

Fisher™ FIELDVUE™ DVC6200 SIS Digital Valve Controller



This manual applies to:

Instrument Level	SIS	
Device Type	130a	
Hardware Revision	2	
Firmware Revision	7	
Device Revision	1	03
DD Revision	7	01

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Section 1: Introduction and Specifications

1.1 Installation, Pneumatic and Electrical Connections and Initial Configuration

Refer to the DVC6200 Series Quick Start Guide (D103556X012) for DVC6200 SIS installation, connection and initial configuration information. If a copy of this quick start guide is needed scan the field support code at the right, contact your [Emerson sales office](#), or visit our website at [Fisher.com](#).



1.2 Scope of the Manual

This instruction manual is a supplement to the DVC6200 Series Quick Start Guide (D103556X012) and Safety manual (D103601X012) that ship with every instrument. This instruction manual includes product specifications, reference materials, custom setup information, maintenance procedures and replacement part details.

NOTE

The information included in this instruction manual also applies to the DVC6200 SIS High Cv. Specifications, setup information, maintenance procedures and replacement part details unique to the DVC6200 SIS High Cv are noted.

This instruction manual describes using an Emerson Device Communicator to set up and calibrate the instrument. You can also use Fisher ValveLink™ software to setup, calibrate and diagnose the valve and instrument. For information on using ValveLink software with the instrument refer to ValveLink software help or documentation.

NOTE

DVC6200 SIS High Cv requires ValveLink software 13.6 or higher to set up, configure and calibrate the instrument.

WARNING



Do not install, operate or maintain a DVC6200 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 of the contents of this manual, including all safety cautions and warnings. If you have any questions about these instructions, contact your Emerson sales office before proceeding.

1.3 Conventions Used in this Manual

Navigation paths are included for procedures and parameters that can be accessed using the Device Communicator.

For example, to access Device Setup:

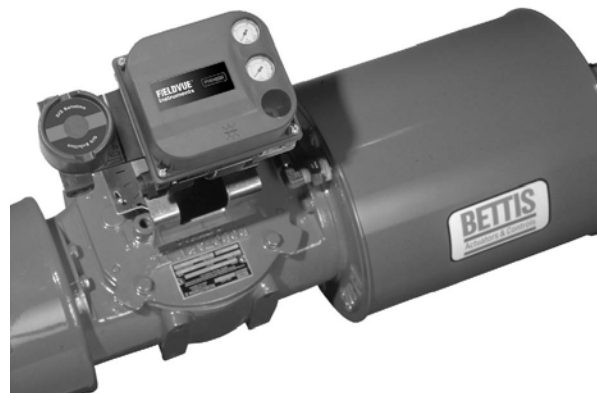
Device Communicator	Configure > Guided Setup > Device Setup
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Refer to Appendix B for Device Communicator menu trees.

NOTE

ValveLink software 13.6 or higher is required to set up and calibrate a DVC6200 SIS High Cv.

Figure 1. FIELDVUE DVC6200 SIS Digital Valve Controller Mounted on a Bettis Quarter-Turn Actuator



X0079

1.4 Description

DVC6200 SIS digital valve controllers (Figure 1) are HART communicating, microprocessor-based current-to-pneumatic instruments. The DVC6200 SIS digital valve controller has three fundamental functions.

1. Modulate a pneumatic output to a valve actuator in response to a demand signal from a logic solver to move the valve to a safe state.
2. Perform periodic tests on a valve assembly to exercise the mechanical components that are prone to sticking.
3. Continuously monitor the health of the valve and report alerts.

1.5 Specifications

⚠ WARNING

Refer to Table 1 for specifications. Incorrect configuration of a positioning instrument could result in the malfunction of the product, property damage or personal injury.

Specifications for DVC6200 SIS digital valve controllers are shown in Table 1. Specifications for the Device Communicator can be found in the Device Communicator [Quick Start Guide](#).

Table 1. Specifications

Available Mounting	Supply Pressure ⁽¹⁾
<ul style="list-style-type: none"> ■ Sliding-stem linear applications ■ Quarter-turn rotary applications ■ Integral mounting to Fisher rotary actuators ■ Integral mounting to Fisher 657/667 or GX actuators <p>DVC6200 SIS digital valve controllers can also be mounted on other actuators that comply with IEC 60534-6-1, IEC 60534-6-2, VDI/VDE-3845 and NAMUR mounting standards.</p> <p>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.</p>	<p>Minimum Recommended <i>DVC6200 SIS with Low Bleed Relay</i> 0.3 bar / 5 psig higher than maximum actuator requirements <i>DVC6200 SIS High Cv (HCv1, HCv2, HCv3)⁽²⁾</i> 2.8 bar / 40 psig required</p> <p>Maximum: 10.0 bar / 145 psig or maximum pressure rating of the actuator, whichever is lower</p> <p>Medium: Air or Natural Gas</p> <p>Supply medium must be clean, dry and noncorrosive</p> <p>Per ISA Standard 7.0.01 A maximum 40 micrometer particle size in the air system is acceptable, however, the DVC6200 SIS High Cv requires a maximum 5 micrometer particle size. Further filtration down to 5 micrometer particle size for other applications is recommended as well. Lubricant content is not to exceed 1 ppm weight (w/w) or volume (v/v) basis. Condensation in the air supply should be minimized.</p> <p><i>Pressure Dew Point:</i> at least 10 °C less than the lowest ambient temperature expected</p> <p>Per ISO 8573-1 <i>Maximum particle density size:</i> Class 7 <i>Oil content:</i> Class 3 <i>Pressure Dew Point:</i> Class 3</p>
Communication Protocol	
<ul style="list-style-type: none"> ■ HART 5 or ■ HART 7 	
Input Signal	
<p>Point-to-Point Analog Input Signal: 4 to 20 mA DC, nominal Minimum Voltage Available at Instrument Terminals must be 9.5 V DC for analog control, 10 V DC for HART communication Minimum Control Current: 4.0 mA Minimum Current without Microprocessor Restart: 3.5 mA Maximum Voltage: 30 V DC Overcurrent protected Reverse Polarity protected</p> <p>Multi-Drop Instrument Power: 11 to 30 V DC at 10 mA Reverse Polarity protected</p>	

- continued -

Table 1. Specifications (continued)

Output Signal	Maximum Output Capacity ⁽⁴⁾⁽⁵⁾
<p>Pneumatic Output: up to full supply pressure <i>Maximum Span:</i> 9.5 bar / 140 psig <i>Action:</i> Double, Single Direct or Single Reverse Note: HCv3 is only available for Single Direct action</p> <p>Electronic Output⁽³⁾ ■ Integral 4 to 20 mA Position Transmitter: 4 to 20 mA output, isolated Supply Voltage: 8 to 30 V DC Reference Accuracy: 1% of travel span Safety Accuracy: 5% of travel span The position transmitter meets the requirements of NAMUR NE43; selectable to show failure high (> 22.5 mA) or failure low (< 3.6 mA). Fail high only when the positioner is powered.</p> <p>■ Integral Switch: One isolated switch, configurable throughout the calibrated travel range or actuated from a device alert Off State: 0 mA (nominal) On State: up to 1 A Supply Voltage: 30 V DC maximum Reference Accuracy: 2% of travel span Safety Accuracy: 5% of travel span</p>	<p>DVC6200 SIS with Low Bleed Relay⁽⁵⁾ <i>At 1.4 bar / 20 psig supply pressure:</i> 10.0 normal m³/hr / 375 scfh <i>At 5.5 bar / 80 psig supply pressure:</i> 29.5 normal m³/hr / 1100 scfh</p> <p>DVC6200 SIS High Cv HCv1: 1.2 Cv HCv2: 3.2 Cv HCv3: 6.2 Cv exhaust, 3.2 Cv fill</p> <p>Operating Ambient Temperature Limits⁽¹⁾⁽⁷⁾ -52 to 85 °C / -62 to 185 °F</p> <p>Independent Linearity⁽⁸⁾ Typical Value: +/-0.50% of output span</p>
Steady State Air Consumption ⁽⁴⁾⁽⁵⁾	Electromagnetic Compatibility
<p>DVC6200 SIS with Low Bleed Relay⁽⁶⁾ <i>At 1.4 bar / 20 psig supply pressure:</i> 0.056 normal m³/hr / 2.1 scfh, average <i>At 5.5 bar / 80 psig supply pressure:</i> 0.184 normal m³/hr / 6.9 scfh, average</p> <p>DVC6200 SIS High Cv: At 3.4 bar / 50 psig supply pressure</p> <p>HCv1 <i>Pressurized:</i> 0.033 normal m³/hr / 1.25 scfh <i>Vented:</i> 0.129 normal m³/hr / 4.82 scfh HCv2 <i>Pressurized:</i> 0.039 normal m³/hr / 1.49 scfh <i>Vented normal:</i> 0.173 m³/hr / 6.48 scfh HCv3 <i>Pressurized:</i> 0.144 normal m³/hr / 5.38 scfh <i>Vented:</i> 0.179 normal m³/hr / 6.70 scfh</p>	<p>Meets EN 61326-1:2021 Immunity-Industrial locations per Table 2 of the EN 61326-1 standard. Performance is shown in Table 2. Emissions-Class A ISM equipment rating: Group 1, Class A</p> <p>Vibration Testing Method Tested per ANSI/ISA S75.13.01 Section 5.3.5</p> <p>Input Load Impedance An equivalent impedance of 500 ohms may be used. This value corresponds to 10 V at 20 mA.</p> <p>Humidity Testing Method Tested per IEC 61514-2</p>

- continued -

Table 1. Specifications (continued)

Hazardous Area Approvals	Connections												
CSA – Intrinsically Safe, Explosion-proof, Division 2, Dust Ignition-proof (Canada) FM – Intrinsically Safe, Explosion-proof, Dust Ignition-proof, Non-Incendive (United States) ATEX – Intrinsically Safe, Flameproof, Type n, Dust by intrinsic safety IECEx – Intrinsically Safe, Flameproof, Type n, Dust by intrinsic safety and enclosure Marine Approvals – Lloyds, DNV, ABS, Bureau Veritas CML – Certification Management Limited (Japan) CUTR – Customs Union Technical Regulations ESMA – Emirates Authority for Standardization and Metrology – ECAS-Ex (UAE) INMETRO – National Institute of Metrology, Quality and Technology (Brazil) KOSHA – Korean Occupational Safety and Health Agency (South Korea) KTL – Korea Testing Laboratory (South Korea) CCC – China Compulsory Certification NEPSI – National Supervision and Inspection Centre for Explosion Protection and Safety of Instrumentation (China) PESO CCOE – Petroleum and Explosives Safety Organization – Chief Controller of Explosives (India) SANS – South Africa National Standards UKEx – Intrinsically Safe and Dust, Flameproof, Dust by Enclosure, Type n (United Kingdom) Not all certifications apply to all constructions. Contact your Emerson sales office or refer to the DVC6200 SIS product page at Fisher.com for approval specific information.	DVC6200 SIS with Low Bleed Relay: Supply Pressure: 1/4 NPT internal and integral pad for mounting Fisher 67CFR regulator Output Pressure: 1/4 NPT internal Tubing: 3/8 in. recommended Vent: 3/8 NPT internal Electrical: 1/2 NPT internal or M20 DVC6200 SIS High Cv: <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;"><i>Supply Port</i></th> <th style="text-align: left;"><i>Output Port</i></th> <th style="text-align: left;"><i>Vent</i></th> </tr> </thead> <tbody> <tr> <td>HCv1: 3/8 NPT</td> <td>HCv1: 3/8 NPT</td> <td>HCv1: 3/8 NPT</td> </tr> <tr> <td>HCv2: 1/2 NPT</td> <td>HCv2: 1/2 NPT</td> <td>HCv2: 1/2 NPT</td> </tr> <tr> <td>HCv3: 1/2 NPT</td> <td>HCv3: 1 NPT</td> <td>HCv3: 1 NPT</td> </tr> </tbody> </table> Recommended tubing size at least equal to port connection size Minimum inside diameter required HCv1: 7.11 mm / 0.28 in. HCv2: 11.7 mm / 0.46 in. HCv3: 16.5 mm / 0.65 in. Electrical: 1/2 NPT internal or M20	<i>Supply Port</i>	<i>Output Port</i>	<i>Vent</i>	HCv1: 3/8 NPT	HCv1: 3/8 NPT	HCv1: 3/8 NPT	HCv2: 1/2 NPT	HCv2: 1/2 NPT	HCv2: 1/2 NPT	HCv3: 1/2 NPT	HCv3: 1 NPT	HCv3: 1 NPT
<i>Supply Port</i>	<i>Output Port</i>	<i>Vent</i>											
HCv1: 3/8 NPT	HCv1: 3/8 NPT	HCv1: 3/8 NPT											
HCv2: 1/2 NPT	HCv2: 1/2 NPT	HCv2: 1/2 NPT											
HCv3: 1/2 NPT	HCv3: 1 NPT	HCv3: 1 NPT											
Electrical Housing	Actuator Compatibility												
CSA – Type 4X, IP66 FM – Type 4X, IP66 ATEX – IP66 IECEx – IP66	Sliding-Stem Linear Linear actuators with rated travel between 6.35 mm / 0.25 in. and 606 mm / 23.375 in. Quarter-Turn Rotary Rotary actuators with rated travel between 45° and 180° ⁽⁹⁾												
Electrical Classification	Weight												
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.	Aluminum DVC6200 SIS with Low Bleed Relay: 3.5 kg / 7.7 lbs DVC6200 SIS High Cv: 6.5 kg / 14.3 lbs Stainless Steel DVC6200 SIS with Low Bleed Relay: 8.6 kg / 19 lbs DVC6205 SIS: 4.1 kg / 9 lbs DVC6215: 1.4 kg / 3.1 lbs												
IEC 61010 Compliance Requirements													
Power Source: The loop current must be derived from a Separated Extra-Low Voltage (SELV) power source Environmental Conditions: Installation Category I													

- continued -

Table 1. Specifications (continued)

Construction Materials	Declaration of SEP
Housing, module base and terminal box Standard: A03600 low copper aluminum alloy Optional: Stainless steel Cover: Thermoplastic polyester Elastomers: Fluorosilicone	Fisher Controls International LLC declares this product to be in compliance with Article 4 paragraph 3 of the PED Directive 2014/68/EU and Part 1, Requirement 8 of the PESR Regulation. It was designed and manufactured in accordance with Sound Engineering Practice (SEP) and cannot bear the CE marking related to PED compliance or the UKCA mark related to the PESR Regulation.
Options ■ Supply and output pressure gauges or tire valves ■ Integral mounted filter regulator ⁽¹⁰⁾ ■ Energize to trip ■ Standard Bleed Relay ■ Remote mount ⁽¹¹⁾⁽¹²⁾ ■ LCP100 local control panel ■ LCP200 local control panel ■ Fisher LC340 line conditioner ■ Stainless steel ■ DVC6200 SIS High Cv	
<p>NOTE: Specialized instrument terms are defined in ANSI/ISA Standard 51.1 – Process Instrument Terminology.</p> <ol style="list-style-type: none"> The pressure/temperature limits in this document and any other applicable code or standard should not be exceeded. HcV1: 1.2 Cv spool valve, needs a minimum 8 in. diameter cylinder/diaphragm. HcV2: 3.2 Cv spool valve, needs a minimum 12 in. diameter cylinder or 220 in.² diaphragm area. HcV3: 6.2 Cv spool valve, needs a minimum 12 in. diameter cylinder or 220 in.² diaphragm area. The electronic output is available with either the position transmitter or the switch. Normal m3/hour – Normal cubic meters per hour at 0 °C and 1.01325 bar, absolute. Scfh – Standard cubic feet per hour at 60 °F and 14.7 psia. Values at 1.4 bar / 20 psig based on single-acting direct relay; values at 5.5 bar / 80 psig based on double-acting relay. The Quad O steady-state consumption requirement of 6 scfh can be met by a DVC6200 SIS with low bleed relay A option, when used with up to 4.8 bar / 70 psi supply of Natural Gas at 16 °C / 60 °F. The 6 scfh requirement can be met by low bleed relay B and C when used with up to 5.2 bar / 75 psi supply of Natural Gas at 16 °C / 60 °F. Temperature limits vary based on hazardous area approval. Lower temperature limit for CUTR Ex d approval with fluorosilicone elastomers is -53 °C / -63.4 °F. Not applicable for travels less than 19 mm / 0.75 in. or for shaft rotation less than 60°. Also not applicable for digital valve controllers in long-stroke applications over 4 in. Rotary actuators with 180 degree rated travel require a special mounting kit; contact your Emerson sales office for kit availability. An integral mounted filter regulator is not available with the DVC6200 SIS High Cv. 4-conductor shielded cable, 18 to 22 AWG minimum wire size, in rigid or flexible metal conduit, 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 with minimal pneumatic lag. At 30 meters / 100 feet there was no performance degradation. The position monitor (transmitter or switch) with the remote mount construction is not safety certified. 	

Table 2. EMC Summary Results – Immunity

Port	Phenomenon	Basic Standard	Test Level	Performance Criteria ⁽¹⁾
Enclosure	Electrostatic discharge (ESD)	IEC 61000-4-2	4 kV contact 8 kV air	A - without I/O B - with I/O
	Radiated EM field	IEC 61000-4-3	80 to 1000 MHz at 10 V/m with 1 kHz AM at 80% 1400 to 2000 MHz at 3 V/m with 1 kHz AM at 80% 2000 to 2700 MHz at 1 V/m with 1 kHz AM at 80% 2700 to 6000 MHz at 10 V/m with 1 kHz AM at 80% ⁽²⁾	A
	Rated power frequency magnetic field	IEC 61000-4-8	30 A/m at 50/60Hz	A
I/O signal/control	Burst	IEC 61000-4-4	1 kV	A - without I/O B - with I/O
	Surge	IEC 61000-4-5	1 kV	A - without I/O B - with I/O
	Conducted RF	IEC 61000-4-6	150 kHz to 80 MHz at 3 Vrms	A

Performance criteria: +/- 1% effect.
 1. A = No degradation during testing. B = Temporary degradation during testing, but is self-recovering.
 2. Supplementary immunity testing performed from 1.4 GHz to 10 GHz to meet EN 61326-1:2021 requirements.

1.6 Related Documents

This section lists other documents containing information related to the DVC6200 SIS digital valve controller. These documents include:

- FIELDVUE DVC6200 SIS Digital Valve Controller Product Bulletin ([D103555X012](#))
- FIELDVUE DVC6200 Digital Valve Controller Dimensions ([D103543X012](#))
- Fisher FIELDVUE Digital Valve Controller Product Selection ([D104363X012](#))
- FIELDVUE DVC6200 Series Quick Start Guide ([D103556X012](#))
- CSA Hazardous Area Approvals - DVC6200 Series Digital Valve Controllers ([D104203X012](#))
- FM Hazardous Area Approvals - DVC6200 Series Digital Valve Controllers ([D104204X012](#))
- ATEX Hazardous Area Approvals - DVC6200 Series Digital Valve Controllers ([D104205X012](#))
- IECEx Hazardous Area Approvals - DVC6200 Series Digital Valve Controllers ([D104206X012](#))
- FIELDVUE DVC6200 SIS Safety Manual ([D103601X012](#))
- HART Field Device Specification for FIELDVUE DVC6200 SIS ([D103638X012](#))
- Monitoring Health of External Solenoid Valve (SOV) with FIELDVUE DVC6200 SIS Digital Valve Controllers ([D104028X012](#))
- Partial Stroke Test using 475/375 Field Communicator ([D103320X012](#))
- Partial Stroke Test using ValveLink Software ([D103641X012](#))
- Pre-Commissioning Installation/Setup Guidelines using ValveLink Software ([D103285X012](#))
- Fisher LCP200 Product Bulletin ([D104313X012](#))

- Fisher LCP200 Instruction Manual (D104296X012)
- Fisher LCP100 Product Bulletin (D103604X012)
- Fisher LCP100 Instruction Manual (D103272X012)
- Fisher LC340 Instruction Manual (D102797X012)
- Fisher HF340 Filter Instruction Manual (D102796X012)
- AMS Trex Device Communicator [User Guide](#)
- ValveLink Software Help or [Documentation](#)

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

1.7 Educational Services

Emerson Educational Services
 Phone: +1-800-338-8158
 E-mail: education@emerson.com
emerson.com/mytraining

Section 2: Wiring Practices

2.1 Logic Solver or Control System Requirements

There are several parameters that should be checked to ensure the logic solver or control system is compatible with the DVC6200 SIS digital valve controller.

HART Filter/Line Conditioner

Depending on the logic solver or control system and operational mode of the DVC6200 SIS digital valve controller, a line conditioner or HART filter may be required.

Operational Mode	Control System or Logic Solver	HART Filter Required?	Line Conditioner Required?
4 to 20 mA Point-to-Point Loop	PROVOX™, RS3™, DeltaV™, Ovation™	No	No
	All Others	Consult Sales Office	No
24 V DC Multi-Drop Loop	All	No	Yes

The HF340 HART filter and LC340 Line Conditioner are passive devices that are inserted in the field wiring of the HART loop. A filter or line conditioner is normally installed near the field wiring terminals of the system I/O (see Figure 2). Its purpose is to effectively isolate the system output from modulated HART communication signals and raise the impedance of the system to allow HART communication. For more information, refer to the HF340 HART filter (D102796X012) or LC340 Line Conditioner (D102797X012) instruction manual.

Voltage Available

The voltage available at the DVC6200 SIS digital valve controller must be at least 10 V DC. The voltage available at the instrument is not the actual voltage measured at the instrument when the instrument is connected. The voltage measured at the instrument is limited by the instrument and is typically less than the voltage available.

As shown in Figure 2, the voltage available at the instrument depends upon:

- The logic solver or control system compliance voltage;
- if a line conditioner filter or intrinsic safety barrier is used; and
- the wire type and length.

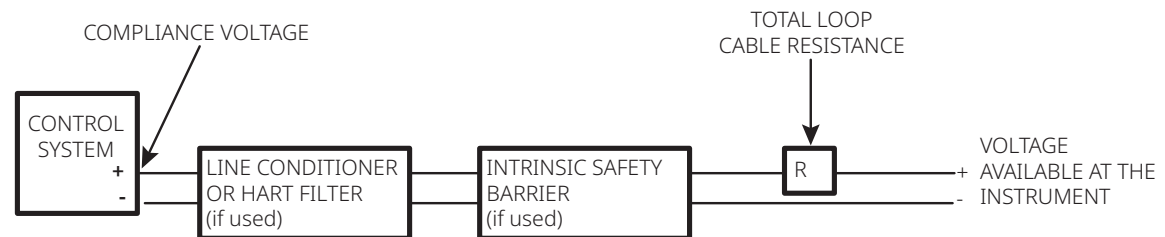
The compliance voltage is the maximum voltage at the logic solver or control system output terminals at which the system can produce maximum loop current.

The voltage available at the instrument may be calculated from the following equation:

Voltage Available = [Compliance Voltage (at maximum current)] - [line conditioner/filter voltage drop] - [total cable resistance maximum current] - [barrier resistance x maximum current].

The calculated voltage available should be greater than or equal to 10 V DC.

Figure 2. Determining Voltage Available at the Instrument



Calculate Voltage Available at the Instrument as follows:

Logic solver or control system compliance voltage

- Line conditioner or filter voltage drop (if used)⁽¹⁾

- Intrinsic safety barrier resistance (if used) x maximum loop current

- Total loop cable resistance x maximum loop current

= Voltage available at the instrument⁽²⁾

Example Calculation

18.5 V
(at 21.05 mA for Honeywell TDC2000)

- 2 V

- 2.55 V (121 ohms x 0.02105 amps)

- 1.01 V (48 ohms x 0.02105 amps for
1000 feet of Belden 9501 cable)

= 15.49 V, available - if safety barrier
(2.55 V) is not used

Notes:

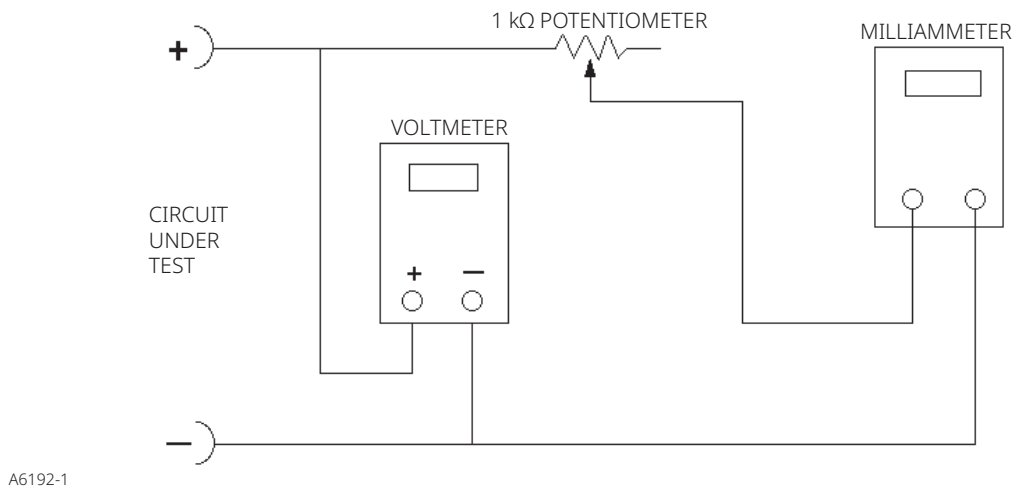
1. Obtain filter voltage drop. The measured drop will be different than this value. The measured filter voltage drop depends upon control system output voltage, the intrinsic safety barrier (if used), and the instrument. See Note 2.

2. The voltage available at the instrument is not the voltage measured at the instrument terminals. Once the instrument is connected, the instrument limits the measured voltage to approximately 8.0 to 9.5 V.

Compliance Voltage

1. Disconnect the field wiring from the system and connect equipment as shown in Figure 3 to the system terminals.

Figure 3. Voltage Test Schematic



2. Set the system to provide maximum output current.
3. Increase the resistance of the 1 k Ω potentiometer, shown in Figure 3, until the current observed on the milliammeter begins to drop quickly.
4. Record the voltage shown on the voltmeter. This is the compliance voltage.

Contact your [Emerson sales office](#) for specific parameter information relating to your control system.

Maximum Cable Capacitance

The maximum cable length for HART communication is limited by the characteristic capacitance of the cable.

Maximum length due to capacitance can be calculated using the following formulas:

$$\text{Length(ft)} = [160,000 - C_{\text{master}}(\text{pF})] \div [C_{\text{cable}}(\text{pF/ft})]$$

$$\text{Length(m)} = [160,000 - C_{\text{master}}(\text{pF})] \div [C_{\text{cable}}(\text{pF/m})]$$

where:

160,000 = a constant derived for FIELDVUE instruments to ensure that the HART network RC time constant will be no greater than 65 μs (per the HART specification).

C_{master} = the capacitance of the control system or HART filter

C_{cable} = the capacitance of the cable used (see Table 3)

The following example shows how to calculate the cable length for a Foxboro I/A control system (1988) with a C_{master}

of 50,000 pF and a Belden 9501 cable with characteristic capacitance of 50pF/ft.

$$\text{Length(ft)} = [160,000 - 50,000\text{pF}] \div [50\text{pF/ft}]$$

$$\text{Length} = 2200 \text{ ft.}$$

The HART communication cable length is limited by the cable characteristic capacitance. To increase cable length, select a wire with lower capacitance per foot. Contact your Emerson sales office for specific information relating to your control system.

Table 3. Cable Characteristics

Cable Type	Capacitance ⁽¹⁾ pF/Ft	Capacitance ⁽¹⁾ pF/m	Resistance ⁽²⁾ Ohms/ft	Resistance ⁽²⁾ Ohms/m
BS5308/1, 0.5 sq mm	61.0	200	0.022	0.074
BS5308/1, 1.0 sq mm	61.0	200	0.012	0.037
BS5308/1, 1.5 sq mm	61.0	200	0.008	0.025
BS5308/2, 0.5 sq mm	121.9	400	0.022	0.074
BS5308/2, 0.75 sq mm	121.9	400	0.016	0.053
BS5308/2, 1.5 sq mm	121.9	400	0.008	0.025
BELDEN 8303, 22 awg	63.0	206.7	0.030	0.098
BELDEN 8441, 22 awg	83.2	273	0.030	0.098
BELDEN 8767, 22 awg	76.8	252	0.030	0.098
BELDEN 8777, 22 awg	54.9	180	0.030	0.098
BELDEN 9501, 24 awg	50.0	164	0.048	0.157
BELDEN 9680, 24 awg	27.5	90.2	0.048	0.157
BELDEN 9729, 24 awg	22.1	72.5	0.048	0.157
BELDEN 9773, 18 awg	54.9	180	0.012	0.042
BELDEN 9829, 24 awg	27.1	88.9	0.048	0.157
BELDEN 9873, 20 awg	54.9	180	0.020	0.069

1. The capacitance values represent capacitance from one conductor to all other conductors and shield.
This is the appropriate value to use in the cable length calculations.

2. The resistance values include both wires of the twisted pair.

Auxiliary Terminal Wiring Length Guidelines

The Auxiliary Input Terminals of a DVC6200 SIS can be used with an LCP100 local control panel or a locally-mounted switch for initiating a partial stroke test. Some applications require that the switch or local control panel be installed remotely from the DVC6200 SIS.

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 100,000 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 100,000 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 and Shield" value.

Example – 18 AWG Unshielded Audio, Control and Instrumentation Cable

Manufacturer's specifications include:

Nom. Capacitance Conductor to Conductor at 1 KHz: 26 pF/ft
Nom. Conductor DC Resistance at 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 = $100,000\text{pF}/(26\text{pF/ft}) = 3846\text{ ft}$

Example – 18 AWG Shielded Audio, Control and Instrumentation Cable

Manufacturer's specifications include:

Nom. Characteristic Impedance: 29 Ohms
Nom. Inductance: .15 $\mu\text{H}/\text{ft}$
Nom. Capacitance Conductor to Conductor at 1 KHz: 51 pF/ft
Nom. Cap. Cond. to other Cond. and Shield at 1 KHz 97 pF/ft
Allowable Length with this cable = $100,000\text{ pF}/(97\text{ pF/ft}) = 1030\text{ ft}$

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.

2.2 Local Control Panel

Fisher LCP100 and LCP200 local control panels are used to manually open and close a safety shutdown valve.

The LCP100 provides a manual reset feature as well as a button for initiating a partial stroke test.

The LCP200 can be configured to auto or manual reset after a trip. It also offers a smart auto reset configuration which requires a manual reset for locally initiated trips but auto reset for all other trips. It includes trip and reset pushbuttons to provide a corresponding change in the state of the associated single pole double throw (SPDT) relay. The trip and reset relays can be used as input to initiate Trip or Reset action in the logic solver. Additionally, it includes a button for initiating a partial stroke test.

Installation

Both LCP100 and LCP200 local control panels have mounting holes for on-site mounting of the device.

NOTE

A mounting kit is available to use when replacing an LCP100 with the LCP200. Contact your [Emerson sales office](#) for information on obtaining this kit.

The local control panel must be installed so that the wiring connections are on the bottom to prevent accumulation of moisture inside the box.

LCP100: When installing the LCP100, cover tighten the screws evenly in a criss-cross pattern to a torque of 2.8 N·m / 25 lbf·in to help ensure the cover is properly installed.

LCP200: When installing the terminal cover on the LCP200, use a 4 mm hex key to tighten the screws evenly in a criss-cross pattern to a torque of 8.7 N·m / 77 lbf·in $\pm 10\%$, to help ensure the cover is properly installed. Apply silicone lubricant to the terminal box O-ring.

Electrical Connections

WARNING

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

LCP100 protection and wiring methods are defined in Table 4. Refer to the LCP100 instruction manual ([D103272X012](#)) for installation wiring diagrams, as well as all other information on the LCP100 local control panel.

Wiring configurations for the LCP200, based on installation requirements, are defined in Table 5. Refer to the LCP200 instruction manual ([D104296X012](#)) for installation wiring diagrams, as well as all other information on the LCP200 local control panel.

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

Table 4. Fisher LCP100 Protection and Wiring Methods

LCP100 Protection Method	LCP100 Power Source	Wiring Order from Logic Solver	DVC6200 SIS Mode (Current or Voltage)
Ex e mb [ib] IIC Ex tb IIIC	LOOP	DVC6200 SIS then LCP100	Point-to-Point
		LCP100 then DVC6200 SIS	Multi-Drop
	24 V DC	DVC6200 SIS then LCP100	Point-to-Point
		LCP100 then DVC6200 SIS	Multi-Drop
Ex ic IIC Ex tb IIIC	LOOP	DVC6200 SIS then LCP100	Point-to-Point
		LCP100 then DVC6200 SIS	Multi-Drop
	24 V DC	DVC6200 SIS then LCP100	Point-to-Point
		LCP100 then DVC6200 SIS	Multi-Drop
Ex ia IIB Ex tb IIIC	LOOP	DVC6200 SIS then LCP100	Point-to-Point
		LCP100 then DVC6200 SIS	Multi-Drop
	24 V DC	DVC6200 SIS then LCP100	Point-to-Point
		LCP100 then DVC6200 SIS	Multi-Drop

Table 5. Fisher LCP200 Wiring Configurations

LCP200 Power Source	System Output	DVC6200 SIS Mode (Current or Voltage)
LOOP	8 to 20 mA	Point-to-Point
	24 V DC	Multi-Drop
24 V DC External Power	4 to 20 mA	Point-to-Point
	24 V DC	Multi-Drop

Section 3: Configuration

NOTE

ValveLink software 13.6 or higher is required to set up, configure and calibrate a DVC6200 SIS High Cv.

