Fisher™ FIELDVUE™ DVC6200 Digital Valve Controller

This manual applies to

Instrument Level	HC, AD, PD, ODV	
Device Type	1309	
Hardware Revision	2	
Firmware Revision	7	
Device Revision	1	3
DD Revision	7	1

W9713

Contents

Section 1 Introduction

Installation, Pneumatic and Electrical Connections, and Initial Configuration

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

Scan or click to access field support

Scope of Manual

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

This instruction manual describes using an Emerson handheld communicator to set up and calibrate the instrument. You can also use Fisher ValveLink™ software or ValveLink Mobile 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.

Do not install, operate, or maintain a DVC6200 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.

Conventions Used in this Manual

Navigation paths and fast-key sequences are included for procedures and parameters that can be accessed using the handheld communicator.

For example, to access Device Setup:

Handheld Communicator	Configure > Guided Setup > Device Setup (2-1-1)

Refer to Appendix B for handheld communicator menu trees.

Note

Fast-key sequences are only applicable to the 475 Field Communicator. They do not apply to the Trex™ Device Communicator.

Description

DVC6200 digital valve controllers (figures 1-1 and 1-2) are communicating, microprocessor-based current-to-pneumatic instruments. In addition to the traditional function of converting an input current signal to a pneumatic output pressure, the DVC6200 digital valve controller, using the HART® communications protocol, gives easy access to information critical to process operation. You can gain information from the principal component of the process, the control valve itself, using the handheld communicator at the valve, or at a field junction box, or by using a

Figure 1-1. FIELDVUE DVC6200 Digital Valve Controller Mounted on a Fisher Sliding-Stem Valve Actuator

X1182-1

Figure 1-2. FIELDVUE DVC6200 Digital Valve Controller Integrally Mounted to a Fisher GX Control Valve

W9616

personal computer or operator's console within the control room. Additionally, an option is available which provides isolated circuitry for a valve position transmitter (for separate valve position feedback) or an integrated switch that can be set as a limit switch or an alert switch.

Using a personal computer and ValveLink software or AMS Suite: Intelligent Device Manager, or a handheld communicator, you can perform several operations with the DVC6200 digital valve controller. You can obtain general information concerning software revision level, messages, tag, descriptor, and date.

Diagnostic information is available to aid you when troubleshooting. Input and output configuration parameters can be set, and the digital valve controller can be calibrated. Refer to table 1-1 for details on the capabilities of each diagnostic tier.

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

The DVC6200 digital valve controller is designed to directly replace standard pneumatic and electro-pneumatic valve mounted positioners.

Table 1-1. Instrument Level Capabilities

CAPABILITY	DIAGNOSTIC LEVEL(2)			
	HC	AD	PD	ODV
Auto Calibration	X	X	X	X
Custom Characterization	X	X	X	X
Burst Communication	X	X	X	X
Alerts	X	X	X	X
Step Response, Drive Signal Test & Dynamic Error Band		X	X	X
Advanced Diagnostics (Valve Signature)		X	X	X
Performance Tuner(3)		X	X	X
Travel Control - Pressure Fallback		X	X	X
Supply Pressure Sensor	X(4)	X	X	X
Performance Diagnostics			X	X
Solenoid Valve Testing			X	X
Lead/Lag Set Point Filter(1)				X

1. Refer to brochure part # D351146X012 for information on Fisher optimized digital valves for compressor antisurge applications.
2. HC = HART Communicating ; AD = Advanced Diagnostics ; PD = Performance Diagnostics ; ODV = Optimized Digital Valve.
3. Performance Tuner is only available in ValveLink software.
4. Supply Pressure Sensor available starting with Firmware 7.

Specifications

⚠ WARNING

Refer to table 1-2 for specifications. Incorrect configuration of a positioning instrument could result in the malfunction of the product, property damage or personal injury.

Specifications for DVC6200 digital valve controllers are shown in table 1-2. Specifications for the Device Communicator can be found in the Device Communicator quick start guide.

