

FIELDVUE® DVC2000 Series Digital Valve Controller

The DVC2000 Series digital valve controller (figure 1) is simple to use, compact, and designed for easy mounting. It converts a 4-20mA input signal into a pneumatic output signal, which feeds the control valve actuator. Instrument setup is performed with a push button and liquid crystal display (LCD) interface. This interface is protected from the environment within a sealed enclosure. The interface supports multiple languages, including German, French, Italian, Spanish, Chinese, Japanese and English.

The DVC2000 Series digital valve controller utilizes a two-stage positioner design. The pre-amplifier stage provides high static gain for responsiveness to small changes in the input signal. The power amplifier stage delivers the right volume of air to the

actuator, combining superior dynamic performance with minimal steady-state air consumption.

The high performance, linkage-less feedback system eliminates physical contact between the valve stem and the positioner. There is no wear of parts so cycle life is maximized. Additionally, the elimination of levers and linkages reduces the number of mounting parts and the mounting complexity. Positioner replacement and maintenance is simplified because the feedback parts stay connected to the actuator stem.

Designed to meet intrinsically safe and non-incendive requirements, this instrument delivers scalable functionality and high performance in a small package.



Figure 1. DVC2000 Series Digital Valve Controller



Specifications

Available Configurations

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

DVC2000 Series positioners can be mounted on other actuators that comply with the VDI/VDE 3845 and 3847 mounting standards.

Input Signal

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

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

Maximum Voltage: 30 volts dc

Minimum Control Current: 4.0mA (below 3.8 mA may cause microprocessor restart)

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

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

Output Signal

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

Minimum Span: 0.5 bar (7 psig)

Maximum Span: 7 bar (101 psig)

Action: Single Acting, direct

Supply Pressure⁽¹⁾

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

Maximum: 7 bar (101 psig)

Temperature Limits⁽¹⁾

-40 to 85°C (-40 to 185°F) for non-approved instruments. LCD may not be readable below -20°C (-4 °F).

Air Consumption

Supply pressure:

At 1.5 bar (22 psig): 0.07 Nm³/h (2.3 scfh)

At 4 bar (58 psig): 0.12 Nm³/h (4.4 scfh)

Air Capacity

Supply pressure:

At 1.5 bar (22 psig): 4.73 Nm³/h (167 scfh)

At 4 bar (58 psig): 9.57 Nm³/h (338 scfh)

Independent Linearity

±0.5% of output span

Electromagnetic Interference (EMI)

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

Electrical Classification

Hazardous Area: Intrinsically safe and non-incendive construction is available to CSA, FM, CENELEC and SAA standards (certifications pending). These instruments also satisfy the requirements of the European ATEX Directive.

Electrical Housing: Meets NEMA 4X, CSA Type 4X, IEC 60529 IP66

Connections

Standard

Supply and Output Pressure: G1/4 female

Electrical: M20 female

Optional

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

Electrical: 1/2-inch NPT female

Materials of Construction

Housing, Cover and Manifold: ASTM B85 A03600 low copper aluminum alloy

Elastomers: Nitrile

-continued-

Specifications (continued)

Stem Travel

Minimum: 8 mm (5/16-inch)

Maximum: 50 mm (2-inches)

Shaft Rotation

Minimum: 45°

Maximum: 90°

Mounting

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

Weight

1.5 kg (3.3 lbs)

Dimensions

Refer to figure 4

Options

■ *Airset:* Type 67CFR with 40 micron filter

■ *Language:* German, French, Italian, Spanish, Chinese, Japanese, English

■ Pipe-away vent

■ *Limit Switches:* Two isolated switches, configurable throughout calibrated travel range

Supply Voltage: 4.3-30 VDC

OFF State: 0.75mA ± 0.25mA

ON State: 4mA ± 0.20mA

Accuracy: 2% of travel span

■ *Transmitter:* 4-20 mA output, isolated

Supply Voltage: 8-30 VDC

Fault Indication: offrange high or low

Accuracy: 1% of travel span

1. The pressure/temperature limits in this bulletin and any applicable standard or code limitation should not be exceeded.

Features

● **Simplicity**—The DVC2000 Series is easy to use. If you are mounting the instrument for the first time, the linkage-less feedback system is easy to install. Once a magnet array is assembled to the valve stem, positioner replacement is simple since there are no physically connected parts.

At its very basic functionality, the DVC2000 series has a local user interface that will allow you to configure, calibrate, and tune the instrument. If the I/O Options Package is installed, you can calibrate the 4-20mA transmitter and configure the limit switch action. Running the Quick Setup routine calibrates and tunes the instrument specifically for that actuator.

The full text display in the local interface is easy to navigate, in part due to the selection of languages. Each unit can be configured to display English, German, French, Italian, Spanish, Japanese or Chinese.

