Fisher™ FIELDVUE™ DVC6200 SIS Digital Valve Controller for Safety Instrumented Systems (SIS)

The FIELDVUE DVC6200 SIS digital valve controller is a HART® communicating instrument for use in valve applications such as Emergency Shutdown, Emergency Blow Down, Emergency Venting, and Emergency Isolation. The DVC6200 SIS is capable of monitoring the health of and controlling the safety shutdown function of a valve and can easily be installed on most Fisher and non-Fisher pneumatic actuators.

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Features

Reliability

- Linkage-less Position Feedback—The high performance, linkage-less feedback system eliminates physical contact between the valve stem and the DVC6200 SIS. This minimizes the affects of pipeline vibration and environmental corrosion.
- Built to Survive—The field proven DVC6200 SIS instrument has fully encapsulated electronics that resist the effects of vibration, temperature, and corrosive atmospheres. A weather-tight wiring terminal box isolates field wiring connections from other areas of the instrument.

Safety

- Partial Stroke Testing (PST)—This is a small ramp test that moves the valve, without disrupting the process, to detect a stuck valve. Testing can be automated, or manually initiated with an external pushbutton or Fisher LCP100 Local Control Panel.
- Full Stroke Testing (FST)—This is a full ramp over the entire valve travel range that is typically performed during a shut down. This test can reveal failures undetected by the PST on-line diagnostic testing.

Ease of Use

- Remote Access—The DVC6200 SIS is a HART communicating device, so information can be accessed anywhere along the loop. This flexibility can reduce exposure to hazardous environments and make it easier to evaluate valves in hard to reach locations.
- Faster Commissioning—HART communication allows you to quickly commission loops with a variety of tools, either locally at the valve assembly or remotely.
- Easy Maintenance—The DVC6200 SIS digital valve controller is modular in design. Critical working components can be replaced without removing field wiring or pneumatic tubing.

Value

- Spurious Trip Protection—PST Pressure Limit defines the output pressure threshold that will abort the partial stroke test if exceeded. This prevents the actuator from completely exhausting pressure and potentially causing a spurious trip in a sticking valve scenario.

- Increased Uptime—The self-diagnostic capability of the DVC6200 SIS provides valve availability and health evaluation without shutting down the process or pulling the valve assembly from the line.

- Audit Documentation—Using ValveLink™ software, a time and date stamp on all tests and reports provides compliance with requirements of statutory authorities.

- Hardware Savings—When installed in an integrated control system, significant hardware and installation cost savings can be achieved. Valve accessories such as limit switches and position transmitters can be eliminated because this information is available via the HART communication protocol. In addition, an integrated 4-20 mA position transmitter or limit switch option is available.

- Improved Maintenance Decisions—Digital communication provides easy access to the condition of the valve. Sound process and asset management decisions can be made by analysis of valve diagnostic information through ValveLink software, DD's, or DTM's.

Packaged Solutions

LCP100—A local control panel can be connected directly to the DVC6200 SIS to provide manual control of the SIS valve, including manual reset. A partial stroke test can also be initiated with the LCP100 (see figure 1).

Figure 1. Fisher LCP100 Local Control Panel

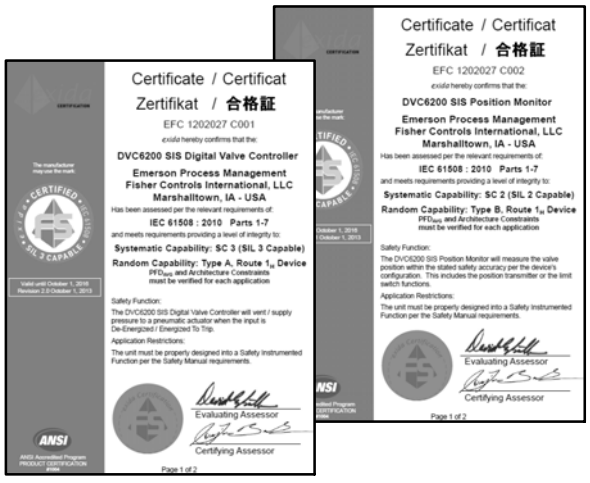
Safety Certification

The functional safety assessment was performed to the requirements of IEC 61508: ed2, 2010, SIL3.

The DVC6200 SIS digital valve controller, in the de-energize to trip (DETT) or energize to trip (ETT) configuration, meets the systematic integrity requirements of SIL 3.

The DVC6200 SIS position monitor, in the position transmitter or limit switch configuration, meets the systematic integrity requirements of SIL 2.