Related Documents

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

- Bulletin 62.1:DVC6200 - Fisher FIELDVUE DVC6200 Digital Valve Controller (D103415X012)
- Bulletin 62.1:DVC6200(S1) Fisher FIELDUVE DVC6200 Digital Valve Controller Dimensions (D103543X012)
- Bulletin 62.1:Digital Valve Controller - Fisher FIELDVUE Digital Valve Controller Product Selection (D104363X012)
- Fisher FIELDVUE DVC6200 Series Digital Valve Controller Quick Start Guide (D103556X012)
- FIELDVUE Digital Valve Controller Split Ranging (D103262X012)
- Using FIELDVUE Instruments with the Smart HART Loop Interface and Monitor (HIM) (D103263X012)
- Using FIELDVUE Instruments with the Smart Wireless THUM Adapter and a HART Interface Module (HIM) (D103469X012)
- Audio Monitor for HART Communications (D103265X012)
- HART Field Device Specification - Supplement to Fisher FIELDVUE DVC6200 Digital Valve Controller (D103639X012)
- Using the HART Tri-Loop HART-to-Analog Signal Converter with FIELDVUE Digital Valve Controllers (D103267X012)
- Implementation of Lock-in-Last Strategy (D103261X012)
- Fisher HF340 Filter Instruction Manual (D102796X012)
- AMS Trex Device Communicator User Guide
- ValveLink Software Help or Documentation

All documents are available from your Emerson sale office or at Fisher.com.

Table 1-2. Specifications

Available Mounting

DVC6200 digital valve controller or DVC6215 feedback unit: ■ Integral mounting to Fisher 657/667 or GX actuators ■ Window mounting to Fisher rotary actuators ■ Sliding-stem linear applications ■ Quarter-turn rotary applications

DVC6205 base unit for 2 inch pipestand or wall mounting (for remote-mount)

The DVC6200 digital valve controller or DVC6215 feedback unit 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; 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(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

Medium: Air or Natural Gas

Supply medium must be clean, dry and noncorrosive.

Per ISA Standard 7.0.01
A maximum 40 micrometer particle size in the air system is acceptable. Further filtration down to 5 micrometer particle size is recommended. Lubricant content is not to exceed 1 ppm weight (w/w) or volume (v/v) basis. Condensation in the air supply should be minimized.

Per ISO 8573-1
Maximum particle density size: Class 7
Oil content: Class 3
Pressure Dew Point: Class 3 or at least 10°C less than the lowest ambient temperature expected

Output Signal

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

Steady-State Air Consumption(2)(3)

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)

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

Maximum Output Capacity(2)(3)

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(1)(4)

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

Independent Linearity(5)

Typical Value: ±0.50% of output span

Electromagnetic Compatibility

Meets EN 61326-1:2021
Immunity—Industrial locations per Table 2 of the EN 61326-1 standard. Performance is shown in table 1-3 below.
Emissions—Class A
ISM equipment rating: Group 1, Class A

-continued-

Table 1-2. Specifications (continued)

Lightning and Surge Protection—The degree of immunity to lightning is specified as Surge immunity in table 1-3. For additional surge protection commercially available transient protection devices can be used.

Vibration Testing Method

Tested per ANSI/ISA-S75.13.01 Section 5.3.5. A resonant frequency search is performed on all three axes. The instrument is subjected to the ISA specified 1/2 hour endurance test at each major resonance.

Input 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

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 Dust by intrinsic safety

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

Electrical Housing

CSA— Type 4X, IP66

FM— Type 4X, IP66

ATEX— IP66

IECEx— IP66

Other Classifications/Certifications

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

ABS— Marine Type Approval

BV— Marine Type Approval

DNV— Marine Type Approval

Lloyds Register— Marine Type Approval

CCC— China Compulsory Certification

CML— Certification Management Limited (Japan)

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

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

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

KOSHA— Korean Occupational Safety & Health Agency (South Korea)

KTL— Korea Testing Laboratory (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)

SANS— South Africa National 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: 3/8 NPT internal
Electrical: 1/2 NPT internal or M20

Actuator Compatibility

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

Quarter-Turn Rotary
Rotary actuators with rated travel between 45 degrees and 180 degrees(6)

Weight

DVC6200
Aluminum: 3.5 kg (7.7 lbs)
Stainless Steel: 8.6 kg (19 lbs)

DVC6205: 4.1 kg (9 lbs)
DVC6215: 1.4 kg (3.1 lbs)

Construction Materials

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

-continued-

Table 1-2. Specifications (continued)

Options

■ Supply and output pressure gauges or
■ Tire valves ■ Integral mounted filter regulator
■ Low-Bleed Relay(7) ■ Extreme Temperature
■ Remote Mount(8) ■ Stainless Steel

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

■ Integral Switch(9):
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

Contact your Emerson sales office or go to Fisher.com for additional information

Declaration of SEP

Fisher Controls International LLC declares this product to be in compliance with Article 4 paragraph 3 of the PED Directive 2014/68/EU. It was designed and manufactured in accordance with Sound Engineering Practice (SEP) and cannot bear the CE marking related to PED compliance.

