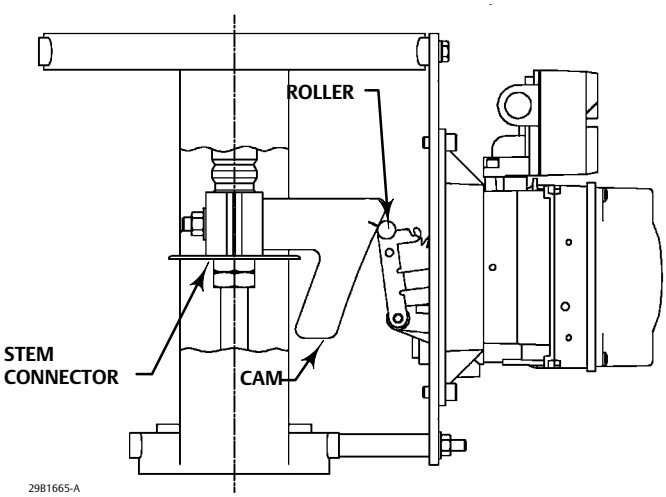


Figure 24. Feedback Connection for Typical Long-Stroke Sliding-Stem Actuator (4 to 24-Inches Travel)



⚠ WARNING

If you answer YES to the prompt for permission to move the valve when the Field Communicator is determining the travel sensor motion, the instrument will move the valve through its full travel range. 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.

- Travel Sensor Motion the Setup Wizard will ask if it can move the valve to determine travel sensor motion. If you answer yes, the instrument may stroke the valve the full travel span to determine travel sensor rotation. If you

answer No, then you will have to specify the rotation for increasing air pressure. Determine the rotation by viewing the end of the travel sensor shaft.

Select Clockwise, or Counterclockwise. Travel Sensor Motion establishes the proper travel sensor rotation. Determine the rotation by viewing the end of the travel sensor shaft from the perspective of the actuator.

For instruments with Relay A and C: If increasing air pressure at output A causes the shaft to turn clockwise, enter Clockwise. If it causes the shaft to turn counterclockwise, enter Counterclockwise.

For instruments with Relay B: If increasing air pressure at output B causes the shaft to turn counterclockwise, enter Clockwise. If it causes the shaft to turn clockwise, enter Counterclockwise.

⚠ WARNING

Changes to the tuning set may cause the valve/assembly actuator to stroke. To avoid personal injury and property damage caused by moving parts, keep hands, tools, and other objects away from the valve/actuator assembly.

- Tuning Set there are twelve tuning sets to choose from. Each tuning set provides a preselected value for the digital valve controller gain settings. Tuning set C provides the slowest response and M provides the fastest response. For smaller actuators use tuning set C or D. For larger actuators use tuning set F or G.

Note

Tuning set B is only available in Pressure Control Mode.

In addition, you can select User Adjusted or Expert, which allows you to modify tuning of the digital valve controller. With User Adjusted, you specify the proportional gain; an algorithm in the Field Communicator calculates the velocity gain and minor loop feedback gain. With Expert you can specify the proportional gain, velocity gain, and minor loop feedback gain.

Note

Use Expert tuning only if standard tuning has not achieved the desired results.

Stabilize/Optimize or Performance Tuner may be used to achieve the desired results more rapidly than Expert tuning.

The tuning sets suggested by Setup Wizard are only recommended starting points. After you finish setting up and calibrating the instrument, run the Performance Tuner to obtain optimum tuning,

- Factory Defaults the Setup Wizard will ask you if you want to use factory defaults. If you select YES, the Setup Wizard sets the setup parameters to the values listed in table 10. If you select NO, the setup parameters listed in the table remain at their previous settings.

Auto Calibrate Travel

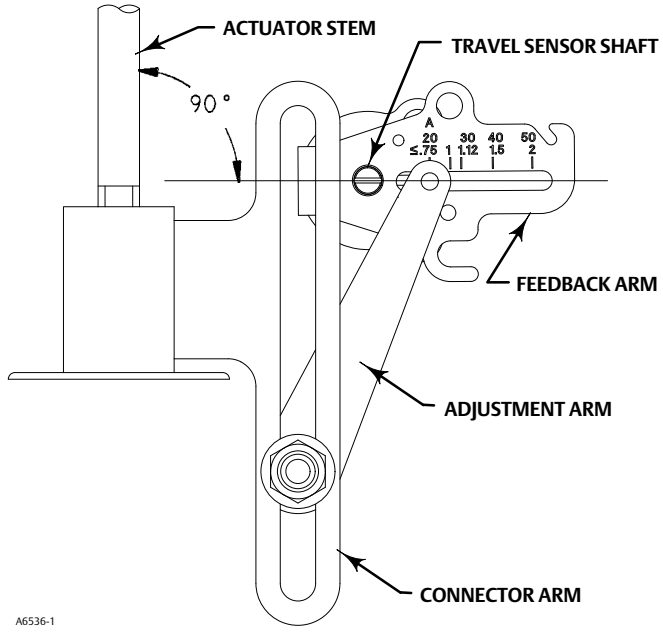
⚠ WARNING

During calibration the valve will move full stroke. To avoid personal injury and property damage caused by the release of process fluid or pressure, isolate the valve from the process and equalize pressure on both sides of the valve or bleed off the process fluid.

The instrument is calibrated during the Setup Wizard. Follow the prompts on the Field Communicator display to automatically calibrate instrument travel. The calibration procedure uses the valve and actuator stops as the 0% and 100% calibration points. For additional calibration information, see the Calibration section in the FIELDVUE DVC6000 SIS Digital Valve Controllers for Safety Instrumented System (SIS) Solutions instruction manual.

1. If the Feedback Connection is Sliding-Stem Standard, the Field Communicator prompts you to select the method of crossover adjustment: manual, last value, or default. Manual adjustment is recommended for initial travel calibration.
2. When prompted by the Field Communicator, make the crossover adjustment by adjusting the current source until the feedback arm is 90° to the actuator stem, as shown in figure 25.
3. The remainder of the auto-calibration procedure is automatic. After completing auto travel calibration, the Field Communicator prompts you to place the instrument In Service and verify that the travel properly tracks the current source.

Figure 25. Crossover Point



If the unit does not calibrate, refer to table 11 for error messages and possible remedies.

Once Auto Calibration is complete, you will be asked to enter the desired stroke test speed (default is 0.25%/sec). An additional automatic PST calibration is run to determine the default value or the partial stroke pressure limit for single

acting actuators (this will be differential pressure for double acting) and pressure set point for End Point Pressure Control.

When calibration is complete, you are asked if you wish to adjust the relay (double-acting only). Select yes to adjust the relay. See Relay Adjustment below for information on adjusting the relay.

Table 11. Auto Calibrate Travel Error Messages

Error Message	Possible Problem and Remedy
Input current must exceed 3.8 mA for calibration.	The analog input signal to the instrument must be greater than 3.8 mA. Adjust the current output from the control system or the current source to provide at least 4.0 mA.
Place Out Of Service and ensure Calibrate Protection is disabled before calib.	The Instrument Mode must be *Out of Service* and the Protection must be *None* before the instrument can be calibrated. For information on changing instrument protection and mode, see the beginning of this section.
Calibration Aborted. An end point was not reached.	The problem may be one or the other of the following: 1. The tuning set selected is too low and the valve does not reach an end point in the allotted time. Press the Hot Key, select *Stabilize/Optimize* then *Increase Response* (selects next higher tuning set). 2. The tuning set selected is too high, valve operation is unstable and does not stay at an end point for the allotted time. Press the Hot Key, select *Stabilize/Optimize* then *Decrease Response* (selects next lower tuning set).
Invalid travel value. Check travel sensor and feedback arm adjustments, and inst supply press. Then, repeat Auto Calib.	Prior to receiving this message, did the instrument output go from zero to full supply? If not, verify instrument supply pressure by referring to the specifications in the appropriate actuator instruction manual. If supply pressure is correct, check instrument pneumatic components (I/P converter and relay). If the instrument output did go from zero to full supply prior to receiving this message, then verify proper mounting by referring to the appropriate mounting procedure in the Installation section. Verify travel sensor adjustment by performing the appropriate Travel Sensor Adjust procedure in the Calibration section. Making the crossover adjustment with the valve positioned at either end of its travel will also cause this message to appear.