Figure 2. exida Certificates



Valve Diagnostics

The DVC6200 SIS digital valve controller provides a broad and deep portfolio of valve diagnostic capabilities. Whether the 475 Field Communicator is used to check for valve alerts and operational status, or ValveLink software is used for comprehensive diagnostic test and analysis, the tools are easy to use.

Valve diagnostic tests enable condition and performance monitoring of the entire valve assembly - not just the digital valve controller. Results are displayed graphically, with severity indicated by a red/yellow/green icon. A detailed description of the identified issue as well as suggestions for recommended actions are provided.

In the event that the DVC6200 SIS is commanded to trip, diagnostic data can be gathered automatically to be used for troubleshooting.

Examples of identifiable issues are:

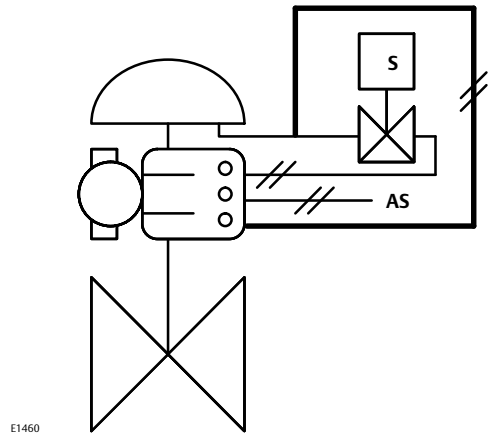
- Valve Stuck
- Solenoid Stuck
- Low air supply or pressure droop
- Dirty air supply
- External air leak (actuator diaphragm or tubing)
- Piston actuator O-ring failure
- Excessive valve assembly friction
- Low valve assembly friction
- Broken actuator spring
- Broken valve/actuator shaft

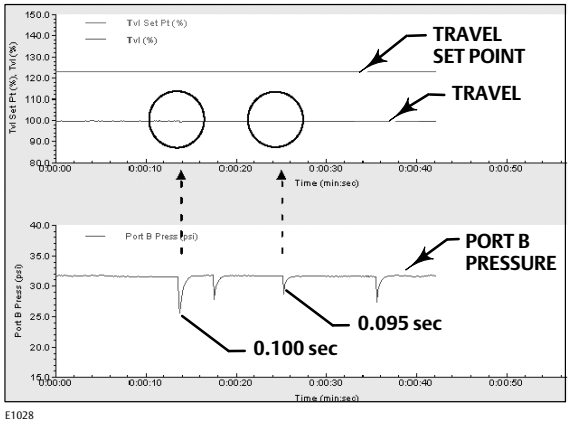
For additional information on FIELDVUE diagnostics and ValveLink software refer to Fisher Bulletin 62.1:ValveLink Software (D102227X012).

Solenoid Valve Health Monitoring

If a solenoid valve is installed between the DVC6200 SIS pressure output and the actuator, as shown in figure 3, the final control element assembly can be configured to verify the operation of the solenoid valve during online operation. In single-acting actuator applications, the “unused” output port of the DVC6200 SIS can be piped such that the pressure downstream of the of solenoid valve is measured. When the solenoid valve is pulsed, the DVC6200 SIS can sense the momentary pressure drop across the solenoid valve. The solenoid should be pulsed long enough to detect a pressure drop across the solenoid valve, but not so long that it affects the travel of the final control element. This not only increases the availability of the solenoid valve during a safety demand, but also enhances the reliability of the SIF (Safety Instrumented Function) loop.