3.1 Guided Setup

Device Communicator

Configure > Guided Setup

To quickly setup the instrument, the following procedures will guide you through the process.

Device Setup is used to configure the unique parameters for the valve, actuator, instrument and accessory construction. After Device Setup is complete, proceed with Auto Calibration.

Auto Calibration is used to establish the limits of physical travel. During this process, the valve will fully stroke from one travel extreme to the other. There are three calibration options to choose from:

- Autocalibrate – Standard runs the full calibration process (recommended).
- Autocalibrate – Without Biases establishes the travel end points, but does not adjust the Minor Loop Feedback bias. This is for advanced use when manually setting the biases for large actuators.
- Advanced Settings allows additional custom configuration of calibration parameters. This is for advanced use when calibrating large actuators.

3.2 Manual Setup

Manual Setup allows you to configure the digital valve controller to your application. Table 6 lists the default settings for a standard factory configuration. You can adjust actuator response, set the various modes, alerts, ranges, travel cutoffs and limits. You can also restart the instrument and set the protection.

Refer to Table 7 for possible configurations for a digital valve controller operated by a 4 to 20 mA input current (point-to-point mode) and Table 8 for possible configurations for a digital valve controller operated by a 0 to 24 V DC power supply (multi-drop mode).

Table 6. Default Detailed Setup Parameters

	Setup Parameter	Default Setting ⁽¹⁾
Instrument Configuration	Restart Control Mode	Resume Last
	Polling Address	0
	Burst Mode Enable	No
	Burst Command	3
Dynamic Response and Tuning	Input Characterization	Linear
	Travel Limit High	125%
	Travel Limit Low	-25%
	Travel/Pressure Cutoff High	50%
	Travel/Pressure Cutoff Low	50%
	Integrator Enable Low Bleed Relay HCv1, HCv2, HCv3	Yes Disable
	Integral Gain Low Bleed Relay HCv1, HCv2 HCv3	9.4 repeats/minute 1.2 repeats/minute 6.0 repeats/minute
Integral Deadzone Low Bleed Relay HCv1, HCv2, HCv3	0.26% 0.75%	
Deviation and Other Alerts	Travel Deviation Alert Enable	Yes
	Travel Deviation Alert Point	5%
	Travel Deviation Time	9.99 seconds
	Pressure Deviation Alert Enable	Yes
	Pressure Deviation Alert Point	5 psi ⁽²⁾
	Pressure Deviation Alert Time	9.99 seconds
	Drive Signal Alert Enable	Yes
	Supply Pressure Alert Enable	Yes

1. The settings listed are for standard factory configuration. DVC6200 SIS instruments can also be ordered with custom configuration settings. Refer to the order requisition for custom settings.

2. Adjust to bar, kPa or Kg/cm² if necessary.

Table 7. Possible Configurations for a FIELDVUE DVC6200 SIS Digital Valve Controller Operated by 4 to 20 mA

Device Setup 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 or Direct-acting HCv1, HCv2, HCv3	Open	Close	Common Application			
			20 mA	Open	100%	100%
	Open	Open ⁽¹⁾	Less Common Application			
			4 mA	Open	100%	100%
	Close	Close ⁽¹⁾	Less Common Application			
			4 mA	Close	0%	0%
Close	Open	Common Application				
		20 mA	Close	0%	0%	
B or Reverse-acting HCv1, HCv2	Open	Close ⁽¹⁾	Less Common Application			
			20 mA	Open	100%	100%
	Open	Open	Common Application			
			4 mA	Open	100%	100%
	Close	Close	Common Application			
			4 mA	Close	0%	0%
Close	Open ⁽¹⁾	Less Common Application				
		20 mA	Close	0%	0%	

1. These configurations are not available when the Hardware Shutdown Switch is Enabled.

NOTE

DVC6200 SIS instruments in PT-PT mode require the Hardware Shutdown Switch be Enabled for FMEDA failure rates to be valid during 4 to 20 mA operation.

Table 8. Possible Configurations for a FIELDVUE DVC6200 SIS Digital Valve Controller Operated by 0 to 24 V DC

Device Setup 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 or Direct-acting HCv1, HCv2, HCv3	Open	Close	Common Application			
			24 V DC	Open	100%	100%
		Open ⁽¹⁾	Less Common Application			
			24 V DC	Open	100%	100%
	Close	Close ⁽¹⁾	Less Common Application			
			24 V DC	Close	0%	0%
		Open	Common Application			
			24 V DC	Close	0%	0%
B or Reverse-acting HCv1, HCv2	Open	Close	Less Common Application			
			24 V DC	Open	100%	100%
		Open ⁽¹⁾	Common Application			
			24 V DC	Open	100%	100%
	Close	Close ⁽¹⁾	Common Application			
			24 V DC	Close	0%	0%
		Open	Less Common Application			
			24 V DC	Close	0%	0%

1. In these configurations, the DVC6200 SIS is used as a diagnostic device, the safety function is provided by other devices in the pneumatic loop, e.g., a solenoid valve.

Mode and Protection

Device Communicator	Configure > Manual Setup > Mode and Protection
----------------------------	--


Instrument Mode

There are two instrument modes for the DVC6200 SIS; In Service or Out of Service. In Service is the normal operating mode such that the instrument follows the 4 to 20 mA or 24 V DC control signal. Out of Service is required in some cases to modify configuration parameters, calibrate or to run diagnostics.

NOTE

Some changes that require the instrument to be taken Out Of Service will not take effect until the instrument is placed back In Service or the instrument is restarted.

Write Protection

There are two Write Protection modes for the DVC6200 SIS: Not Protected or Protected. Protected prevents configuration and calibration changes to the instrument. The default setting is Not Protected. Write Protection can be changed to Protected remotely. However, to change Write Protection to Not Protected, you must have physical access to the instrument. The procedure will require you to press a button () on the terminal box as a security measure.

Instrument

Device Communicator

Configure > Manual Setup > Instrument

Follow the prompts on the Device Communicator display to configure the following Instrument parameters:

Identification

- HART Tag – A tag name up to 8 characters is available for the instrument. The HART tag is the easiest way to distinguish between instruments in a multi-instrument environment. Use the HART tag to label instruments electronically according to the requirements of your application. The tag you assign is automatically displayed when the Device Communicator establishes contact with the digital valve controller at power-up.
- HART Long Tag (HART Universal Revision 7 only) – A tag name up to 32 characters is available for the instrument.
- Description provides a separate electronic label allowing for additional instrument identification.
- Message – Enter any message with up to 32 characters. Message provides the most specific user-defined means for identifying individual instruments in multi-instrument environments.
- Polling Address – If the digital valve controller is used in point-to-point operation, the Polling Address is 0. When several devices are connected in the same loop, such as for split ranging, each device must be assigned a unique polling address. The Polling Address is set to a value between 0 and 63 for HART 7 and 0 and 15 for HART 5. To change the polling address the instrument must be Out Of Service. For the Device Communicator to be able to communicate with a device whose polling address is not 0, it must be configured to automatically search for all or specific connected devices.

Serial Numbers

- Instrument Serial Number – Enter the serial number on the instrument nameplate, up to 12 characters.
- Valve Serial Number – Enter the serial number for the valve in the application with up to 12 characters.

Units

- Pressure Units – Defines the output and supply pressure units in either psi, bar, kPa, or kg/cm².
- Temperature Units – Degrees Fahrenheit or Celsius. The temperature measured is from a sensor mounted on the digital valve controller's printed wiring board.
- Analog Input Units – Permits defining the Analog Input Units in mA or percent of 4 to 20 mA range.

Terminal Box

- Calibration (CAL) Button – This button is near the wiring terminals in the terminal box and provides a quick means to autocalibrate the instrument. The button must be pressed for 3 to 10 seconds. Autocalibration will move the valve through the full range of travel whether the Instrument Mode is In Service or Out of Service. However, if the Write Protection is Protected, this button will not be active. To abort, press the button again for 1 second. The calibration button is disabled by default.
- Auxiliary Terminal Action – These wire terminals can be configured to initiate a partial stroke test upon detection of a short across the (+) and (-) terminals. The terminals must be shorted for 3 to 10 seconds. Alternatively, the auxiliary terminals can be configured to support the local control panel.

Spec Sheet

The Spec Sheet provides a means to store the entire control valve specifications on board the DVC6200 SIS.

Edit Instrument Time

Permits setting the instrument clock. When alerts are stored in the alert record, the record includes the time and date. The instrument clock uses a 24-hour format.

Travel/Pressure Control

Device Communicator

Configure > Manual Setup > Travel/Pressure Control

End Point Pressure Control (EPPC)

- EPPC Enable – Select Yes or No. 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 maintained at the EPPC Set Point. Because the digital valve controller is actively controlling the pressure 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. To ensure there is an alert when an output pressure deviation occurs, setup the alert as described under Pressure Deviation Alert.

- EPPC Set Point – Used in conjunction with End Point Pressure Control, End Point Pressure Control Set Point allows the user to select a pressure to be delivered by the instrument at the travel extreme. For a fail-closed valve, this pressure must be sufficient to maintain the fully open position. For a fail-open valve, this pressure (which is automatically set to supply pressure) must be sufficient to fully close the valve and maintain its rated shutoff classification. For double-acting spring return actuators, this is the differential pressure required to either maintain the fully open or fully closed position, depending on the valve and actuator configuration. For a double-acting actuator without springs with a fail-close valve, this is 95% of the supply pressure.
- EPPC Saturation Time – End Point Pressure Control Saturation Time is the time the digital valve controller stays in hard cutoff before switching to pressure control. Default is 45 seconds.
- End Point Pressure Control Tuning – These are the tuning parameters that the instrument uses while in end point pressure control. The tuning set letters correspond with the travel control tuning sets (e.g., if tuning set C is appropriate for travel control, it is also appropriate for pressure control). However, note that the individual values may be different between travel and pressure control.

Characterization

Input Characterization defines the relationship between the travel target and ranged set point. Ranged set point is the input to the characterization function. If the zero power condition equals closed, then a set point of 0% corresponds to a ranged input of 0%. If the zero power condition equals open, a set point of 0% corresponds to a ranged input of 100%. Travel target is the output from the characterization function.

To select an input characterization, select Input Characterization from the Characterization menu. You can select from the three fixed input characteristics shown in Figure 4 or you can select a custom characteristic. Figure 4 shows the relationship between the travel target and ranged set point for the fixed input characteristics, assuming the Zero Power Condition is configured as closed.

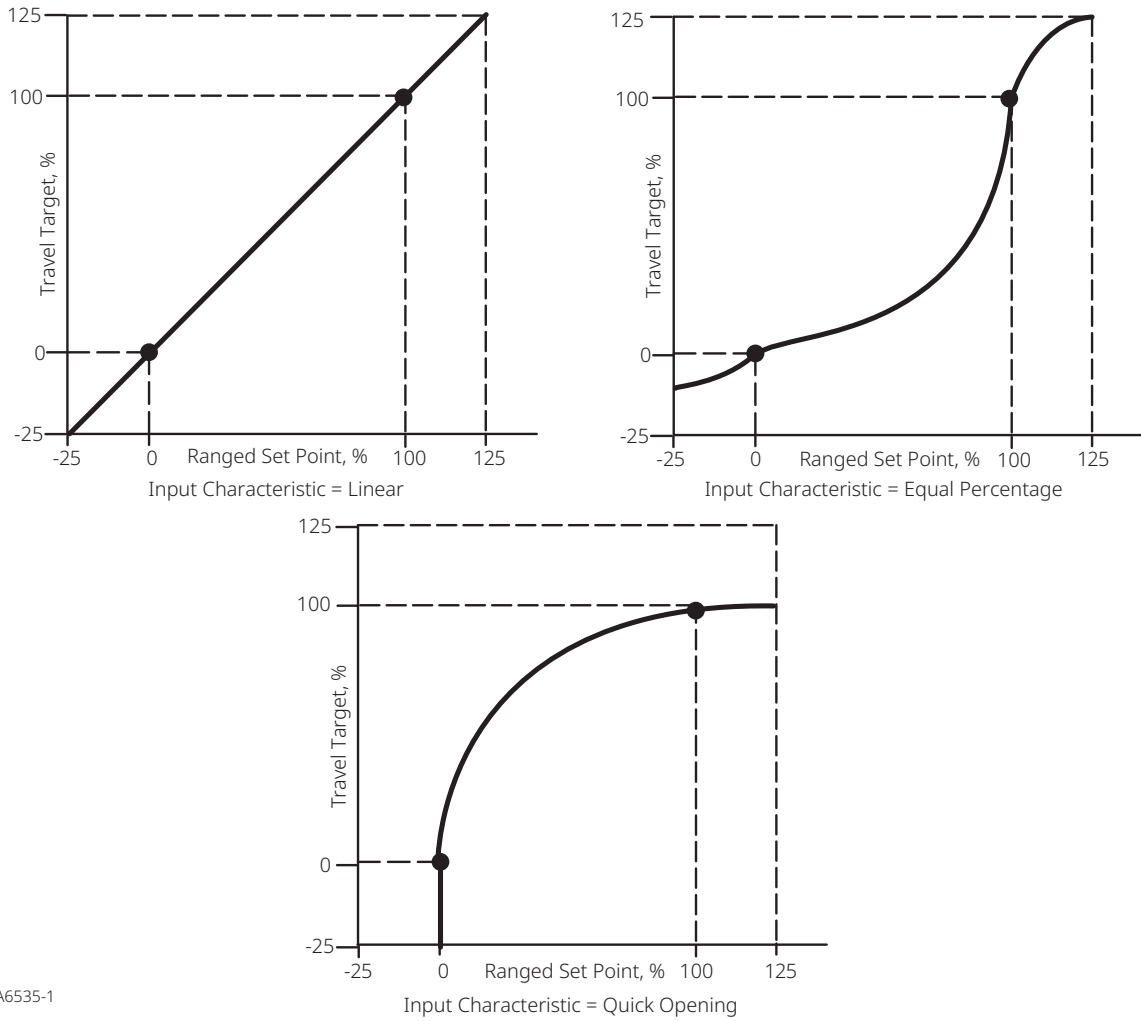
You can specify 21 points on a custom characteristic curve. Each point defines a travel target, in % of ranged travel, for a corresponding set point, in % of ranged set point. Set point values range from -6.25% to 106.25%. Before modification, the custom characteristic is linear.

Custom Characterization

To define a custom input character, from the Characterization menu select Custom Characterization. Select the point you wish to define (1 to 21), then enter the desired set point value. Press Enter then enter the desired travel target for the corresponding set point. When finished, select point 0 to return to the Characterization menu.

With input characterization you can modify the overall characteristic of the valve and instrument combination. Selecting an equal percentage, quick opening or custom (other than the default of linear) input characteristic modifies the overall valve and instrument characteristic. However, if you select the linear input characteristic, the overall valve and instrument characteristic is the characteristic of the valve, which is determined by the valve trim (i.e., the plug or cage).

Figure 4. Travel Target Versus Ranged Set Point, for Various Input Characteristics (Zero Power Condition = Closed)



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Dynamic Response

- SP Rate Open is the maximum rate (% of valve travel per second) at which the digital valve controller will move to the open position regardless of the rate of input current change. A value of 0 will deactivate this feature and allow the valve to stroke open as fast as possible.
- SP Rate Close is the maximum rate (% of valve travel per second) at which the digital valve controller will move to the close position regardless of the rate of input current change. A value of 0 will deactivate this feature and allow the valve to stroke close as fast as possible.
- Set Point Filter Time (Lag Time) slows the response of the digital valve controller. A value ranging from 0.2 to 10.0 can be used for noisy or fast processes to improve closed loop process control. Entering a value of 0.0 will deactivate the lag filter.

Travel Cutoffs

- Hi Cutoff Select – When selected the Travel Target is set to 123% when the Travel exceeds the Hi Cutoff Point.
- Hi Cutoff Point is the point within the calibrated travel range above which the cutoff is in effect. When using cutoffs, a Cutoff Hi of 50% is recommended to ensure valve goes fully open.
- Lo Cutoff Select – When selected the Travel Target is set to -23% when the Travel is below the Lo Cutoff Point.
- Lo Cutoff Point is the point within the calibrated travel range below which the cutoff is in effect. When using cutoffs, a Cutoff Lo of 50% is recommended to help ensure maximum shutoff seat loading.

Tuning

Device Communicator Configure > Manual Setup > Tuning

Travel Tuning

⚠ WARNING

Changes to the tuning set may cause the valve/actuator assembly 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.

- Travel Tuning Set

There are eleven 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.

Table 9 lists the proportional gain, velocity gain and minor loop feedback gain values for preselected tuning sets. Table 10 lists the proportional gain and velocity gain values for preselected tuning sets for the DVC6200 SIS High Cv.

Table 9. Values for Preselected Travel Tuning Sets

Tuning Set	Proportional Gain	Velocity Gain	Minor Loop Feedback Gain
Pneumatic Relay			
C	4.4	3.0	35
D	4.8	3.0	35
E	5.5	3.0	35
F	6.2	3.1	35
G	7.2	3.6	34
H	8.4	4.2	31
I	9.7	4.85	27
J	11.3	5.65	23
K	13.1	6.0	18
L	15.5	6.0	12
M	18.0	6.0	12
X (Expert)	User Adjusted	User Adjusted	User Adjusted

In addition, you can specify Expert tuning and individually set the proportional gain, velocity gain and minor loop feedback gain. Individually setting or changing any tuning parameter or running Stabilize/Optimize will automatically change the tuning set to X (expert).

Table 10. Gain Values for Preselected Travel Tuning Sets - DVC6200 SIS High Cv

Tuning Set	Proportional Gain	Velocity Gain
HCv1		
C	1.7	40
D	2.3	36
E	2.9	33
F	3.4	32
G	4.0	31
H	4.6	30
I	5.2	29
J	5.8	29
K	6.3	28
L	6.9	28
M	7.5	27
X (Expert)	User Adjusted	User Adjusted
HCv2 and HCv3		
C	2.5	37
D	3.3	34
E	4.0	32
F	4.8	31
G	5.5	31
H	6.3	30
I	7.0	30
J	7.8	29
K	8.5	29
L	9.3	29
M	10.0	28
X (Expert)	User Adjusted	User Adjusted

NOTE

Use Expert tuning only if standard tuning has not achieved the desired results. Stabilize/Optimize or Performance Tuner in ValveLink software, may be used to achieve the desired results more rapidly than manual Expert tuning.

Table 11 provides tuning set selection guidelines using Fisher and Baumann actuators. Table 12 provides tuning set selection guidelines for Bettis actuators for use with the DVC6200 SIS High Cv. These tuning sets are only recommended starting points. After you finish setting up and calibrating the instrument, you may have to select either a higher or lower tuning set to get the desired response.

- Proportional Gain for the travel control tuning set. Changing this parameter will also change the tuning set to Expert.
- Velocity Gain for the travel control tuning set. Changing this parameter will also change the tuning set to Expert.
- MLFB Gain is the minor loop feedback gain for the travel control tuning set. Changing this parameter will also change the tuning set to Expert.

Table 11. Actuator Information for Initial Setup

Actuator Manufacturer	Actuator Model	Actuator Size	Actuator Style	Starting Tuning Set (Pneumatic Relay)	Travel Sensor Motion ⁽²⁾ Relay A or C ⁽³⁾	
Fisher	585C and 585CR	25 50 60 68, 80 100, 130	Piston Dbl with or without Spring. See actuator instruction manual and nameplate.	E I J L M	User Specified	
	657	30, 30i 34, 34i, 40, 40i 45, 45i, 50, 50i 46, 46i, 60, 60i, 70, 70i and 80 to 100	Spring and Diaphragm	H K L M	Away from the top of the instrument	
	667	30, 30i 34, 34i, 40, 40i 45, 45i, 50, 50i 46, 46i, 60, 60i, 70, 70i, 76, 76i and 80 to 100	Spring and Diaphragm	H K L M	Towards the top of the instrument	
	1051 and 1052	20, 30 33 40 60, 70	Spring and Diaphragm (Window-mount)	H I K M	Away from the top of the instrument	
	1061	30 40 60 68, 80, 100, 130	Piston Dbl without Spring	J K L M	Depends upon pneumatic connections. See description for Travel Sensor Motion	
	1066SR	20 27, 75	Piston Sgl with Spring	G L	Mounting Style	Travel Sensor Motion
					A	Away from the top of the instrument
B					Towards the top of the instrument	
C					Towards the top of the instrument	
					D	Away from the top of the instrument

- continued -

Table 11. Actuator Information for Initial Setup (continued)

Actuator Manufacturer	Actuator Model	Actuator Size	Actuator Style	Starting Tuning Set (Pneumatic Relay)	Travel Sensor Motion ⁽²⁾ Relay A or C ⁽³⁾		
Fisher	2052	1	Spring and Diaphragm (Window-mount)	H	Away from the top of the instrument		
		2		J			
		3		M			
Fisher	3024C	30, 30E 34, 34E, 40, 40E 45, 45E	Spring and Diaphragm	E H K	For P _o operating mode (air opens): Towards the top of the instrument For P _s operating mode (air closes): Away from the top of the instrument		
		GX		225	X ⁽¹⁾	Air to Open Towards the top of the instrument	Air to Close Away from the top of the instrument
				750	K		
1200	M						
Baumann	Air to Extend	16 32 54	Spring and Diaphragm	C E H	Away from the top of the instrument		
	Air to Retract	10 25 54		E H J	Towards the top of the instrument		
	Rotary				Specify		

NOTE: Refer to Table 13 for feedback connection (magnet assembly) information.
 1. X = Expert Tuning. Proportional Gain = 4.2; Velocity Gain = 3.0; Minor Loop Feedback Gain = 18.0
 2. Travel Sensor Motion in this instance refers to the motion of the magnet assembly.
 3. Values shown are for Relay A and C. Reverse for Relay B.

- Integral Enable – Yes or No. Enable the integral setting to improve static performance by correcting for error that exists between the travel target and actual travel. Travel Integral Control is enabled by default.
- Integral Gain – Travel Integral Gain is the ratio of the change in output to the change in input, based on the control action in which the output is proportional to the time integral of the input.

Table 12. Actuator Information for Initial Setup - DVC6200 SIS High Cv

Actuator Manufacturer	Actuator Model	Starting Tuning Set			Travel Sensor Motion ⁽¹⁾
		HCv1	HCv2	HCv3	
Bettis	G01008	C	C	C	User Specified
	G01009	D	C	C	User Specified
	G01010	E	C	C	User Specified
	G01012	G	C	C	User Specified
	G01014	H	E	E	User Specified
	G2009	D	C	C	User Specified
	G2010	E	C	C	User Specified
	G2012	G	C	C	User Specified
	G2014	H	E	E	User Specified
	G2016	J	F	F	User Specified
	G3010	E	C	C	User Specified
	G3012	G	C	C	User Specified
	G3014	H	E	E	User Specified
	G3016	J	F	F	User Specified
	G3020	K	K	K	User Specified
	G4012	G	C	C	User Specified
	G4014	H	E	E	User Specified
	G4016	J	F	F	User Specified
	G4020, G4024, G4028	K	K	K	User Specified
	G5016	J	F	F	User Specified
G5020, G5024, G5028, G5032, G5036, G7020, G7024, G7028, G7032, G7036, G70T28, G8024, G8028, G8032, G8036, G8040, G80T32, G80T36	K	K	K	User Specified	

1. Travel Sensor Motion in this instance refers to the motion of the magnet assembly.

- Stabilize/Optimize

⚠ WARNING

During Stabilize/Optimize 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.

Stabilize/Optimize permits you to adjust valve response by changing the digital valve controller tuning. During this routine, the instrument must be out of service; however, the instrument will respond to setpoint changes.

If the valve is unstable select decrease response for a more conservative setting. If the valve response is sluggish, select increase response for a more aggressive setting. When finished select Done.

Integral Settings

NOTE

Use the Integral Dead Zone and Integrator Limit values automatically selected during setup for the DVC6200 SIS High Cv.

- Integral Dead Zone – A window around the Primary Setpoint in which integral action is disabled. This feature is used to eliminate friction induced limit cycles around the Primary Setpoint when the integrator is active. The Dead Zone is configurable from 0% to 2%, corresponding to a symmetric window from 0% to +/-2% around the Primary Setpoint. Default value is 0.25%. Default value for the DVC6200 SIS High Cv is 0.75%.
- Integrator Limit – The Integrator Limit provides an upper limit to the integrator output. The high limit is configurable from 0 to 100% of the I/P drive signal. Default value for the DVC6200 SIS High Cv 50%.

Valve and Actuator

Device Communicator Configure > Manual Setup > Valve and Actuator

Valve Style – Enter the valve style, rotary or sliding-stem

Actuator Style – Enter the actuator style, spring and diaphragm, piston double-acting without spring, piston single-acting with spring or piston double-acting with spring.

Feedback Connection – Refer to Table 13 for Feedback Connection options. Choose the assembly that matches the actuator travel range.

NOTE

As a general rule, do not use less than 60% of the magnet assembly travel range for full travel measurement. Performance will decrease as the assembly is increasingly subranged.

The linear magnet assemblies have a valid travel range indicated by arrows molded into the piece. This means that the hall sensor (on the back of the DVC6200 SIS housing) has to remain within this range throughout the entire valve travel. The linear magnet assemblies are symmetrical. Either end may be up.

Table 13. Feedback Connection Options

Magnet Assembly	Travel Range		
	mm	in.	Degrees
SStem #7	4.2 to 7	0.17 to 0.28	---
SStem #19	8 to 19	0.32 to 0.75	---
SStem #25	20 to 25	0.76 to 1.00	---
SStem #38	26 to 38	1.01 to 1.50	---
SStem #50	39 to 50	1.51 to 2.00	---
SStem #110	51 to 110	2.01 to 4.125	---
SStem #210	110 to 210	4.125 to 8.25	---
SStem #1 Roller	> 210	> 8.25	60 to 90°
RShaft Window #1	---	---	60 to 90°
RShaft Window #2	---	---	60 to 90°
RShaft End Mount	---	---	60 to 90°

Relay Type – There are three categories of relays that result in combinations from which to select.

Relay Type: The relay type is printed on the label affixed to the relay body.

A = double-acting or single-acting

B = single-acting, reverse

C = single-acting, direct

Special App: This is used in single-acting applications where the “unused” output port is configured to read the pressure downstream of a solenoid valve.

Lo Bleed: The label affixed to the relay body indicates whether it is a low bleed version.

HCv1 = Single-acting direct/reverse acting or double-acting

HCv2 = Single-acting direct/reverse acting or double-acting

HCv3 = Single-acting direct

Zero Power Condition – 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 type, as shown in Figure 5.

Figure 5. Zero Power Condition



X077-SIS

Relay Type	Loss of Electrical Power
Single-Acting Direct (Relay A, C, HCv1, HCv2, HCv3)	Port A pressure to zero
Double-Acting (Relay A, HCv1, HCv2)	Port A pressure to zero Port B pressure to full supply
Single-Acting Reverse (Relay B, HCv1, HCv2)	Port B pressure to full supply

Travel Sensor Motion

⚠ WARNING

If you answer YES to the prompt for permission to move the valve when determining travel sensor motion, the instrument will move the valve through a significant portion of its travel range. 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.

Select Clockwise/Toward Bottom or Counterclockwise/Toward Top. Travel Sensor Motion establishes the proper travel sensor rotation. For quarter-turn actuators determine rotation by viewing the rotation of the magnet assembly from the back of the instrument.

NOTE

Travel Sensor Motion in this instance refers to the motion of the magnet assembly. Note that the magnet assembly may be referred to as a magnetic array in user interface tools.

- For instruments with Relay A or C or direct-acting HCv1, HCv2, HCv3: If increasing air pressure at output A causes the magnet assembly to move down or the rotary shaft to turn clockwise, enter CW/To Bottom Inst. If it causes the magnet assembly to move up or the rotary shaft to turn counterclockwise, enter CCW/To Top Inst.
- For instruments with Relay B or reverse-acting HCv1, HCv2: If decreasing air pressure at output B causes the magnet assembly to down or the rotary shaft to turn clockwise, enter CW/To Bottom Inst. If it causes the magnet assembly to move up or the rotary shaft to turn counterclockwise, enter CCW/To Top Inst.

Maximum Supply Pressure

Enter the maximum supply pressure that is required to fully stroke the valve. For DVC6200 SIS High Cv the supply pressure must be between 2.8 bar / 40 psig and 10 bar / 145 psig.

Port A Pressure Limit

In single acting direct only applications, the instrument will limit the output pressure to the actuator from Port A. When this pressure limit is exceeded the device will go to the no air state.

NOTICE

This is a firmware controlled feature that requires loop power to the instrument. If loop power is lost or there is an electronic or firmware failure, the protection feature will not remain in effect.

Output Pressure Limit Enable enables/disables the Port A Pressure Limit feature.

NOTE

There is an associated alert available with this feature. See the Port A Overpressurized alert in Section 3.10, Alert Setup.

SIS/Partial Stroke Test

Device Communicator

Configure > Manual Setup > SIS/Partial Stroke

A partial stroke test is the process of taking the valve from the normal end to a target position at a preconfigured ramp rate before returning to the normal end while gathering data. The data is analyzed to evaluate the condition of the valve assembly against a set of user defined thresholds. A partial stroke test is only run if everything is normal in the instrument. A safety demand signal will always take precedence over a partial stroke test.

Partial Stroke Test Parameters

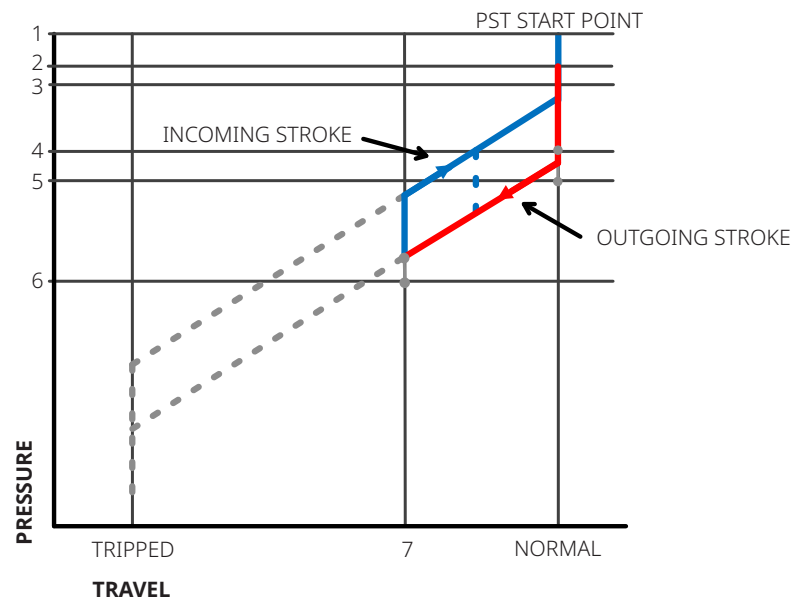
Test Start Point defines the normal (not tripped) end of valve travel. The valve must be at this end for a PST to be initiated. Setting this value to Not Configured will disable partial stroke tests.

Travel Hi Hi defines, in percent (%) of calibrated travel, the point above which the valve is considered to have reached the high end.

Travel Lo Lo defines, in percent (%) of calibrated travel, the point below which the valve is considered to have reached the low end.

Pause Time is the time between the outgoing and incoming strokes of the test. The default value is 5 seconds. The outgoing stroke is from the normal end to the PST target and the incoming stroke is the return stroke to normal. See Figure 6.

Figure 6. Valve Signature Representation



1. SUPPLY PRESSURE
2. END POINT PRESSURE CONTROL
3. INCOMING PRESSURE THRESHOLD
4. LOW FRICTION BREAKOUT PRESSURE THRESHOLD
5. HIGH FRICTION BREAKOUT PRESSURE THRESHOLD
6. OUTGOING PRESSURE THRESHOLD
7. TARGET TRAVEL MOVEMENT $\leq 30\%$

High Friction Breakout Pressure indicates that the breakout required a higher force than configured by the user. Refer to Figure 6.

Low Friction Breakout Pressure indicates that the breakout required a lower force than configured by the user. Refer to Figure 6.

Action On a Failed Test defines if the valve should step or ramp back on a failed stroke test.