After instrument setup is completed, and you have placed the instrument in service, if End Point Pressure Control not enabled, you will be prompted to enable it. Select YES.

End Point Pressure Control allows the digital valve controller to pull back from saturation of the pneumatic output after reaching the travel extreme. Rather than having the instrument provide full supply pressure (saturation) continuously at the travel extreme, the digital valve controller switches to an End Point Pressure Control where the output pressure (pressure controller set point) to the actuator is controlled at a certain value. This value is configured through Pressure Set Point. Because the digital valve controller is constantly in control and not allowed to reach a dormant or saturated state, it is constantly testing its own pneumatic system. If there is an output pressure deviation, for example, the instrument will issue an alert.

If after completing setup and calibration the valve cycles or overshoots (unstable), or is unresponsive (sluggish), you can improve operation by selecting either *Performance Tuner* from the *Guided Setup* menu. For additional information on using the Performance Tuner to optimize digital valve controller tuning, refer to the Performance Tuner information below.

Relay Adjustment

The double-acting relay can be adjusted as part of the Setup Wizard. The following is a brief description of relay adjustment. For additional information, see the Calibration section in the FIELDVUE DVC6000 SIS Digital Valve Controllers for Safety Instrumented System (SIS) Solutions instruction manual.

Note

Relay B and C are not user-adjustable.

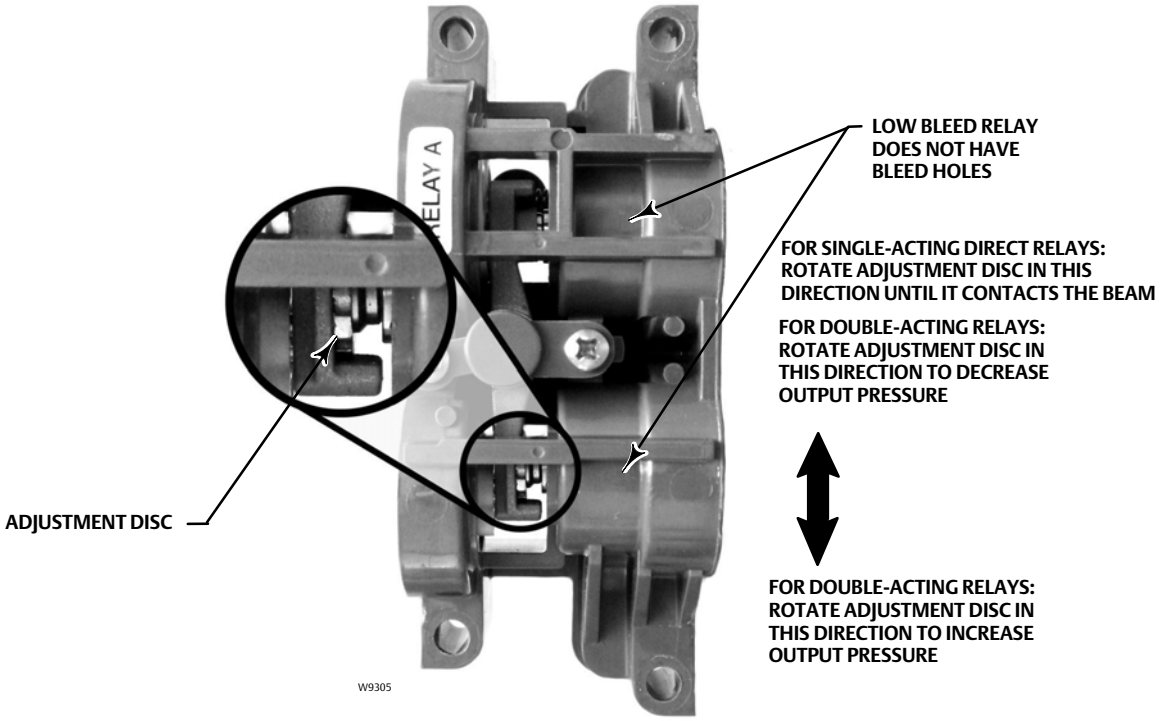
Double-Acting Relay (Relay A)

The double-acting relay is designated by Relay A. For double-acting actuators, the valve must be near mid-travel to properly adjust the relay. The Field Communicator will automatically position the valve when *Relay Adjust* is selected.

Rotate the adjustment disc, shown in figure 26, until the value displayed on the Field Communicator is between 50 and 70% of supply pressure. This adjustment is very sensitive. Be sure to allow the pressure reading to stabilize before making another adjustment (stabilization may take up to 30 seconds or more for larger actuators).

Relay A may also adjusted for use in single-acting- direct applications. Rotate the adjustment disc as shown in figure 26 for single-acting direct operation.

Figure 26. Relay A Adjustment (Shroud Removed for Clarity)



Single-Acting Direct Relay (Relay C)

The single-acting direct relay is designated Relay C, and requires no adjustment.

Single-Acting Reverse Relay (Relay B)

The single-acting reverse relay is designated Relay B. Relay B is calibrated at the factory and requires no further adjustment.

Performance Tuner (1-1-2)

⚠ WARNING

During performance tuning the valve may move, causing process fluid or pressure to be released. To avoid personal injury and property damage caused by the release of process fluid or pressure, isolate the valve from the process and equalize pressure on both sides of the valve or bleed off the process fluid.

The Performance Tuner is used to optimize digital valve controller tuning. It can be used with digital valve controllers mounted on most sliding-stem and rotary actuators, including Fisher and other manufacturers' products. Moreover, because the Performance Tuner can detect internal instabilities before they become apparent in the travel response, it can generally optimize tuning more effectively than manual tuning. Typically, the Performance Tuner takes 3 to 5 minutes to tune an instrument, although tuning instruments mounted on larger actuators may take longer.

Access the Performance Tuner by selecting *Performance Tuner* from the *Guided Setup* menu. Follow the prompts on the Field Communicator display to optimize digital valve controller tuning.

Basic Setup and Calibration Check List

☐ Is basic setup complete? If not, perform Basic Setup procedure on page 31.

☐ Does the final control element correctly respond to a setpoint change and is it stable? If not, run the Performance Tuner, as describe on page 40.

Final control element is ready to be placed on line.

SIS Variables and Diagnostics

Partial Stroke Test (2-5)

⚠ WARNING

During the partial stroke test the valve will move. To avoid personal injury and property damage caused by the release of pressure or process fluid, when used in an application where the valve is normally closed, provide some temporary means of control for the process.

