Fisher™ FIELDVUE™ DVC6000 HW2 Digital Valve Controller

The FIELDVUE DVC6000 HW2 digital valve controller is a HART® communicating instrument that converts a two-wire 4-20 mA control signal into a pneumatic output to an actuator. It can easily be retrofitted in place of existing analog positioners on most Fisher and non-Fisher pneumatic actuators.

W8373-1

Features

Reliability

- Built to Survive— The field proven DVC6000 HW2 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.
- Actuator Overpressure Prevention

Performance

- Accurate and Responsive— The two-stage positioner design provides quick response to large step changes and precise control for small setpoint changes.
- Travel Control/Pressure Fallback— Valve position feedback is critical to the operation of a digital valve controller. The DVC6000 HW2 can detect position feedback problems and automatically revert to pressure control mode to keep the valve operational.
- Ramped Cutoff provides smooth transition from throttling control to shutoff

Ease of Use

- Enhanced Safety— The DVC6000 HW2 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 communications allows you to quickly commission loops with a variety of tools, either locally at the valve assembly or remotely.
- Easy Maintenance— The DVC6000 HW2 is modular in design. Critical working components can be replaced without removing field wiring or pneumatic tubing.

Value

- 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 due to the integrated position transmitter or switch option.
- Increased Uptime— The self-diagnostic capability of the DVC6000 HW2 provides valve performance and health evaluation without shutting down the process or pulling the valve assembly from the line.
- 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 information through Fisher ValveLink™ software.

Valve Diagnostics

The DVC6000 HW2 digital valve controller provides a broad and deep portfolio of valve diagnostic capabilities. Whether an Emerson 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. When installed as part of a HART communicating system, the DVC6000 HW2 delivers prompt notification of current or potential equipment issues and supports NAMUR NE107 alert categorization.

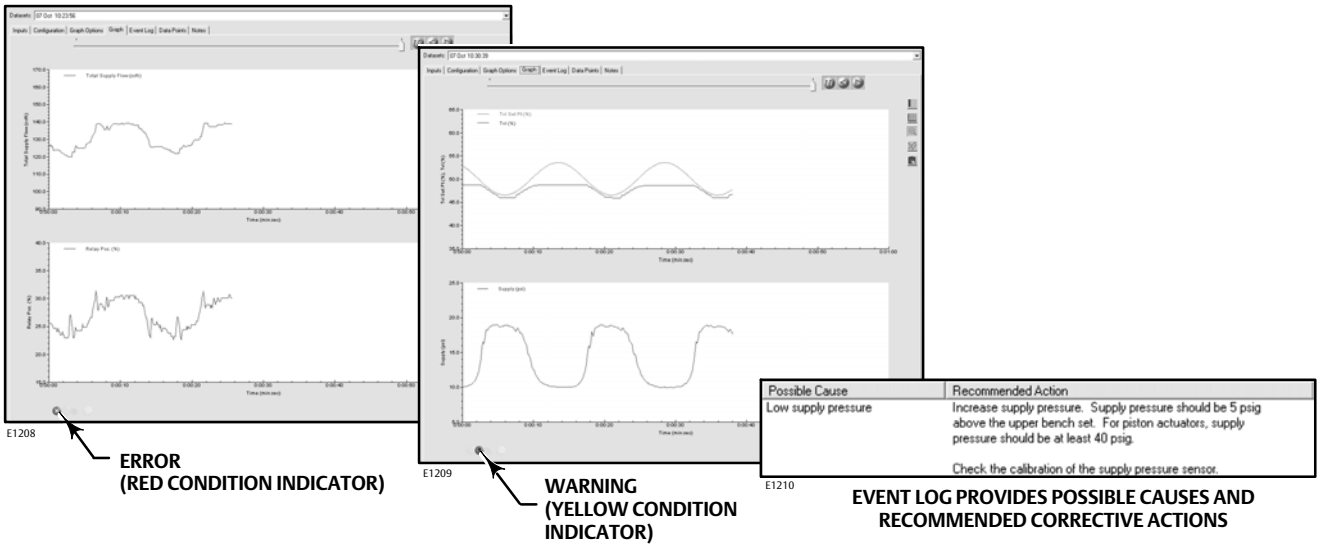
Alerts assist in identification and notification of the following situations:

- Valve travel deviation due to excessive valve friction or galling
- High cycle due to dither or improper tuning
- Total travel movement accumulation beyond a specified point resulting in packing wear
- Valve travel above or below a specified point
- Various instrument mechanical and electrical issues

These alerts are stored in memory on board the DVC6000 HW2.

Additionally, Performance Diagnostics enable condition and performance monitoring of the entire valve assembly (not just the instrument) while the valve is actively controlling the process. When conducting Performance Diagnostics tests, the valve does NOT move beyond the normal setpoint changes driven by the process controller. The DVC6000 HW2 uses statistical algorithms to determine condition and performance related issues based on live readings from the many on-board sensors. Results are then displayed graphically, with severity indicated by a red/yellow/green indicator (figure 1). A detailed description of the identified issue as well as suggestions for recommended actions are provided.