● **Reliability**—The DVC2000 is based on the field proven FIELDVUE technology. Fisher's years of control experience has brought this product line to a high level of reliability and dependability.

● **Performance**—The two-stage positioner design provides a mechanical platform that enables

responsiveness to small input changes and tighter process control. The digital tuning algorithm allows optimal response to get the valve to its desired position quickly, without overshoot.

● **Diagnostics**—*Local User Interface:* DVC2000 Series instruments come standard with a liquid crystal display. Predefined instrument and valve diagnostics are built into the firmware to alert you if there are any problems with the mounting, electronics, hardware, or valve performance.

Handheld Field Communicator—DVC2000 Series instruments are packed with user-configurable alerts and alarms. These flags provide notification of current status and potential valve and instrument problems through alerts such as travel deviation, travel limit, cycle count, and travel accumulation.

AMS ValveLink® Software—With AMS ValveLink Software, tests can be performed to identify problems with the entire control valve assembly. Utilizing the valve stem travel feedback, actuator pressure sensor, and other sensors on the instrument, the health of the control valve can be evaluated while the valve is still in service and fully operational. This helps you pinpoint problems without disrupting the process - before the equipment fails.

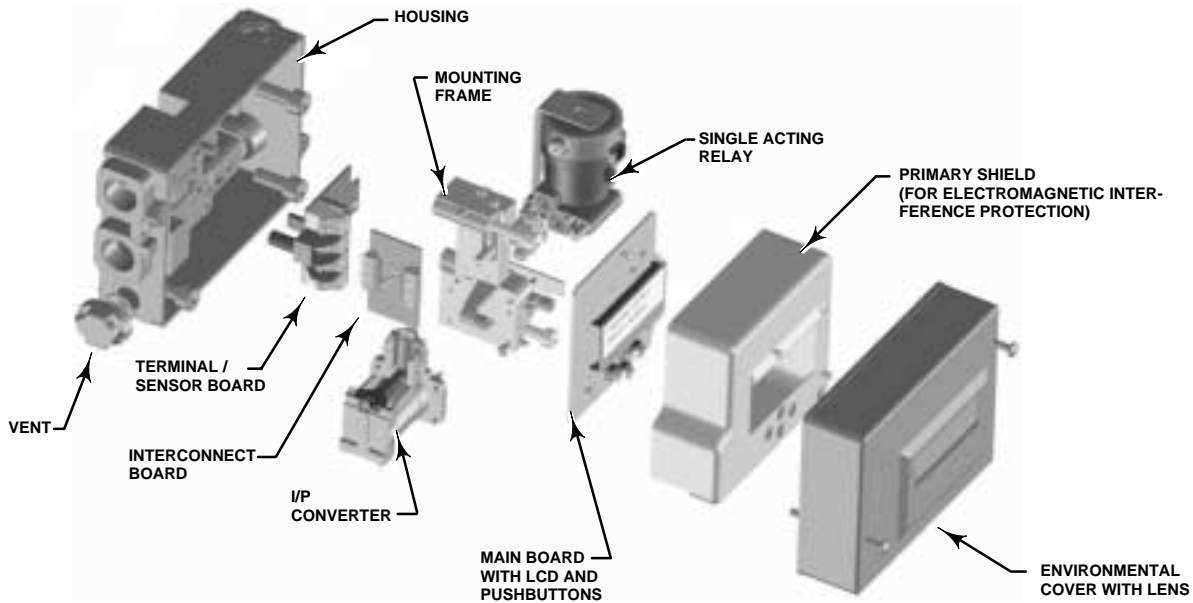


Figure 2. DVC2000 Series Digital Valve Controller Assembly (Exploded View)

• **I/O Options Package**— The DVC2000 Series is available with an I/O Options Package which includes two (2) integral limit switches and a stem position transmitter. The limit switches are configurable for open and closed valve indication anywhere within $\pm 25\%$ of the calibrated travel range. The position transmitter provides a 4-20mA signal for valve position feedback verification. As an integral component to the instrument, this option module avoids the need for difficult to mount external switches and transmitters.

Modbus with AMS ValveLink Software and HART® Multiplexers

HART communication allows you to extract more value from the DVC2000 Series instrument beyond its inherent improved performance. When integrated into a multiplexer network and using AMS Software, the device and valve information is real-time. From the safety of a control room, multiple instruments can be monitored for alerts and alarms. Additionally, tasks such as configuration, calibration, and diagnostic testing do not require special trips to the field. AMS ValveLink Software can communicate via Modbus to the distributed control system (DCS) to provide critical information such as valve travel alerts and alarms.