The Partial Stroke Test allows the DVC6000 SIS digital valve controller to perform a Valve Signature type of test while the instrument is in service and operational. In SIS applications, it is important to be able to exercise and test the valve to verify that it will operate when commanded. This feature allows the user to partially stroke the valve while continually monitoring the input signal. If a demand arises, the test is aborted and the valve moves to its commanded position. The partial stroke valve travel is configurable between 1 and 30% maximum travel, in 0.1% increments. Data from the last partial stroke test is stored in the instrument memory for retrieval by ValveLink software.

The Partial Stroke Test allows you to perform a partial, 10%, stroke test (standard) or a custom stroke test. With the custom stroke test, the stroke may be extended up to 30%. Be sure to check plant guidelines before performing a custom stroke test. The purpose of this test is to ensure that the valve assembly moves upon demand.

A partial stroke test can be initiated when the valve is operating at either 4 mA or 20 mA (point-to-point mode). In applications where a spurious trip is to be minimized, 4 mA is the normal operating position.

When enabled, a partial stroke test may be initiated by the device (as a scheduled, auto partial stroke test), a remote push button located in the field or at the valve, the optional LCP100 local control panel, the Field Communicator, or ValveLink software. Refer to the FIELDVUE DVC6000 SIS Digital Valve Controller for Safety Instrumented System (SIS) Solutions instruction manual for information on the optional LCP100 local control panel.

Device (Digital Valve Controller)

The Auto Partial Stroke Test allows the partial stroke test to be scheduled by the DVC6000 SIS. The test is scheduled in number of hours between tests. Any power cycle will reset the test interval timer.

Auxiliary Terminal

The auxiliary terminal can be used for different applications. The default configuration is for a partial stroke test initiated by shorting the contacts wired to the auxiliary +/- terminals of the DVC6000 SIS. Refer to Auxiliary Terminal Wiring Length Guidelines below.

- Local Push Button

A partial stroke test command may be sent to the DVC6000 SIS digital valve controller using a set of contacts wired to the auxiliary +/- terminals. To perform a test, the contacts must be closed for 3 to 5 seconds and then opened. To abort the test, close the contacts for 1 second. The last set of diagnostic data is stored in the instrument memory for later retrieval via ValveLink software.

- Local DI

When configured by the user interface, the Auxiliary Terminal can be used as a discrete input from a pressure switch, temperature switch, etc., to provide an alert.

Auxiliary Terminal Wiring Length Guidelines

The Auxiliary Input Terminals of a DVC6000 SIS can be used with a locally-mounted switch for initiating a partial stroke test. Some applications require that the partial stroke test be initiated from a remote location.

The length for wiring connected to the Auxiliary Input Terminals is limited by capacitance. For proper operation of the Auxiliary Input Terminals capacitance should not exceed 18000 pF. As with all control signal wiring, good wiring practices should be observed to minimize adverse effect of electrical noise on the Aux Switch function.

Example Calculation: Capacitance per foot or per meter is required to calculate the length of wire that may be connected to the Aux switch input. The wire should not exceed the capacitance limit of 18000 pF. Typically the wire manufacturer supplies a data sheet which provides all of the electrical properties of the wire. The pertinent parameter is the highest possible capacitance. If shielded wire is used, the appropriate number is the “Conductor to Other Conductor & Shield” value.

Example — 18AWG Unshielded Audio, Control and Instrumentation Cable

Manufacturer's specifications include:

Nom. Capacitance Conductor to Conductor @ 1 KHz: 26 pF/ft
Nom. Conductor DC Resistance @ 20 Deg. C: 5.96 Ohms/1000 ft
Max. Operating Voltage - UL 200 V RMS (PLTC, CMG),150 V RMS (ITC)
Allowable Length with this cable = 18000 pF /(26 pF/ft) = 692 ft

Example — 18AWG Shielded Audio, Control and Instrumentation Cable

Manufacturer's specifications include:

Nom. Characteristic Impedance: 29 Ohms
Nom. Inductance: .15 µH/ft
Nom. Capacitance Conductor to Conductor @ KHz: 51 pF/ft
Nom. Cap. Cond. to other Cond. & Shield @ 1 KHz 97 pF/ft
Allowable Length with this cable = 18000 pF /(9 7pF/ft) = 185 ft

The AUX switch input passes less than 1 mA through the switch contacts, and uses less than 5 V, therefore, neither the resistance nor the voltage rating of the cable are critical. Ensure that switch contact corrosion is prevented. It is generally advisable that the switch have gold-plated or sealed contacts.

Field Communicator

1. Connect the Field Communicator to the LOOP terminals on the digital valve controller.
2. Turn on the Field Communicator.
3. From the *Online* menu, select *Service Tools* and *Partial Stroke Test*.
4. Select either *Standard (10%)* or *Custom*. With the Custom Stroke Test, the stroke may be entered up to 30% with configurable stroking speed and pause time.
5. The currently configured Stroke, Stroking Speed, and Pause Time is displayed. Choose "Yes" to run the test using these values. Choose "No" to modify the values. The default value for Stroke Speed is 0.25%/second.
6. The valve begins to move and the actual travel reported by the digital valve controller is displayed on the Field Communicator.
7. Observe the valve as it runs the Partial Stroke Test to verify that it moves to the desired setpoint and then returns to the original position.

Partial Stroke Variables for Configuring the Partial Stroke Test (1-2-7)

Follow the prompts on the Field Communicator display to enter or view information for the following PST Variables: *Max Travel Movement* (Maximum Travel Movement), *Stroke Speed, Pause Time, PST Press Limit* (Partial Stroke Pressure Limit).

Max Travel Movement—Defines the maximum displacement of partial stroke test signal from the travel stop. Default value is 10%. It may be set to a value between 1 and 30% in 0.1% increments.

Note

The Max Travel Movement is the percentage of total span that the valve moves away from its operating state towards its fail state during a Partial Stroke Test.

Stroke Speed—The stroke speed can be set for 1%/second, 0.5%/second, 0.25%/second, 0.12%/second, or 0.06%/second. The default value for Partial Stroke Speed is 0.25%/second. For large size actuators set the stroke speed to 0.06%/second.

Pause Time— the Setup Wizard sets the Partial Stroke Pause Time to 5 seconds. This is the pause time between the up and down strokes of the test. It can be set for 5, 10, 15, 20, or 30 seconds.

PST Press Limit (single-acting actuators)—During the Setup Wizard or Auto Travel Calibration, the Partial Stroke Pressure Limit will be set to a positive value for single acting actuators. For those actuators that vent from the test starting point, the pressure limit will be a minimum value. For those actuators that fill from the test starting point, the pressure limit will be a maximum value. The pressure signal used for this threshold depends on relay type and is summarized below.

Relay Type	Pressure Signal
A or C	Port A - Port B
B	Port B - Port A
B Special App.	Port B
C Special App.	Port A

PST Press Limit (double-acting actuators)—During the Setup Wizard or Auto Travel Calibration, the PST Press Limit will be set to a negative value for actuators where the Partial Stroke Start Point is opposite of the Zero Power Condition (e.g., Partial Stroke Start Point = Open and Zero Power Condition = Closed) and to a positive valve for actuators where the Partial Stroke Start Point is the same as the Zero Power Condition. Refer to the FIELDVUE DVC6000 SIS Digital Valve Controller for Safety Instrumented System (SIS) Solutions instruction manual for information on manual SIS / partial stroke parameter configuration.

Additional SIS Variables and Diagnostics

Manual Reset
DVC Power Up (Locked-in-Safety) > Manual Reset

Manual Reset will lock the device in its safety position until the digital valve controller is reset. If Manual Reset is selected, its state can be determined from the status monitor by monitoring the Locked In Safety Position alert. It is configurable by the Field Communicator or ValveLink software.