Figure 3. Solenoid Valve Testing

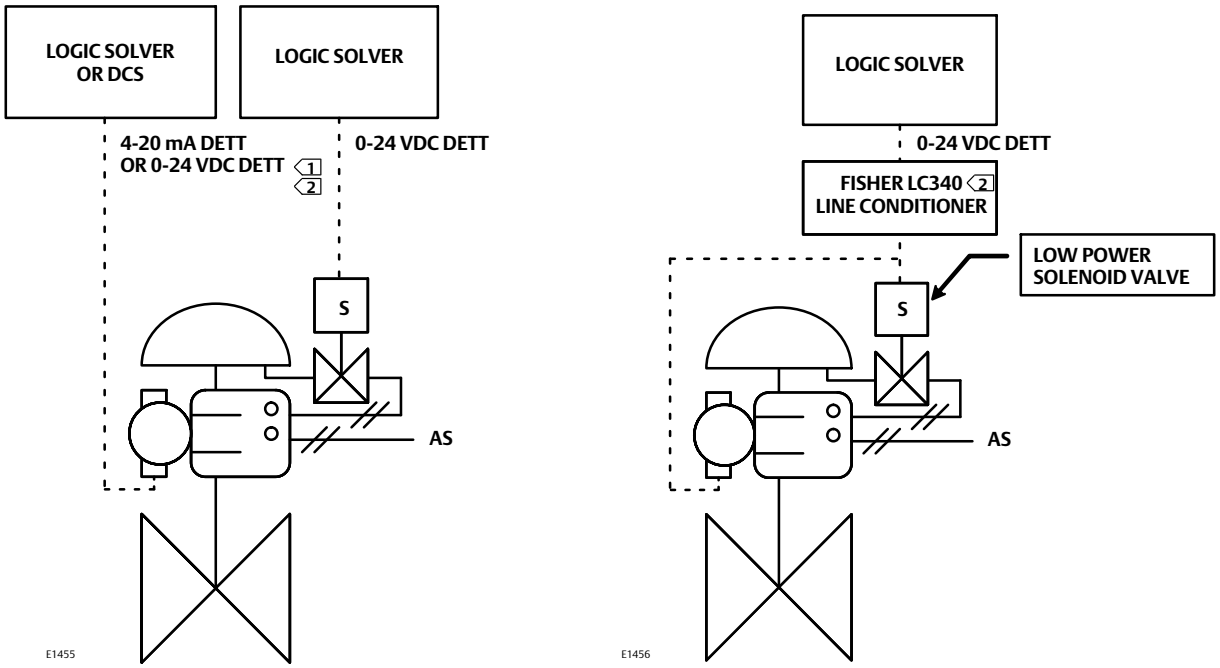




ValveLink Software Screen Image Showing Pressure Drop Across the Solenoid Valve

Application Examples

Figure 4. De-Energize to Trip (DETT) FIELDVUE DVC6200 SIS and DETT Solenoid Valve



Options Available

- LCP100 Local Control Panel or external pushbutton
- Integral 4-20 mA position transmitter or discrete switch

Benefits

- DVC6200 SIS provides diagnostic coverage with PST
- DVC6200 SIS used with solenoid can provide redundant safety function
- DVC6200 SIS can provide additional diagnostic coverage when optional solenoid pulse recording is utilized
- When powered by 4-20 mA, the DVC6200 SIS is capable of recording the demand and reset stroke

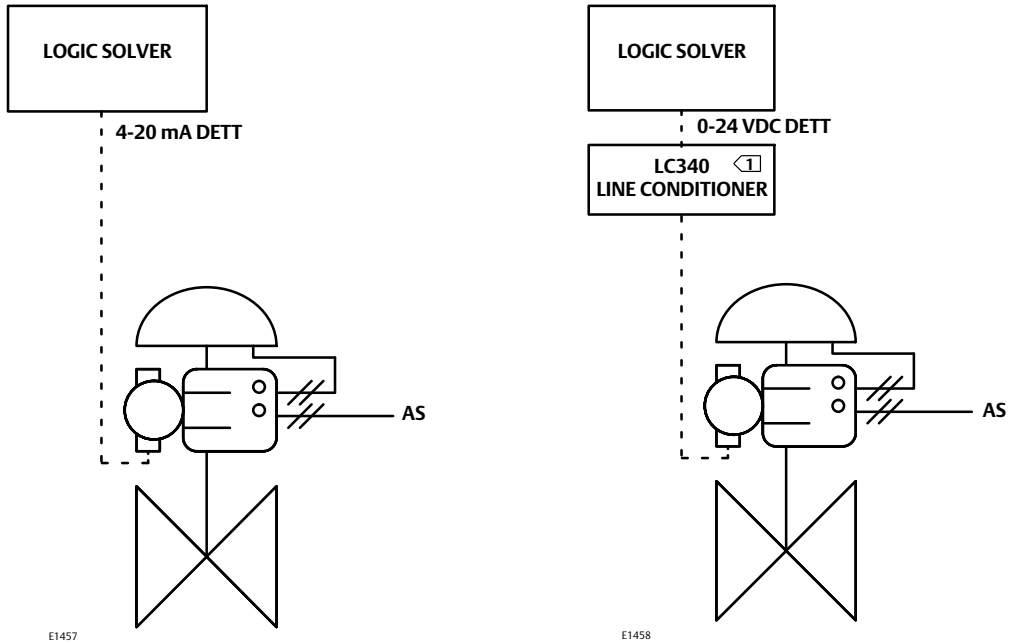
Operation

- DVC6200 SIS will move to the safety demand state upon signal de-energization, loss of power, or loss of pneumatic supply

1 An LC340 line conditioner is required for 0-24 VDC DETT

2 LC340 mounting requires standard 35 mm DIN rail; install in marshalling or I/O cabinet, or junction box. For additional information refer to the LC340 instruction manual (D102797X012), available at www.FIELDVUE.com or from your Emerson Process Management sales office.