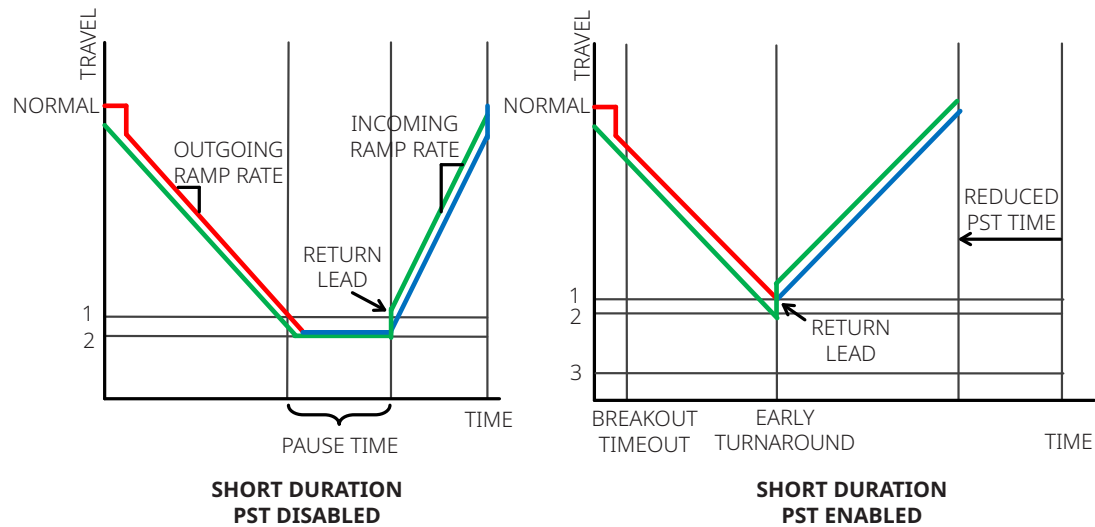
Auto Test Interval is the interval of time in days between valve stroke tests that are automatically executed by the digital valve controller, subject to the device being powered up. A value of 0 disables this feature.

Partial Stroke Parameters

Minimum Travel Movement is the percentage of total span that the valve moves away from its normal operating end of travel towards its tripped end of travel during the test. The default value is 10%; default for DVC6200 SIS High Cv is 20%.

Short Duration PST, when enabled the incoming stroke is initiated as soon as the travel reaches the minimum travel movement. Refer to Figure 7 for a time series representation of this parameter.

Figure 7. Time Series Representation of Short Duration PST



1. MINIMUM TRAVEL MOVEMENT
2. TRAVEL TARGET MOVEMENT
3. MAXIMUM ALLOWABLE TRAVEL

Outgoing Ramp Rate is the rate at which the valve will move during the Outgoing stroke of the Partial Stroke test. The default value is 0.25%/second.

Incoming Ramp Rate is the rate at which the valve will move during the Incoming stroke of the Partial Stroke test. The default value is 0.25%/second.

Return Lead defines the percent (%) change in setpoint to overcome the hysteresis in the valve assembly. The error between setpoint and actual error is added to this percent change. For example, if the Return Lead is set at 0.5% and there is a 1% error this will be set at 1.5%

Breakout Timeout is the user configured amount of time before which the valve must leave the normal end during a PST.

Outgoing Pressure Threshold defines the actuator pressure at which a partial stroke test will abort during the outgoing stroke (see Figure 6). This prevents the DVC6200 SIS from exhausting (or building) excessive pressure from/to the actuator in an attempt to move a stuck valve. During PST Calibration, the Partial Stroke Outgoing Pressure Threshold will be set automatically as follows:

- Single-Acting Actuators – For those actuators that exhaust pressure from the partial test start point, the Outgoing Pressure Threshold will be a minimum value. For those actuators that build pressure from the partial test start point, the Outgoing Pressure Threshold will be a maximum value.
- Double-Acting Actuators – The Outgoing Pressure Threshold 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 value for actuators where the partial stroke start point is the same as the Zero Power Condition.

The pressure signal used to determine this parameter 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
HCv1, HCv2, HCv3 (direct-acting)	Port A
HCv1, HCv2 (reverse-acting)	Port B
HCv1, HCv2 (double-acting)	Port A - Port B

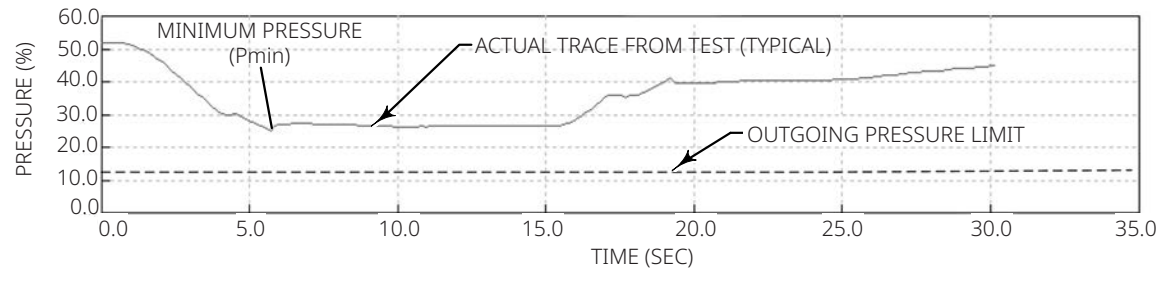
To manually set the partial stroke Outgoing Pressure Threshold, you must examine current partial stroke test results using ValveLink software. The following steps will guide you through the process:

1. Connect the DVC6200 SIS to a system running ValveLink software.
2. Disable Partial Stroke Outgoing Pressure Limit by ensuring it is not selected as an evaluation criteria for PST Abnormal.
3. Run a partial stroke test.
4. Select the Press/Time radio button on the partial stroke graph (refer to the example in Figure 8). If the actuator pressure starts high and moves low, find the minimum actuator pressure (Pmin). If the actuator pressure starts low and moves high, find the maximum actuator pressure (Pmax). Double-acting actuators will display differential pressure. Use Table 14 to estimate the Outgoing Pressure Threshold.
5. Enable the previously disabled Outgoing Pressure Limit – calculate the value using Table 14.

Table 14. Estimates for Outgoing Partial Stroke Pressure Limits

Actuator Style	Relay Type	Zero Power Condition	PST Starting Point	Partial Stroke Pressure Limit
Spring and Diaphragm	A, C or Direct-acting HCv1, HCv2, HCv3 B or Reverse-acting HCv1, HCv2	Closed	Open	$P_{min} - 0.25 *$ (Bench Set High - Bench Set Low)
			Closed	$P_{max} + 0.25 *$ (Bench Set High - Bench Set Low)
		Open	Open	$P_{max} + 0.25 *$ (Bench Set High - Bench Set Low)
			Closed	$P_{min} - 0.25 *$ (Bench Set High - Bench Set Low)
	B or Reverse-acting HCv1, HCv2	Closed	Open	$P_{max} + 0.25 *$ (Bench Set High - Bench Set Low)
			Closed	$P_{min} - 0.25 *$ (Bench Set High - Bench Set Low)
		Open	Open	$P_{min} - 0.25 *$ (Bench Set High - Bench Set Low)
			Closed	$P_{max} + 0.25 *$ (Bench Set High - Bench Set Low)
Single-Acting Piston	A, C or Direct-acting HCv1, HCv2, HCv3	Closed	Open	$0.5 * P_{min}$
			Closed	$P_{max} + 0.5 * (P_{supply} - P_{max})$
		Open	Open	$P_{max} + 0.5 * (P_{supply} - P_{max})$
			Closed	$0.5 * P_{min}$
	B or Reverse-acting HCv1, HCv2	Closed	Open	$P_{max} + 0.5 * (P_{supply} - P_{max})$
			Closed	$0.5 * P_{min}$
		Open	Open	$0.5 * P_{min}$
			Closed	$P_{max} + 0.5 * (P_{supply} - P_{max})$
Double-Acting Piston	A or HCv1, HCv2	Closed	Open	$P_{min} - 0.5 * (P_{supply} + P_{min})$
			Closed	$P_{max} + 0.5 * (P_{supply} - P_{max})$
		Open	Open	$P_{max} + 0.5 * (P_{supply} - P_{max})$
			Closed	$P_{min} - 0.5 * (P_{supply} + P_{min})$

Figure 8. Example Time Series Plot; Actuator Pressure



Incoming Pressure Threshold defines the actuator pressure at which a partial stroke test will abort during the incoming stroke (see Figure 6). This prevents the DVC6200 SIS from exhausting (or building) excessive pressure from/to the actuator in an attempt to move a stuck valve.

PST Abnormal Criteria

A partial stroke test is marked as abnormal if it fails any of the following user-selected criteria.

1. Stroking Pressure (includes outgoing and incoming)
2. Hi friction breakout pressure
3. Low friction breakout pressure
4. Max travel
5. Insufficient travel
6. Not seated (either at the start or end of the test)
7. SOV Test preceded PST and failed
8. Travel deviation

PST Abort Criteria

The PST is terminated and the valve is returned to the normal end. The return to the normal end will be per the user configuration for an aborted test. The abort criteria will only be active if it is added as a criteria to be evaluated during PST by adding it to the PST Abnormal Criteria.

The user can select any of the following to abort a Partial Stroke Test:

1. Stroking Pressure (includes outgoing and incoming)
2. Hi friction breakout pressure
3. Low friction breakout pressure
4. Max travel
5. Insufficient travel
6. Not seated (either at the start or end of the test)
7. SOV Test preceded PST and failed
8. Travel deviation

PST Prohibited

A partial stroke test will not be initiated if any of the following user-configurable conditions are active:

1. Flash Integrity Failure
2. Minor Loop Sensor Failure
3. Reference Voltage Failure
4. Drive Current Failure
5. Critical NVM Failure
6. Temperature Sensor Failure
7. Pressure Sensor Failure
8. Travel Sensor Failure
9. Supply Pressure Low
10. Travel Deviation
11. Pressure Fallback active

SIS Options

- Loop-Initiated PST, when this feature is enabled, the digital valve controller will run a partial stroke test if the loop current is set to within $\pm 0.5\%$ of the PST trip point. The loop current must remain at that point for the duration of the test. To abort the test, the loop current must be returned to the normal or tripped current. This feature is disabled by default. This feature is not available when a local control panel is installed.
 - PST Trip Point (ETT) is the point at which the loop current must be set to run a partial stroke test for energize-to-trip applications. This value is not configurable and is preset at 8 mA.
 - PST Trip Point (DETT) is the point at which the loop current must be set to run a partial stroke test for de-energize-to-trip applications. This value is not configurable and is preset at 16 mA.
- Latch on Position Trip – The device will take the output to the trip state if the loop current is normal and the travel crosses the threshold towards the trip end. The position latch reset is always manual reset. The latch can be cleared by using one of the user interfaces, a local control panel or recycling power to the device. Select enable or disable.

NOTE

The condition that caused the valve to drift toward the trip end must be corrected before the manual reset is done. For example, if supply pressure droop caused the drift, the supply pressure must be restored before the manual reset is performed.

- Position Trip Point is defined as a % of travel from the trip end.

- Change Reset Mode defines the latching behavior of the DVC6200 SIS after a trip has occurred. There are three choices available.
 - Auto Reset – The valve will follow the loop signal from the logic solver and will not latch in the tripped position.
 - Manual Reset – The valve will latch in the tripped position until the loop signal from the logic solver is at the normal state and the DVC6200 SIS is reset. The reset signal can be initiated by a Local Control Panel, discrete switch wired to the AUX terminals or from a HART command through the user interface.
 - Smart Auto Reset – The valve will latch in the tripped position until the originating source that tripped the valve provides a reset signal. If the logic solver trips the valve and the local control panel trip button is not pressed, then the logic solver can return the valve to the normal position. However, if the local control panel trip button is pressed, then the local control panel is required to reset the valve to the normal position. (Note that the local control panel can issue a “pre-approval” if the reset button is pressed while the logic solver is still tripped. When the logic solver attempts to return the valve to the normal state, the DVC6200 SIS will follow).
- Action on Failed Test – This displays the action taken by the instrument if a communication timeout occurs. Values are Ramp Back or Step Back.

Solenoid Valve Test

NOTE

Solenoid valve health monitoring is not supported by the DVC6200 SIS High Cv.

The DVC6200 SIS can be used to test and evaluate the operation of an external solenoid valve (SOV). This is accomplished by briefly removing power to the solenoid valve and examining the resulting pressure drop across the solenoid valve.

If the solenoid valve is connected directly to a logic solver, then the DVC6200 SIS can be used to monitor the pressures while the logic solver momentarily trips the solenoid valve. ValveLink Software can gather the data and provide a graphical representation of the actuator pressure and valve travel. Refer to the Monitoring Health of External Solenoid Valve (SOV) with FIELDVUE DVC6200 SIS Digital Valve Controllers Instruction Manual Supplement (D104028X012) for further details.

If the solenoid valve is wired in series with the DVC6200 SIS and logic solver, then the DVC6200 SIS can be used to initiate the momentary trip. For instructions on the physical pneumatic and electrical connections refer to the Quick Start Guide (D103556X012).

Instrument Configuration to Support SOV Testing

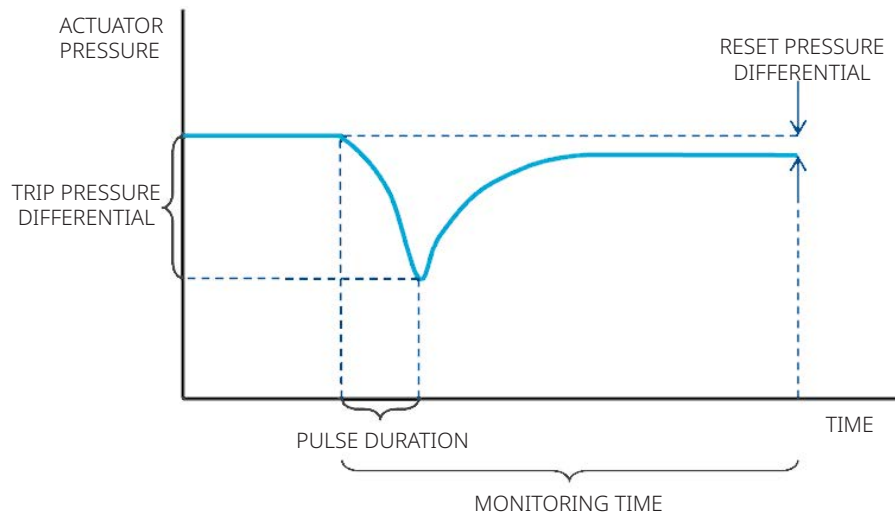
- Relay Type – Select the appropriate relay (B or C) with the “special app” designation. Special app refers to the additional tubing (monitoring line) that is installed between the unused output port of the DVC6200 SIS and a connection downstream of the solenoid valve, close to the actuator.
- Output Terminal Function – Since the solenoid valve is wired through the output terminals of the DVC6200 SIS, the terminals must be enabled and configured as “SOV Test”. Note that the Transmitter/Switch selection on the printed wiring board (PWB) must also be set to “Switch”.

SOV Test Parameters

See Figure 9.

- Pulse Duration is the length of time of the momentary power disruption to the solenoid valve. It should be long enough to detect a Trip Pressure Differential, but short enough to not cause the SIS valve to move. This is automatically determined during the SOV Test Calibration routine.
- Monitoring Time is the length of time from the start of the test (pulse initiation), to the end of the data gathering. It should be long enough to allow the Reset Pressure Differential to stabilize.
- Trip Pressure Differential – During the momentary solenoid valve trip, the pressure drop across the solenoid valve is measured. This value is the maximum pressure drop recorded during the SOV test. It is determined automatically during the SOV Test Calibration routine.

Figure 9. Graphical Representation of SOV Test Parameters



- Reset Pressure Differential – After the solenoid valve is momentarily tripped, the pressure differential across the solenoid valve should reduce back to zero. However, depending on the Monitoring Time, the downstream pressure may not fully recover at the end of the test. This value is automatically determined during the SOV Test Calibration routine.
- SOV Test before PST configures the device to always run a SOV test prior to a PST test any time a PST is initiated.
- On Abnormal SOV Test – If SOV Test before PST is configured, this determines the behavior if the SOV test result is abnormal. The configuration choices are to continue on to the PST or cancel the PST.
- Independent SOV Test configures the device to allow a SOV Test to be run independent of a PST test.

SOV Test Alerts

- Trip Pressure Alert Point – During an SOV Test, if the trip pressure differential is lower than this value, the alert will be active.
- Reset Pressure Alert Point – During an SOV Test, if the reset pressure differential exceeds this value, the alert will be active.

Outputs

Device Communicator

Configure > Manual Setup > Outputs

Output Terminal Configuration

- Output Terminal Enable – If using the output terminal for a Position Transmitter or Switch Output or for Solenoid Valve Testing, this must be Enabled.
- Function – The output terminals can be configured as one of the following:
 - Transmitter – 4 to 20 mA output that represents 0 to 100% of the calibrated valve travel.
 - Limit Switch – Discrete switch (1 A max) that trips at a configurable point within 0 to 100% of calibrated valve travel.
 - Alert Switch – Discrete switch (1 A max) that trips based on a configurable device alert.
 - SOV Test – Normally closed discrete switch that momentarily opens during a solenoid valve test.
- Fail Signal – Should the output circuit fail to operate properly the output will attempt to drive to a known state. Depending on the nature of the failure, the circuit may or may not be able to achieve this fail state. When configured as a position transmitter, the output can be configured to fail low (< 3.6 mA). The output can be configured to fail high (> 22.5 mA) when the digital valve controller is powered. When configured as a switch, the output can be configured to drive Closed or Open.

NOTE

On loss of digital valve controller power, the switch circuit will always go to the open state.

Switch Configuration

- Limit Switch Trip Point defines the threshold for the limit switch in percent of calibrated travel when the function is configured as a Limit Switch.
- Alert Switch Source determines which alert will activate the switch when the function is configured as an Alert Switch. The alert choices are: Travel Deviation, PST Abnormal, Tripped by LCP, SIS Diagnostic Credit Alert, Diagnostic in Progress, PST Abnormal/ PST Prohibited, PST Pass or SIS Stroke Time Alert.
- Switch Closed configures the action of the switch. The choices are: Below Trip Point/ Alert Not Active or Above Trip Point/Alert Active.

HART Variable Assignments

Instrument variables can be reported via four different HART variable assignments. The Primary Variable is always configured as Analog Input. However, the remaining three variables have additional options as listed below.

Primary Variable (PV)	Analog Input
Secondary Variable (SV)	Travel, Travel Setpoint, Pressure A, Pressure B, Pressure AB, Supply Pressure, Drive Signal or Analog Input
Tertiary Variable (TV)	Travel, Travel Setpoint, Pressure A, Pressure B, Pressure AB, Supply Pressure, Drive Signal or Analog Input
Quaternary Variable (QV)	Travel, Travel Setpoint, Pressure A, Pressure B, Pressure AB, Supply Pressure, Drive Signal or Analog Input

Transmitter Output

This configures the relationship between the valve travel and the position transmitter output signal. There are two choices; 4 mA = Valve Closed or 4 mA = Valve Open.

Burst Mode

Burst mode provides continuous communication from the digital valve controller. Burst mode applies only to the transmission of burst mode data (HART Variable Assignments) and does not affect the way other data is accessed.

- Burst Enable – This turns on or off the burst mode.
- Burst Command – This defines which HART command is configured for burst reporting. When using a TriLoop, select Command 3.

HART 5

- Analog Input (Command 1)
- Loop Current/Travel (Command 2)
- Loop Current/PV/SV/TV/QV (Command 3)

HART 7

- Analog Input (Command 1)
- Loop Current/Travel (Command 2)
- Loop Current/PV/SV/TV/QV (Command 3)
- Read Device Variable with Status (Command 9)
- Read Device Variables (Command 33)
- Read Additional Status (Command 48)

NOTE

Access to information in the instrument is normally obtained through the poll/response of HART communication. The Device Communicator or the control system may request any of the information that is normally available, even while the instrument is in burst mode. Between each burst mode transmission sent by the instrument, a short pause allows the Device Communicator or control system to initiate a request. The instrument receives the request, processes the response message and then continues "bursting" the burst mode data.

Burst mode will be automatically disabled during diagnostics tests such as Valve Signature.

HART 7 allows three burst commands to be reported. When using a Tri-Loop, do not enable the 2nd or 3rd burst commands. These additional commands will result in missed messages, thus taking the Tri-Loop's output to the fault state.

3.3 Alert Setup

Device Communicator Configure > Alert Setup

An alert is a notification that the instrument has detected a problem. Alerts that are enabled and active will be recorded in the instrument memory within the Alert Record (see Section 5). Some alerts are also defined in the HART Command 48 response structure which is can be read by any HART communicating host system (refer to the DVC6200 SIS HART Field Device Specification, [D103638X012](#)).

Certain critical alerts can be configured to shut down the device when active (i.e. latch in the Zero Power Condition). This can be enabled or disabled for each applicable alert. The default shutdown setting is disabled. To clear the shutdown, correct the problem and then cycle power to the instrument (or disable the alert).

Alerts may be enabled or disabled with the instrument In Service, Out of Service, Protection On or Protection Off. However, shutdown alerts can only be enabled or disabled while Protection is off. For a detailed explanation of the alerts and the recommended actions, refer to Section 5.

3.4 Change to HART 5/Change to HART 7

Device Communicator Service Tool > Maintenance > Change to HART 5/Change to HART 7

This procedure changes the instrument from HART Universal Revision 5 to HART Universal Revision 7 (or vice versa). Before proceeding, verify that your systems are prepared to support HART Universal Revision 7 devices. Follow the prompts on the Device Communicator display.

NOTE

This procedure must never be done while the valve is in service and controlling the process. Depending on the control system or asset management system attached, complete system reset may be required to reestablish HART communication. Consult the system documentation for further information.

Section 4: Calibration

NOTE

ValveLink software 13.6 or higher is required to calibrate a DVC6200 SIS High Cv.

Calibration Overview

When a DVC6200 SIS digital valve controller is ordered as part of a control valve assembly, the factory mounts the digital valve controller on the actuator and connects the necessary tubing, then sets up and calibrates the controller.

For digital valve controllers that are ordered separately, recalibration of the analog input or pressure sensors generally is unnecessary. However, after mounting on an actuator, perform the initial setup then calibrate travel by selecting *Configure > Calibration > Travel Calibration > Auto Calibration*. For more detailed calibration information, refer to the following calibration procedures.

Device Communicator	Configure > Calibration
----------------------------	-------------------------

NOTE

The Instrument Mode must be Out Of Service and the Protection set to None before the instrument can be calibrated.

If you are operating in burst mode, we recommend that you disable burst before continuing with calibration. Once calibration is complete, burst mode may then be turned back on.

WARNING

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

4.1 Travel Calibration

If a double-acting relay is used, you will be prompted to run the relay adjustment when auto or manual calibration is selected. Select Yes to adjust the relay, select No to proceed with calibration. For additional information, refer to Relay Adjustment on page 50.

NOTE

Relay adjustment is not applicable to DVC6200 SIS High Cv digital valve controllers.

Auto Calibration

1. The auto calibration procedure is automatic. It is completed when the Calibration menu appears.

During calibration, the instrument seeks the high and low end points and the minor loop feedback (MLFB) and output bias. By searching for the end points, the instrument establishes the limits of physical travel, i.e., the actual travel 0 and 100% positions. This also determines how far the relay beam swings to calibrate the sensitivity of the MLFB sensor.

NOTE

Minor loop feedback is not relevant for DVC6200 SIS High Cv digital valve controllers.

2. Place the instrument In Service and verify that the travel properly tracks the current source.

If the unit does not calibrate, refer to Table 15 for error messages and possible remedies.

Table 15. Auto Calibrate Travel Error Messages

Relay Type	Pressure Signal
Power failure occurred during Auto Calib	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.
Auto Calib did not complete within the time limit	The problem may be one or the other of the following: <ol style="list-style-type: none"> 1. The tuning set selected is too low and the valve does not reach an end point in the allotted time. Select Manual Setup > Tuning > Travel Tuning > 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. Select Manual Setup > Tuning > Travel Tuning > Stabilize/Optimize then Decrease Response (selects next lower tuning set).

Table 15. Auto Calibrate Travel Error Messages (continued)

Relay Type	Pressure Signal
Insufficient travel	<p>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).</p> <p>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 and checking the magnet array for proper alignment.</p>
Drive signal exceed low limit; check supply pressure	<ol style="list-style-type: none"> 1. Check supply pressure (reverse-acting relay) 2. Friction is too high
Drive signal exceed high limit; check supply pressure	<ol style="list-style-type: none"> 1. Check supply pressure (direct-acting relay) 2. Friction is too high

Manual Calibration

Two procedures are available to manually calibrate travel:

- Analog Adjust – This procedure is used when you can manually change the 4 to 20 mA current source to move the valve.
- Digital Adjust – This procedure is used when the 4 to 20 mA current source cannot be manually changed.

Analog Calibration Adjust

Connect a variable current source to the instrument LOOP + and LOOP - terminals. The current source should be capable of generating 4 to 20 mA.

Follow the prompts on the Device Communicator display to calibrate the instrument's travel in percent.

NOTE

0% Travel = Valve Closed
100% Travel = Valve Open

1. Adjust the input current until the valve is near mid-travel. Press OK.
-

NOTE

In steps 2 through 7 the accuracy of the current source adjustment affects the position accuracy.

2. Adjust the current source until the valve is at 0% travel, then press OK.
3. Adjust the current source until the valve is at 100% travel, then press OK.
4. Adjust the current source until the valve is at 0% travel, then press OK.
5. Adjust the current source until the valve is at 100% travel, then press OK.
6. Adjust the current source until the valve is at 5% travel, then press OK.
7. Adjust the current source until the valve is at 95% travel, then press OK.
8. Place the instrument In Service and verify that the travel properly tracks the current source.

Digital Calibration Adjust

Connect a variable current source to the instrument LOOP + and LOOP - terminals. The current source should be set between 4 and 20 mA.

Follow the prompts on the Device Communicator display to calibrate the instrument's travel in percent.

1. Adjust the input current until the valve is near mid-travel. Press OK.

NOTE

0% Travel = Valve Closed

100% Travel = Valve Open

2. From the adjustment menu, select the direction and size of change required to set the travel at 0%.

Selecting large, medium and small adjustments causes changes of approximately 10.0%, 1.0% and 0.1%, respectively. If another adjustment is required, repeat step 2. Otherwise, select Done and go to step 3.

3. From the adjustment menu, select the direction and size of change required to set the travel to 100%.

If another adjustment is required, repeat step 3. Otherwise, select Done and go to step 4.

4. From the adjustment menu, select the direction and size of change required to set the travel at 0%.

If another adjustment is required, repeat step 4. Otherwise, select Done and go to step 5.

5. From the adjustment menu, select the direction and size of change required to set the travel to 100%.

If another adjustment is required, repeat step 5. Otherwise, select Done and go to step 6.

6. From the adjustment menu, select the direction and size of change required to set the travel to 5%.

If another adjustment is required, repeat step 6. Otherwise, select Done and go to step 7.

7. From the adjustment menu, select the direction and size of change required to set the travel to 95%.

If another adjustment is required, repeat step 7. Otherwise, select Done and go to step 8.

8. Place the instrument In Service and verify that the travel properly tracks the current source.

Pushbutton Calibration

A pushbutton near the wiring terminals in the terminal box provides a quick means to autocalibrate the instrument. The button must be pressed for 3 to 10 seconds. Autocalibration will move the valve through the full range of travel whether the Instrument Mode is In Service or Out of Service. However, if the Write Protection is Protected, this button will not be active. To abort, press the button again for 1 second. The calibration button is disabled by default. To enable it, go to *Manual Setup > Instrument > Calibration Button*.

NOTE

The autocal pushbutton will not be active if the instrument is Locked in Safety.

This calibration procedure is recommended whenever the I/P converter or pneumatic relay/spool valve is replaced. Do not use the pushbutton calibration for initial calibration when mounting the instrument on an actuator or if the printed wiring board assembly was replaced.

If you suspect calibration has changed due to drift, first perform a Valve Signature diagnostic test using ValveLink software to capture the asfound data for future root cause analysis.

4.2 Sensor Calibration

Pressure Sensors

NOTE

The pressure sensor is calibrated at the factory and should not require calibration.

Output Pressure Sensor

To calibrate the output pressure sensor, connect an external reference gauge to the output being calibrated. The gauge should be capable of measuring maximum instrument supply pressure. Depending upon the sensor you wish to calibrate, select either Output A Sensor or Output B Sensor. Follow the prompts on the Device Communicator display to calibrate the instrument's output pressure sensor.

1. Adjust the supply pressure regulator to the maximum instrument supply pressure. Press OK.
2. The instrument reduces the output pressure to 0. The following message appears.

Use the Increase and Decrease selections until the displayed pressure matches the output x pressure.

Press OK when you have read the message.

3. The value of the output pressure appears on the display. Press OK to display the adjustment menu.
4. From the adjustment menu, select the direction and size of adjustment to the displayed value.

Selecting large, medium and small adjustments causes changes of approximately 3.0 psi/0.207 bar/20.7 kPa, 0.30 psi/0.0207 bar/2.07 kPa and 0.03 psi/0.00207 bar/0.207 kPa, respectively.

If the displayed value does not match the output pressure, press OK, then repeat this step (step 4) to further adjust the displayed value. When the displayed value matches the output pressure, select Done and go to step 5.

5. The instrument sets the output pressure to full supply. The following message appears.

Use the Increase and Decrease selections until the displayed pressure matches the output x pressure.

Press OK when you have read the message.

6. The value of the output pressure appears on the display. Press OK to display the adjustment menu.
7. From the adjustment menu, select the direction and size of adjustment to the displayed value. If the displayed value does not match the output pressure, press OK, then repeat this step (step 7) to further adjust the displayed value. When the displayed value matches the output pressure, select Done and go to step 8.
8. Place the instrument In Service and verify that the displayed pressure matches the measured output pressure.

Supply Pressure Sensor

To calibrate the supply pressure sensor, connect an external reference gauge to the output side of the supply regulator. The gauge should be capable of measuring maximum instrument supply pressure. Follow the prompts on the Device Communicator display to calibrate the instrument's supply pressure sensor.

1. Select a) Zero Only or b) Zero and Span (gauge required).
 - a. If Zero Only calibration is selected, adjust the supply pressure regulator to remove supply pressure from the instrument. Press OK. Once calibration is complete, go to step 5.
 - b. If Zero and Span calibration is selected, adjust the supply pressure regulator to remove supply pressure from the instrument. Press OK. Adjust the supply regulator to the maximum instrument supply pressure. Press OK. Proceed with step 2.
2. The following message appears:

Use the Increase and Decrease selections until the displayed pressure matches the supply pressure.

Press OK when you have read the message.

3. The value of the pressure appears on the display.
4. From the adjustment menu, select the direction and size of adjustment to the displayed value.

Selecting large, medium and small adjustments causes changes of approximately 3.0 psi/0.207 bar/20.7 kPa, 0.30 psi/0.0207 bar/2.07 kPa and 0.03 psi/0.00207 bar/0.207 kPa, respectively.

Adjust the displayed value until it matches the supply pressure, select Done and go to step 5.

5. Place the instrument In Service and verify that the displayed pressure matches the measured supply pressure.

Analog Input Calibration

To calibrate the analog input sensor, connect a variable current source to the instrument LOOP+ and LOOP- terminals. The current source should be capable of generating an output of 4 to 20 mA. Follow the prompts on the Device Communicator display to calibrate the analog input sensor.

1. Set the current source to the target value shown on the display. The target value is the Input Range Low value. Press OK.
2. The following message appears:

Use the Increase and Decrease selections until the displayed current matches the target.

Press OK when you have read this message.

3. The value of the Analog Input appears on the display. Press OK to display the adjustment menu.
4. From the adjustment menu, select the direction and size of adjustment to the displayed value.

Selecting large, medium and small adjustments causes changes of approximately 0.4 mA, 0.04 mA and 0.004 mA, respectively.

If the displayed value does not match the current source, press OK, then repeat this step (step 4) to further adjust the displayed value. When the displayed value matches the current source, select Done and go to step 5.

5. Set the current source to the target value shown on the display. The target value is the Input Range High value. Press OK.
6. The following message appears:

Use the Increase and Decrease selections until the displayed current matches the target.

Press OK when you have read this message.

7. The value of the Analog Input appears on the display. Press OK to display the adjustment menu.

- From the adjustment menu, select the direction and size of adjustment to the displayed value. If the displayed value does not match the current source, press OK, then repeat this step (step 8) to further adjust the displayed value. When the displayed value matches the current source, select Done and go to step 9.
- Place the instrument In Service and verify that the analog input displayed matches the current source.

4.3 Relay Adjustment

Before beginning travel calibration, check the relay adjustment. Replace the digital valve controller cover when finished.

NOTE

Relay B and C are not user-adjustable.

Relay adjustment is not applicable for DVC6200 SIS High Cv digital valve controllers.

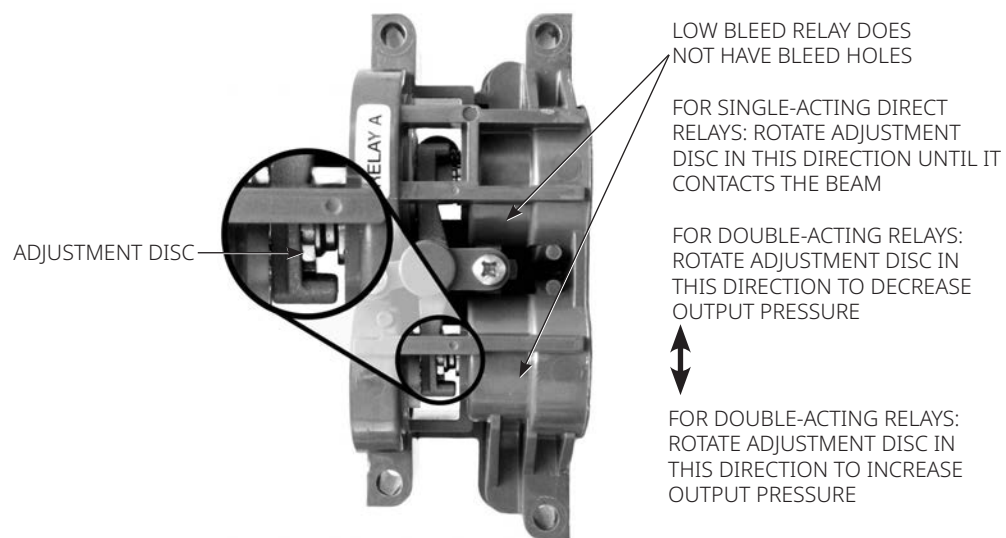
Double-Acting Relay

The double-acting relay is designated by "Relay A" on a label affixed to the relay itself. For double-acting actuators, the valve must be near mid-travel to properly adjust the relay. The Device Communicator will automatically position the valve when Relay Adjust is selected.