When Auxiliary Terminal Action is set to the optional SIS Local Control Panel (LP100), DVC Power Up is set to Manual Reset and cannot be changed to Auto Reset.

The reset signal depends on how the aux terminals are configured. If configured for an optional SIS Local Control Panel, the digital valve controller can be reset by pressing the button next to the green light on the LCP100.

If configured as Push Button Partial Stroke, the digital valve controller can be reset by shorting the aux terminals with a user-supplied push button for more than 3 seconds but less than 10 seconds. The device cannot be reset from the aux terminals if they are configured otherwise.

Demand Mode Tests

The following steps assume the use of single acting spring and diaphragm actuators or double-acting spring assist piston actuators.

Perform the following steps to confirm valve operation:

a. Point-to-Point Mode (DVC6000 SIS powered with 4-20 mA current source)

If the DVC6000 SIS is in series with a solenoid valve,

1. Disconnect the power from the solenoid valve, but maintain the 20 mA current to the digital valve controller. The valve should move to its “fail safe” position.
2. Maintain power to the solenoid valve and adjust the current to the digital valve controller from 20 mA to 4 mA. The valve should move to its “fail safe” position.
3. Remove power from the solenoid valve and adjust the current to the digital valve controller from 20 mA to 4 mA. The valve should go to its “fail safe” position.

If a solenoid is not used with the DVC6000 SIS,

1. Adjust the current to the digital valve controller from 20 mA to 4 mA. The valve should move to its “fail safe” position.

Note

The above tests are applicable for single-acting direct relays A and C. If single-acting reverse relay B is used adjust the current from 4 mA (normal state) to 20 mA (trip state).

b. Multidrop Mode (DVC6000 SIS is powered by a 24 VDC power source)

If the DVC6000 SIS is pneumatically in series with a solenoid valve, and shares a single power source,

Disconnect power to both devices. The valve should go to its “fail safe” position.

If the DVC6000 SIS is pneumatically in series with a solenoid valve, with independent power sources,

Connect a 24 VDC power supply to the solenoid valve and a second 24 VDC power supply to the DVC6000 SIS. Disconnect the solenoid valve power supply, but maintain the power supply to the DVC6000 SIS. The valve should go to its “fail safe” position quickly. Then, maintain the power supply to the solenoid valve and disconnect the DVC6000 SIS power supply. The valve should go to its “fail safe” position, although not as quickly as it does in the previous scenario.

If DVC6000 SIS is alone, without a solenoid valve,

Disconnect power to the digital valve controller. The valve should go to its “fail safe” position.

Note

The above tests are not applicable for single-acting reverse relay B when no solenoid valve is present.

Energize / De-Energize-to-Trip

In a de-energize-to-trip (DETT) configuration the current loop signal is 20 mA during normal operation and the safe state is commanded by taking the loop current to 4 mA.

In an energize-to-trip (ETT) configuration, (a less common application), the current loop signal is 4 mA during normal operation and the safe state is commanded by taking the loop current to 20 mA.

Both energize-to-trip and de-energize-to-trip can be achieved with a 4-20 mA application. De-energize-to-trip can also be achieved with a 0-24 VDC or 0-20 mA application.

Table 12. Specifications

Available Configurations

Valve-Mounted Instruments
DVC6010 SIS: Sliding stem applications
DVC6020 SIS: Rotary and long-stroke sliding-stem applications [over 102 mm (4-inch) travel]
DVC6030 SIS: Quarter-turn rotary applications

All units can be used in either 4-wire or 2-wire system installations.

DVC6000 SIS digital valve controllers must have the Safety Instrumented System Application (SIS) option

Remote-Mounted Instrument(1)
DVC6005 SIS: Base unit for 2 inch pipestand or wall mounting
DVC6015: Feedback unit for sliding-stem applications
DVC6025: Feedback unit for rotary or long-stroke sliding-stem applications
DVC6035: Feedback unit for quarter-turn rotary applications

DVC6000 SIS digital valve controllers can be mounted on Fisher and other manufacturers rotary and sliding-stem actuators.

Input Signal

Point-to-Point:
Analog Input Signal: 4-20 mA DC, nominal
Minimum voltage available at instrument terminals must be 10.5 VDC for analog control, 11 VDC for HART communication
Minimum Control Current: 4.0 mA
Minimum Current w/o Microprocessor Restart: 3.5 mA
Maximum Voltage: 30 VDC
Overcurrent Protection: Input circuitry limits current to prevent internal damage
Reverse Polarity Protection: No damage occurs from reversal of loop current
Multi-drop:
Instrument Power: 11-30 VDC at approximately 8 mA
Reverse Polarity Protection: No damage occurs from reversal of loop current

Supply Pressure(2)

Recommended: 1.7 bar (25 psi) or 0.3 bar (5 psi) plus the maximum actuator requirements, whichever is higher

Maximum: 10 bar (145 psig) or maximum pressure rating of the actuator, whichever is lower

Medium: Air or Natural Gas

Air: Supply pressure must be clean, dry air that meets the requirements of ISA Standard 7.0.01.

Natural Gas: Natural gas must be clean, dry, oil-free, and noncorrosive. H2S content should not exceed 20 ppm.

Filtration down to 5 micrometer particle size is recommended. Lubricant content is not to exceed 1 ppm weight (w/w) or volume (v/v) basis. Condensation in the air supply should be minimized

For additional information on air quality refer to the appropriate safety manual:

Safety Manual for FIELDVUE DVC6000 Digital Valve Controllers for Safety Instrumented System (SIS) Solutions 0-20 mA or 0-24 VDC (D103035X012) ***or***

Safety Manual for FIELDVUE DVC6000 Digital Valve Controllers for Safety Instrumented System (SIS) Solutions 4-20 mA (D103294X012)

Output Signal

Pneumatic signal as required by the actuator, up to full supply pressure.
Minimum Span: 0.4 bar (6 psig)
Maximum Span: 9.5 bar (140 psig)
Action: Double, Single direct, and Single reverse

Steady-State Air Consumption(3)(4)

Low Bleed Relay
At 1.4 bar (20 psig) supply pressure: Average value 0.056 normal m^3/hr (2.1 scfh)
At 5.5 bar (80 psig) supply pressure: Average value 0.184 normal m^3/hr (6.9 scfh)

The low bleed relay is the standard relay for DVC6000 SIS digital valve controllers, used for On/Off applications. Performance may be affected in throttling applications.

Maximum Output Capacity(3)(4)

At 1.4 bar (20 psig) supply pressure:
10.0 normal m^3/hr (375 scfh)
At 5.5 bar (80 psig) supply pressure:
29.5 normal m^3/hr (1100 scfh)

Independent Linearity(5)

±0.50% of output span

-continued-

Table 12. Specifications (continued)

Electromagnetic Interference (EMI)

Meets EN 61326-1 (First Edition)
Immunity—Industrial locations per Table 2 of the EN 61326-1 standard. Performance is shown in table 1-3 below.
Emissions—Class A
ISM equipment rating: Group 1, Class A

Lightning and Surge Protection—The degree of immunity to lightning is specified as Surge immunity in table 13. For additional surge protection commercially available transient protection devices can be used.

Vibration Testing Method

Tested per ISA-S75.13 Section 5.3.5. A resonant frequency search is performed on all three axes. The instrument is subjected to the ISA specified 1/2 hour endurance test at each major resonance, plus an additional two million cycles.