Figure 5. De-Energize to Trip (DETT) FIELDVUE DVC6200 SIS; No Solenoid Valve



Options Available

- LCP100 Local Control Panel or external pushbutton
- Integral 4-20 mA position transmitter or discrete switch

Benefits

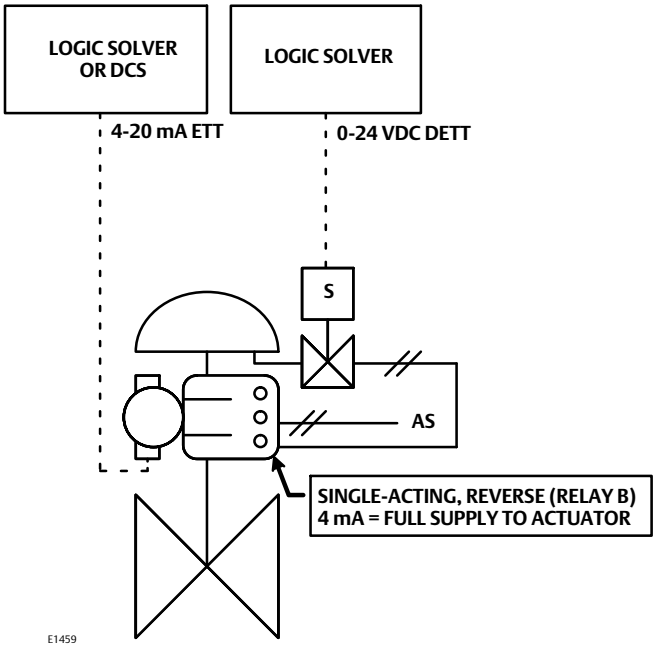
- DVC6200 SIS provides diagnostic coverage with PST
- Eliminates solenoid valve
- When powered by 4-20 mA, the DVC6200 SIS is capable of recording the demand and reset stroke

Operation

- DVC6200 SIS will move to the safety demand state upon signal de-energization, loss of power, or loss of pneumatic supply

1 LC340 mounting requires standard 35 mm DIN rail; install in marshalling or I/O cabinet, or junction box. For additional information refer to the LC340 instruction manual (D102797X012), available at www.FIELDVUE.com or from your Emerson Process Management sales office.

Figure 6. FIELDVUE DVC6200 SIS for PST only and DETT Solenoid Valve



Options Available

- LCP100 Local Control Panel or external pushbutton
- Integral 4-20 mA position transmitter or discrete switch

Benefits

- The energize to trip option provides maximum actuator pressure at minimum control signal (4 mA). Therefore, loss of the control signal will not cause the valve to trip.
- Prevents spurious trip on loss of electrical power to DVC6200 SIS
- DVC6200 SIS can provide additional diagnostics coverage when performing PST
- DVC6200 SIS can provide additional diagnostic coverage when optional solenoid pulse recording is utilized

Operation

- DVC6200 SIS will move to the safety demand state upon signal energization or loss of pneumatic supply
- The solenoid valve will move to the safety demand state upon signal de-energization

Specifications

Available Mounting

■ Sliding-stem linear applications
■ Quarter-turn rotary applications
■ Integral mounting to Fisher rotary actuators
■ Integral mounting to the Fisher GX control valve and actuator system

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

Communication Protocol

■ HART 5 or ■ HART 7

Input Signal

Point-to-Point
Analog Input Signal: 4-20 mA DC, nominal

Minimum Voltage Available at Instrument Terminals must be 9.5 VDC for analog control, 10 VDC for HART communication
Minimum Control Current: 4.0 mA
Minimum Current w/o Microprocessor Restart: 3.5 mA
Maximum Voltage: 30 VDC
Overcurrent protected
Reverse Polarity protected

Multi-Drop
Instrument Power: 11 to 30 VDC at 10 mA
Reverse Polarity protected

Supply Pressure(1)

Minimum Recommended: 0.3 bar (5 psig) higher than maximum actuator requirements
Maximum: 10.0 bar (145 psig) or maximum pressure rating of the actuator, whichever is lower

Supply Medium

Air or Natural Gas

Supply medium must be clean, dry, and noncorrosive and meet the requirements of ISA Standard 7.0.01 or ISO 8573-1