Rotate the adjustment disc, shown in Figure 10, until the output pressure displayed on the Device 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 large actuators).

Low bleed relay stabilization may take approximately two minutes longer than the standard relay.

Figure 10. Relay A Adjustment (Shroud Removed for Clarity)



W9305

Relay A may also be adjusted for use in single-acting- direct applications. Rotate the adjustment disc as shown in Figure 10 for single-acting direct operation.

NOTE

Care should be taken during relay adjustment as the adjustment disc may disengage if rotated too far.

Single-Acting Relays

WARNING

If the unused port is monitoring pressure, ensure that the pressure source conforms to ISA Standard 7.0.01 and does not exceed the pressure supplied to the instrument. Failure to do so could result in personal injury or property damage caused by loss of process control.

Single-Acting Direct Relay

The single-acting direct relay is designated by “Relay C” on a label affixed to the relay itself. Relay C requires no adjustment.

Single-Acting Reverse Relay

The single-acting reverse relay is designated by “Relay B” on a label affixed to the relay itself. Relay B is calibrated at the factory and requires no further adjustment.

4.4 PST Calibration

This procedure permits you to run the Partial Stroke Calibration, which enables the Partial Stroke Test. It establishes values for Partial Stroke Pressure Limit, Pressure Set Point and Pressure Saturation Time for End Point Pressure Control, Travel Deviation Alert Point and Travel Deviation Time. The Partial Stroke Calibration also sets default values for max travel movement, test speed and test pause time.

NOTE

You must take the instrument out of service before running Partial Stroke Calibration. Ensure that the instrument is put back in service after the completing the calibration procedure.

4.5 SOV Test Calibration

NOTE

SOV Test Calibration is not applicable to DVC6200 SIS High Cv digital valve controllers.

This procedure is used when a solenoid valve is wired to the Output terminals. During this routine, the output terminal circuit is interrupted momentarily to trip the solenoid. During the test, the Trip Pressure Differential, Recovery Pressure Differential and Valve Travel are monitored. The test attempts to find the optimal trip duration which results in a measurable pressure drop across the solenoid, but no valve travel movement. If the proper duration cannot be established within 10 tries, the test will stop.

Section 5: Device Information, Alerts and Diagnostics

5.1 Overview

Device Communicator

Overview

Status and Primary Purpose Variables

The overview section provides basic information about the current state of the instrument and gives you access to the current values of:

- Alert Status
- Communication Status
- Instrument Mode (In/Out of Service)
- Analog Input
- Setpoint
- Travel
- Supply Pressure
- Actuator Pressure(s)

Device Information

Device Information provides details about the instrument construction including:

- Tag Name
- Instrument Model Number
- Instrument Level
- Device ID (unique number used to prevent the instrument from accepting commands intended for other instruments)
- Serial Numbers
- Firmware, DD and Hardware Revisions
- HART Universal Revision
- Write Protection (provides a procedure to enable/disable)

5.2 Service Tools

Device Communicator	Service Tools
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Device Status

Instrument alerts, when enabled, detect many operational and performance issues that may be of interest. If there are no alerts currently active, this display will be empty.

Alert Record

The DVC6200 SIS will store 20 alerts. Once the alert record is full, no additional alerts will be stored until the record is cleared.

Alert Reporting

In addition to on-board storage of alerts, the DVC6200 SIS can report active alerts via HART Command 48 - Read Additional Status. Refer to Table 16 for a summary of the default alert settings from the factory. Following is a detailed description of the meaning of each alert.

Table 16. Default Alert Settings

Name	Alert	Shutdown	NE107 Category
Flash Integrity Failure	Enabled ⁽¹⁾	Disabled	Failure
Minor Loop Sensor Failure	Enabled ⁽¹⁾	Disabled	Failure
Reference Voltage Failure	Enabled ⁽¹⁾	Disabled	Failure
Drive Current Failure	Enabled ⁽¹⁾	Disabled	Failure
Critical NVM Failure	Enabled ⁽¹⁾	Disabled	Failure
Temperature Sensor Failure	Enabled ⁽¹⁾	Disabled	Failure
Pressure Sensor Failure	Enabled ⁽¹⁾	Disabled	Failure
Travel Sensor Failure	Enabled ⁽¹⁾	Disabled	Failure
Alert Record Not Empty	Disabled	Not Available	Maintenance
Tripped by the LCP	Disabled	Not Available	Not Available
Calibration in Progress	Disabled	Not Available	Function Check
Diagnostics in Progress	Disabled	Not Available	Function Check
Pressure Fallback Active	Enabled	Not Available	Out of Specification
SIS Program Flow Failure	Enabled	Disabled	Failure
Autocal in Progress	Disabled	Not Available	Function Check

Table 16. Default Alert Settings (continued)

Name	Alert	Shutdown	NE107 Category
SIS Hardware Failure	Enabled	Disabled	Failure
Non-Critical NVM	Enabled ⁽¹⁾	Disabled	Failure
Cycle Counter High	Disabled	Not Available	Maintenance
Travel Accumulator High	Disabled	Not Available	Maintenance
Instrument Time is Approximate	Disabled	Not Available	Not Available
Alert Record Full	Disabled	Not Available	Maintenance
Offline/Failed	Enabled	Not Available	Failure
SIS Stroke Performance	Disabled	Not Available	Out of Specification
Diagnostic Data Available	Disabled	Not Available	Not Available
PST Abnormal	Enabled	Not Available	Out of Specification
Supply Pressure Low	Enabled	Not Available	Out of Specification
End Point Pressure Deviation	Enabled	Not Available	Out of Specification
Manual Reset Required	Disabled	Not Available	Not Available
Supply Pressure High	Enabled	Not Available	Maintenance
Integrator Saturated High	Disabled	Not Available	Out of Specification
Integrator Saturated Low	Disabled	Not Available	Out of Specification
Travel Alert Low	Disabled	Not Available	Not Available
Travel Alert Low-Low	Disabled	Not Available	Not Available
Travel Alert High	Disabled	Not Available	Not Available
Travel Alert High-High	Disabled	Not Available	Not Available
Travel Deviation	Enabled	Not Available	Out of Specification
Travel Cutoff High	Disabled	Not Available	Not Available
Travel Cutoff Low	Disabled	Not Available	Not Available
Drive Signal Alert	Enabled	Not Available	Out of Specification
PST Pass	Enabled	Not Available	Not Available
PST Prohibited	Enabled	Not Available	Not Available
LCP Stuck Button	Enabled	Not Available	Failure
LCP Communications Failure	Enabled	Not Available	Failure
Output Circuit Error	Enabled	Not Available	Failure
Port A Over pressurized	Enabled	Disabled	Failure
1. These default alert configurations cannot be changed.			

Alert Record Full is active when the alert record is full. Additional alerts that are detected will not be saved to the alert record until the alert record is cleared.

Alert Record Not Empty is active when there are 1 or more alerts stored in the alert record.

Autocal in Progress is active when auto calibration is in progress.

Calibration in Progress is active when calibration is in progress.

Critical NVM Failure is active if there is a failure associated with NVM that is critical for instrument operation. To clear the alert, restart the instrument. If the alert persists, replace the printed wiring board assembly.

Cycle Counter High is active if the Cycle Counter exceeds the Cycle Count Alert Point. The Cycle Count records the number of times the travel changes direction when it is outside of the deadband. To clear the alert, set the Cycle Counter to a value less than the alert point. See Figure 12.

Diagnostic Data Available is active when diagnostic data has been collected and is being stored in the instrument.

Diagnostics in Progress is active when a diagnostic test is in progress.

Drive Current Failure is active when the drive current to the I/P converter is not flowing as expected. If this alert occurs, check the connection between the I/P converter and the printed wiring board assembly. Try removing the I/P converter and reinstalling it. If the alert does not clear, replace the I/P converter or the printed wiring board assembly.

Drive Signal Alert monitors the drive signal and calibrated travel. If one of the following conditions exists for more than 20 seconds, the alert is set.

For the case where Zero Power Condition is defined as closed:

Drive Signal < 10% and Calibrated Travel > 3%

Drive Signal > 90% and Calibrated Travel < 97%

For the case where Zero Power Condition is defined as open:

Drive Signal < 10% and Calibrated Travel < 97%

Drive Signal > 90% and Calibrated Travel > 3%

End Point Pressure Deviation is active if the instrument is in pressure control and the pressure is not tracking the set point within the configured deviation allowance.

Field Device Malfunction is active if the pressure, position or temperature sensors are providing invalid readings.

Flash Integrity Failure is active if there is a failure associated with flash ROM (read only memory). To clear the alert, restart the instrument. If the alert persists, replace the printed wiring board assembly.

Instrument Time is Approximate is active if the instrument has been powered down since the last time the instrument clock was set. To clear the alert, reset the instrument time.

Integrator Saturated High is active if the instrument integrator is saturated at the high extreme.

Integrator Saturated Low is active if the instrument integrator is saturated at the low extreme.

Internal Sensor Out of Limits is active if there is a problem with either the pressure sensor or the printed wiring board assembly.

LCP Communications Failure is active if the AUX terminals are configured for use with the local control panel, but communication between the DVC6200 SIS and LCP is not occurring.

LCP Stuck Button is active if the instrument detects that a button on the local control panel is stuck in the activated position.

Loop Current Validation Alert is active if the loop current is significantly out of range or if there is a problem with the analog circuit electronics. To clear the alert, restart the instrument with the loop current verified to be in the 4 to 20 mA range. If the alert persists, replace the printed wiring board.

NOTE

If the control system is known to output current 24 mA or above, Shutdown on Loop Current Validation should not be enabled.

Minor Loop Sensor Failure is active if the pneumatic relay position reading is outside the valid range. If the alert persists, replace the printed wiring board.

Non-Critical NVM is active if there is a failure associated with NVM (nonvolatile memory) that is not critical for instrument operation. To clear the alert, restart the instrument. If the alert persists, replace the printed wiring board assembly.

Offline/Failed is active if a shutdown alert has put the device in a failed state and is therefore not controlling the input. Examine the alert(s) that caused the shutdown.

Output Circuit Error is active if the output circuit is not responding. Verify that the DIP switch on the main electronics matches the configuration of the OUT terminals. If the DIP switch setting is correct and the alert is still active, replace the main electronics.

Port A Overpressurized requires that both the Port A Overpressurized Alert and the Port A Output Pressure Limit are enabled and applies to single acting direct applications only. The alert is active if the output pressure from Port A of the DVC6200 SIS exceeds the configured pressure limit setting. Check the supply pressure regulator for damage and verify its pressure set point.

Pressure Fallback Active is active when the instrument has detected a problem with the travel feedback and is now controlling the output like an I/P transducer.

Pressure Sensor Failure is active if any of the 3 pressure sensor readings (output A, output B, supply) are outside the range of 24.0 to 125.0% of the calibrated pressure for more than 60 seconds. If this alert is active, check the instrument supply pressure, ensure the printed wiring board assembly is properly mounted onto the module base assembly and ensure the pressure sensor O-rings are properly installed. If the alert persists after restarting the instrument, replace the printed wiring board assembly.

PST Abnormal indicates that a partial stroke test has failed. The criteria for determining an abnormal partial stroke test is user configurable. See page 36 for PST Abnormal Criteria.

NOTICE

If a PST Abnormal alert is active, there may be potential energy stored in the valve and actuator assembly. Sudden release of this energy may cause the valve to suddenly open or close, resulting in equipment damage.

PST Prohibited indicates that a partial stroke test was initiated, but then aborted due to abnormal conditions. The criteria for prohibiting a partial stroke test is user configurable. See page 37 for PST Prohibited criteria.

PST Pass indicates that a partial stroke test has completed normally. This alert will automatically clear. The timeout setting for the alert shares the same configuration setting as the Tripped by LCP Alert Latch.

Reference Voltage Failure is active if there is a failure associated with the internal voltage reference. If this alert is active, replace the printed wiring board assembly.

SIS Hardware Failure is active if a demand has occurred, but the electronics hardware failed to take control of the I/P drive.

Manual Reset Required indicates that the DVC6200 SIS is in the tripped position. In order for the instrument to follow the loop signal, it must be reset by pressing the Green button on the LCP or perform a Reset Latch with the host.

SIS Program Flow Failure is active if the firmware is not performing the expected series of calculations.

SIS Stroke Performance – If the DVC6200 SIS is tripped to the safety position and/or returns to the normal position, the instrument will record the demand and/or return stroke time, demand break out time and the calendar time that these events happened. This alert is active if any of the configured thresholds are exceeded.

Supply Pressure High is active if the supply pressure falls above the supply pressure high alert point.

Supply Pressure Low is active if the supply pressure falls below the supply pressure low alert point.

Temperature Sensor Failure is active when the instrument temperature sensor fails or the sensor reading is outside of the range of -60 to 100 °C / -76 to 212 °F. The temperature reading is used internally for temperature compensation of inputs. If this alert is active, restart the instrument. If the alert persists, replace the printed wiring board assembly.

Travel Accumulator High is active if the Travel Accumulator exceeds the Travel Accumulator Alert Point. The Travel Accumulator totalizes the travel of the valve when the deadband is exceeded. To clear the alert, set the Travel Accumulator to a value less than the alert point. See Figure 12.

Travel Alert Hi is active when the Travel exceeds the Travel Alert Hi Point. Once the alert is active, the alert will clear when the Travel falls below the Travel Alert Hi Point minus the Travel Alert Deadband. See Figure 11.

NOTE

The Travel Alert Hi Hi and Travel Alert Lo Lo points are used to calculate the stroke time in the event of a demand. The values are typically set to 99% and 1% respectively, however it is not necessary to enable the alert. Stroke time can be read from the device with ValveLink software.

Travel Alert Hi-Hi is active when the Travel exceeds the Travel Alert Hi Hi Point. Once the alert is active, the alert will clear when the Travel falls below the Travel Alert Hi Hi Point minus the Travel Alert Deadband. See Figure 11.

Travel Alert Lo is active when the Travel is below the Travel Alert Lo Point. Once the alert is active, the alert will clear when the Travel exceeds the Travel Alert Lo Point plus the Travel Alert Deadband. See Figure 11.

Travel Alert Lo-Lo is active when the Travel is below the Travel Alert Lo Point. Once the alert is active, the alert will clear when the Travel exceeds the Travel Alert Lo Point plus the Travel Alert Deadband. See Figure 11.

Travel Cutoff Hi is active when the Travel exceeds the Hi Cutoff Point.

Travel Cutoff Lo is active when the Travel falls below the Lo Cutoff Point.

Travel Deviation – If the difference between the Travel Target and the Travel exceeds the Travel Deviation Alert Point for more than the Travel Deviation Time, the Travel Deviation Alert is active. It remains active until the difference between the travel target and the Travel is less than the Travel Deviation Alert Point minus the Travel Alert Deadband. See Figure 11.

Travel Sensor Failure is active if the sensed travel is outside the range of 25.0 to 125.0% of calibrated travel. If this alert is active, check the instrument mounting. Also, check that the electrical connection from the travel sensor is properly plugged into the printed wiring board assembly. After restarting the instrument, if the alert persists, troubleshoot the printed wiring board assembly or travel sensor.

Tripped by the LCP indicates that the DVC6200 SIS is in the tripped position as a result of someone pressing the trip button on the local control panel. This alert will automatically clear only after the valve returns to the normal state and the Tripped by LCP Alert Latch timeout has expired.

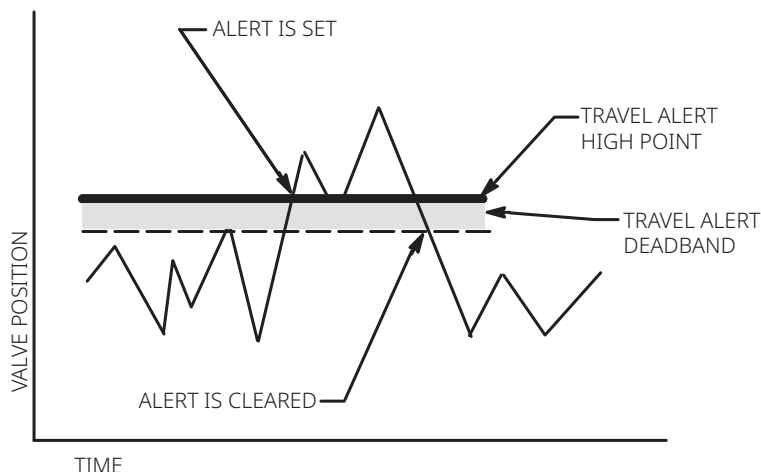
Variable out of Range is active if one or more of the measured analog sensor readings (loop current, pressure, temperature or travel) is saturated or reading out of its configured range. The condition may be due to improper configuration or physical setup and not be due to a sensor malfunction.

Deadband Principle of Operation

The deadband is the percent (%) of ranged travel around a travel reference point where no change in alert status will occur. This prevents the alert from toggling on and off when operating near the alert point.

The Travel Alert Deadband applies to the Travel Deviation Alert as well as the Travel Alert Hi, Lo, Hi Hi and Lo Lo. Figure 11 illustrates the principle behind setting and clearing a Travel Alert Hi. The alert is set when the travel exceeds the alert point and is cleared when it falls below the deadband.

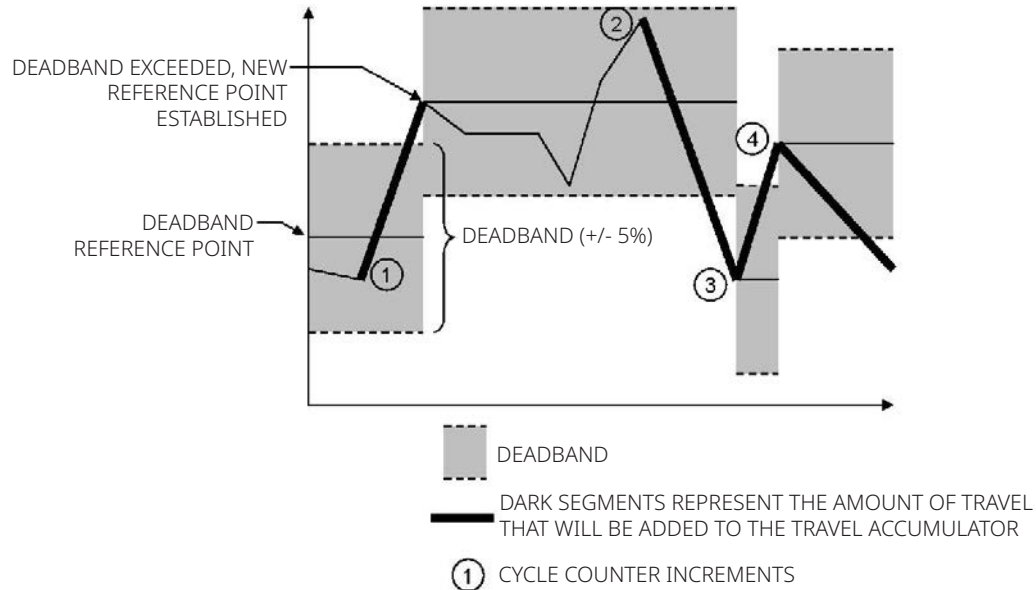
Figure 11. Installing Inner Guide and Access Handle Assembly



A6532

The Cycle Counter and Travel Accumulator Deadband applies to both the Cycle Count High Alert and the Travel Accumulator High Alert. The deadband establishes a zone around a travel reference point. The travel reference point gets reestablished to the point of travel reversal that occurs outside of the deadband. The deadband must be exceeded before a change in travel direction will be counted as a cycle and the accumulated travel (up to the point of travel reversal) is added to the total accumulation. See Figure 12.

Figure 12. Cycle Counter and Travel Accumulator Deadband Example (Set at 10%)



E1473

Diagnostics

NOTE

DVC6200 SIS High Cv requires ValveLink software 13.6 or higher to perform the Diagnostic procedures.

⚠ WARNING

During stroke valve, partial stroke and demand mode tests 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.

Stroke Valve

Follow the prompts on the Device Communicator display to select from the following:

- Done – Select this if you are done. All ramping is stopped when DONE is selected.
- Ramp Open – ramps the travel toward open at the rate of 1.0% per second of the ranged travel.
- Ramp Closed – ramps the travel toward closed at the rate of 1.0% per second of the ranged travel.
- Ramp to Target – ramps the travel to the specified target at the rate of 1.0% per second of the ranged travel.
- Step to Target – steps the travel to the specified target.

Partial Stroke Test

There are multiple ways that a partial stroke test can be initiated with the DVC6200 SIS.

- Automatic (Scheduled)

The Auto Partial Stroke Test allows the partial stroke test to be scheduled by the DVC6200 SIS. The test is scheduled in number of hours between tests. Any power cycle will reset the test clock timer.

- Local Pushbutton

A partial stroke test command may be sent to the 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 10 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 Pushbutton

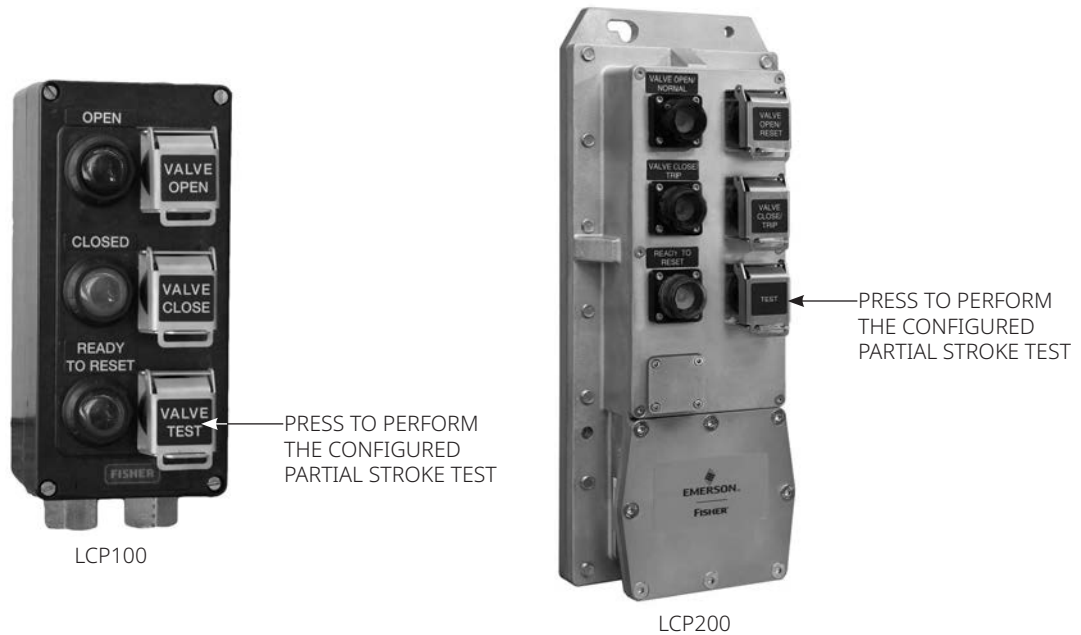
The LCP100 or LPC200 local control panel is wired directly to the DVC6200 SIS digital valve controller.

The “Valve Test” pushbutton (see Figure 13) allows the valve to perform the configured partial stroke test.

- Press and hold for 3 to 10 seconds

The test can be overridden by the “Valve Close” button, “Valve Open” button or if an emergency demand occurs.

Figure 13. Local Control Panel



- Device Communicator
 1. Connect the Device Communicator to the LOOP terminals on the digital valve controller.
 2. Turn on the Device Communicator.
 3. From the Online menu, select Service Tools > Diagnostics > 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 Device Communicator.
 7. Once the valve has reached the endpoint, check that the valve has reached the desired set point. The valve should return to its original position.
 - ValveLink Software
- Run the Partial Stroke diagnostic.

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:

- Point-to-Point Mode (DVC6200 SIS powered with 4 to 20 mA current source)

If the DVC6200 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 a DVC6200 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 relay A or C or direct-acting HCV1, HCV2 or HCV3. If single-acting reverse relay B or reverse-acting HCV1 or HCV2 are used adjust the current from 4 mA (normal state) to 20 mA (trip state).

- Multi-drop Mode (DVC6200 SIS is powered by a 24 V DC power source)

If the DVC6200 SIS is pneumatically in series with a solenoid valve and shares a single power source,

1. Disconnect power to both devices. The valve should go to its "fail-safe" position.

If the DVC6200 SIS is pneumatically in series with a solenoid valve and shares a single power sources,

1. Connect a 24 V DC power supply to the solenoid valve and a second 24 V DC power supply to the DVC6200 SIS.
2. Disconnect the solenoid valve power supply, but maintain the power supply to the DVC6200 SIS. The valve should go to its "fail-safe" position quickly.
3. Maintain the power supply to the solenoid valve and disconnect the DVC6200 SIS power supply. The valve should go to its "fail-safe" position, although not as quickly as it does in the previous scenario.

If DVC6200 SIS is alone, without a solenoid valve,

1. Disconnect power to the digital valve controller. The valve should go to its "fail-safe" position.

NOTE

The above tests are applicable for single-acting direct relay A, C or HCV1, HCV2 or HCV3.

- If a local control panel is used, conduct the following tests:

LCP100

Successful Partial Stroke Test

1. Press the "Valve Test" (black) pushbutton for more than 3 seconds (but less than 10 seconds).
2. Observe that the green light starts flashing when the valve starts moving.
3. Observe that the valve moves no more than the configured PST travel limit.
4. Observe that the valve returns to the normal operating position and the green light comes on solid.

Manually Aborted Partial Stroke Test

5. Press the "Valve Test" (black) pushbutton for more than 3 seconds (but less than 10 seconds).
6. Observe that the green light starts flashing when the valve starts moving.
7. Before the valve reaches the travel limit of the configured partial stroke test, press the "Valve Test" pushbutton or the pushbutton next to the green light.
8. Observe that the valve immediately returns to the normal operating position and the green light comes on solid.

Emergency Demand through the Logic Solver

1. Reduce the current to the DVC6200 SIS to 4 mA for de-energize to trip operation.

NOTE

You may remove the power completely; however, the lights in step 3 will be off. Without power to the DVC6200 SIS, the LCP100 cannot function.

2. Observe that the valve moves to its fail-safe state.
3. Observe that the red light comes on solid and the yellow light stays off (valve is not ready to open).
4. Press the pushbutton next to the green light and observe that the valve does not move.
5. Increase the current to the DVC6200 SIS to 20 mA and observe that the valve remains in its fail-safe state.
6. Observe that the red light stays on solid and the yellow light comes on solid (ready to reset).
7. Press the pushbutton next to the green light.
8. Observe that the green light starts flashing, then becomes solid and the red light is off.

Emergency Demand through Local Control Panel

1. Press the pushbutton next to the red light.
2. Observe that the valve moves to its fail-safe position.
3. Observe that the red light starts flashing, then becomes solid and the yellow light comes on solid (ready to reset).

4. Press the pushbutton next to the green light.
5. Observe that the red light goes off, the valve moves to its normal operating position and the green light comes on solid.

LCP200

Successful Partial Stroke Test

1. Verify that the Top (Green/Normal) light is on solid.
2. Press the Bottom (Test) pushbutton for more than 3 seconds (but less than 10 seconds).
3. Observe that the top light starts flashing when the valve starts moving.
4. Observe that the valve moves no more than the configured partial stroke test travel limit.
5. Observe that the valve returns to the normal operating position and the top light comes on solid.
6. If the relay contacts are being used, verify that the Test contact changes state when the PST is in progress. When the PST is complete verify that the contact returns to the pre-PST state.

Manually Aborted Partial Stroke Test

1. Verify that the Top (Green/Normal) light is on solid.
2. Press the Bottom (Test) pushbutton for more than 3 seconds (but less than 10 seconds).
3. Observe that the top light starts flashing when the valve starts moving.
4. Before the valve reaches the travel limit of the configured partial stroke test, press the Top (Reset) pushbutton or the bottom pushbutton.
5. Observe that the valve immediately returns to the normal operating position and the top light comes on solid and if the contact is being used, the Reset contact changes state for 1.5 to 3 seconds.
6. If the relay contacts are being used, verify that the Test contact changes state when the PST is in progress.

Emergency Demand through the Logic Solver

1. Reduce the current to the DVC6200 SIS to 4 mA (for de-energize to trip operation).

NOTE

For a loop powered installation, a minimum current of 8 mA is required at the trip state/"Safety Demand" for proper functioning of the pushbuttons and lights.

2. Observe that the valve moves to its Trip state.
3. Observe that the Middle (Red/Trip) light comes on solid and the Bottom (Yellow/Ready-to-Reset) light stays off.
4. Increase the current to the DVC6200 SIS to 20 mA (for de-energize to trip) and observe that the valve behaves as configured in the reset option i.e., Auto, Manual or Smart Auto. If the configuration is for auto reset, skip steps 5 and 6.

5. Observe that the middle light stays on solid and the bottom light comes on solid (ready to reset).
6. Press the Top (Reset) pushbutton.
7. Observe that the middle and bottom lights go off, the valve moves to its normal operating position and then the Top (Green/Normal) light comes on solid.
8. If the relay contacts are being used, verify that the Reset contact changes state for 1.5 to 3 seconds when the top pushbutton is pressed.

Emergency Demand and Reset through Local Control Panel

1. Press the Middle (Trip) pushbutton.
2. Observe that the valve moves to its Trip position.
3. Observe that the Middle (Red/Trip) light comes on solid and the Bottom (Yellow/Ready-to-Reset) light is on solid.
4. If the relay contacts are being used, verify that the Trip contact changes state for 1.5 to 3 seconds when the middle pushbutton is pressed.
5. Press the Top (Reset) pushbutton.
6. Observe that the middle light goes off, the valve moves to its normal operating position and then the Top (Green/Normal) light comes on solid.
7. If the relay contacts are being used, verify that the Reset contact changes state for 1.5 to 3 seconds when the top pushbutton is pressed.

Solenoid Valve Health Monitoring

NOTE

Solenoid valve health monitoring is not supported by the DVC6200 SIS High Cv.

Solenoid valve health monitoring requires the following setup:

- Single-acting actuator
- Solenoid valve installed between the DVC6200 SIS pressure output and the actuator
- Unused output pressure port of the DVC6200 SIS connected between the solenoid and the actuator, close to the actuator
- Relay configured as "special application"
- Output terminal configured as "Limit Switch" (only required when the solenoid valve is wired in series with the DVC6200 SIS)

If the solenoid valve is wired directly to the logic solver, the following steps can be used to test the solenoid valve.

1. Momentarily interrupt the power to the solenoid valve through the Logic Solver (typically 100 to 200 milliseconds). The duration of the interruption should be short enough so that the safety valve travel does not move, but long enough so that a pressure drop across the solenoid valve is detected.

2. Properly configured, data collection will occur automatically and will be stored onboard the DVC6200 SIS.
3. With ValveLink software, upload the diagnostic data from the triggered profile menu.
4. Examine the graph and observe that there was a change in the pressure reading downstream of the solenoid.

If the solenoid valve is wired in series with the DVC6200 SIS and logic solver, the following steps can be used to test the solenoid valve.

1. With ValveLink software, run the Solenoid Valve Test diagnostic. When configured correctly, the DVC6200 SIS will conduct the power interruption and collect the data.
2. Examine the graph and observe that there was a change in the pressure reading downstream of the solenoid.

5.3 Variables

Device Communicator

Service Tools > Variables

The Variables section provides current values of the instrument variables. Below is a list of the variables available for viewing:

- Write Protection (also provides a procedure to enable/disable)
- Instrument Mode (also provides a procedure to place in/out of service)
- Analog Input
- Setpoint
- Travel
- Drive Signal
- Input Characterization (also provides a procedure to modify)
- Cycle Counter
- Travel Accumulator
- Supply Pressure
- Actuator Pressure(s)
- Instrument Temperature
- Travel Counts (this is the raw travel sensor reading used for advanced adjustments)
- Maximum Recorded Temperature
- Minimum Recorded Temperature
- Number of Power Ups
- Days Powered Up

Section 6: Maintenance and Troubleshooting

The DVC6200 SIS digital valve controller enclosure is rated Type 4X and IP66, therefore periodic cleaning of internal components is not required. If the DVC6200 SIS is installed in an area where the exterior surfaces tend to get heavily coated or layered with industrial or atmospheric contaminants, it is recommended that the vent (key 52) be periodically removed and inspected to ensure there is no partial or full obstruction. If the vent appears to be partially or fully obstructed, it must be cleaned or replaced. Lightly brush the exterior of the vent to remove contaminants and run a mild water/detergent solution through the vent to ensure it is free of any obstruction. Allow the vent to dry before reinstalling.

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.