Input Impedance (Point-to-Point only)

The input impedance of the DVC6000 SIS active electronic circuit is not purely resistive. For comparison to resistive load specifications, an equivalent impedance of 550 ohms may be used. This value corresponds to 11 V @ 20 mA.

Operating Ambient Temperature Limits(2)(6)

-40 to 85°C (-40 to 185°F) for most approved valve-mounted instruments
-60 to 125°C (-76 to 257°F) for remote-mounted feedback unit
-52 to 85°C (-62 to 185°F) for valve-mounted instruments utilizing the Extreme Temperature option (fluorosilicone elastomers)

Humidity Limits

0 to 100% condensing relative humidity

Electrical Classification

Hazardous Area:

CSA—Intrinsically Safe, Explosion proof, Division 2, Dust-Ignition proof

FM—Intrinsically Safe, Explosion proof, Non-incendive, Dust-Ignition proof

ATEX—Intrinsically Safe, Flameproof, Type n

IECEx—Intrinsically Safe, Flameproof, Type n

Electrical Housing:

CSA—Type 4, IP66

FM—Type 4, IP66

ATEX—IP66

IECEx—IP66

Refer to Hazardous Area Classifications and Special Instructions for Safe Use and Installation in Hazardous Locations, starting on page 5, for specific approval information

Pollution Degree 2, Overvoltage Category III per ANSI/ISA-82.02.01 (IEC 61010-1 Mod).

Auxiliary Terminal Contact: Nominal Electrical Rating 5 V, <1 mA; It is recommended that the switch be sealed or have gold plated contacts to avoid corrosion.

For proper operation of the auxiliary input terminal capacitance should not exceed 18000 pF

Other Classifications/Certifications

Gas Certified, Single Seal Device— CSA, FM, ATEX, and IECEx

FSETAN—Federal Service of Technological, Ecological and Nuclear Inspectorate (Russia)

GOST-R—Russian GOST-R

INMETRO— National Institute of Metrology, Quality, and Technology (Brazil)

KGS—Korea Gas Safety Corporation (South Korea)

KISCO—Korea Industrial Safety Corporation (South Korea)

NEPSI— National Supervision and Inspection Centre for Explosion Protection and Safety of Instrumentation (China)

PESO CCOE— Petroleum and Explosives Safety Organisation - Chief Controller of Explosives (India)

TIIS— Technology Institution of Industrial Safety (Japan)

Contact your Emerson Process Management sales office for classification/certification specific information

IEC 61010 Compliance Requirements (Valve-Mounted Instruments only)

Power Source: The loop current must be derived from a Separated Extra-Low Voltage (SELV) power source.
Environmental Conditions: Installation Category I

-continued-

Table 12. Specifications (continued)

Connections

Supply Pressure: 1/4 NPT internal and integral pad for mounting 67CFR regulator
Output Pressure: 1/4 NPT internal
Tubing: 3/8-inch, recommended
Vent: 3/8 NPT internal
Electrical: 1/2 NPT internal conduit connection, M20 adapter optional

Stem/Shaft Travel

Linear Actuators with rated travel between 6.35 mm (0.25 inch) and 606 mm (23.375 inches)

Rotary Actuators with rated travel between 50 degrees and 180 degrees.

Mounting

Designed for direct actuator mounting or remote pipestand or wall mounting. Mounting the instrument vertically, with the vent at the bottom of the assembly, or horizontally, with the vent pointing down, is recommended to allow drainage of moisture that may be introduced via the instrument air supply.

Weight

Valve-Mounted Instruments
Aluminum: 3.5 kg (7.7 lbs)
Stainless Steel: 7.7 kg (17 lbs)

Remote-Mounted Instruments
DVC6005 SIS Base Unit: 4.1 kg (9 lbs)
DVC6015 Feedback Unit: 1.3 kg (2.9 lbs)
DVC6025 Feedback Unit: 1.4 kg (3.1 lbs)
DVC6035 Feedback Unit: 0.9 kg (2.0 lbs)

Options

■ Supply and output pressure gauges or ■ Tire valves ■ Integral mounted filter regulator ■ Stainless steel housing, module base, and terminal box ■ Extreme Temperature ■ Remote Mount(1) ■ Beacon Indicator ■ LCP100 local control panel ■ Natural Gas Certified, Single Seal Device ■ Feedback Assembly PTFE Sleeve Protective Kit for aluminum units in saltwater or particulate environments

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 European Community Directives.

NOTE: Specialized instrument terms are defined in ANSI/ISA Standard 51.1 - Process Instrument Terminology.
1. 3-conductor shielded cable, 22 AWG minimum wire size, is required for connection between base unit and feedback unit. Pneumatic tubing between base unit output connection and actuator has been tested to 91 meters (300 feet). At 15 meters (50 feet) there was no performance degradation. At 91 meters there was minimal pneumatic lag.
2. The pressure/temperature limits in this document and any applicable code or standard should not be exceeded.
3. Values at 1.4 bar (20 psig) based on a single-acting direct relay; values at 5.5 bar (80 psig) based on double-acting relay.
4. Normal m^3/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.
5. Typical value. Not applicable for travels less than 19 mm (0.75 inch) or for shaft rotation less than 60 degrees. Also, not applicable to DVC6020 digital valve controllers in long-stroke applications.
6. Temperature limits vary based on hazardous area approval.

Table 13. Electromagnetic Immunity Performance

PORT	PHENOMENON	BASIC STANDARD	TEST LEVEL	PERFORMANCE CRITERIA(1)	
				Point-to-Point Mode	Multi-drop Mode
Enclosure	Electrostatic discharge (ESD)	IEC 61000-4-2	4 kV contact 8 kV air	A(2)	A
	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	A
	Rated power frequency magnetic field	IEC 61000-4-8	60 A/m at 50 Hz	A	A
I/O signal/control	Burst	IEC 61000-4-4	1 kV	A(2)	A
	Surge	IEC 61000-4-5	1 kV (line to ground only, each)	B	B
	Conducted RF	IEC 61000-4-6	150 kHz to 80 MHz at 3 Vrms	A	A

Specification limit = ± 1% of span
1. A = No degradation during testing. B = Temporary degradation during testing, but is self-recovering.
2. Excluding auxiliary switch function, which meets Performance Criteria B.

Figure 27. FIELDVUE DVC6000 SIS Digital Valve Controller Failure Modes

RELAY TYPE	LOSS OF POWER	LOSS OF PNEUMATIC SUPPLY
Single-Acting Direct (Relay C)	Instrument goes to zero air output at port A.	Failure direction per actuator fail mode.
Double-Acting (Relay A)	Instrument goes to full supply air output at port B. A goes to zero air output.	Failure direction cannot be determined.
Single-Acting Reverse (Relay B)	Instrument goes to full supply air output at port B.	Failure direction per actuator fail mode.