Figure 1. Condition Indicators (Performance Diagnostics)



Examples of identifiable issues are:

- Low or high air supply or pressure droop
- Incorrect regulator setting
- Dirty air supply
- External air leak (actuator diaphragm or tubing)
- Calibration shift
- Valve stuck
- Piston actuator O-ring failure
- Excessive or insufficient valve assembly friction
- Excessive valve assembly deadband
- Elastomer failure in the DVC6000 HW2
- Broken actuator spring

Performance Diagnostics also provide access to full-stroke dynamic testing of the valve assembly including: valve signature, dynamic error band, step response, and stroke check. These tests change the instrument setpoint at a controlled rate and are performed while the valve assembly is isolated from the process.

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

Specifications

Available Configurations

DVC6000 HW2 digital valve controllers can be mounted on Fisher and other manufacturers rotary and sliding-stem actuators(1)

DVC6005 HW2: Base unit for 2 inch pipestand or wall mounting

■ DVC6015: Remotely mounted feedback unit for sliding-stem applications
■ DVC6025: Remotely mounted feedback unit for rotary or long-stroke sliding-stem applications, or
■ DVC6035: Remotely mounted feedback unit for quarter-turn rotary applications

Mounting kit required for mounting feedback unit on actuator

Communication Protocol

■ HART 5 or ■ HART 7

Input Signal

Point-to-Point:.
Analog Input Signal: 4-20 mA DC, nominal; split ranging available
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(2)

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

Medium: Air or Natural Gas

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

Output Signal

Pneumatic signal as required by the actuator, up to full supply pressure

Minimum Span: 0.4 bar (6 psig)
Maximum Span: 9.5 bar (140 psig)
Action: ■ Double, ■ Single Direct, or ■ Single Reverse

Steady-State Air Consumption(3)(4)

Standard Relay:
At 1.4 bar (20 psig) supply pressure:
Less than 0.38 normal m^3/hr (14 scfh)
At 5.5 bar (80 psig) supply pressure:
Less than 1.3 normal m^3/hr (49 scfh)

Maximum Output Capacity(3)(4)

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

Operating Ambient Temperature Limits(2)(5)

-40 to 85°C (-40 to 185°F) for base unit
-52 to 85°C (-62 to 185°F) for base unit utilizing the Extreme Temperature option (fluorosilicone elastomers)
-52 to 125°C (-62 to 257°F) for remote-mount feedback unit

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 Impedance

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

Humidity Limits

Tested per IEC 61514-2

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Specifications (continued)

Electrical Classification

Hazardous Area:

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

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

ATEX—Intrinsically Safe, Flameproof, Type n, Dust by intrinsic safety

IECEx—Intrinsically Safe, Flameproof, Type n, Dust by intrinsic safety or by enclosure

Electrical Housing:

CSA— Type 4X, IP66

FM— Type 4X, IP66

ATEX— IP66

IECEx— IP66

Other Classifications/Certifications

Lloyds Register— Marine Type Approval

CUTR—Customs Union Technical Regulations (Russia, Kazakhstan, Belarus, and Armenia)

ESMA— Emirates Authority for Standardization and Metrology - ECAS-Ex (UAE)

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

KTL— Korea Testing Laboratory (South Korea)

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

SANS— South African Bureau of Standards

Contact your Emerson sales office for classification/certification specific information

Connections

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

Actuator Compatibility

Stem Travel (Sliding-Stem Linear)
Linear actuators with rated travel between 6.35 mm (0.25 inch) and 606 mm (23.375 inches)

Shaft Rotation (Quarter-Turn Rotary)
Rotary actuators with rated travel between 45 degrees and 180 degrees

Weight

DVC6005 HW2 Base Unit: 4.1 kg (9 lbs)

DVC6015 Feedback Unit: 1.3 kg (2.9 lbs)
DVC6025 Feedback Unit: 1.4 kg (3.1 lbs)
DVC6035 Feedback Unit: 0.9 kg (2.0 lbs)

Construction Materials

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

Options

■ Supply and output pressure gauges or ■ Tire valves
■ Integral mounted filter regulator
■ Low-Bleed Relay(7) ■ Extreme Temperature

■ **Integral 4-20 mA Position Transmitter(8)(9):**
4-20 mA output, isolated
Supply Voltage: 8-30 VDC
Reference Accuracy: 1% of travel span

■ **Integral Switch(8):**
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

NOTE: Specialized instrument terms are defined in ANSI/ISA Standard 51.1 - Process Instrument Terminology.
1. 3-conductor shielded cable, 22 AWG minimum wire size, is required for connection between base unit and feedback unit. Pneumatic tubing between base unit output connection and actuator has been tested to 91 meters (300 feet). At 15 meters (50 feet) there was no performance degradation. At 91 meters there was minimal pneumatic lag.
2. The pressure/temperature limits in this document and any other applicable code or standard should not be exceeded.
3. Normal m^3/hour - Normal cubic meters per hour at 0°C and 1.01325 bar, absolute. Scfh - Standard cubic feet per hour at 60°F and 14.7 psia.
4. Values at 1.4 bar (20 psig) based on a single-acting direct relay; values at 5.5 bar (80 psig) based on double-acting relay.
5. Temperature limits vary based on hazardous area approval.
6. Not applicable for DVC6020 digital valve controllers in long-stroke applications or remote-mounted DVC6005 digital valve controllers with long pneumatic tubing lengths.
7. The Quad O steady-state consumption requirement of 6 scfh can be met by a DVC6000 HW2 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).
8. The electronic output is available with either the position transmitter or the switch.
9. Position transmitter meets the requirements of NAMUR NE43; selectable to show failure low (< 3.6 mA) or failure high (> 22.5 mA). Fail high available only when the positioner is powered.

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