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

Avoid personal injury or property damage from sudden release of process pressure or bursting of parts. Before performing any maintenance procedures on the DVC6200 SIS digital valve controller:

- **Always wear protective clothing, gloves and eyewear.**
- **Do not remove the actuator from the valve while the valve is still pressurized.**
- **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.**
- **Check with your process or safety engineer for any additional measures that must be taken to protect against process media.**
- **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

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.

⚠ WARNING

When replacing components, use only components specified by the factory. Always use proper component replacement techniques, as presented in this manual. Improper techniques or component selection may invalidate the approvals and the product specifications, as indicated in Table 1, may impair operations and the intended function of the device and could cause personal injury or property damage.

Because of the diagnostic capability of the DVC6200 SIS, predictive maintenance is available through the use of ValveLink software. Using the digital valve controller, valve and instrument maintenance can be enhanced, thus avoiding unnecessary maintenance. For information on using ValveLink software, refer to the ValveLink software online help.

6.1 Removing the Magnetic Feedback Assembly

To remove the magnet assembly from the actuator stem, perform the following basic steps.

1. Make sure that the valve is isolated from the process.
2. Remove the instrument terminal box cover.
3. Disconnect the field wiring from the terminal board.
4. Shut off the instrument air supply.
5. Disconnect the pneumatic tubing and remove the DVC6200 SIS or the DVC6215 from the actuator.
6. Remove the screws holding the magnet assembly to the connector arm.

When replacing the instrument, be sure to follow the mounting guidelines in the quick start guide ([D103556X012](#)) that shipped with the digital valve controller. Setup and calibrate the instrument prior to returning to service.

6.2 Module Base Maintenance

The digital valve controller contains a module base consisting of the I/P converter, printed wiring board assembly and pneumatic relay. The module base may be easily replaced in the field without disconnecting field wiring or tubing.

Tools Required

Table 17 lists the tools required for maintaining the DVC6200 SIS digital valve controller.

Table 17. Tools Required

Tool	Size	Component
Phillips Screwdriver		Relay, printed wiring board assembly and cover screws
Hex key	5 mm	Terminal box screw
Hex key	1.5 mm	Terminal box cover screw
Hex key	2.5 mm	I/P converter screws
Hex key	6 mm	Module base screws
Hex key	9/64 in.	Spool valve screws, HCv1
Hex key	3 mm	Spool valve screws, HCv2 and HCv3

Component Replacement

When replacing any of the components of the DVC6200 SIS, the maintenance should be performed in an instrument shop whenever possible. Make sure that the electrical wiring and pneumatic tubing is disconnected prior to disassembling the instrument.

Refer to the appropriate figure(s) as needed.

Figure 23: FIELDVUE DVC6200 SIS Digital Valve Controller Housing Assembly

Figure 24: DVC6200 SIS High Cv, HCv1 Housing Assembly

Figure 25: DVC6200 SIS High Cv, HCv2 Housing Assembly

Figure 26: DVC6200 SIS High Cv, HCv3 Housing Assembly

Figure 27: DVC6200 SIS High Cv Module Base and Housing

Figure 28: FIELDVUE DVC6205 SIS Base Unit Housing Assembly

Figure 29: Gauge Configuration

Figure 30: DVC6215 Remote Feedback Assembly

Removing the Module Base

Refer to Figure 23, 24, 25, 26, 27 or 28 for key number locations.

⚠ WARNING

To avoid personal injury or equipment damage from bursting of parts, turn off the supply pressure to the digital valve controller and bleed off any excess supply pressure before attempting to remove the module base assembly from the housing.

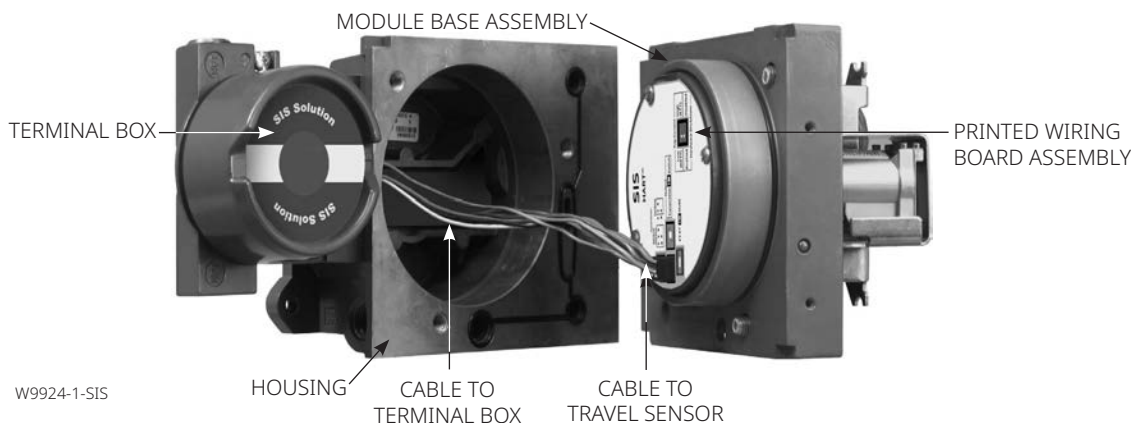
1. Unscrew the four captive screws in the cover (key 43) and remove the cover from the module base (key 2).
2. Using a 6 mm hex socket wrench, loosen the three-socket head screws (key 38). These screws are captive in the module base by retaining rings (key 154).

NOTE

The module base is linked to the housing by two cable assemblies. Disconnect these cable assemblies after you pull the module base out of the housing.

3. Pull the module base straight out of the housing (key 1). Once clear of the housing, swing the module base to the side of the housing to gain access to the cable assemblies.
4. The digital valve controller/base unit has two cable assemblies, shown in Figure 14, which connect the module base, via the printed wiring board assembly, travel sensor and the terminal box. Disconnect these cable assemblies from the printed wiring board assembly on the back of the module base.

Figure 14. Printed Wiring Board Cable Connections



Replacing the Module Base

Refer to Figure 23, 24, 25, 26, 27 or 28 for key number locations.

NOTICE

To avoid affecting performance of the instrument, take care not to damage the module base seal or guide surface. Do not bump or damage the bare connector pins on the PWB assembly. Damaging either the module base or guide surface may result in material damage, which could compromise the instruments ability to maintain a pressure seal.

NOTE

To avoid affecting performance of the instrument, inspect the guide surface on the module and the corresponding seating area in the housing before installing the module base assembly. These surfaces must be free of dust, dirt, scratches and contamination.

Ensure the module base seal is in good condition. Do not reuse a damaged or worn seal.

1. Ensure the module base seal (key 237) is properly installed in the housing (key 1). Ensure the O-ring (key 12) is in place on the module base assembly.
 2. Connect the travel sensor and terminal box cable assemblies to the PWB assembly (key 50). Orientation of the connector is required.
 3. Insert the module base (key 2) into the housing (key 1).
-

NOTE

For stainless steel digital valve controllers, pipe thread sealant (key 64) is recommended under the head of the three socket head screws (key 38) prior to attaching the module base to the housing in the next step.

4. Install three socket head screws (key 38) in the module base into the housing. If not already installed, press three retaining rings (key 154) into the module base. Evenly tighten the screws in a crisscross pattern to a final torque of 16 N•m / 138 lbf•in.
-

NOTICE

Disruption of process control can result if the cable assemblies/wiring are damaged when attaching the cover to the module base assembly.

Ensure that the cable assemblies/wiring are positioned in the cavity of the module base so they do not get compressed or damaged when attaching the cover to the module base assembly in step 5.

5. Attach the cover (key 43) to the module base assembly.

6.3 Submodule Maintenance

The module base of the DVC6200 SIS contains the following submodules: I/P converter, PWB assembly and pneumatic relay/spool valve. If problems occur, these submodules may be removed from the module base and replaced with new submodules. After replacing a submodule, the module base may be put back into service.

NOTICE

Exercise care when performing maintenance on the module base. Reinstall the cover to protect the I/P converter and gauges when servicing other submodules.

In order to maintain accuracy specifications, do not strike or drop the I/P converter during submodule maintenance.

I/P Converter

Refer to Figure 23, 24, 25, 26, 27 or 28 for key number locations. The I/P converter (key 41) is located on the front of the module base.

NOTE

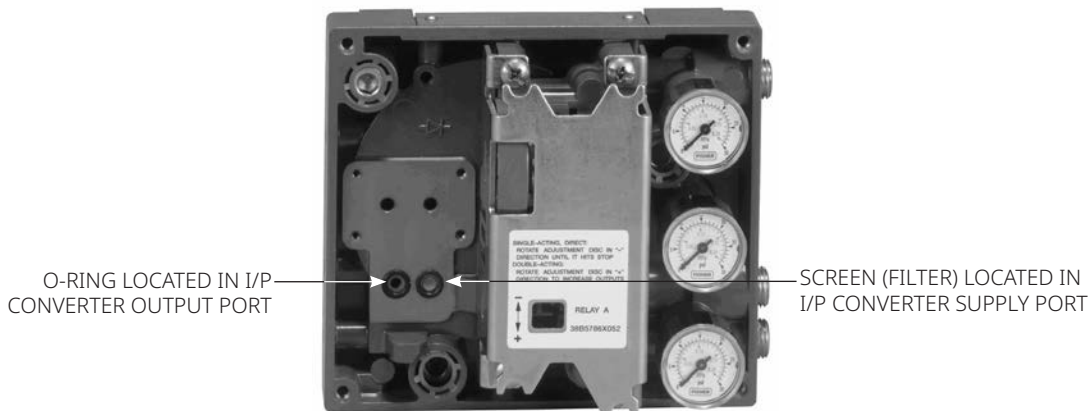
After I/P converter submodule replacement, calibrate the digital valve controller to maintain accuracy specifications.

Replacing the I/P Filter

A screen in the supply port beneath the I/P converter serves as a secondary filter for the supply medium. To replace this filter, perform the following procedure:

1. Remove the I/P converter (key 41) and shroud (key 169) as described in the Removing the I/P Converter procedure.
2. Remove the screen (key 231) from the supply port.
3. Install a new screen in the supply port as shown in Figure 15.

Figure 15. I/P Filter Location



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-
4. Inspect the O-ring (key 39) in the I/P output port. Replace if necessary.
 5. Reinstall the I/P converter (key 41) and shroud (key 169) as described in the Replacing the I/P Converter procedure.

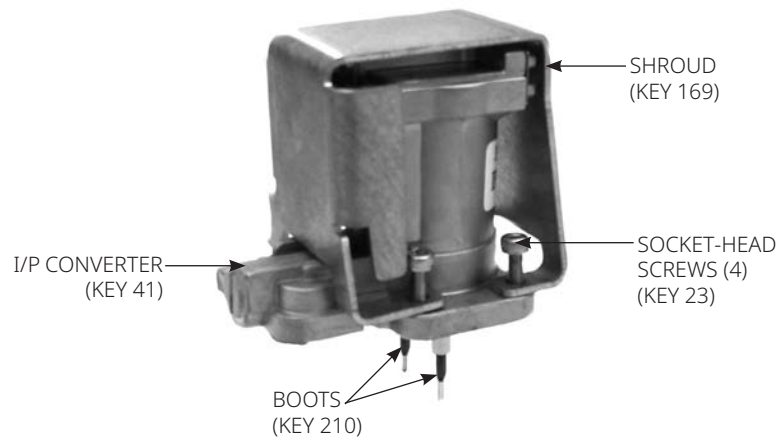
Removing the I/P Converter

1. Remove the front cover (key 43), if not already removed.
2. Refer to Figure 16. Using a 2.5 mm hex socket wrench, remove the four socket-head screws (key 23) that attach the shroud (key 169) and I/P converter (key 41) to the module base (key 2).
3. Remove the shroud (key 169); then pull the I/P converter (key 41) straight out of the module base (key 2). Be careful not to damage the two electrical leads that come out of the base of the I/P converter.
4. Ensure that the O-ring (key 39) and screen (key 231) stay in the module base and do not come out with the I/P converter (key 41).

Replacing the I/P Converter

1. Refer to Figure 15. Inspect the condition of the O-ring (key 39) and screen (key 231) in the module base (key 2). Replace them, if necessary. Apply silicone lubricant to the O-rings.
2. Ensure the two boots (key 210) shown in Figure 16 are properly installed on the electrical leads.

Figure 16. I/P Converter



3. Install the I/P converter (key 41) straight into the module base (key 2), taking care that the two electrical leads feed into the guides in the module base. These guides route the leads to the printed wiring board assembly submodule.
4. Install the shroud (key 169) over the I/P converter (key 41).
5. Install the four socket-head screws (key 23) and evenly tighten them in a crisscross pattern to a final torque of 1.6 N•m / 14 lbf•in.
6. After replacing the I/P converter, calibrate travel or perform touch-up calibration to maintain accuracy specifications.

Printed Wiring Board (PWB) Assembly

Refer to Figure 23, 24, 25, 26, 27 or 28 for key number locations. The PWB assembly (key 50) is located on the back of the module base assembly (key 2).

NOTE

If the PWB assembly submodule is replaced, calibrate and configure the digital valve controller to maintain accuracy specifications.

Removing the Printed Wiring Board Assembly

1. Separate the module base from the housing by performing the Removing the Module Base procedure.
2. Remove three screws (key 33).
3. Lift the PWB assembly (key 50) straight out of the module base (key 2).
4. Ensure that the O-rings (key 40) remain in the pressure sensor bosses on the module base assembly (key 2) after the PWB assembly (key 50) has been removed.

Replacing the Printed Wiring Board Assembly and Setting the DIP Switch

1. Apply silicone lubricant to the pressure sensor O-rings (key 40) and install them on the pressure sensor bosses in the module base assembly.
2. Properly orient the PWB assembly (key 50) as you install it into the module base. The two electrical leads from the I/P converter (key 41) must guide into their receptacles in the PWB assembly and the pressure sensor bosses on the module base must fit into their receptacles in the PWB assembly.
3. Push the PWB assembly (key 50) into its cavity in the module base.
4. Install and tighten three screws (key 33) to a torque of 1 N•m / 10.1 lbf•in.
5. Set the DIP switch on the PWB assembly according to Table 18.

Table 18. DIP Switch Configuration⁽¹⁾

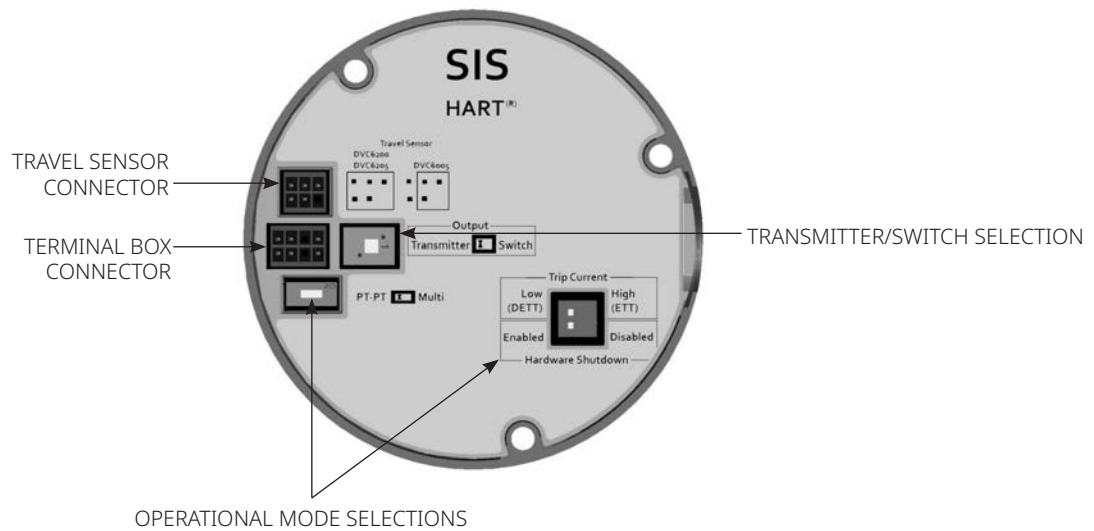
Switch Label	Operational Mode	DIP Switch Position
PT-PT	4 to 20 mA Point-to-Point Loop	LEFT
Multi	24 V DC MultiDrop Loop	RIGHT
Hardware Shutdown	Enabled	LEFT
Hardware Shutdown	Disabled	RIGHT
Trip Current Low (DETT)	De-energize to trip	LEFT
Trip Current High (ETT)	Energize to trip	RIGHT

1. Refer to Figure 17 for switch location.

NOTE

DVC6200 SIS instruments in PT-PT mode require the Hardware Shutdown Switch be Enabled for FMEDA failure rates to be valid for 4 to 20 mA operation.

Figure 17. Printed Wiring Board (PWB) Connections and Settings



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6. Reassemble the module base to the housing by performing the Replacing the Module Base procedure.
7. Setup and calibrate the digital valve controller.

Pneumatic Relay

NOTE

The pneumatic relay is only available on the DVC6200 SIS with pneumatic relay and the DVC6205 SIS.

Refer to Figure 23 or 27 for key number locations. The pneumatic relay (key 24) is located on the front of the module base.

NOTE

After relay submodule replacement, calibrate the digital valve controller to maintain accuracy specifications.

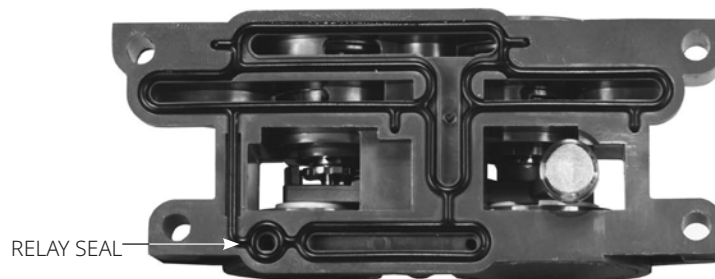
Removing the Pneumatic Relay

1. Loosen the four screws that attach the relay (key 24) to the module base. These screws are captive in the relay.
2. Remove the relay.

Replacing the Pneumatic Relay

1. Visually inspect the holes in the module base to ensure they are clean and free of obstructions. If cleaning is necessary, do not enlarge the holes.
2. Apply silicone lubricant to the relay seal and position it in the grooves on the bottom of the relay as shown in Figure 18. Press small seal retaining tabs into retaining slots to hold relay seal in place.

Figure 18. Pneumatic Relay Assembly



3. Position the relay (with shroud) on the module base. Tighten the four screws, in a crisscross pattern, to a final torque of 2 N•m / 20.7 lbf•in.
4. Using the Device Communicator, verify that the value for Relay Type parameter matches the relay type installed.
5. After replacing the relay and verifying the relay type, calibrate travel or perform touch-up calibration to maintain accuracy specifications.

Spool Valve

NOTE

The spool valve is only available on DVC6200 SIS High Cv digital valve controllers.

There are no repairable or replaceable parts on the spool valve. Contact your [Emerson sales office](#) if a replacement spool valve is needed.

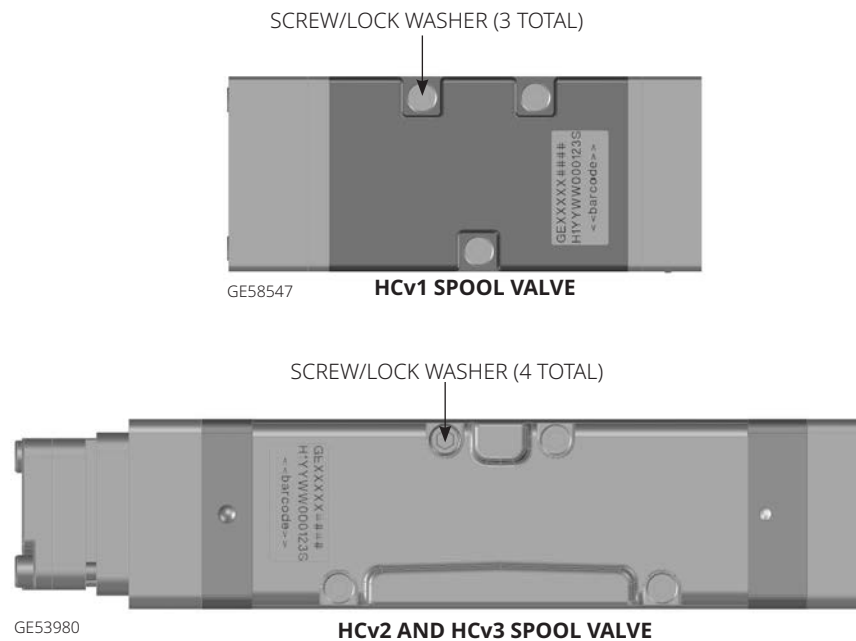
Removing the Spool Valve

Refer to Figure 24, 25 or 26 for key number locations.

1. Unscrew the screws connecting the spool valve (key 305) to the housing (key 1), shown in Figure 19 and remove the spool valve.

Replacing the Spool Valve

1. Ensure that the seal is in place on the spool valve and mount the spool valve (key 305) to the housing (key 1). Install the screws and tighten in a crisscross pattern to a final torque of 1.4 N•m / 12 lbf•in.
2. Using ValveLink software 13.6 or higher, verify that the value for Relay Type parameter matches the spool valve installed.
3. After replacing the spool valve and verifying the Relay Type, calibrate travel or perform touch-up calibration to maintain accuracy specifications.

Figure 19. Spool Valve Mounting Screws

Seal Retainer

NOTE

The seal retainer is only available on DVC6200 SIS High Cv digital valve controllers.

Refer to Figure 20 for key number locations. The seal retainer (key 306) is located on the front of the module base.

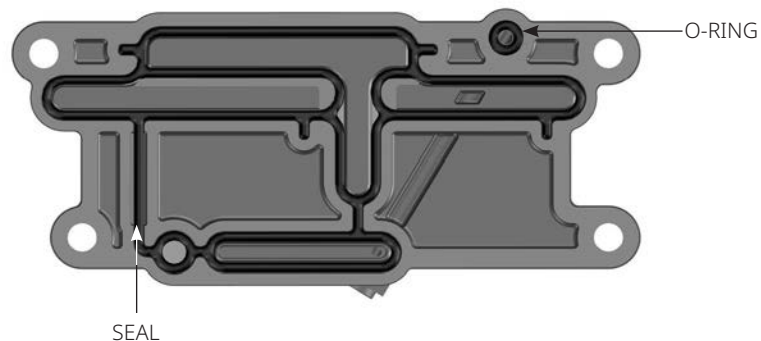
Removing the Seal Retainer

1. Loosen the four screws that attach the seal retainer (key 306) to the module base and remove the seal retainer.

Replacing the Seal Retainer

1. Visually inspect the holes in the module base to ensure they are clean and free of obstructions. If cleaning is necessary, do not enlarge the holes.
2. Apply silicone lubricant to the seal (key 307) and the O-ring (key 308) and position them in the grooves on the bottom of the seal retainer as shown in Figure 20. Press small seal retaining tabs into retaining slots to hold the seal in place.
3. Position the seal retainer on the module base. Tighten the four screws in a crisscross pattern to a final torque of 2 N•m / 20.7 lbf•in.
4. Verify that you can stroke the valve. If the valve does not stroke, check the seal and O-ring to ensure that they are in place. Reposition as necessary until you are able to stroke the valve.

Figure 20. Seal Retainer Assembly



Gauges, Pipe Plugs or Tire Valves

Depending on the options ordered, the DVC6200 SIS or DVC6205 SIS will be equipped with either gauges (key 47), pipe plugs (key 66) or tire valves (key 67). Single-acting instruments will also have a screen (key 236, Figure 29). These are located on the top of the module base next to the relay.

Perform the following procedure to replace the gauges, tire valves or pipe plugs. Refer to Figure 23, 24, 25, 26, 27, 28 or 29 for key number locations.

1. Remove the front cover (key 43).
2. Remove the gauge, pipe plug or tire valve as follows:

For gauges (key 47), the flats are on the gauge case. Use a wrench on the flats of the gauge to remove the gauge from the module base. For double-acting instruments, to remove the supply gauge remove one of the output gauges.

For pipe plugs (key 66) and tire valves (key 67), use a wrench to remove these from the module base.

3. Apply pipe thread sealant (key 64) to the threads of the replacement gauges, pipe plugs or tire valves.
4. Using a wrench, screw the gauges, pipe plugs or tire valves into the module base.

6.4 Terminal Box

Refer to Figure 23, 24, 25, 26, 27 or 28 for key number locations.

The terminal box is located on the housing and contains the terminal strip assembly for field wiring connections.

NOTE

The DVC6205 SIS feedback connections terminal box (shown to the right in Figure 21) is not a replaceable part. Do not remove the tamper proof paint on the screw.

Figure 21. Terminal Boxes

Removing the Terminal Box

⚠ WARNING

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.

1. Loosen the set screw (key 58) in the cap (key 4) so that the cap can be unscrewed from the terminal box.
2. After removing the cap (key 4), note the location of field wiring connections and disconnect the field wiring from the terminal box.
3. Separate the module base from the housing by performing the Removing the Module Base procedure.
4. Disconnect the terminal box wiring connector from the PWB assembly (key 50).
5. Remove the screw (key 72). Pull the terminal box assembly straight out of the housing.

Replacing the Terminal Box

NOTE

Inspect all O-rings for wear and replace as necessary.

1. Apply lubricant, silicone sealant to the O-ring (key 34) and install the O-ring over the stem of the terminal box.
2. Insert the terminal box assembly stem into the housing until it bottoms out. Position the terminal box assembly so that the hole for the screw (key 72) in the terminal box aligns with the threaded hole in the housing. Install the screw (key 72).
3. Connect the terminal box wiring connector to the PWB assembly (key 50). Orientation of the connector is required.
4. Reassemble the module base to the housing by performing the Replacing the Module Base procedure.

5. Reconnect the field wiring as noted in step 2 in the Removing the Terminal Box procedure.
6. Apply lubricant, silicone sealant to the O-ring (key 36) and install the O-ring over the 2-5/8 in. threads of the terminal box. Use of a tool is recommended to prevent cutting the O-ring while installing it over the threads.
7. Apply lithium grease (key 63) to the 2-5/8 in. threads on the terminal box to prevent seizing or galling when the cap is installed.
8. Screw the cap (key 4) onto the terminal box until no gap remains.
9. Install the set screw (key 58) into the cap (key 4). Secure the cap by engaging the set screw.

6.5 Troubleshooting

If communication or output difficulties are experienced with the instrument, refer to the troubleshooting chart in Table 19. Also see the DVC6200 SIS Technical Support Checklist on page 84.

6.6 Checking Voltage Available

WARNING

Personal injury or property damage caused by fire or explosion may occur if this test is attempted in an area which contains a potentially explosive atmosphere or has been classified as hazardous.

To check the Voltage Available at the instrument, perform the following:

1. Connect the equipment in Figure 3 to the field wiring in place of the FIELDVUE instrument.
2. Set the control system to provide maximum output current.
3. Set the resistance of the 1 kilohm potentiometer shown in Figure 3 to zero.
4. Record the current shown on the milliammeter.
5. Adjust the resistance of the 1 kilohm potentiometer until the voltage read on the voltmeter is 10.0 V.
6. Record the current shown on the milliammeter.
7. If the current recorded in step 6 is the same as that recorded in step 4 (± 0.08 mA), the voltage available is adequate.
8. If the voltage available is inadequate, refer to Wiring Practices in the Installation section.

6.7 Restart Processor

This is a “soft” reset of the device. This procedure can only be performed while the instrument is out of service. A soft reset will immediately put into effect changes that have been sent to the instrument. Also, if the device is configured to shutdown on an alert, the soft reset will clear the shutdown.

Table 19. Instrument Troubleshooting

Symptom	Possible Cause	Action
Analog input reading at instrument does not match actual current provided	Control mode not Analog.	Check the control mode using the Device Communicator. If in the Digital or Test mode, the instrument receives its set point as a digital signal. Control is not based on input current. Change Control Mode to Analog.
	Low control system compliance voltage.	Check system compliance voltage (see Wiring Practices in the Installation section).
	Instrument shutdown due to self test failure.	Check instrument status using the Device Communicator (see Viewing Instrument Status in the Viewing Device Information section).
	Analog input sensor not calibrated.	Calibrate the analog input sensor (see Analog Input Calibration in the Calibration section).
	Current leakage.	Excessive moisture in the terminal box can cause current leakage. Typically the current will vary randomly if this is the case. Allow the inside of the terminal box to dry, then retest.
Instrument will not communicate	Insufficient Voltage Available.	Calculate Voltage Available (see Wiring Practices in the Installation section). Voltage Available should be greater than or equal to 10 V DC.
	Controller output Impedance too low.	Install a HART filter after reviewing Control System Compliance Voltage requirements (see Wiring Practices in the Installation section).
	Cable capacitance too high.	Review maximum cable capacitance limits (see Wiring Practices in the Installation section).
	HART filter improperly adjusted.	Check filter adjustment (see the appropriate HART filter instruction manual).
	Improper field wiring.	Check polarity of wiring and integrity of connections. Make sure cable shield is grounded only at the control system.
	Controller output providing less than 4 mA to loop	Check control system minimum output setting, which should not be less than 3.8 mA.
	Disconnected loop wiring cable at PWB.	Verify connectors are plugged in correctly.
	PWB DIP switch not set properly.	Check for incorrect setting or broken DIP switch on the back of the PWB. Reset switch or replace PWB, if switch is broken. See Table 18 for switch setting information
	PWB failure.	Use a 4 to 20 mA current source to apply power to the instrument. Terminal voltage across the LOOP+ and LOOP- terminals should be 8.0 to 9.5 V DC. If the terminal voltage is not 8.0 to 9.5 V DC, replace the PWB.

Table 19. Instrument Troubleshooting (continued)

Symptom	Possible Cause	Action
Instrument will not communicate.	Polling address incorrect	Use the Device Communicator to set the polling address (refer to the Detailed Setup section). From the Utility menu, select Configure Communicator > Polling > Always Poll. Set the instrument polling address to 0.
	Defective terminal box	Check continuity from each screw terminal to the corresponding PWB connector pin. If necessary, replace the terminal box assembly.
	Defective Device Communicator or ValveLink modem cable	If necessary, repair or replace cable.
	ValveLink modem defective or not compatible with PC	Replace ValveLink modem.
	ValveLink hardlock defective or not programmed	Replace if defective or return to factory for programming.
Instrument will not calibrate, has sluggish performance or oscillates.	Configuration errors	Verify configuration: If necessary, set protection to None. If Out of Service, place In Service. Check: Travel Sensor Motion Tuning set Zero Power Condition Feedback Connection Control mode (should be Analog) Restart control mode (should be Analog)
	Restricted pneumatic passages in I/P converter	Check screen in I/P converter supply port of the module base. Replace if necessary. If passages in I/P converter restricted, replace I/P converter.
	O-ring(s) between I/P converter ass'y missing or hard and flattened losing seal	Replace O-ring(s).
	I/P converter ass'y damaged/ corroded/clogged	Check for bent flapper, open coil (continuity), contamination, staining or dirty air supply. Coil resistance should be between 1680 to 1860 ohms. Replace I/P assembly if damaged, corroded, clogged or open coil.
	I/P converter ass'y out of spec	I/P converter ass'y nozzle may have been adjusted. Verify drive signal (55 to 80% for double-acting; 60 to 85% for single-acting) with the valve off the stops. Replace I/P converter assembly if drive signal is continuously high or low.
	Defective module base seal	Check module base seal for condition and position. If necessary, replace seal.

Table 19. Instrument Troubleshooting (continued)

Symptom	Possible Cause	Action
Instrument will not calibrate, has sluggish performance or oscillates	Defective relay	Depress relay beam at adjustment location in shroud, look for increase in output pressure. Remove relay, inspect relay seal. Replace relay seal or relay if I/P converter assembly is good and air passages not blocked. Check relay adjustment.
	Defective 67CFR regulator, supply pressure gauge jumps around	Replace 67CFR regulator.
ValveLink diagnostic tests provide erroneous results	Defective pressure sensor	Replace PWB.
	Pressure sensor O-ring missing.	Replace O-ring.
Device Communicator does not turn on	Battery pack not charged	Charge battery pack. Note: Battery pack can be charged while attached to the Device Communicator or separately. The Device Communicator is fully operable while the battery pack is charging. Do not attempt to charge the battery pack in a hazardous area.

6.8 DVC6200 SIS Technical Support Checklist

Have the following information available prior to contacting your [Emerson sales office](#) for support.

1. Instrument serial number as read from nameplate _____
2. Is the digital valve controller responding to the control signal? Yes _____ No _____
If not, describe _____
3. Measure the voltage across the "Loop -" and Loop +" terminal box screws when the commanded current is 4.0 mA and 20.0 mA: _____ V at 4.0 mA _____ V at 20.0 mA.
(These values should be around 8.6 V at 4.0 mA and 8.8 V at 20 mA).
4. Is it possible to communicate via HART to the digital valve controller?
Yes _____ No _____
5. What is the firmware version of the digital valve controller? _____
6. What is the hardware version of the digital valve controller? _____
7. Is the digital valve controller's Instrument Mode "In Service"? Yes _____ No _____
8. Is the digital valve controller's Control Mode set to "Analog"? Yes _____ No _____
9. What are the following parameter readings?
Input Signal _____ Drive Signal _____ %
Supply Pressure _____ Pressure A _____ Pressure B _____
Travel Target _____ % Travel _____ %
10. What are the following alert readings?
Fail alerts _____
Valve alerts _____
Operational status _____
Alert event record entries _____
11. Export ValveLink data (if available) for the device (Status Monitor, Detailed Setup, etc.).