Related Documents

Other documents containing information related to DVC6000 SIS digital valve controllers:

- FIELDVUE DVC6000 SIS Digital Valve Controllers for Safety Instrumented System (SIS) Solutions (Bulletin 62.1:DVC6000 SIS)
- FIELDVUE DVC6000 Digital Valve Controller Dimensions (Bulletin 62.1:DVC6000(S1))
- FIELDVUE DVC6000 SIS Digital Valve Controllers for Safety Instrumented System (SIS) Solutions Instruction Manual (D103230X012)
- Safety Manual for FIELDVUE DVC6000 Digital Valve Controllers for Safety Instrumented System (SIS) Solutions - 0-20 mA or 0-24 VDC (D103035X012)
- Safety Manual for FIELDVUE DVC6000 Digital Valve Controllers for Safety Instrumented System (SIS) Solutions - 4-20 mA (D103294X012)
- Partial Stroke Test using ValveLink Software - Supplement to FIELDVUE DVC6000 SIS Digital Valve Controllers for Safety Instrumented System (SIS) Solutions Instruction Manual (D103274X012)
- Pre-Commissioning Installation / Setup Guidelines using ValveLink Software - Supplement to FIELDVUE DVC6000 SIS Digital Valve Controllers for Safety Instrumented System (SIS) Solutions Instruction Manual (D103285X012)
- Fisher LCP100 Local Control Panel Instruction Manual (D103272X012)
- Fisher LC340 Line Conditioner Instruction Manual (D102797X012)
- Fisher HF340 Filter Instruction Manual (D102796X012)
- ValveLink software Help or Documentation

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

Educational Services

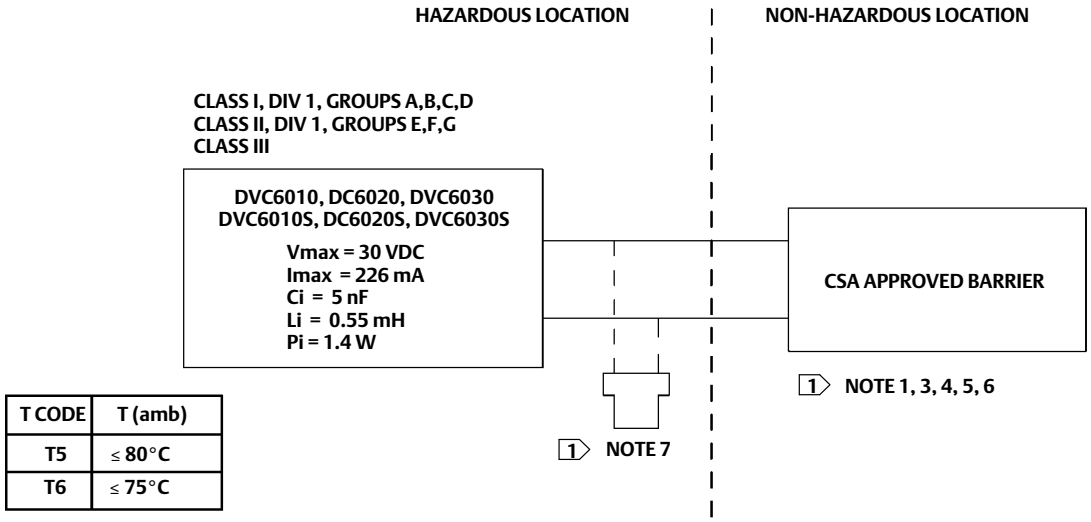
For information on available courses for DVC6000 SIS digital valve controllers, as well as a variety of other products, contact:

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@emerson.com

Loop Schematics and 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 Process Management sales office.

Figure 28. CSA Schematic



T CODE	T (amb)
T5	≤ 80°C
T6	≤ 75°C

1 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 (Vmax or Ui), THE CURRENT (Imax or Ii), AND THE POWER (Pmax or Pi) OF THE INTRINSICALLY SAFE APPARATUS MUST BE EQUAL TO OR GREATER THAN THE VOLTAGE (Voc or Uo), AND THE CURRENT (Isc or Io), AND THE POWER (Po) DEFINED BY THE ASSOCIATED APPARATUS. IN ADDITION, THE SUM OF THE MAX UNPROTECTED CAPACITANCE (Ci) AND MAX UNPROTECTED INDUCTANCE (Li), INCLUDING THE INTERCONNECTING CABLING CAPACITANCE (Ccable) AND CABLING INDUCTANCE (Lcable) MUST BE LESS THAN THE ALLOWABLE CAPACITANCE (Ca) AND INDUCTANCE (La) DEFINED BY THE ASSOCIATED APPARATUS. IF THE ABOVE CRITERIA IS MET, THEN THE COMBINATION MAY BE CONNECTED.

Vmax or Ui ≥ Voc or Uo Imax or Ii ≥ Isc or Io Pmax or Pi ≥ Po Ci + Ccable ≤ Ca Li + Lcable ≤ La

3 INSTALLATION MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE (NEC) NFPA70 AND ANSI/ISA RP12.6.01

4 MAXIMUM SAFE AREA VOLTAGE SHOULD NOT EXCEED 250 Vrms

5 RESISTANCE BETWEEN INTRINSICALLY SAFE GROUND AND EARTH GROUND MUST BE LESS THAN ONE OHM

6 LOOPS MUST BE CONNECTED ACCORDING TO THE BARRIER MANUFACTURER'S INSTRUCTIONS.

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

GE42818
Sheet 2 Rev. E
Sheet 8 Rev. D

Figure 29. Typical CSA/FM Nameplate

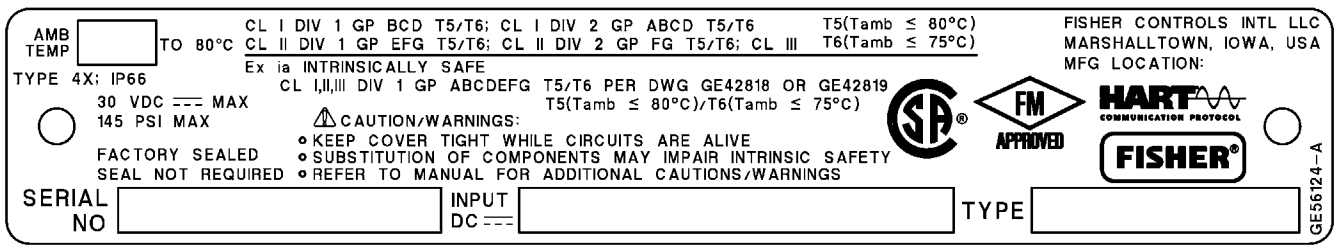
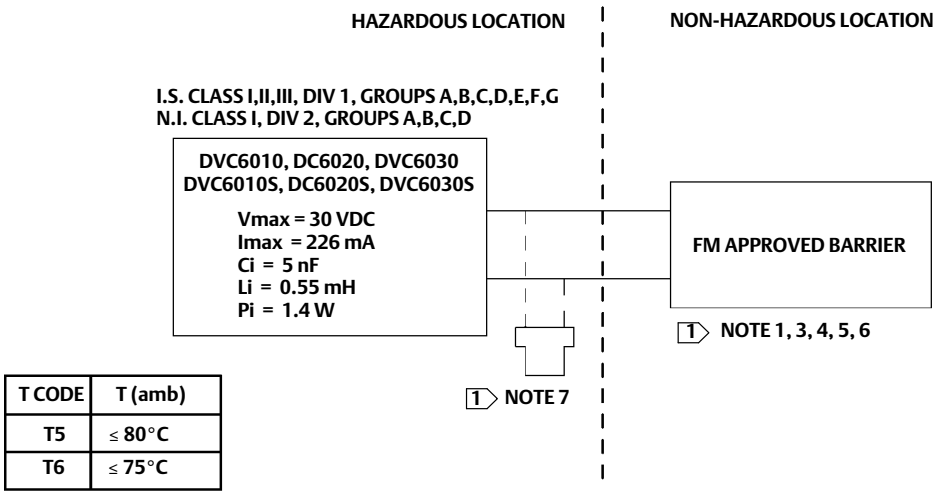


Figure 30. FM Schematic



T CODE	T (amb)
T5	≤ 80°C
T6	≤ 75°C

1 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 (Vmax or Ui), THE CURRENT (Imax or Ii), AND THE POWER (Pmax or Pi) OF THE INTRINSICALLY SAFE APPARATUS MUST BE EQUAL TO OR GREATER THAN THE VOLTAGE (Voc or Uo), AND THE CURRENT (Isc or Io), AND THE POWER (Po) DEFINED BY THE ASSOCIATED APPARATUS. IN ADDITION, THE SUM OF THE MAX UNPROTECTED CAPACITANCE (Ci) AND MAX UNPROTECTED INDUCTANCE (Li), INCLUDING THE INTERCONNECTING CABLING CAPACITANCE (Ccable) AND CABLING INDUCTANCE (Lcable) MUST BE LESS THAN THE ALLOWABLE CAPACITANCE (Ca) AND INDUCTANCE (La) DEFINED BY THE ASSOCIATED APPARATUS. IF THE ABOVE CRITERIA IS MET, THEN THE COMBINATION MAY BE CONNECTED.