Integration

Traditional 4-20 mA Systems

Because the DVC2000 Series instrument operates with a 4-20mA control signal, it directly replaces older analog instruments. Microprocessor based electronics provide improved control performance along with repeatable and reliable configuration and calibration.

Integrated Control System

A control system with HART communication capabilities has the ability to directly gather information from DVC2000 Series digital valve controllers. Information such as valve travel, alerts and alarms can be seamlessly accessed to provide a view into the field device from the safety of the control room.

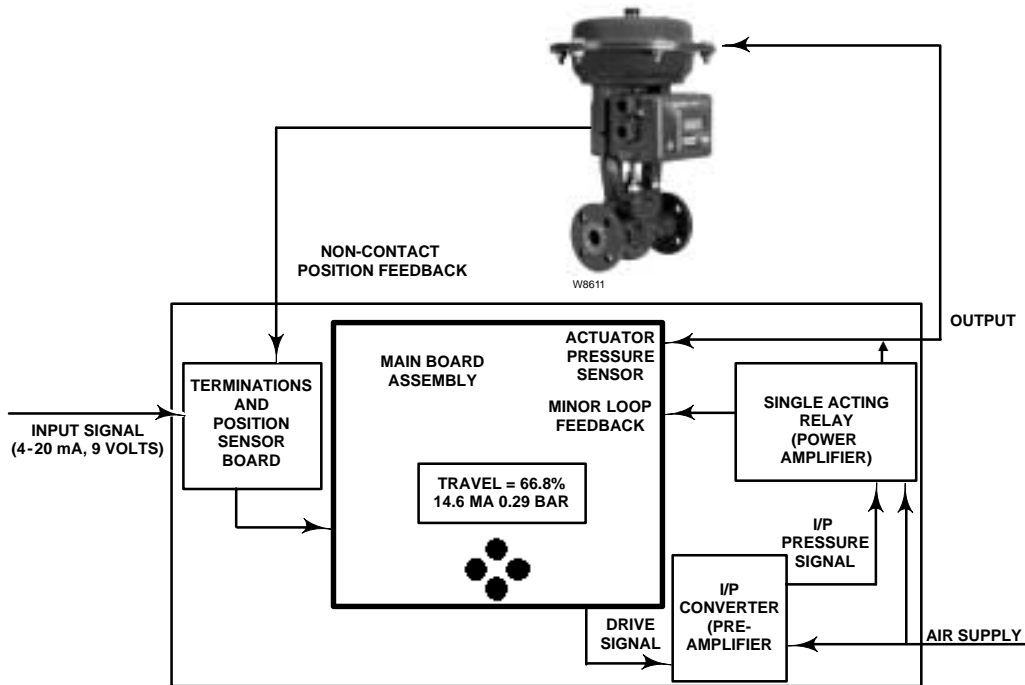


Figure 3. DVC2000 Series Digital Valve Controller Block Diagram

Principle of Operation

DVC2000 Series instruments (figures 2 and 3) receive a 4-20mA set point and position the valve by increasing or decreasing the air output to an actuator.

- The **input signal** provides electrical power and the set point simultaneously. The 4-20mA signal is routed into **the terminals** through a twisted pair of wires.
- The unit's **mainboard** contains a microprocessor that continuously runs a digital control algorithm. This algorithm produces a "drive signal" to the I/P converter.

- **The I/P converter** assembly (or pre-amplifier) is connected to supply pressure and converts the electronic "drive signal" into a pneumatic "pressure signal." This pressure signal is the input to the pneumatic relay assembly.

- **The relay** (or power amplifier) is also connected to supply pressure and amplifies the small pressure signal from the I/P converter into a larger pressure output signal used by the actuator. The change in relay output pressure to the actuator causes the valve to move.

- Valve position is sensed through the linkage-less feedback system. The travel sensor is electrically connected to the printed wiring board to provide a travel feedback signal used in the control algorithm. The valve continues to move until the correct position is attained.

Installation

The DVC2000 Series is designed for mounting on any single acting pneumatic actuator up to 50 mm (2 inches) of travel. Double acting operation can be achieved with the addition of an externally mounted pneumatic reversing relay. The envelope and travel feedback system conforms to VDI/VDE 3845, VDI/VDE 3847, IEC 60534-6-1, and IEC 60534-6-2 standards.

Furthermore, the DVC2000 Series instrument can be integrally mounted to the Design GX actuator, avoiding the need for complicated mounting brackets. The positioner mounts directly to an interface pad on the actuator yoke leg with a secure 3-point mounting. Internal passages inside the actuator yoke legs route the pneumatic output of the DVC to the actuator casing, eliminating the need for external tubing (in the air-to-open configuration).