Mounting

1. Which digital valve controller do you have?
DVC6200 SIS _____ DVC6200 SIS High Cv _____ DVC6205 SIS/DVC6215 _____
2. What Make, Brand, Style, Size, etc. actuator is the DVC6200 SIS mounted on?

3. What is the full travel of the valve? _____
4. What is the Mounting Kit part number? _____
5. If mounting kits are made by Impact Partner/Customer, please provide pictures of installation.
6. Is the Mounting kit installed per the instructions? Yes _____ No _____
7. What is the safe position of the valve? Fail closed _____ Fail open _____

Section 7: Parts

7.1 Parts Ordering

Whenever corresponding with your [Emerson sales office](#) about this equipment, always mention the controller serial number.

WARNING

Use only genuine Fisher replacement parts. Components that are not supplied by Emerson should not, under any circumstances, be used in any Fisher instrument. Use of components not supplied by Emerson may void your warranty, might adversely affect the performance of the instrument and could cause personal injury and property damage.

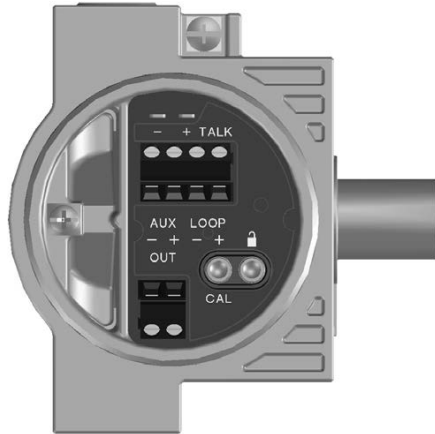
7.2 Parts Kits

NOTE

All DVC6200 SIS parts kits with elastomers include extreme temperature fluorosilicone elastomers.

Kit	Description	Part Number
1*	Elastomer Spare Parts Kit (kit contains parts to service one digital valve controller) DVC6200 SIS and DVC6205 SIS DVC6200 SIS High Cv	19B5402X022 19B5402X082
2*	Small Hardware Spare Parts Kit (kit contains parts to service one digital valve controller) DVC6200 SIS and DVC6205 SIS DVC6200 SIS High Cv	19B5403X032 19B5403X022
3*	Seal Screen Kit [kit contains 25 seal screens (key 231) and 25 O-rings (key 39)]	14B5072X182
4*	Integral Mount Seal Kit (for 667 size 30i to 76i and GX actuators) [kit contains 5 seals (key 288)]	19B5402X032
5*	Terminal Box Kit (see Figure 22) Aluminum with I/O Package with I/O Package, M20 Stainless Steel with I/O Package with I/O Package, M20 Use only with replace in-kind. Terminal boxes are compatible only with PWB Assembly electronics hardware revision 2 (HW2).	19B5401X552 19B5401X582 19B5401X562 19B5401X592
6*	I/P Converter Kit	38B6041X132
*Recommended spare parts		

Figure 22. Terminal Boxes



X0430

Key	Description
50*	<p>PWB Assembly (HW2) (see Figure 23, 26 or 27) for DVC6200 SIS and DVC6205 SIS Hardware Revision 2 (HW2), with I/O Package For instrument level SIS</p> <p>The following PWB Assembly is compatible only with the terminal box shown in Figure 22. Contact your Emerson sales office if a replacement PWB is needed.</p>
*Recommended spare parts	

Kit	Description	Part Number
7*	<p>Spare Module Base Assembly Kit [kit contains module base (key 2); drive screws, qty. 2, (key 11); shield/label (key 19); hex socket cap screw, qty. 3, (key 38); self tapping screw, qty. 2 (key 49); pipe plug, qty. 3 (key 61); retaining ring, qty. 3 (key 154); screen (key 236); and flame arrestors, qty. 3 (key 243)]</p> <p>DVC6200 SIS and DVC6205 SIS Aluminum Stainless Steel DVC6200 SIS High Cv Aluminum</p>	<p>GE18654X012 GE18654X022 19B5409X012</p>
8*	<p>Spare Housing Assembly Kit [kit contains housing (key 1); vent assembly (key 52); seal (only included in Housing A kits) (key 288); seal (key 237); O-ring (key 34); O-ring (only used with integrally mounted regulator) (key 5)]</p> <p>DVC6200 SIS and DVC6205 SIS Aluminum Housing A (used for GX actuator) Housing B (used for all actuators except GX) Stainless Steel Housing B (used for all actuators except GX)</p> <p>DVC6200 SIS High Cv Aluminum HCv1 HCv2 HCv3</p>	<p>GE48798X042 GE48798X082 GE48798X102 19B5408X012 19B5408X022 19B5408X032</p>
9*	<p>Spare I/P Shroud Kit [kit contains shroud (key 169) and hex socket cap screw, qty. 4 (key 23)]</p>	<p>GE29183X012</p>
10*	<p>Remote Mount Feedback Unit Kit (see Figure 30) [remote housing assembly (key 25); hex socket set screw (key 58); 1/2 NPT pipe plug (key 62); wire retainer, qty 2 (key 131); terminal cover (key 255); O-ring (key 256); gasket (Housing A only, used for GX actuator) (key 287); seal (Housing A only, used for GX actuator) (key 288)]</p> <p>The remote mount feedback kit is not orderable by part number due to nameplate/approval requirements. Contact your Emerson sales office for information on ordering this kit.</p>	

Kit	Description	Part Number
11*	<p>Feedback Array Kit Sliding Stem (Linear) [kit contains • feedback array and hex socket cap screws, qty. 2, washer, plain, qty. 2, external tooth lock washer, qty. 2 (only with aluminum feedback array kit). • 210 mm / 8-1/4 in. kit contains feedback array and hex socket cap screws, qty. 4, washer, plain, qty. 4, external tooth lock washer, qty. 4 (only with aluminum feedback array kit) and insert]. Stainless steel kits only for use with stainless steel mounting kits.</p> <p>7 mm / 1/4 in. Aluminum Stainless steel</p> <p>19 mm / 3/4 in. Aluminum Stainless steel</p> <p>25 mm / 1 in. Aluminum Stainless steel</p> <p>38 mm / 1-1/2 in. Aluminum Stainless steel</p> <p>50 mm / 2 in. Aluminum Stainless steel</p> <p>110 mm / 4-1/8 in. Aluminum Stainless steel</p> <p>210 mm / 8-1/4 in. Aluminum Stainless steel</p> <p>Rotary Array Kit with Pointer and Scale [Kit contains feedback assembly, pointer assembly, travel indicator scale and M3 machine pan head screws qty. 2]. Stainless steel kits only for use with stainless steel mounting kits. Aluminum Stainless steel</p> <p>Rotary Array Kit with Coupler [Kit contains feedback assembly, NAMUR coupler, M3 machine pan head screws qty. 2 and cap screw qt. 1] Aluminum Stainless steel</p> <p>Rotary Array Kit with Beacon [Kit contains feedback assembly, beacon visual on/off indicator, indicator cover assembly, M3 machine pan head screws qty. 2 and M6 cap screws qty. 4] Aluminum Stainless steel</p>	<p>GG20240X012 GE65853X082</p> <p>GG20240X022 GE65853X012</p> <p>GG20240X032 GE65853X022</p> <p>GG20240X042 GE65853X03</p> <p>GG20240X052 GE65853X042</p> <p>GG20240X082 GE65853X062</p> <p>GG20243X012 GE65853X072</p> <p>GG10562X012 GG10562X022</p> <p>GE71982X012 GE71982X022</p> <p>GH19538X012 GH19538X022</p>
12	<p>Mounting Shield Kit [kit contains shield, qty. 3 and machine screws, qty. 6]</p>	GG05242X022
13*	<p>Gasket/Seal Kit, for use with GX actuator [kit contains insulating gasket (key 287) and seal (key 288)]</p>	GE45468X012

Kit	Description	Part Number
14*	Spool Valve Replacement Kit for DVC6200 SIS High Cv, Single-Acting only	
	FVMQ Diaphragm HCv1 HCv2 or HCv3	19B5412X012 19B5412X032
	VMQ Diaphragm HCv1 HCv2 or HCv3	19B5412X022 19B5412X042
15*	Exhaust Vent Kit for DVC6200 SIS High Cv HCv1 or HCv2 HCv3	19B5411X012 19B5411X022
16	Alignment Template For linear actuators (except GX) For GX actuators	GE43826X012 GE20586X012
*Recommended spare parts		

7.3 Parts List

NOTE

Contact your Emerson sales office for Part Ordering information.

All DVC6200 SIS parts with elastomers include extreme temperature fluorosilicone elastomers.

Parts with footnote numbers shown are available in parts kits; see footnote information at the bottom of the page.

Housing

See Figure 23, 24, 25, 26, 27 or 28.

Kit	Description
1	Housing ⁽⁸⁾
11	Drive Screw (2 req'd) (DVC6205 SIS only)
20	Shield (DVC6205 SIS only)
52	Vent ⁽²⁾
74	Mounting Bracket (DVC6205 SIS only)
248	Screw, hex head (4 req'd) (DVC6205 SIS only)
249	Screw, hex head (4 req'd) (DVC6205 SIS only)
250	Spacer (4 req'd) (DVC6205 SIS only)
267	Standoff (2 req'd) (DVC6205 SIS only)
271	Screen ⁽⁸⁾ (DVC6200 SIS with pneumatic relay and DVC6205 SIS only)
287	Gasket, Housing A only (used for GX actuator) (DVC6200 SIS with pneumatic relay)
288	Seal (used for 667 size 30i to 76i and GX actuators) (DVC6200 SIS with pneumatic relay)
2. Available in the Small Hardware Spare Parts Kit	
8. Available in the Spare Housing Assembly Kit	

Common Parts

See Figure 23, 24, 25, 26, 27 or 28.

Kit	Description	Part Number
16*	O-ring ⁽¹⁾ (3 req'd)	
29	Warning label, for use only with LCIE hazardous area classifications	
33	Mach Screw, pan head ⁽²⁾ (3 req'd)	
38	Cap Screw, hex socket ⁽²⁾⁽⁷⁾ (3 req'd)	
43*	Cover Assembly (includes cover screws)	GG53748X022
48	Nameplate	
49	Screw, self tapping (2 req'd) ⁽⁷⁾	
61	Pipe Plug, hex socket ⁽⁷⁾ Housing A with relay C (2 req'd) (used for GX actuator) Housing A with relay B (1 req'd) (used for GX actuator) Housing B with relay B and C (1 req'd) (used for all actuators except GX) Not required for relay A Not required for DVC6200 SIS High Cv	
63	Lithium grease (not furnished with the instrument)	
64	Pipe thread sealant, anaerobic (not furnished with the instrument)	
65	Lubricant, silicone sealant (not furnished with the instrument)	
154	Retaining Ring ⁽²⁾ (3 req'd)	
236	Screen (required for relay B and C only) ⁽⁸⁾	
237	Module Base Seal ⁽¹⁾	
*Recommended spare parts 1. Available in the Elastomer Spare Parts Kit 2. Available in the Small Hardware Spare Parts Kit 7. Available in the Spare Module Base Assembly Kit 8. Available in the Spare Housing Assembly Kit		

Module Base

See Figure 23, 24, 25, 26, 27 or 28.

Kit	Description
2	Module Base ⁽⁷⁾
11	Drive Screw ⁽⁷⁾ (2 req'd)
12	O-ring ⁽¹⁾
19	Shield ⁽⁷⁾
61	Pipe Plug, hex socket ⁽⁷⁾ (3 req'd)
243	Slotted Pin (flame arrestor) ⁽⁷⁾ (3 req'd)
1. Available in the Elastomer Spare Parts Kit 7. Available in the Spare Module Base Assembly Kit	

I/P Converter Assembly

See Figure 23, 24, 25, 26, 27 or 28.

Kit	Description
23	Cap Screw, hex socket ⁽²⁾⁽⁹⁾ (4 req'd)
39*	O-ring ⁽¹⁾⁽³⁾⁽⁶⁾
41	I/P Converter ⁽⁶⁾
169	Shroud ⁽⁶⁾⁽⁹⁾ (see Figure 16)
210*	Boot ⁽¹⁾⁽⁶⁾ (2 req'd) (see Figure 16)
231*	Seal Screen ⁽¹⁾⁽³⁾⁽⁶⁾
*Recommended spare parts 1. Available in the Elastomer Spare Parts Kit 2. Available in the Small Hardware Spare Parts Kit 3. Available in the Seal Screen Kit 6. Available in the I/P Converter Kit 9. Available in the Spare Shroud Kit	

Relay

DVC6200 SIS with Pneumatic Relay (Figure 23) and DVC6205 SIS (Figure 27).

Kit	Description	Part Number
24*	Relay Assembly, (includes shroud, relay seal, mounting screws)	
	Low Bleed	
	Single-acting direct (relay C)	38B5786X962
	Double-acting (relay A)	38B5786X882
	Single-acting reverse (relay B)	38B5786X922
*Recommended spare parts		

Spool Valve

DVC6200 SIS High Cv (Figure 23, 24, 25 or 26)

Kit	Description
304	Porting Block
304B	Plug
305	Spool valve assembly
306	Seal retainer assembly
307*	Relay seal
308	O-ring
316	Screw, machine pan head slotted cross recessed (4 req'd)
318	O-ring
*Recommended spare parts	

Loop Connections Terminal Box

See Figure 23, 24, 25, 26 or 28.

Kit	Description
4	Terminal Box Cap
34*	O-ring ⁽¹⁾⁽⁵⁾
36*	O-ring ⁽¹⁾⁽⁵⁾
58	Set Screw, hex socket ⁽²⁾
72	Cap Screw, hex socket ⁽²⁾
164	Terminal Box Assembly
*Recommended spare parts 1. Available in the Elastomer Spare Parts Kit 2. Available in the Small Hardware Spare Parts Kit 5. Available in the Terminal Box Kit	

Feedback Connections Terminal Box

DVC6205 SIS (Figure 28)

Kit	Description
4	Terminal Box Cap
34*	O-ring ⁽¹⁾⁽⁵⁾
36*	O-ring ⁽¹⁾⁽⁵⁾
58	Set Screw, hex socket ⁽²⁾
62	Pipe Plug, hex hd
263*	O-ring
264	Terminal Box Assembly
*Recommended spare parts 1. Available in the Elastomer Spare Parts Kit 2. Available in the Small Hardware Spare Parts Kit 5. Available in the Terminal Box Kit	

Pressure Gauges, Pipe Plugs or Tire Valve Assemblies

See Figure 29.

Kit	Description
47*	Pressure Gauge Double-acting (3 req'd); Single-acting (2 req'd) PSI/MPa Gauge Scale To 60 PSI, 0.4 MPa To 160 PSI, 1.1 MPa PSI/bar Gauge Scale To 60 PSI, 4 bar To 160 PSI, 11 bar PSI/KG/CM2 Gauge Scale To 60 PSI, 4 KG/CM ² To 160 PSI, 11 KG/CM ²
66	Pipe Plug, hex head For units without gauges
67	Tire Valve, used with Tire Valve Option only Double-acting (3 req'd); Single-acting (2 req'd)
*Recommended spare parts	

DVC6215 Feedback Unit

See Figure 30.

Kit	Description
65	Lubricant, silicone sealant (not furnished with the instrument)
256*	O-ring
*Recommended spare parts	

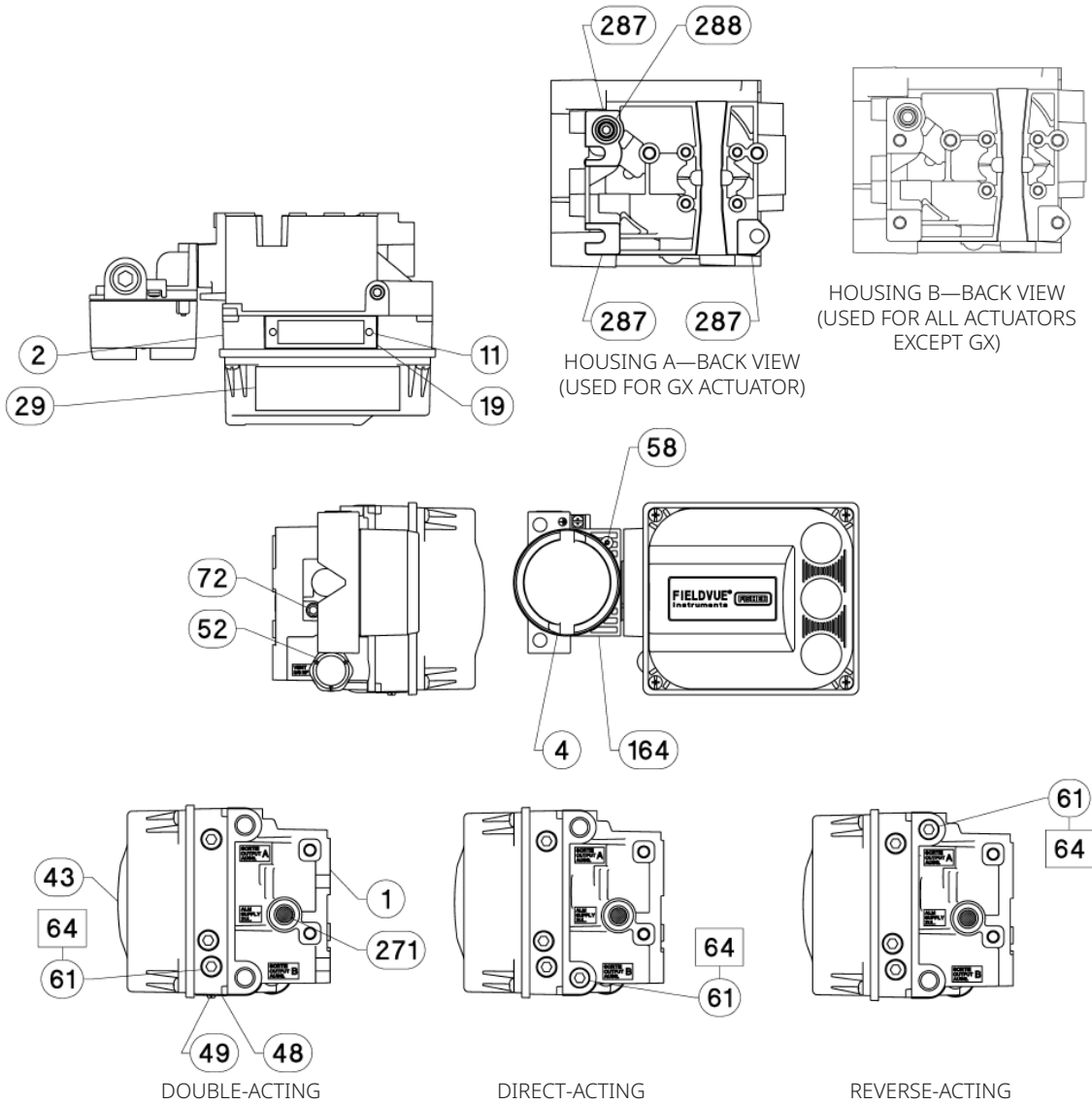
HART Filter

Description
HF340, DIN rail mount

Line Conditioner

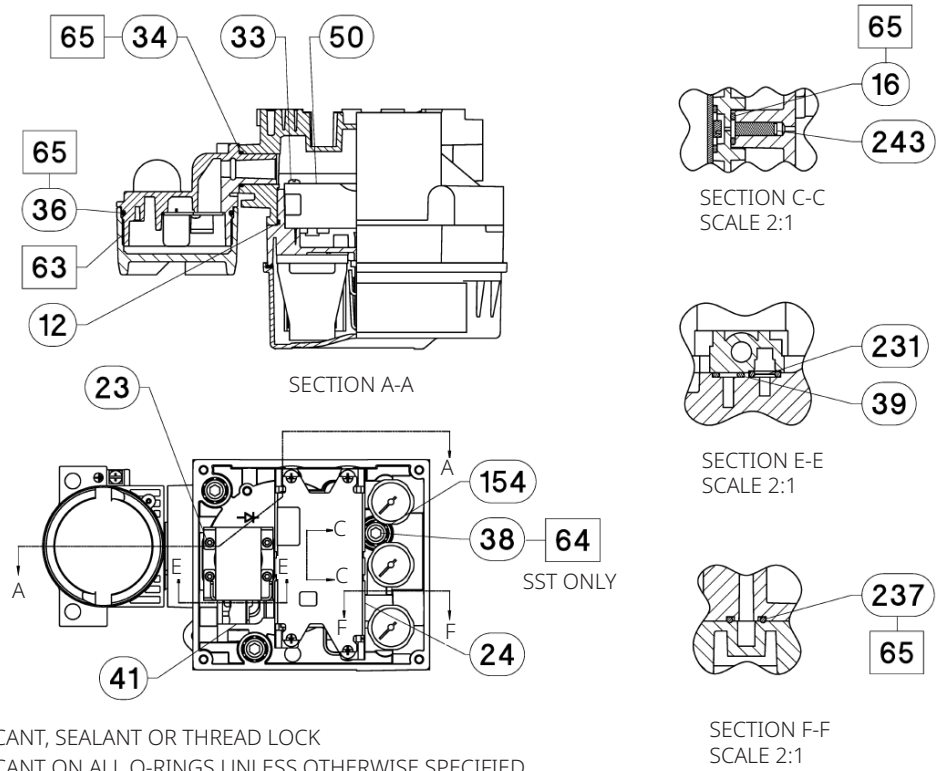
Description
LC340 Line Conditioner

Figure 23. FIELDVUE DVC6200 SIS Digital Valve Controller Housing Assembly



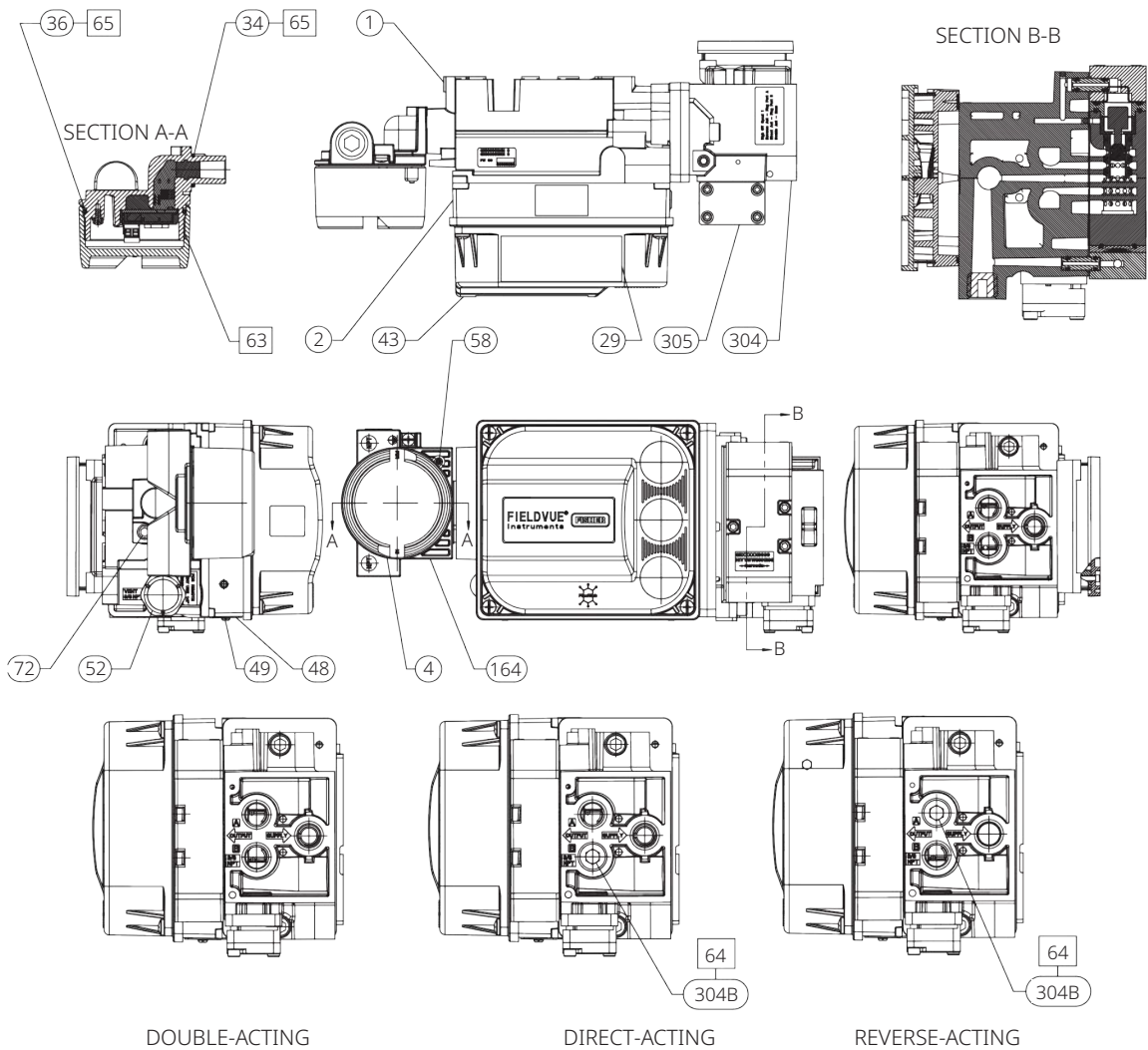
- APPLY LUBRICANT, SEALANT OR THREAD LOCK
- 65 APPLY LUBRICANT ON ALL O-RINGS UNLESS OTHERWISE SPECIFIED

Figure 23. FIELDVUE DVC6200 SIS Digital Valve Controller Housing Assembly (continued)



GE40185 sheet 2 of 3

Figure 24. FIELDVUE DVC6200 SIS High Cv, HCv1 Housing Assembly

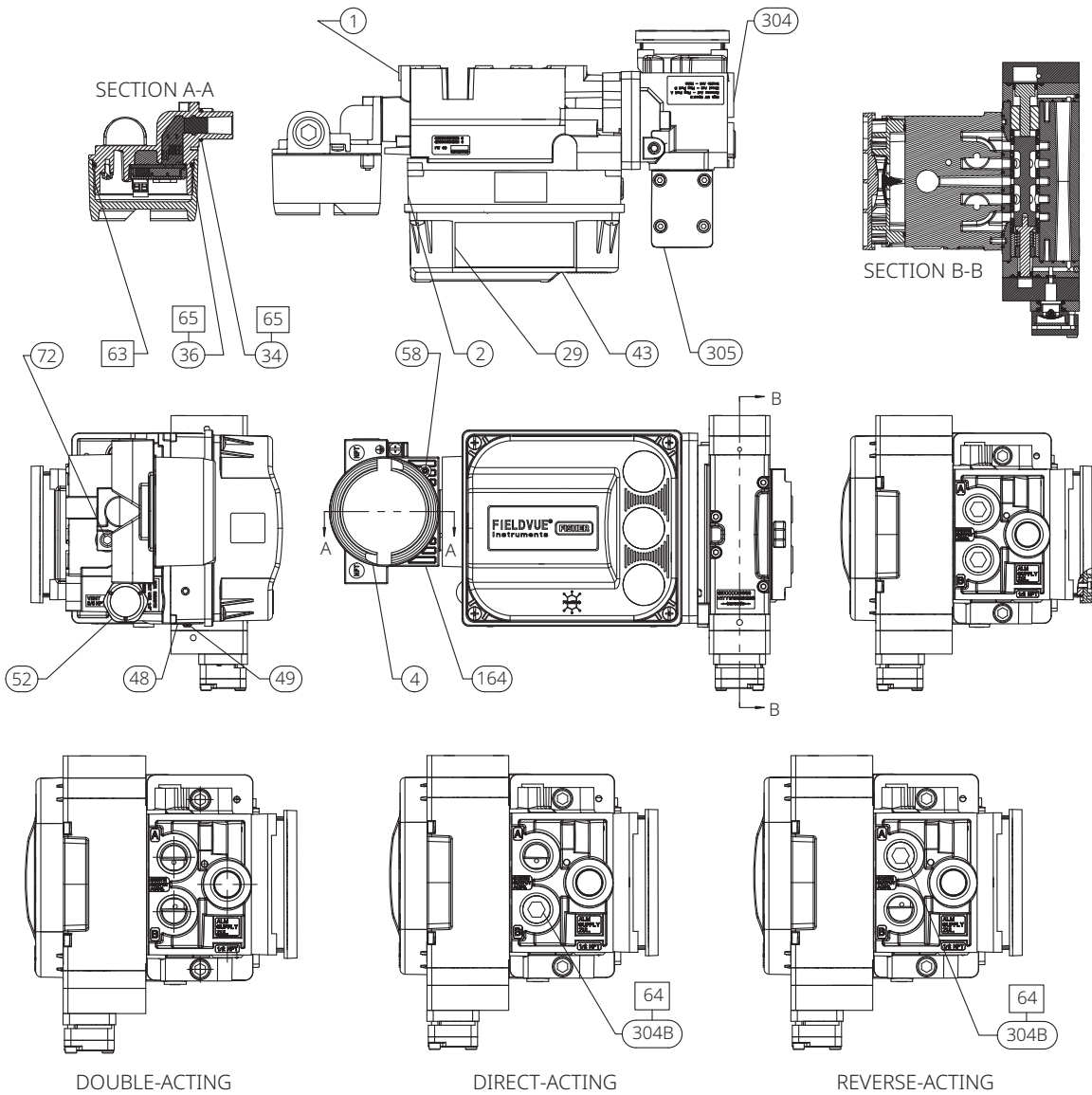


GE55008

APPLY LUBRICANT, SEALANT OR THREAD LOCK

APPLY LUBRICANT ON ALL O-RINGS UNLESS OTHERWISE SPECIFIED

Figure 25. FIELDVUE DVC6200 SIS High Cv, HCv2 Housing Assembly

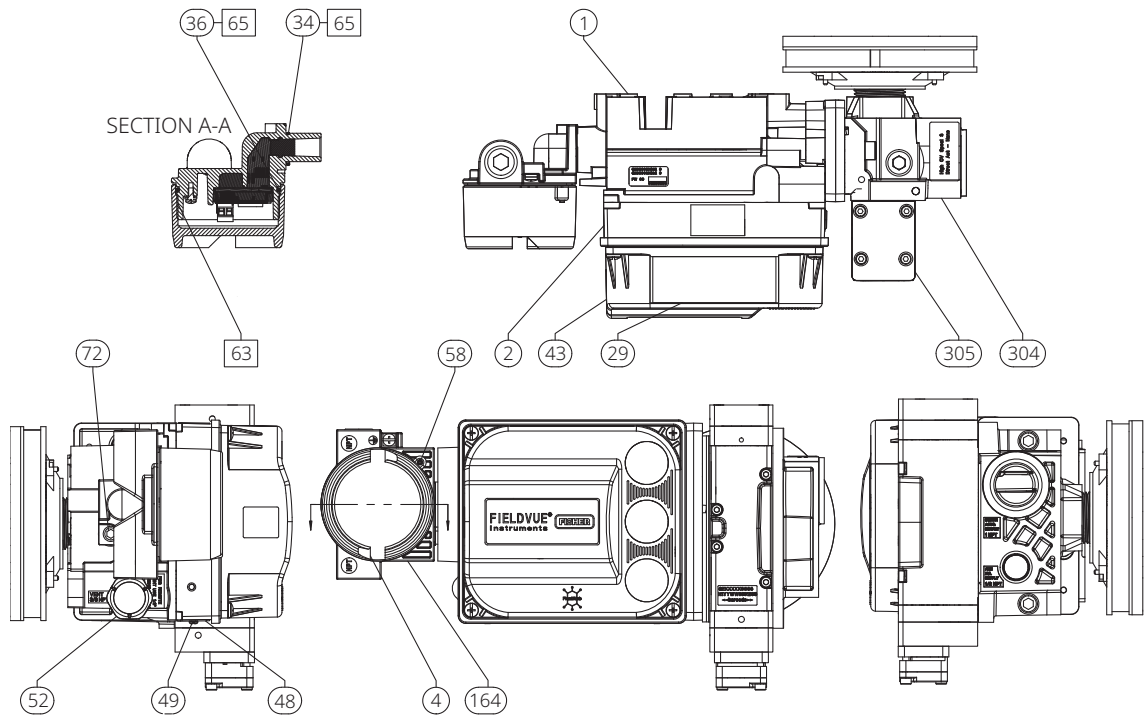


GE51419

□ APPLY LUBRICANT, SEALANT OR THREAD LOCK

65 APPLY LUBRICANT ON ALL O-RINGS UNLESS OTHERWISE SPECIFIED

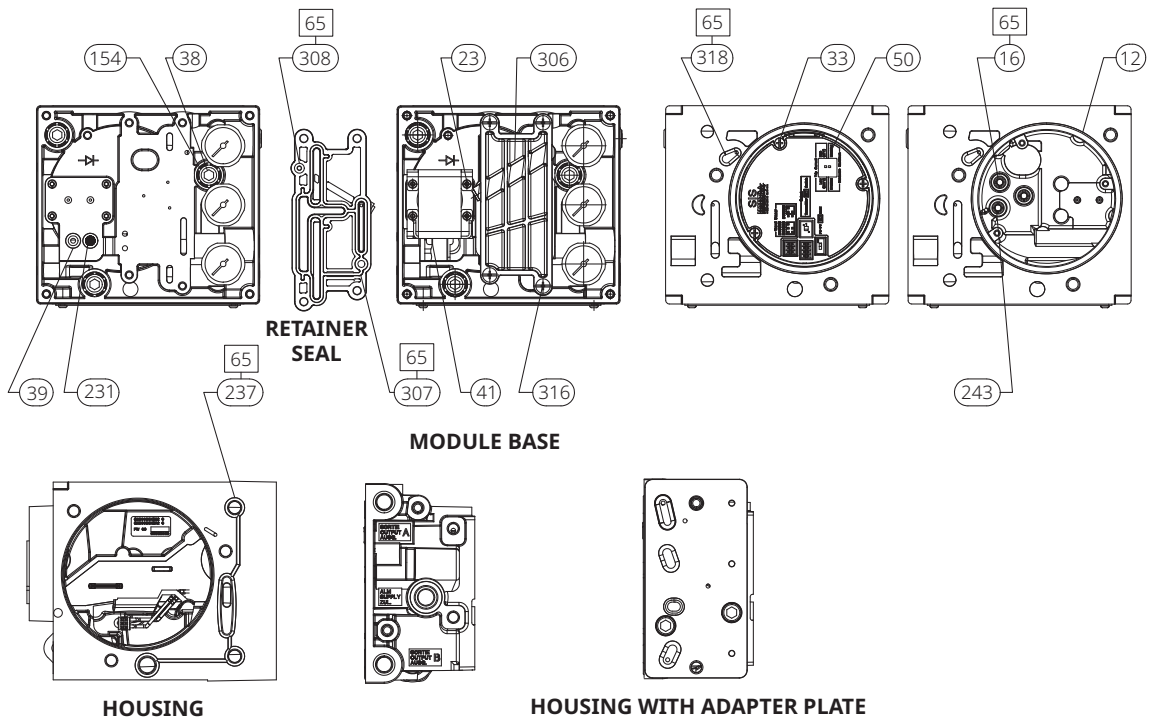
Figure 26. FIELDVUE DVC6200 SIS High Cv, HCv3 Housing Assembly