Vmax or Ui ≥ Voc or Uo Imax or Ii ≥ Isc or Io Pmax or Pi ≥ Po Ci + Ccable ≤ Ca Li + Lcable ≤ La

3 INSTALLATION MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE (NEC) NFPA70 AND ANSI/ISA RP12.6.01

4 MAXIMUM SAFE AREA VOLTAGE SHOULD NOT EXCEED 250 Vrms.

5 RESISTANCE BETWEEN INTRINSICALLY SAFE GROUND AND EARTH GROUND MUST BE LESS THAN ONE OHM

6 LOOPS MUST BE CONNECTED ACCORDING TO THE BARRIER MANUFACTURER'S INSTRUCTION

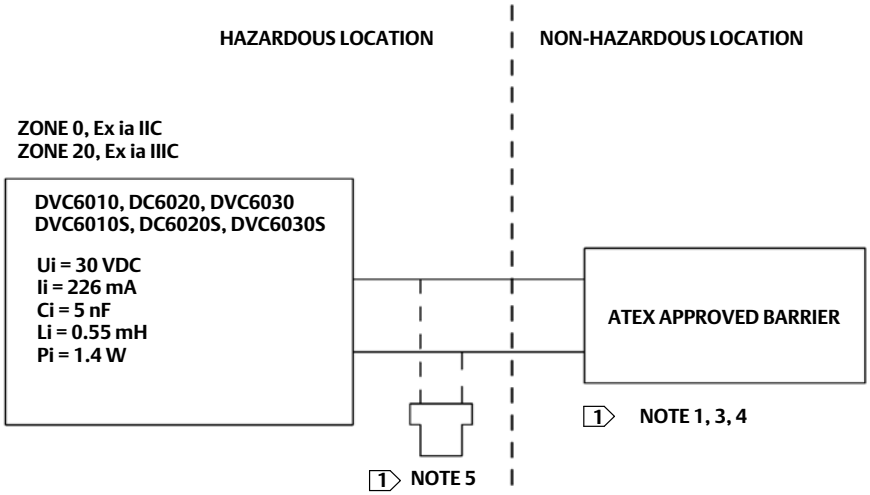
7 IF HAND-HELD COMMUNICATOR OR MULTIPLEXER IS USED IT MUST BE FM APPROVED WITH ENTITY PARAMETERS AND INSTALLED PER THE MANUFACTURER'S CONTROL DRAWING

⚠ WARNING

THE APPARATUS ENCLOSURE CONTAINS ALUMINUM AND IS CONSIDERED TO CONSTITUTE A POTENTIAL RISK OF IGNTION BY IMPACT AND FRICTION. AVOID IMPACT AND FRICTION DURING INSTALLATION AND USE TO PREVENT RISK OF IGNTION.

GE42819
sheet 2, Rev. D
Sheet 8, Rev. E

Figure 31. ATEX Schematic



ZONE 0 Ex ia IIC		ZONE 20 Ex ia IIIC	
T CODE	T AMB	MAX SURFACE TEMP	T AMB
T5	≤ 80°C	T92°C	≤ 80°C
T6	≤ 75°C	T85°C	≤ 73°C

1 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 (Vmax or Ui), THE CURRENT (Imax or Ii), AND THE POWER (Pmax or Pi) OF THE INTRINSICALLY SAFE APPARATUS MUST BE EQUAL TO OR GREATER THAN THE VOLTAGE (Voc or Uo), AND THE CURRENT (Isc or Io), AND THE POWER(Po) DEFINED BY THE ASSOCIATED APPARATUS. IN ADDITION, THE SUM OF THE MAX UNPROTECTED CAPACITANCE (Ci) AND MAX UNPROTECTED INDUCTANCE (Li), INCLUDING THE INTERCONNECTING CABLING CAPACITANCE (Ccable) AND CABLING INDUCTANCE (Lcable) MUST BE LESS THAN THE ALLOWABLE CAPACITANCE (Ca) AND INDUCTANCE (La) DEFINED BY THE ASSOCIATED APPARATUS. IF THE ABOVE CRITERIA IS MET, THEN THE COMBINATION MAY BE CONNECTED.

Vmax or Ui ≥ Voc or Uo Imax or Ii ≥ Isc or Io Pmax or Pi ≥ Po Ci + Ccable ≤ Ca Li + Lcable ≤ La

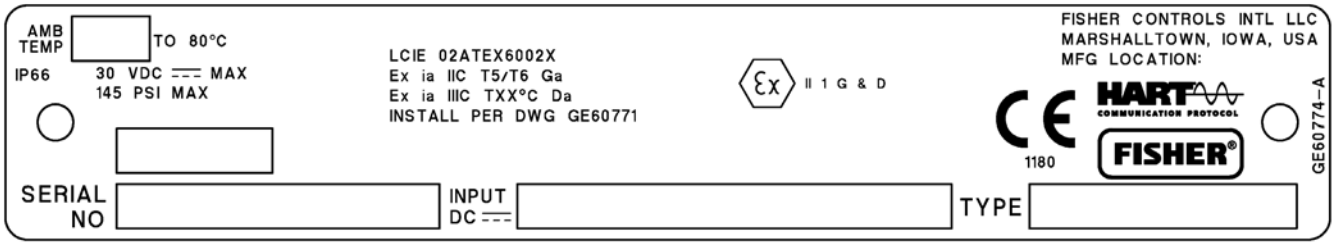
3 INSTALLATION MUST BE IN ACCORDANCE WITH THE NATIONAL WIRING PRACTICES OF THE COUNTRY IN USE.

4 LOOPS MUST BE CONNECTED ACCORDING TO THE BARRIER MANUFACTURER'S INSTRUCTIONS.

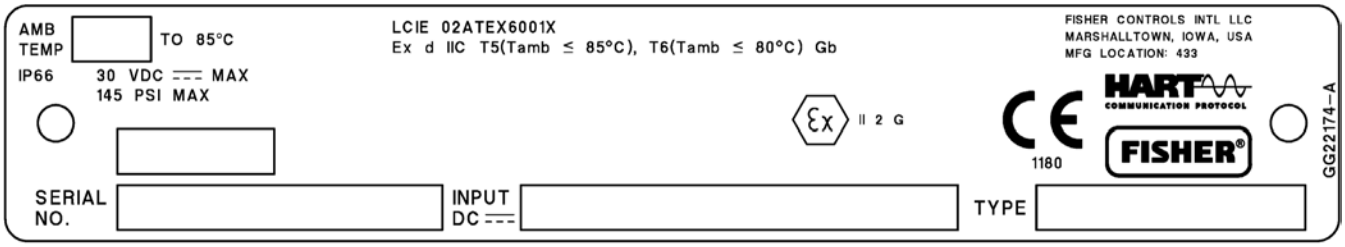
5 IF HAND-HELD COMMUNICATOR OR MULTIPLEXER IS USED, IT MUST BE ATEX APPROVED WITH ENTITY PARAMETERS AND INSTALLED PER THE MANUFACTURER'S CONTROL DRAWINGS.