Electrical connections are made on the termination strip, which uses cage clamp style wiring connectors. The electrical wiring entry point is available with either M20 or 1/4-inch NPT female connections. Pressure connections are available with either G1/4 or 1/4-inch NPT female connections.

Ordering Information

Note: Fisher does not assume responsibility for the selection, use, or maintenance of any product. Responsibility for proper selection, use, and maintenance of any Fisher product remains solely with the purchaser and end user.

Refer to the Specifications section. Carefully review each specification and indicate your choice whenever a selection is to be made.

When ordering, specify:

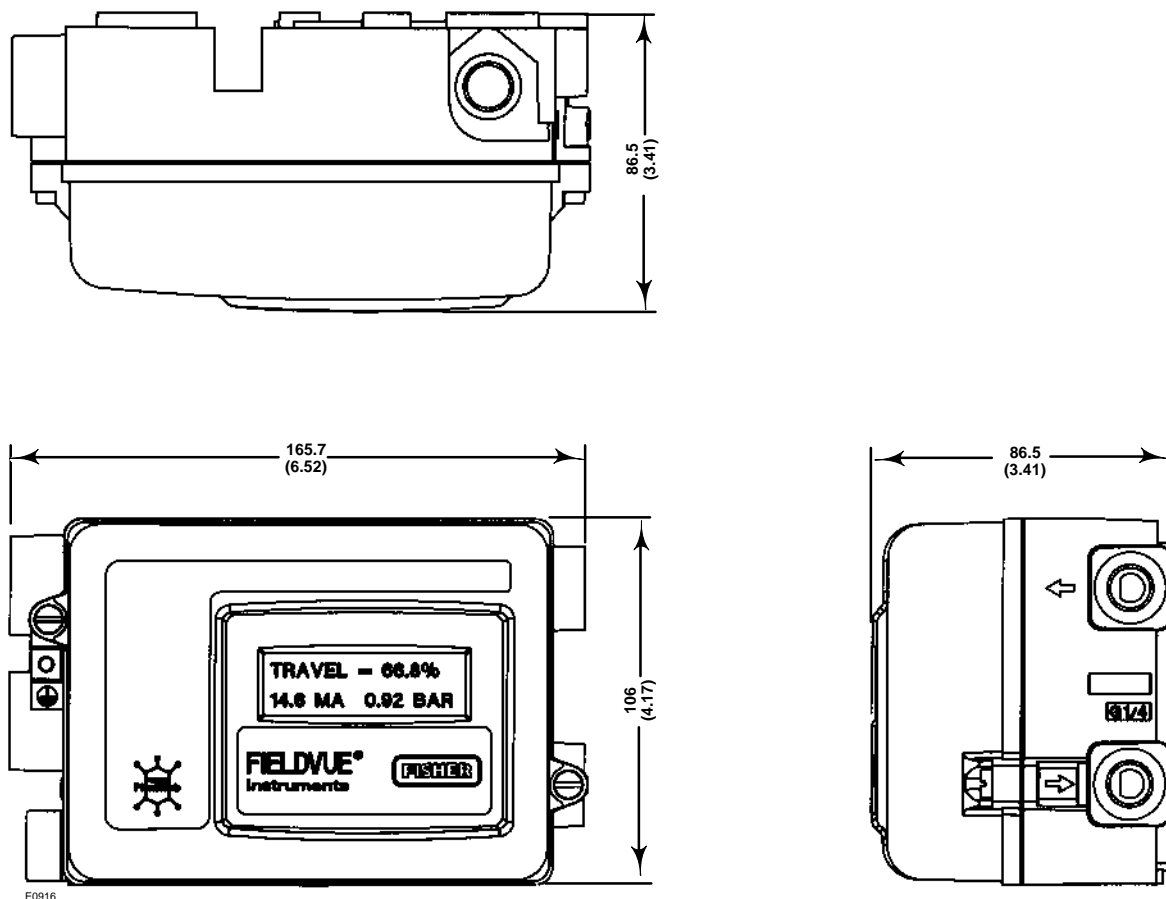
1. Actuator type and size
2. Maximum actuator travel or rotation
3. Minimum actuator operating pressure
4. Hazardous area certification requirements
5. Options
 - a. G1/4 pneumatic and M20 conduit connections or 1/4-inch NPT pneumatic and 1/2-inch NPT conduit connections
 - b. Language (German, French, Italian, Spanish, Chinese, Japanese, English)
 - c. Supply pressure regulator
 - d. Valve diagnostic level (online performance testing, offline advanced testing, basic alerts/alarms)
 - e. I/O Options Package (includes position transmitter and two (2) limit switches)
 - f. Pipe-away vent connector
 - g. HART filter

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E0916

mm
(INCH)

Figure 4. Dimensions for Type DVC2000 Digital Valve Controller

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