GE52726

- APPLY LUBRICANT, SEALANT OR THREAD LOCK
- 65 APPLY LUBRICANT ON ALL O-RINGS UNLESS OTHERWISE SPECIFIED

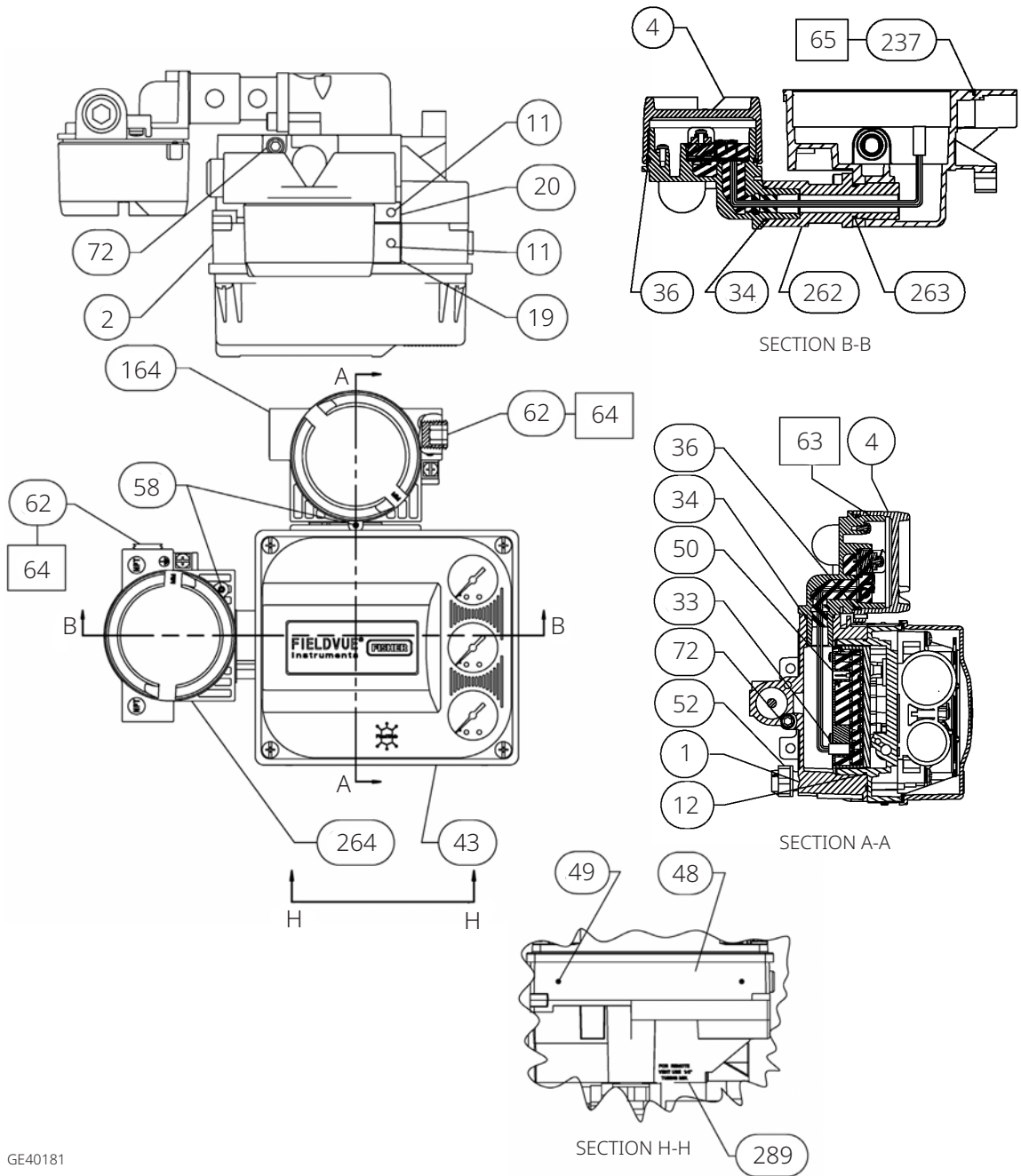
Figure 27. FIELDVUE DVC6200 SIS High Cv Module Base and Housing



GE55008

- APPLY LUBRICANT, SEALANT OR THREAD LOCK
- 65 APPLY LUBRICANT ON ALL O-RINGS UNLESS OTHERWISE SPECIFIED

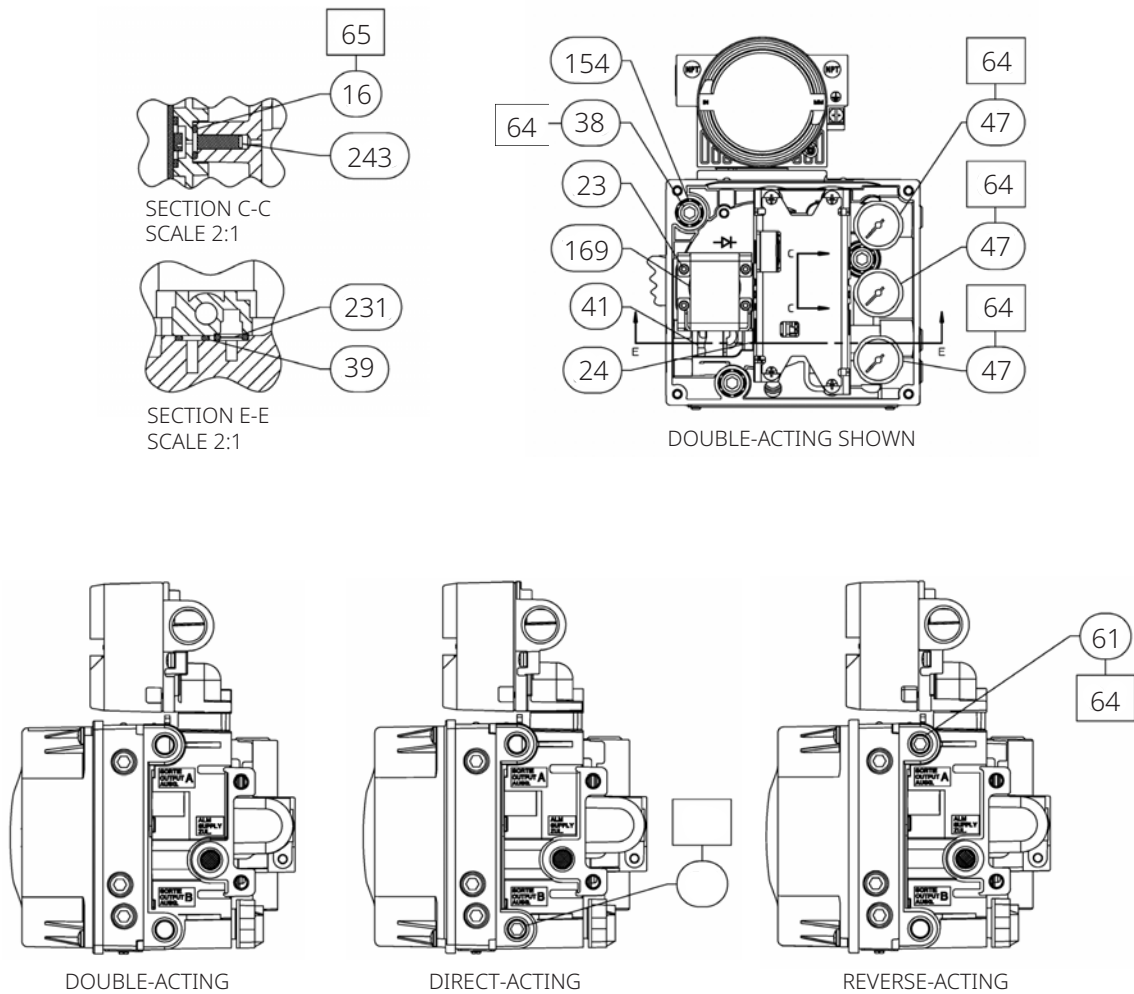
Figure 28. FIELDVUE DVC6205 SIS Base Unit Housing Assembly



GE40181

- APPLY LUBRICANT, SEALANT OR THREAD LOCK
- 65 APPLY LUBRICANT ON ALL O-RINGS UNLESS OTHERWISE SPECIFIED

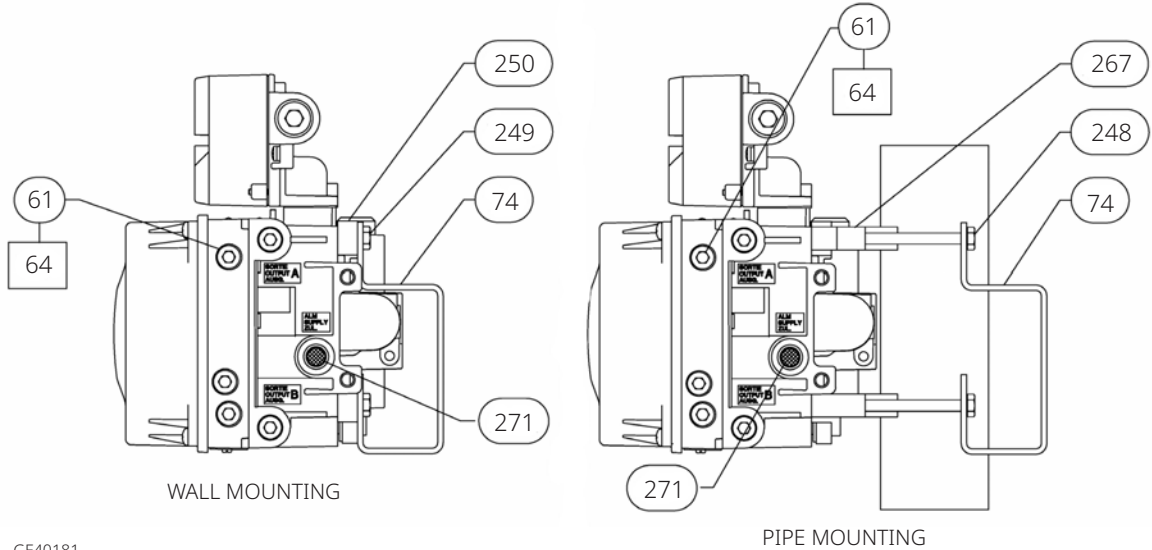
Figure 28. FIELDVUE DVC6205 SIS Base Unit Housing Assembly (continued)



GE40181

- APPLY LUBRICANT, SEALANT OR THREAD LOCK
- 65 APPLY LUBRICANT ON ALL O-RINGS UNLESS OTHERWISE SPECIFIED

Figure 28. FIELDVUE DVC6205 SIS Base Unit Housing Assembly (continued)



GE40181

□ APPLY LUBRICANT, SEALANT OR THREAD LOCK

65 □ APPLY LUBRICANT ON ALL O-RINGS UNLESS OTHERWISE SPECIFIED

Figure 29. Gauge Configuration

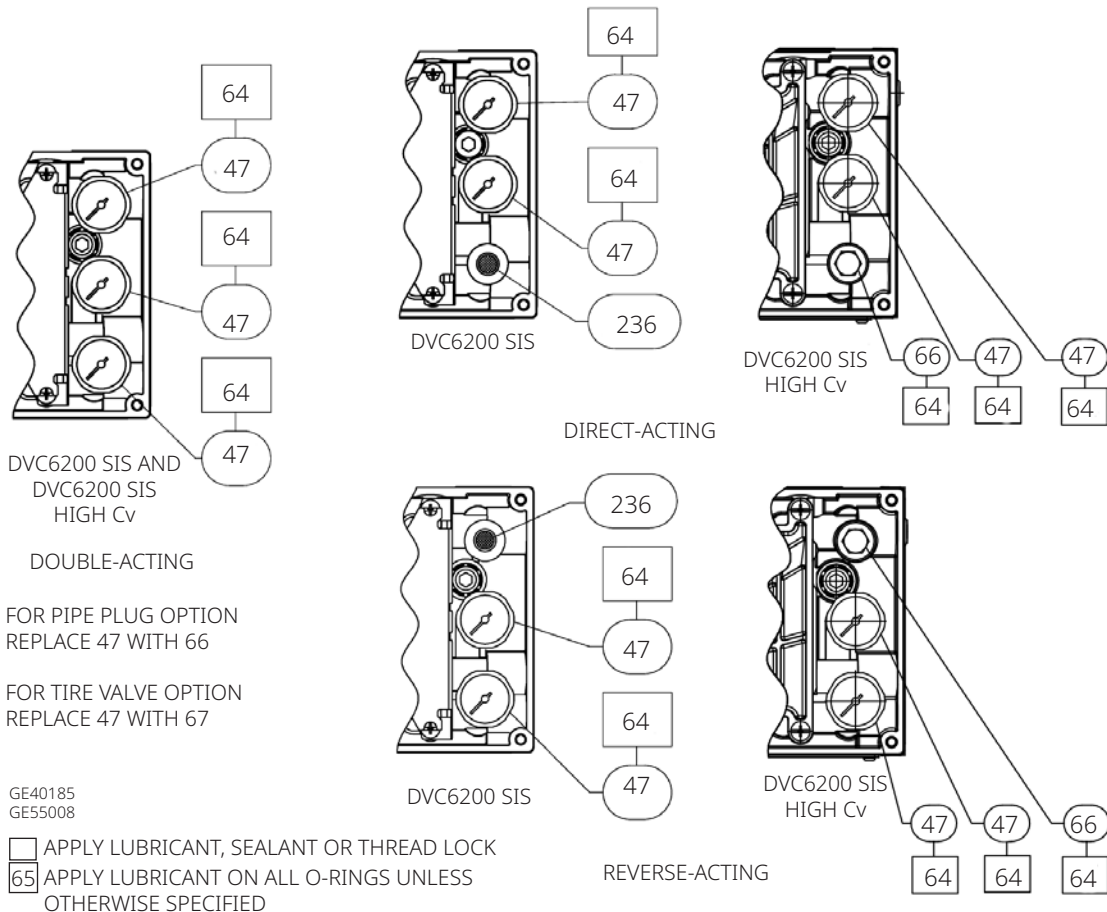
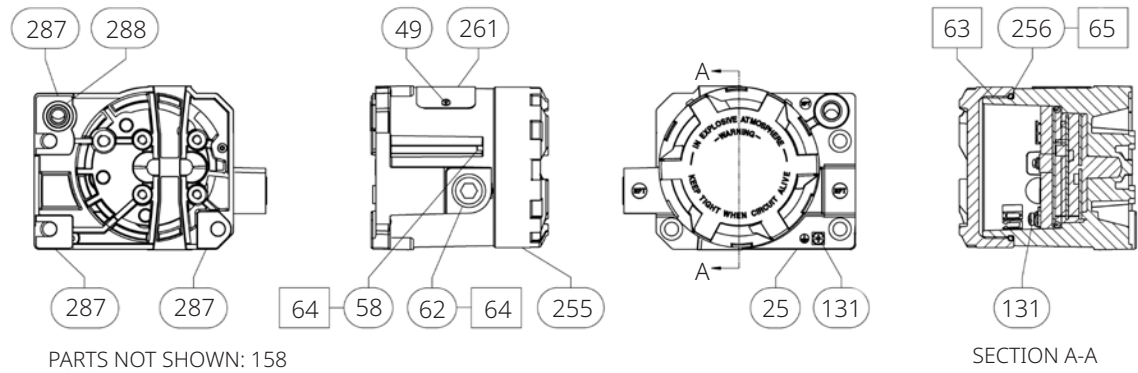


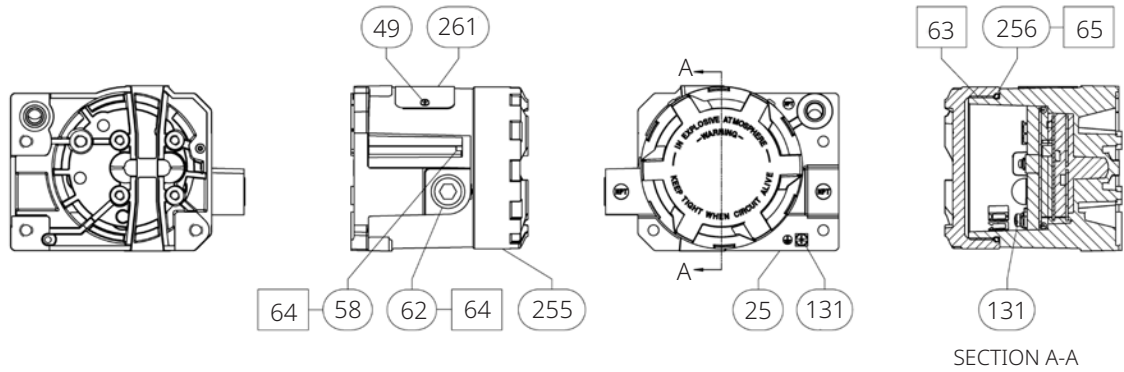
Figure 30. FIELDVUE DVC6215 Remote Feedback Assembly



GE46670-B

□ APPLY LUBRICANT/SEALANT

HOUSING A
(USED FOR GX ACTUATOR)



PARTS NOT SHOWN: 158

□ APPLY LUBRICANT/SEALANT

GE40178-B

HOUSING B
(USED FOR ALL ACTUATORS EXCEPT GX)

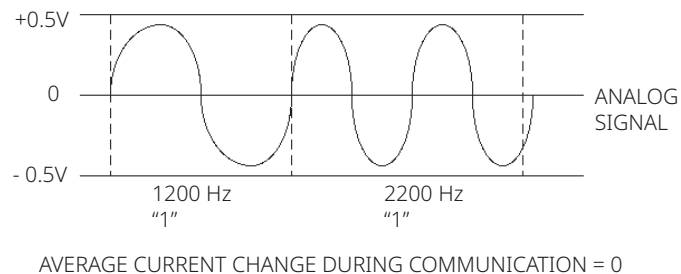
Appendix A: Principle of Operation

A.1 HART Communication

The HART (Highway Addressable Remote Transducer) protocol gives field devices the capability of communicating instrument and process data digitally. This digital communication occurs over the same two-wire loop that provides the 4 to 20 mA process control signal, without disrupting the process signal. In this way, the analog process signal, with its faster update rate, can be used for control. At the same time, the HART protocol allows access to digital diagnostic, maintenance and additional process data. The protocol provides total system integration via a host device.

The HART protocol uses frequency shift keying (FSK). Two individual frequencies of 1200 and 2200 Hz are superimposed over the 4 to 20 mA current signal. These frequencies represent the digits 1 and 0 (see Figure A-1). By superimposing a frequency signal over the 4 to 20 mA current, digital communication is attained. The average value of the HART signal is zero, therefore no DC value is added to the 4 to 20 mA signal. Thus, true simultaneous communication is achieved without interrupting the process signal.

Figure A-1. HART Frequency Shift Keying Technique

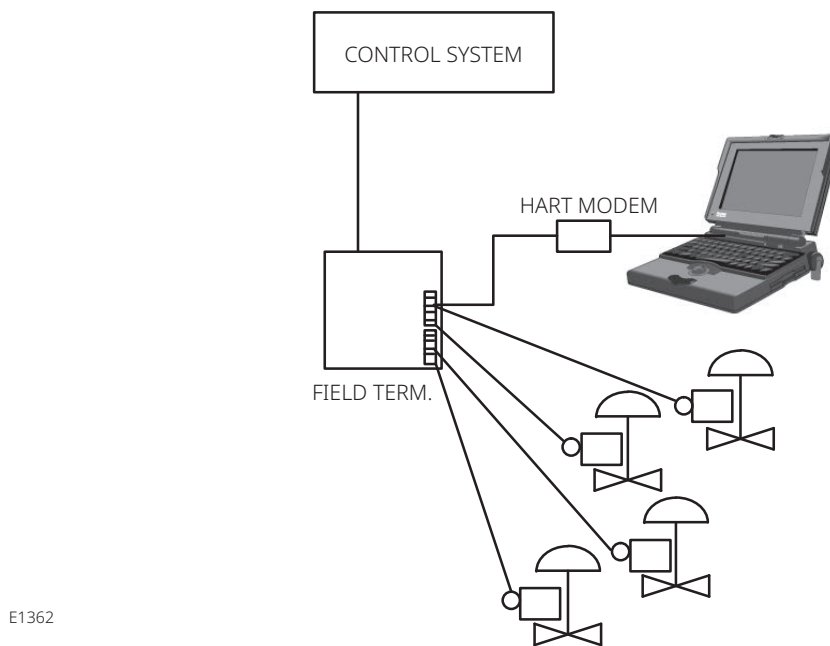


A6174

The HART protocol allows the capability of multidropping, i.e., networking several devices to a single communications line. This process is well suited for monitoring remote applications such as pipelines, custody transfer sites and tank farms. See Table 18 for instructions on changing the printed wiring board DIP switch configuration to multidrop.

A.2 DVC6200 SIS Digital Valve Controller

The DVC6200 SIS digital valve controller housing contains the travel sensor, terminal box, pneumatic input and output connections and a module base that may be easily replaced in the field without disconnecting field wiring or tubing. The module base contains the following submodules: I/P converter, printed wiring board (pwb) assembly and pneumatic relay. The relay position is detected by sensing the magnet on the relay beam via a detector on the printed wiring board. This sensor is used for the minor loop feedback (MLFB) reading. The module base can be rebuilt by replacing the submodules. See Figures A-3, A-4, A-5 and A-6. Refer to Figures A-7 and A-8 for DVC6200 SIS High Cv.

Figure A-2. HART Frequency Shift Keying Technique

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DVC6200 SIS digital valve controllers are loop-powered instruments that provide a control valve position proportional to an input signal from the control room. The following describes a double-acting digital valve controller mounted on a piston actuator.

The input signal is routed into the terminal box through a single twisted pair of wires and then to the printed wiring board assembly submodule where it is read by the microprocessor, processed by a digital algorithm and converted into an analog I/P drive signal.

As the input signal increases, the drive signal to the I/P converter increases, increasing the I/P output pressure. The I/P output pressure is routed to the pneumatic relay submodule. The relay is also connected to supply pressure and amplifies the small pneumatic signal from the I/P converter. The relay accepts the amplified pneumatic signal and provides two output pressures. With increasing input (4 to 20 mA signal), the output A pressure always increases and the output B pressure decreases. The output A pressure is used for double-acting and single-acting direct applications. The output B pressure is used for double-acting and single-acting reverse applications. As shown in Figures A-3, A-4, A-5 and A-7 the increased output A pressure causes the actuator stem to move downward. Stem position is sensed by the non-contact travel feedback sensor. The stem continues to move downward until the correct stem position is attained. At this point the printed wiring board assembly stabilizes the I/P drive signal. This positions the flapper to prevent any further increase in nozzle pressure.

As the input signal decreases, the drive signal to the I/P converter submodule decreases, decreasing the I/P output pressure. The pneumatic relay decreases the output A pressure and increases the output B pressure. The stem moves upward until the correct position is attained. At this point the printed wiring board assembly stabilizes the I/P drive signal. This positions the flapper to prevent any further decrease in nozzle pressure.

Figure A-3. FIELDVUE DVC6200 SIS Digital Valve Controller Block Diagram

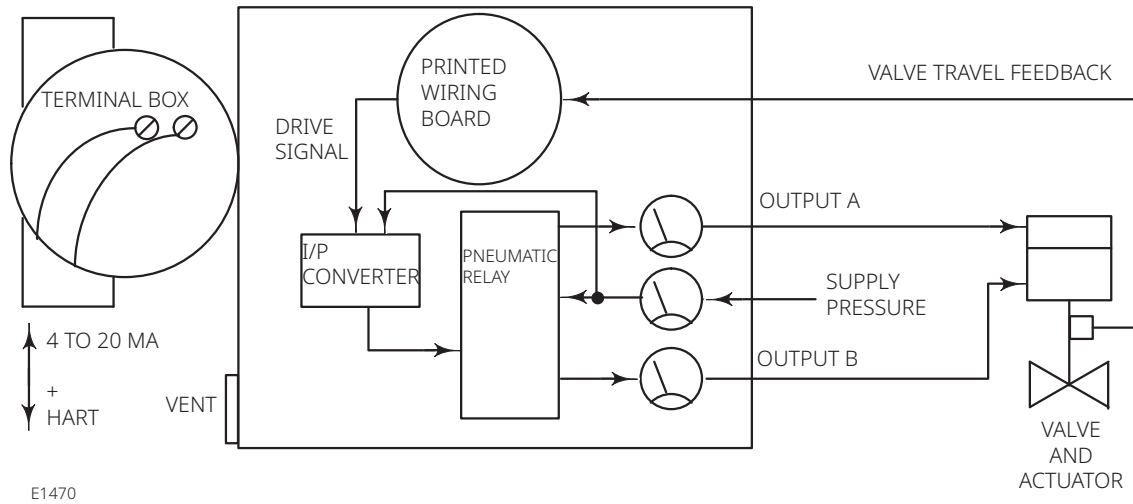


Figure A-4. FIELDVUE DVC6200 SIS Digital Valve Controller with Position Transmitter Block Diagram

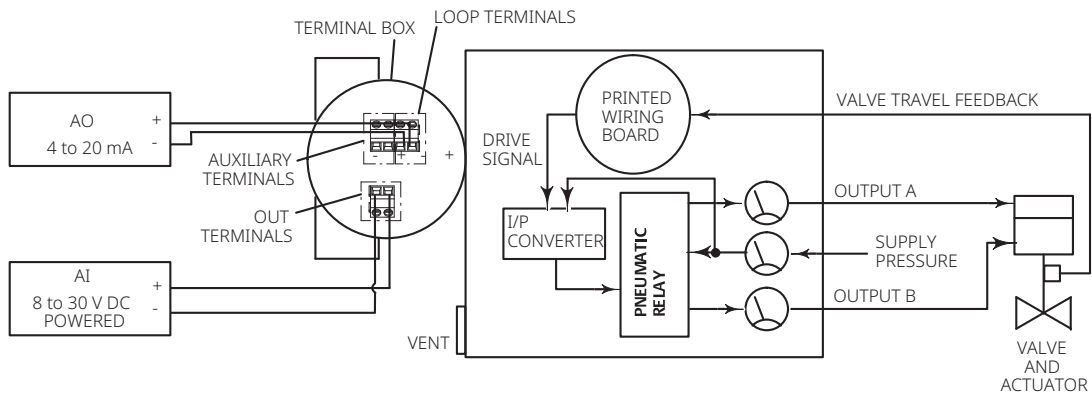


Figure A-5. FIELDVUE DVC6200 SIS Digital Valve Controller with Discrete Switch Block Diagram

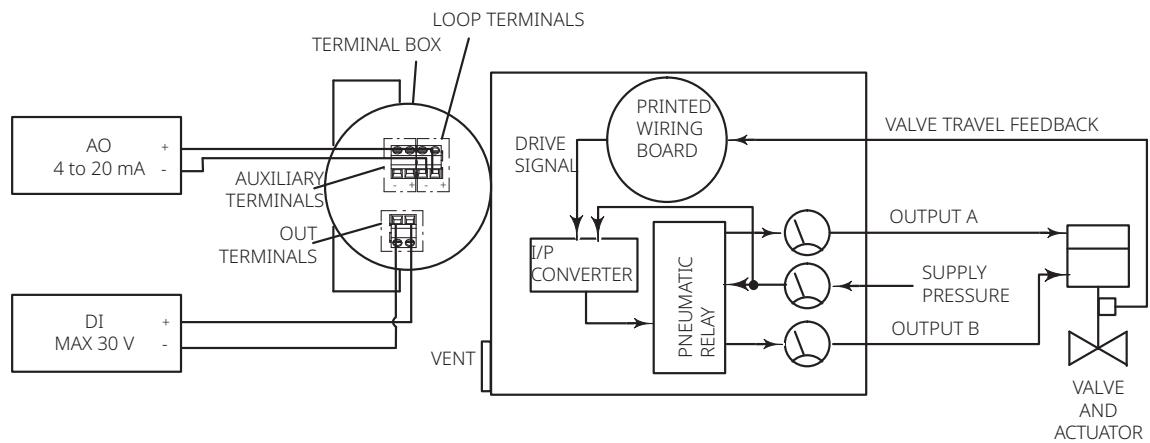


Figure A-6. FIELDVUE DVC6200 SIS Digital Valve Controller Assembly

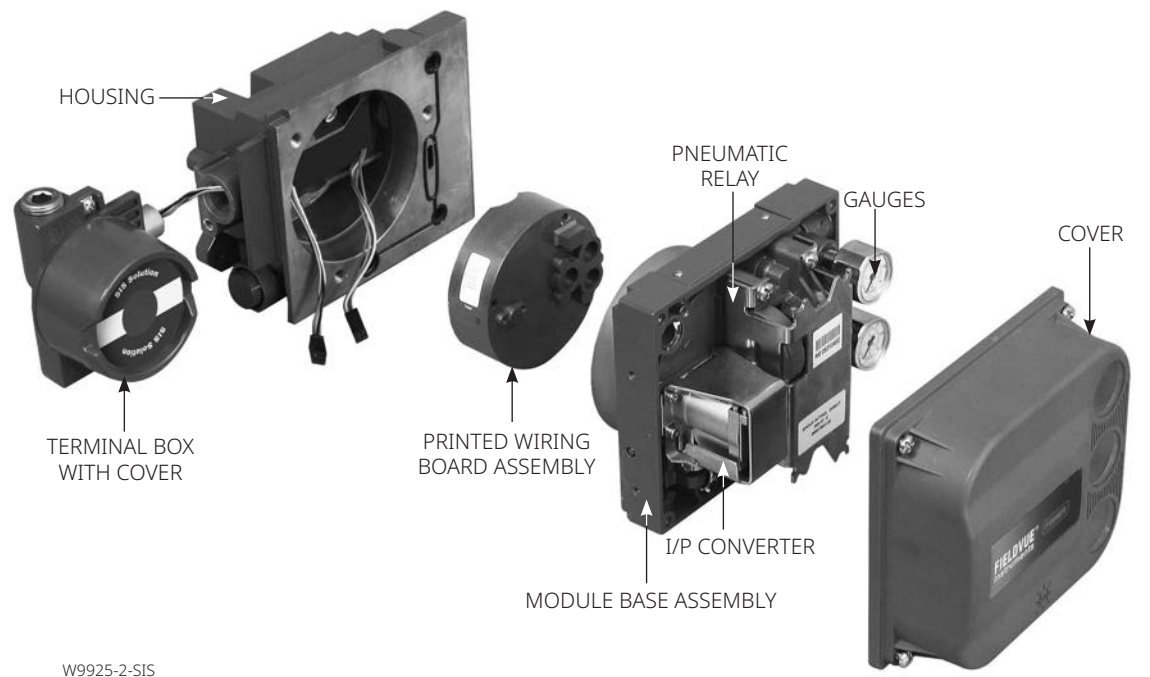


Figure A-7. FIELDVUE DVC6200 SIS High Cv Digital Valve Controller Block Diagram

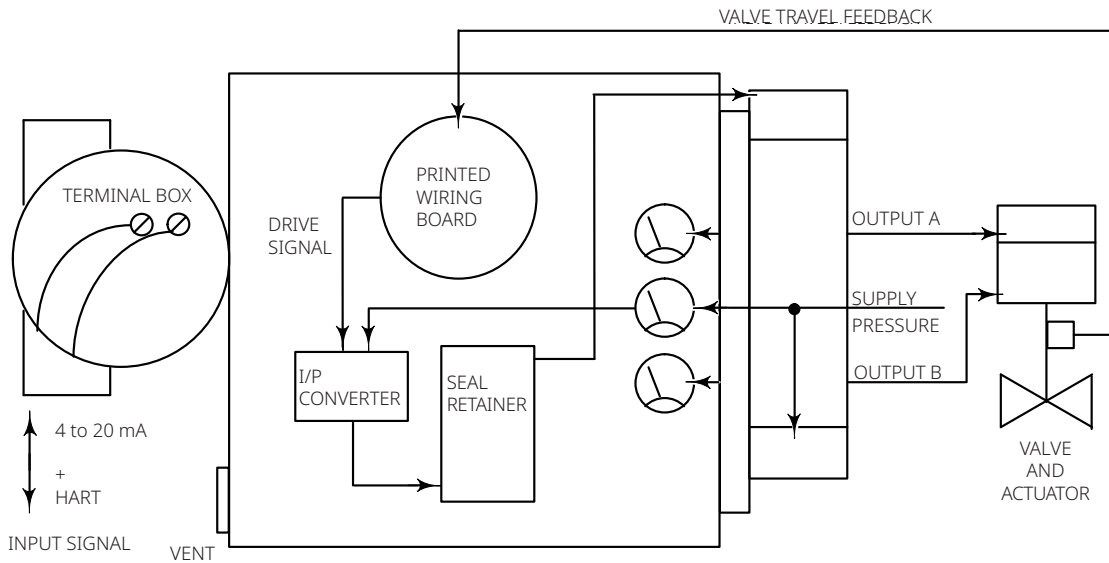
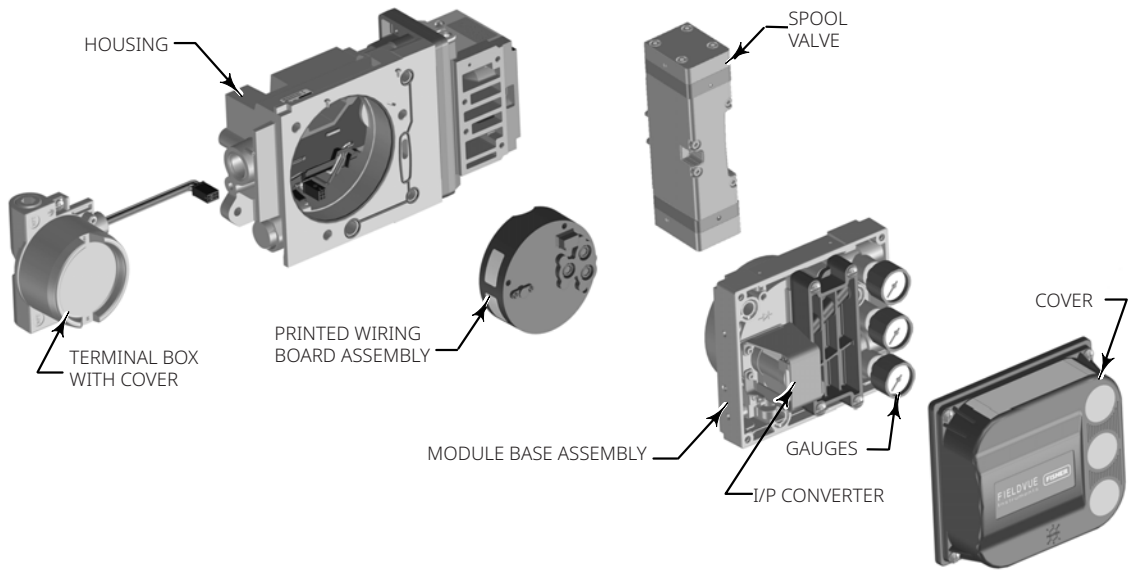


Figure A-8. FIELDVUE DVC6200 SIS Digital Valve Controller with Position Transmitter Block Diagram



Appendix B: Device Communicator Menu Trees

This section contains the Device Communicator menu trees.