GE60771 sheet 2 and 3, Rev. B

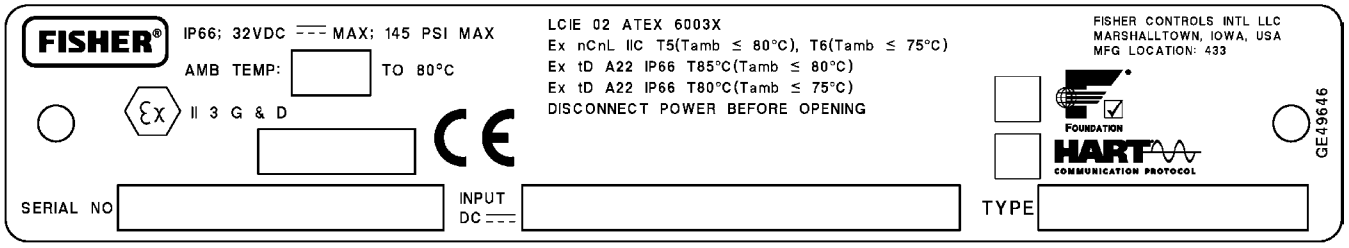
Figure 32. Typical ATEX Nameplates



INTRINSICALLY SAFE



FLAMEPROOF



TYPE n

Figure 33. Typical IECEx Nameplate

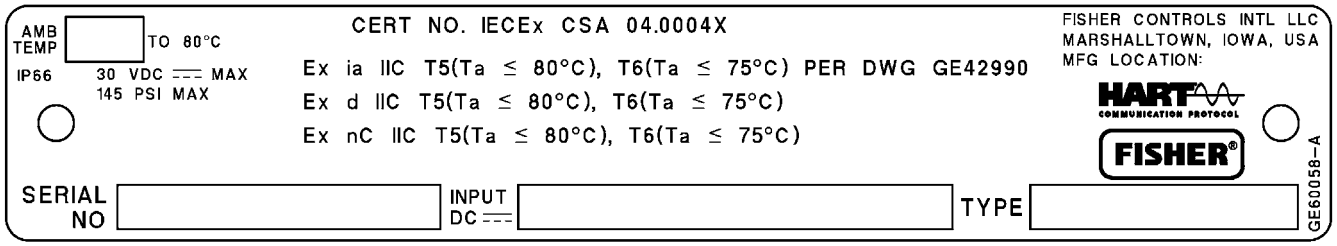
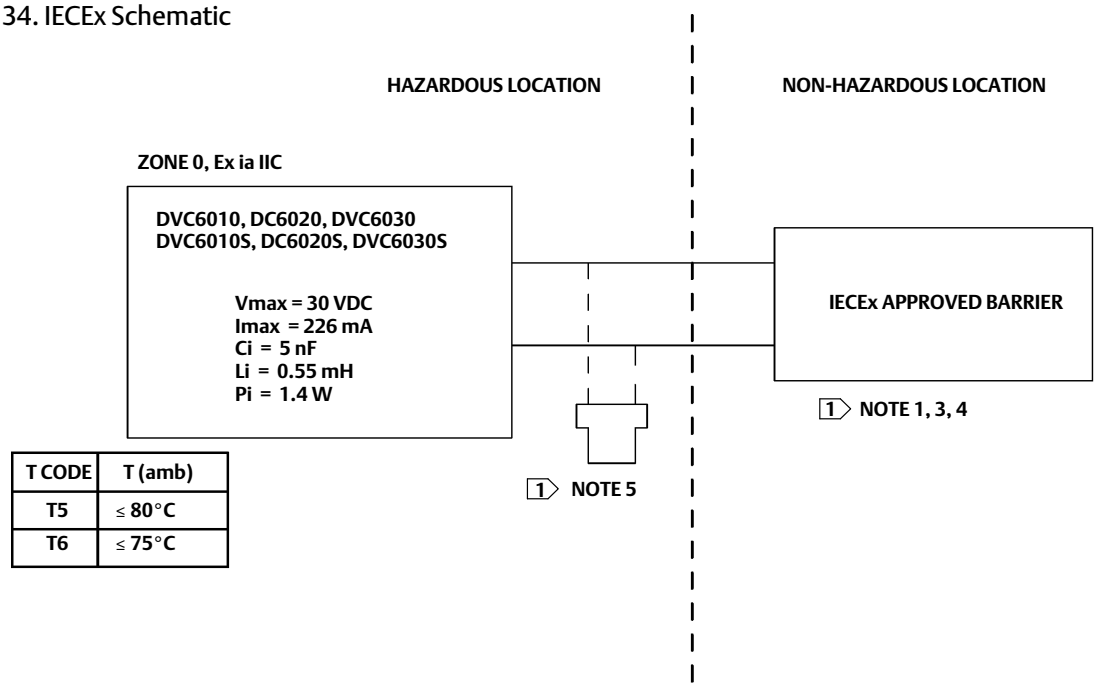


Figure 34. IECEx Schematic



T CODE	T (amb)
T5	≤ 80°C
T6	≤ 75°C

1 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 (Vmax or Ui), THE CURRENT (Imax or Ii), AND THE POWER (Pmax or Pi) OF THE INTRINSICALLY SAFE APPARATUS MUST BE EQUAL TO OR GREATER THAN THE VOLTAGE (Voc OR Uo), AND THE CURRENT (Isc or Io), AND THE POWER (Po) DEFINED BY THE ASSOCIATED APPARATUS. IN ADDITION, THE SUM OF THE MAX UNPROTECTED CAPACITANCE (Ci) AND MAX UNPROTECTED INDUCTANCE (Li), INCLUDING THE INTERCONNECTING CABLING CAPACITANCE (Ccable) AND CABLING INDUCTANCE (Lcable) MUST BE LESS THAN THE ALLOWABLE CAPACITANCE (Ca) AND INDUCTANCE (La) DEFINED BY THE ASSOCIATED APPARATUS. IF THE ABOVE CRITERIA IS MET, THEN THE COMBINATION MAY BE CONNECTED.

Vmax or Ui ≥ Voc or Uo Imax or Ii ≥ Isc or Io Pmax or Pi ≥ Po Ci + Ccable ≤ Ca Li + Lcable ≤ La

3 INSTALLATION MUST BE IN ACCORDANCE WITH THE NATIONAL WIRING PRACTICES OF THE COUNTRY IN USE

4 LOOPS MUST BE CONNECTED ACCORDING TO THE BARRIER MANUFACTURER'S INSTRUCTIONS

5 IF HAND-HELD COMMUNICATOR OR MULTIPLEXER IS USED IT MUST BE IECEx APPROVED WITH ENTITY PARAMETERS AND INSTALLED PER THE MANUFACTURERS CONTROL DRAWING

GE42990
Sheet 2, Rev. E
Sheet 8, Rev. D

CE

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.

Emerson Process Management
Marshalltown, Iowa 50158 USA
Sorocaba, 18087 Brazil
Chatham, Kent ME4 4QZ UK
Dubai, United Arab Emirates
Singapore 128461 Singapore

www.Fisher.com

EMERSON
Process Management