Output Signal

Pneumatic Output: up to full supply pressure
Minimum Span: 0.4 bar (6 psig)
Maximum Span: 9.5 bar (140 psig)
Action: Double, Single Direct, or Single Reverse

Electronic Output(2)

■ Integral 4-20 mA Position Transmitter:
4-20 mA output, isolated
Supply Voltage: 8-30 VDC
Fault Indication: offrange high or low
Reference Accuracy: 1% of travel span
Safety Accuracy: 5% of travel span
■ Integral Limit 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 VDC maximum
Reference Accuracy: 2% of travel span
Safety Accuracy: 5% of travel span

Steady State Air Consumption(3)(4)

Low Bleed Relay
At 1.4 bar (20 psig) supply pressure:
0.056 normal m3/hr (2.1 scfh), average
At 5.5 bar (80 psig) supply pressure:
0.184 normal m3/hr (6.9 scfh), average

Maximum Output Capacity(3)(4)

At 1.4 bar (20 psig) supply pressure:
10.0 normal m3/hr (375 scfh)
At 5.5 bar (80 psig) supply pressure:
29.5 normal m3/hr (1100 scfh)

Operating Ambient Temperature Limits(1)(5)

-52 to 85°C (-62 to 185°F)

Independent Linearity(6)

Typical Value: +/-0.50% of output span

Electromagnetic Compatibility

Meets EN 61326-1:2013
Immunity-Industrial locations per Table 2 of the EN 61326-1 standard
Emissions-Class A
ISM equipment rating: Group 1, Class A

Vibration Testing Method

Tested per ANSI/ISA S75.13.01 Section 5.3.5

Input Load Impedance

An equivalent impedance of 500 ohms may be used. This value corresponds to 10V @ 20 mA.

Humidity Testing Method

Tested per IEC 61514-2

-continued-

Specifications (continued)

Electrical Classification

Hazardous Area Approvals

CSA— Intrinsically Safe, Explosion-proof, Division 2, Dust Ignition-proof
FM— Intrinsically Safe, Explosion-proof, Dust Ignition-proof, Non-Incendive
ATEX— Intrinsically Safe, Flameproof, Type n
IECEx— Intrinsically Safe, Flameproof, Type n

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

Electrical Housing

CSA— Type 4X, IP66
FM— Type 4X, IP66
ATEX— IP66
IECEx— IP66

Other Classifications/Certifications

CUTR— Customs Union Technical Regulations (Russia, Kazakhstan, Belarus, and Armenia)
INMETRO— National Institute of Metrology, Quality, and Technology (Brazil)
KGS— Korea Gas Safety Corporation (South Korea)
NEPSI— National Supervision and Inspection Centre for Explosion Protection and Safety of Instrumentation (China)
PESO CCOE— Petroleum and Explosives Safety Organisation - Chief Controller of Explosives (India)

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

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

Connections

Supply Pressure: 1/4 NPT internal and integral pad for mounting Fisher 67CFR regulator
Output Pressure: 1/4 NPT internal
Tubing: 3/8-inch recommended
Vent: 3/8 NPT internal
Electrical: 1/2 NPT internal or M20(7)

Actuator Compatibility

Stem Travel (Sliding-Stem Linear)
Minimum: 6.35 mm (0.25 inch)
Maximum: 606 mm (23.875 inches)

Shaft Rotation (Quarter-Turn Rotary)
Minimum: 45°
Maximum: 90°

Weight

Aluminum: 3.5 kg (7.7 lbs)
Stainless Steel: 8.6 kg (19 lbs)

Construction Materials

Housing, module base, and terminal box:
A03600 low copper aluminum alloy (standard)
Stainless steel (optional)
Cover: Thermoplastic polyester
Elastomers: Fluorosilicone

Options

■ Supply and output pressure gauges or tire valves
■ Integral mounted filter regulator ■ Energize to trip
■ Standard Bleed Relay ■ Remote mount(8)(9)
■ LCP100 local control panel ■ LC340 line conditioner
■ Stainless steel

NOTE: Specialized instrument terms are defined in ANSI/ISA Standard 51.1 – Process Instrument Terminology.
1. The pressure/temperature limits in this document and any other applicable code or standard should not be exceeded.
2. The electronic output is available with either the position transmitter or the switch.
3. 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.
4. 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.
5. Temperature limits vary based on hazardous area approval.
6. Not applicable for travels less than 19 mm (0.75 inch) or for shaft rotation less than 60 degrees. Also not applicable for digital valve controllers in long-stroke applications over 4-inch.
7. M20 electrical connection only available with ATEX approvals.
8. 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.
9. The position monitor (transmitter or switch) with the remote mount construction is not safety certified.

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