Figure B-1. Hot Key

Favorites Hot Key

- Instrument Mode
- Change Instrument Mode
- Write Protection
- Change Write Protection

Figure B-2. Online

HART Application

- Offline

- Online

- Overview**

- Configure**

- Service Tools**

- Utility

- HART Diagnostics

Figure B-3. Overview

Overview

- Device Status
- Analog Input
- Setpoint
- Travel
- Drive Signal
- Pressure Variables
 - Supply Pressure**
 - Pressure A**
 - Pressure B**
 - Pressure A-B**

Device Information

Identification

- HART Tag
- HART Long Tag⁽¹⁾
- Manufacturer
- Model
- Instrument Level
- Device ID and Serial Numbers
 - Device ID
 - Valve Serial Number
 - Instrument Serial Number
 - PWB Serial Number
- Message
- Description

Revisions

- HART Universal Revision
- Device Revision
- Hardware Revision
- Firmware Revision
- DD Information

Security

- Write Protection
- Change Write Protection

NOTE:

1. HART 7 ONLY.

Figure B-4. Guided Setup

Configure

- Guided Setup
 - Device Setup**
 - Auto Calibration**
- Manual Setup
- Alert Setup
- Calibration

Figure B-5. Manual Setup

Configure

Guided Setup

Manual Setup

Mode and Protection

- Instrument Mode
- Change Instrument Mode
- Write Protection
- Change Write Protection

Instrument

- Identification
 - HART Tag
 - HART Long Tag⁽¹⁾
 - Description
 - Message
 - Polling Address (0-63)
- Serial Numbers
 - Instrument Serial Number
 - Valve Serial Number
- Units
 - Pressure Units
 - Temperature Units
 - Analog Input Units
- Terminal Box
 - Calibration Button
 - Auxiliary Terminal Action
 - Edit Auxiliary Terminal Action
- Spec Sheet
 - Units
 - Travel Units
 - Length Units
 - Area Units
 - Spring Rate Units
 - Torque Units

- Valve
 - Valve Manufacturer
 - Valve Model
 - Valve Serial Number
 - Valve Style
 - Valve Style
 - Valve Size
 - Valve Class
 - Stem Diameter
 - Packing Type
 - Valve Travel
 - Rated Travel
 - Actual Travel
 - Inlet/Outlet Pressures
 - Inlet Pressure
 - Outlet Pressure
 - Torque⁽²⁾
 - Dynamic Torque
 - Breakout Torque
 - Trim
 - Seat Type
 - Leak Class
 - Port Diameter
 - Port Type
 - Flow Direction
 - Push Down To
 - Flow Tends To
 - Unbalanced Area
 - Actuator
 - Actuator Manufacturer
 - Actuator Model
 - Actuator Size
 - Actuator Selection
 - Travel
 - Lever Style⁽²⁾
 - Effective Area
 - Spring Rate
 - Air
 - Accessories
 - Volume Booster
 - Solenoid Valve
 - Position Transmitter
 - Limit Switch Valve Open
 - Limit Switch Valve Close

Edit Instrument Time

NOTES:

1. HART 7 ONLY.
2. AVAILABLE WHEN VALVE IS ROTARY.

Travel/Pressure Control

Tuning

Valve and Actuator

SIS/Partial Stroke

Solenoid Valve Test

Local Control Panel

Outputs

(continued on next page)

Figure B-5. Manual Setup (continued)

Manual Setup

Mode and Protection

Instrument

Travel/Pressure Control

End Point Pressure Control (EPPC)

- EPPC Enab
- Change EPPC Enable
- EPPC Set Point
- EPPC Saturation Time

Characterization

- Input Characterization
- Custom Characterization

Dynamic Response

- SP Rate Open⁽¹⁾
- SP Rate Close⁽¹⁾
- View/Edit Lag Time

Travel Cutoffs⁽²⁾

- Hi Cutoff Select
- Hi Cutoff Point
- Hi Soft Cutoff Rate
- Lo Cutoff Select
- Lo Cutoff Point
- Lo Soft Cutoff Rate

Tuning

Travel Tuning

- Travel Tuning Set
- Proportional Gain
- Velocity Gain
- MLFB Gain
- Integral Enable
- Integral Gain
- Stabilize/Optimize

Integral Settings

- Integral Dead Zone
- Integrator Limit

EPPC Tuning

- Pressure Tuning Set
- Proportional Gain
- MLFB Gain
- Integral Enable
- Integral Gain

Valve and Actuator

SIS / Partial Stroke

Solenoid Valve Test

Local Control Panel

Outputs

(continued on next page)

NOTES:

1. SP RATE OPEN AND SP RATE CLOSE ARE NOT VISIBLE WHEN SHUTDOWN SWITCHS ARE ENABLED.
2. THE TRAVEL CUTOFFS MENU IS NOT VISIBLE WHEN SHUTDOWN SWITCHS ARE ENABLED.

Figure B-5. Manual Setup (continued)

Manual Setup

Mode and Protection

Instrument

Travel/Pressure Control

Tuning

Valve and Actuator

Valve Style

Actuator Style

Feedback Connection

Relay Type

Zero Power Condition

Travel Sensor Motion

Max Supply Pressure

SIS/Partial Stroke⁽¹⁾

Test Configuration

PST Enable

PST Start Point

PST Variables

Return Lead

Short Duration PST

Max Allowable Travel Movement

Min Required Travel Movement

Test Acceptance Criteria

Outgoing Pressure Threshold

Incoming Pressure Threshold

High Friction Breakout Press

Low Friction Breakout Press

Breakout Timeout

SIS Options

Auto Partial Stroke Test Interval

Start PST on Loop Current Trigger

Latch on Position Trip

Position Trip Point

Action on Failed Test

PST Alert Behavior

PST Abnormal Criteria

PST Abort Criteria

PST Result Criticality

PST Deferral Behavior

Demand Stroke Time

Last PST results

Solenoid Valve Test⁽¹⁾

Pulse Duration

Monitoring Time

SOV Test Before PST

On Abnormal SOV Test

Independent SOV Test

Local Control Panel

LCP Model

Change Reset Mode

Alert Mapping to F...

Outputs

Output Terminal Config

Output Terminal Enable

Function

Fail Signal

Limit Switch Configuration

Limit Switch Trip Point

Switch Closed

Alert Switch Configuration

Alert Switch Source

HART Var Assignments

Primary Variable (PV)

Secondary Variable (SV)

Tertiary Variable (TV)

Quaternary Variable (QV)

Transmitter Output

Burst Mode

Burst Enable

View/Edit Burst Messages⁽²⁾

NOTES:

1. HART 7 ONLY.

2. LABEL IS 'BURST COMMAND' FOR HART 5.

Figure B-6. Alert Setup

Configure

Guided Setup

Manual Setup

Alert Setup

Electronics

Electronic Alerts Enable

Drive Signal

Shutdown Activated

Output Circuit Error⁽¹⁾

Electronic Alerts NE107⁽²⁾

Drive Current Failure

Drive Signal

Critical NVM Failure

Non-Critical NVM Failure

Flash Integrity Failure

Reference Voltage Failure

Shutdown Activated

Output Circuit Error⁽¹⁾

Loop Current Validation

Electronic Alerts Shutdown

Drive Current Failure Shutdown

Critical NVM Failure Shutdown

Non-Critical NVM Failure Shutdown

Flash Integrity Failure Shutdown

Reference Voltage Failure Shutdown

Loop Current Validation Shutdown

Pressure

Pressure Alerts Enable

Supply Pressure Hi

Supply Pressure Lo

Pressure Deviation

Port A Overpressurized

Pressure Alert NE107⁽²⁾

Supply Pressure Hi

Supply Pressure Lo

Pressure Deviation

Port A Overpressurized

Supply Pressure

Supply Pressure Hi Alert Point

Supply Pressure Lo Alert Point

Pressure Deviation Alert Point

Pressure Deviation Time

Port A Pressure Limit

Output Pressure Limit Enable

Travel

Travel Alerts Enable

Tvl Deviation

Tvl Hi Hi

Tvl Lo Lo

Tvl Hi

Tvl Lo

Tvl Cutoff Hi

Tvl Cutoff Lo

Travel Alerts NE107⁽²⁾

Travel Deviation

Travel Hi Hi

Travel Lo Lo

Travel Hi

Travel Lo

Travel Cutoff Hi

Travel Cutoff Lo

Travel

Setpoint

Travel Alert DB

Travel Deviation

Travel Deviation

Travel Deviation Alert Point

Travel Deviation Time

Travel Limit

Travel Hi Hi Alert Point

Travel Lo Lo Alert Point

Travel Hi Alert Point

Travel Lo Alert Point

Travel Cutoff

Hi Cutoff Point

Lo Cutoff Point

Travel History

SIS / Partial Stroke

Sensors

Alert Record/Status

(continued on next page)

NOTES:

1. OUTPUT CIRCUIT ERROR IS AVAILABLE WHEN THE TRANSMITTER FUNCTION IS CONFIGURED.

2. NE107 ALERTS ARE AVAILABLE FOR HART 7.

Figure B-6. Alert Setup (continued)

Alert Setup

Electronics

Pressure

Travel

Travel History

Travel History Alerts Enable

 Cycle Count Hi

 Tvl Accum Hi

 SIS Stroke Time

Travel History Alerts NE107

 Cycle Count High

 Travel Accumulator High

 SIS Stroke Time

Cycle Count/Travel Accum Deadband

Cycle Counter

 Cycle Count

 Edit Cycle Counts

 Cycle Count High Alert Point

Travel Accumulator

 Travel Accumulator

 Edit Travel Accumulator

 Travel Accumulator Alert Point

SIS Stroke Alerts

 SIS Stroke Alerts Enable

 Demand Breakout Time

 Demand Breakout Time Alert Pt

 Demand Stroke Time

 Demand Stroke Time Alert Pt

 Reset Stroke Time

 Reset Stroke Time Alert Pt

SIS/Partial Stroke

SIS/Partial Stroke Alerts Enable

 PST Abnormal

 PST Pass

 PST Prohibited

 Tripped by LCP

 Manual Reset Required

SIS/Partial Stroke Alerts NE107⁽²⁾

 PST Abnormal

 PST Pass

 PST Prohibited

 Program Flow Failure

 SIS Hardware Failure

 Tripped by LCP

 Manual Reset Required

SIS/Partial Stroke Alerts Shutdown

 Program Flow Failure Shutdown

 SIS Hardware Failure Shutdown

PST Prohibited Alerts Enable

 PST Prohibited Electronic Alerts

 Critical NVM Failure

 Drive Current Failure

 Reference Voltage Failure

 Minor Loop Sensor Failure

 Flash Integrity Failure

 Travel Sensor Failure

 Pressure Sensor Failure

 Temp Sensor Failure

 Pressure Fallback Active

 Supply Pressure Lo

 Travel Deviation

Tripped by LCP Alert Latch

Solenoid Valve Test⁽¹⁾

SOV Test Alerts Enable

 Trip Pressure

 Reset Pressure

Min Required Press Drop Alert Pt

Max Allowable Press Drop Alert Pt

Local Control Panel

Local Control Panel Alerts Enable

 LCP Button Stuck

 LCP Communication Failure

Local Control Panel Alerts NE107⁽²⁾

 LCP Button Stuck

 LCP Communication Failure

Sensors

Sensor Alerts NE107⁽²⁾

 Travel Sensor Failure

 Pressure Sensor Failure

 Temp Sensor Failure

 Minor Loop Sensor Failure

Sensor Alerts Shutdown

 Travel Sensor Failure Shutdown

 Pressure Sensor Failure Shutdown

 Temp Sensor Failure Shutdown

 Minor Loop Sensor Failure Shutdown

Alert Record/Status

Alert Record/Status Alerts Enable

 Alert Record Not Empty

 Alert Record Full

 Instrument Time is Approximate

 Calibration in Progress

 Autocal in Progress

 Diagnostic in Progress

 Diagnostic Data Avail

 Integrator Sat Hi

 Integrator Sat Lo

Alert Record/Status Alerts NE107⁽²⁾

 Alert Record Not Empty

 Alert Record Full

 Instrument Time is Approximate

 Calibration in Progress

 Autocal in Progress

 Diagnostic in Progress

 Diagnostic Data Avail

 Integrator Sat Hi

 Integrator Sat Lo

View Alert Records

Clear Records

Instrument Alert Record

Edit Instrument Time

NOTES:

1. HART 7 ONLY.

2. NE107 ALERTS ARE AVAILABLE FOR HART 7.

Figure B-7. Calibration

Configure

Guided Setup

Manual Setup

Alert Setup

Calibration

Travel Calibration (HART 5)

Auto Calibration

Last AutoCal Status

Manual Calibration

Calibration Record

Travel Calibration (HART 7)

Auto Calibration

Last AutoCal Status

Manual Calibration

Calibration Type

Calibration Time

Calibrator

Relay Adjust

Sensor Calibration

Pressures Sensors

Analog Input⁽¹⁾

PST Calibration

SOV Test Calibration⁽²⁾

NOTES:

1. ANALOG INPUT IS NOT AVAILABLE WHEN THE DIP SWITCH IS SET TO MULTI-DROP.

2. HART 7 ONLY.

Figure B-8. Service Tools

Service Tools

Device Status

Alert Record

View Alert Records

Clear Records

Diagnostics

Stroke Valve

Partial Stroke Test

LCP LED Test

Reset LCP Communication

Variables

Travel/Pressure

Setpoint

Travel

Drive Signal

Supply Pressure

Pressure A

Pressure B

Pressure A-B

SIS Hardware Shutdown

Analog Input

Temperature

Travel Counts

Characterization

Input Characterization

Custom Characterization

Travel History

Cycle Count

Travel Accumulator

Run Time Extremes

Maximum Recorded Temperature

Minimum Recorded Temperature

Days Powered Up

Number of Power Ups

Maintenance

Stabilize/Optimize

Restart Processor

Reset PST Abnormal Alert

Reset Latch

Change to HART 5⁽¹⁾

Simulate⁽²⁾

Calibration

NOTES:

1. LABEL IS 'CHANGE TO HART 7' FOR HART 5.

2. HART 7 ONLY.

Glossary

Alert Point

An adjustable value that, when exceeded, activates an alert.

Algorithm

A set of logical steps to solve a problem or accomplish a task. A computer program contains one or more algorithms.

Alphanumeric

Consisting of letters and numbers.

Analog Input Units

Units in which the analog input is displayed and maintained in the instrument.

ANSI (acronym)

The acronym ANSI stands for the American National Standards Institute.

ANSI Class

Valve pressure/temperature rating.

Bench Set

Pressure, supplied to an actuator, required to drive the actuator through rated valve travel. Expressed in pounds per square inch.

Breakout Timeout

The user configured amount of time before which the valve must leave the normal end during a Partial Stroke test.

Byte

A unit of binary digits (bits). A byte consists of eight bits.

Calibration Location

Where the instrument was last calibrated; either in the factory or in the field.

Configuration

Stored instructions and operating parameters for a FIELDVUE Instrument.

Control Loop

An arrangement of physical and electronic components for process control. The electronic components of the loop continuously measure one or more aspects of the process, then alter those aspects as necessary to achieve a desired process condition. A simple control loop measures only one variable. More sophisticated control loops measure many variables and maintain specified relationships among those variables.

Control Mode

Defines where the instrument reads its set point. The following control modes are available for a FIELDVUE Instrument:

Analog – The instrument receives its travel set point over the 4 to 20 mA loop.

Digital – The instrument receives its set point digitally, via the HART communications link.

Test – This is not a user-selectable mode. The Device Communicator or ValveLink software places the instrument in this mode whenever it needs to move the valve, such as for calibration or diagnostic tests.

Control Mode, Restart

Determines the instrument control mode after a restart. See Control Mode for the available restart control modes.

Controller

A device that operates automatically to regulate a controlled variable.

Current-to-Pressure (I/P) Converter

An electronic component or device that converts a milliamp signal to a proportional pneumatic pressure output signal.

Cycle Counter

The capability of a FIELDVUE instrument to record the number of times the travel changes direction. The change in direction must occur after the deadband has been exceeded before it can be counted as a cycle.

Cycle Count High Alert

Checks the difference between the Cycle Counter and the Cycle Count High Alert Point. Cycle Count High Alert is active when the cycle counter value exceeds the Cycle Count High Alert Point. It clears after you reset the Cycle Counter to a value less than the alert point.

Cycle Count High Alert Point

An adjustable value which, when exceeded, activates the Cycle Count Alert. Valid entries are 0 to 4 billion cycles.

Cycle Counter Deadband

Region around the travel reference point, in percent of ranged travel, established at the last increment of the Cycle Counter. The deadband must be exceeded before a change in travel can be counted as a cycle. Valid entries are 0% to 100%. Typical value is between 2% and 5%.

Deviation

Usually, the difference between setpoint and process variable. More generally, any departure from a desired or expected value or pattern.

Device ID

Unique identifier embedded in the instrument at the factory.

Device Revision

Revision number of the interface software that permits communication between the handheld communicator and the instrument.

Drive Signal

The signal to the I/P converter from the printed circuit board in the Front Cover Assembly. It is the percentage of the total microprocessor effort needed to drive the valve fully open.

Drive Signal Alert

Checks the drive signal and calibrated travel. If one of the following conditions exists for more than the user configured Drive Signal Deviation Time, the Drive Signal Alert is active. If none of the conditions exist, the alert is cleared.

If Zero Power Condition = Closed

The alert is active when: drive signal <10% and calibrated travel >3%

drive signal >90% and calibrated travel <97%

If Zero Power Condition = Open

The alert is active when: drive signal <10% and calibrated travel <97%

drive signal >90% and calibrated travel >3%

Equal Percentage

A valve flow characteristic where equal increments of valve stem travel produce equal percentage changes in existing flow. One of the input characteristics available for a FIELDVUE Instrument. See also, Linear and Quick Opening.

Feedback Signal

Indicates to the instrument the actual position of the valve. The travel sensor provides the feedback signal to the instrument's printed circuit board in the Front Cover Assembly.

Firmware Revision

The revision number of the instrument firmware. Firmware is a program that is entered into the instrument at time of manufacture and cannot be changed by the user.

Free Time

Percent of time that the microprocessor is idle. A typical value is 25%. The actual value depends on the number of functions in the instrument that are enabled and on the amount of communication currently in progress.

Full Ranged Travel

Current, in mA, that corresponds with the point where ranged travel is maximum, i.e., limited by the mechanical travel stops.

Gain

The ratio of output change to input change.

Hardware Revision

Revision number of the Fisher instrument hardware. The physical components of the instrument are defined as the hardware.

HART (acronym)

The acronym HART stands for Highway Addressable Remote Transducer.

HART Universal Revision

Revision number of the HART Universal Commands which are the communications protocol for the instrument.

Incoming Ramp Rate

The rate at which the valve will move during the Incoming stroke of the Partial Stroke test. The default value is 0.25%/second.

Input Characteristic

The relationship between the ranged travel and ranged input. Possible values include: linear, equal percentage and quick opening.

Input Current

The current signal from the control system that serves as the analog input to the instrument. See also Input Signal.

Input Range

The input range that corresponds to the travel range.

Input Signal

The current signal from the control system. The input signal can be displayed in milliamperes or in percent of ranged input.

Instrument Level

Determines the functions available for the instrument.

Instrument Mode

Determines if the instrument responds to its analog input signal. There are two instrument modes:

In Service: For a fully functioning instrument, the instrument output changes in response to analog input changes. Typically changes to setup or calibration cannot be made when the instrument mode is In Service.

Out of Service: The instrument output does not change in response to analog input changes when the instrument mode is Out of Service. Some setup parameters can be changed only when the instrument mode is Out of Service.

Instrument Protection

Determines if commands from a HART device can calibrate and/or configure certain parameters in the instrument. There are two types of instrument protection:

Configuration and Calibration: Prohibits changing protected setup parameters; prohibit calibration.

None: Permits both configuration and calibration. The instrument is "unprotected."

Instrument Serial Number

The serial number assigned to the instrument by the factory but can be changed during setup. The instrument serial number should match the serial number on the instrument nameplate.

Leak Class

Defines the allowable leakage by a valve when it is closed. Leak class numbers are listed in two standards: ANSI/FCI 70-2 and IEC 534-4.

Linear

A valve flow characteristic where changes in flow rate are directly proportional to changes in valve stem travel. One of the input characteristics available for a FIELDVUE Instrument. See also, Equal Percentage and Quick Opening.

Linearity, dynamic

Linearity (independent) is the maximum deviation from a straight line best fit to the opening and closing curves and a line representing the average value of those curves.

Memory

A type of semiconductor used for storing programs or data. FIELDVUE instruments use three types of memory: Random Access Memory (RAM), Read Only Memory (ROM) and Non-Volatile Memory (NVM). See also these listings in this glossary.

Menu

A list of programs, commands or other activities that you select by using the arrow keys to highlight the item then pressing ENTER or by entering the numeric value of the menu item.

Minimum Closing Time

Minimum time, in seconds, for the travel to decrease through the entire ranged travel. This rate is applied to any travel decrease. Valid entries are 0 to 400 seconds. Deactivate by entering a value of 0 seconds.

Minimum Opening Time

Minimum time, in seconds, for the travel to increase through the entire ranged travel. This rate is applied to any travel increase. Because of friction, actual valve travel may not respond in exactly the same time frame. Valid entries are 0 to 400 seconds. Deactivate by entering a value of 0 seconds.

Non-Volatile Memory (NVM)

A type of semiconductor memory that retains its contents even though power is disconnected. NVM contents can be changed during configuration unlike ROM which can be changed only at time of instrument manufacture. NVM stores configuration restart data.

Outgoing Ramp Rate

The rate at which the valve will move during the Outgoing stroke of the Partial Stroke test. The default value is 0.25%/second.

Parallel

Simultaneous: said of data transmission on two or more channels at the same time.

Partial Stroke Test (PST)

The process of taking the valve from the normal end to a target position at a preconfigured ramp rate before returning to the normal end while gathering data.

Pause Time

The time between the outgoing and incoming strokes of the Partial Stroke test. The default value is 5 seconds.

Polling Address

Address of the instrument. If the digital valve controller is used in a point-to-point configuration, set the polling address to 0. If it is used in a multidrop configuration or split range application, set the polling address to a value from 0 to 63 for HART 7.

Pressure Sensor

A FIELDVUE instrument internal device that senses pneumatic pressure. The DVC7K has three pressure sensors: one to sense supply pressure and two to sense the output pressures.

Primary Master

Masters are communicating devices. A primary master is a communicating device permanently wired to a field instrument. Typically, a HART-compatible control system is the primary master.

In contrast, a secondary master is not often permanently wired to a field instrument. The handheld communicator or a computer running Device Description (DD) software communicating through a HART modem could be considered a secondary master.

Note: If one type of master changes the instrument mode to Manual, the same type must change it back to Automatic. For example, if a device set up as a primary master changes the instrument mode to Manual, a device set up as a primary master must be used to change the instrument mode back to Automatic.

Quick Opening

A valve flow characteristic where most of the change in flow rate takes place for small amounts of stem travel from the closed position. The flow characteristic curve is basically linear through the first 40 percent of stem travel. One of the input characteristics available for a FIELDVUE Instrument. See also, Equal Percentage and Linear.

Ramp Rate

See Incoming Ramp Rate and Outgoing Ramp Rate definitions.

Random Access Memory (RAM)

A type of semiconductor memory that is normally used by the microprocessor during normal operation that permits rapid retrieval and storage of programs and data. See also Read Only Memory (ROM) and Non-Volatile Memory (NVM).

Rate

Amount of change in output proportional to the rate of change in input.

Read-Only Memory (ROM)

A memory in which information is stored at the time of instrument manufacture. You can examine but not change ROM contents.

Return Lead

The percent (%) change in setpoint required to overcome the hysteresis in the valve assembly during a Partial Stroke test. The error between setpoint and actual error is added to this percent change.

Seat Load

Force exerted on the valve seat, typically expressed in pounds force per lineal inch of port circumference. Seat load is determined by shutoff requirements.

Set Point Filter Time (Lag Time)

The time constant, in seconds, for the first-order input filter. The default of 0 seconds will bypass the filter.

Short Duration PST

During a Partial Stroke test, allows the incoming stroke to be initiated as soon as the travel reaches the minimum travel movement.

Software

Microprocessor or computer programs and routines that reside in alterable memory (usually RAM), as opposed to firmware, which consists of programs and routines that are programmed into memory (usually ROM) when the instrument is manufactured. Software can be manipulated during normal operation, firmware cannot.

Stroke Time

The DVC6200 SIS calculates the time it takes to fully stroke in the event of a demand and stores the last value. In order for the calculation to occur, the Travel Hi Hi and Travel Lo Lo alert points must be configured to 99% and 1% respectively. Stroke time can be read from the device with ValveLink software.

Stroking Time

The time, in seconds, required to move the valvem from its fully open position to fully closed or vice versa.

Temperature Sensor

A device within the FIELDVUE instrument that measures the instrument's internal temperature.

Test Start Point

The normal (not tripped) end of valve travel. The valve must be at this end for a Partial Stroke test to be initiated.

Travel

Movement of the valve stem or shaft which changes the amount the valve is open or closed.

Travel Accumulator

The capability of a FIELDVUE instrument to record total change in travel. The value of the Travel Accumulator increments when the magnitude of the change exceeds the Travel Accumulator Deadband. To reset the Travel Accumulator, set it to zero.

Travel Accumulator Alert

Checks the difference between the Travel Accumulator value and the Travel Accumulator Alert Point. The Travel Accumulator Alert is active when the Travel Accumulator value exceeds the Travel Accumulator Alert Point. It clears after you reset the Travel Accumulator to a value less than the alert point.

Travel Accumulator Alert Point

An adjustable value which, when exceeded, activates the Travel Accumulator Alert. Valid entries are 0% to 4 billion %.

Travel Accumulator Deadband

Region around the travel reference point established at the last increment of the accumulator. This region must be exceeded before a change in travel can be accumulated. Valid entries are 0% to 100%.

Travel Alert

Checks the ranged travel against the travel high and low alert points. The travel alert is active if either the high or low point is exceeded. Once a high or low point is exceeded, the ranged travel must clear that point by the Travel Alert Deadband before the alert clears. Four travel alerts are available: Travel Alert Hi, Travel Alert Lo, Travel Alert Hi Hi and Travel Alert Lo Lo.

Travel Alert Deadband

Travel, in percent of ranged travel, required to clear a travel alert, once it is active. Valid entries are -25% to 125%.

Travel Alert High Point

Value of the travel, in percent of ranged travel, which, when exceeded, sets the Travel Alert Hi alert. Valid entries are -25% to 125%.

Travel Alert High High Point

Value of the travel, in percent of ranged travel, which, when exceeded, sets the Travel Alert Hi Hi alert. Valid entries are -25% to 125%.

Travel Low Alert Point

Value of the travel, in percent of ranged travel, which, when exceeded, activates the Travel Alert Low Alert. Valid entries are -25% to 125%.

Travel Alert Low Low Point

Value of the travel, in percent of ranged travel, which, when exceeded, sets the Travel Alert Lo Lo alert. Valid entries are -25% to 125%.

Travel Cutoff

Defines the cutoff point for the travel, in percent of ranged travel. There are two travel cutoffs: high and low. Once travel exceeds the cutoff, the drive signal is set to either maximum or minimum, depending on the Zero Control Signal and if the cutoff is high or low. Minimum opening time or minimum closing time are not in effect while the travel is beyond the cutoff. Use the travel cutoff to obtain the desired seat load or to be sure the valve is fully open.

Travel Deviation

The difference between the analog input signal (in percent of ranged input), the "target" travel and the actual "ranged" travel.

Travel Deviation Alert

Checks the difference between the target and the ranged travel. If the difference exceeds the Travel Deviation Alert Point for more than the Travel Deviation Time, the Travel Deviation Alert is active. It remains active until the difference is less than the Travel Deviation Alert Point.

Travel Deviation Alert Point

An adjustable value for the target travel and the ranged travel difference, expressed in percent. When this value is exceeded by the travel deviation for more than the Travel Deviation Time, the Travel Deviation Alert is active. Valid entries are 0% to 100%. Typically this is set to 5%.

Travel Deviation Time

The time, in seconds, that the travel deviation must exceed the Travel Deviation Alert Point before the alert is active. Valid entries are 1 to 60 seconds.

Travel Limit

A setup parameter that defines the maximum allowable travel (in percent of ranged travel) for the valve. During operation, the travel target will not exceed this limit. There are two travel limits: high and low. Typically the travel limit low will be used to keep the valve from going completely closed.

Travel Range

Travel, in percent of calibrated travel, that corresponds to the input range.

Travel Sensor

A device within the FIELDVUE instrument that senses valve stem or shaft movement. The travel sensor in the DVC7K is the Hall Effect sensor that measures the position of the magnetic assembly.

Travel Sensor Motion

Increasing or decreasing air pressure causes the magnet assembly to move up or down or the rotary shaft to turn clockwise or counterclockwise. Guided Setup asks if it can move the valve to determine travel.

Tuning

The adjustment of control terms or parameter values to produce a desired control effect.

Tuning Set

Preset values that identify gain settings for a FIELDVUE instrument. The tuning set and supply pressure together determine an instrument's response to input signal changes.

Watch Dog Timer

A timer that the microprocessor must rearm periodically. If the microprocessor is unable to rearm the timer, the instrument goes through reset.

Zero Power Condition

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 follows:

Single-Acting Direct (Relay C) Upon loss of electrical power instrument goes to zero air output at port A.

Double-Acting (Relay A) Upon loss of electrical power instrument goes to full supply air output at port B. A goes to zero air output.

Single-Acting Reverse (Relay B) Upon loss of electrical power instrument goes to full supply air output at Port B.



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