However, the product *may* bear the CE marking to indicate compliance with *other* applicable European Community Directives.

NOTE: Specialized instrument terms are defined in ANSI/ISA Standard 51.1 - Process Instrument Terminology.
1. The pressure/temperature limits in this document and any other applicable code or standard should not be exceeded.
2. 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.
3. Values at 1.4 bar (20 psig) based on a single-acting direct relay; values at 5.5 bar (80 psig) based on double-acting relay.
4. 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).
5. 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.
6. Rotary actuators with 180 degree rated travel require a special mounting kit; contact your Emerson sales office for kit availability
7. The Quad O steady-state consumption requirement of 6 scfh can be met by a DVC6200 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. 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). At 15 meters (50 feet) there was no performance degradation. At 91 meters there was minimal pneumatic lag.
9. The electronic output is available with either the position transmitter or the integral switch.

Table 1-3. 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
	Radiated EM field	IEC 61000-4-3	80 to 1000 MHz @ 10 V/m with 1 kHz AM at 80% 1400 to 2000 MHz @ 10 V/m with 1 kHz AM at 80% 2000 to 2700 MHz @ 10 V/m with 1 kHz AM at 80% 2700 to 6000 MHz @ 10V/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
	Surge	IEC 61000-4-5	1 kV	B
	Conducted RF	IEC 61000-4-6	150 kHz to 80 MHz at 3 Vrms	A

Performance criteria
DVC6200: +/- 1%
DVC6205 Remote Mount: +/- 2%
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.

Educational Services

Emerson Automation Solutions
Educational Services - Registration
Phone: +1-800-338-8158
e-mail: education@emerson.com
emerson.com/mytraining

Section 2 Wiring Practices

Control System Requirements

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

HART Filter

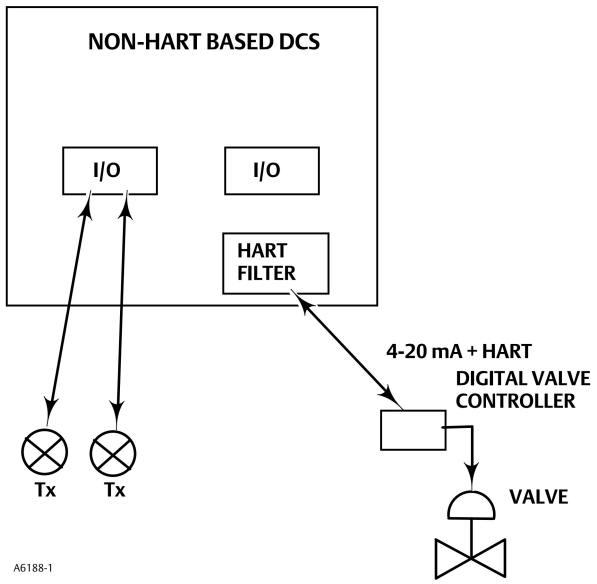
Depending on the control system you are using, a HART filter may be needed to allow HART communication. The HART filter is a passive device that is inserted in field wiring from the HART loop. The filter is normally installed near the field wiring terminals of the control system I/O (see figure 2-1). Its purpose is to effectively isolate the control system output from modulated HART communication signals and raise the impedance of the control system to allow HART communication. For more information on the description and use of the HART filter, refer to the appropriate HART filter instruction manual.

To determine if your system requires a filter contact your Emerson sales office.

Note

A HART filter is typically NOT required for any of the Emerson control systems, including PROVOX™, RS3™, and DeltaV™ systems.

Figure 2-1. HART Filter Application



Voltage Available

The voltage available at the DVC6200 digital valve controller must be at least 10 VDC. 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 2-2, the voltage available at the instrument depends upon:

- the control system compliance voltage
- if a filter, wireless THUM adapter, or intrinsic safety barrier is used, and
- the wire type and length.

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

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

Voltage Available = [Control System Compliance Voltage (at maximum current)] - [filter voltage drop (if a HART filter is used)] - [total cable resistance $\times$ maximum current] - [barrier resistance x maximum current].

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

Table 2-1 lists the resistance of some typical cables.

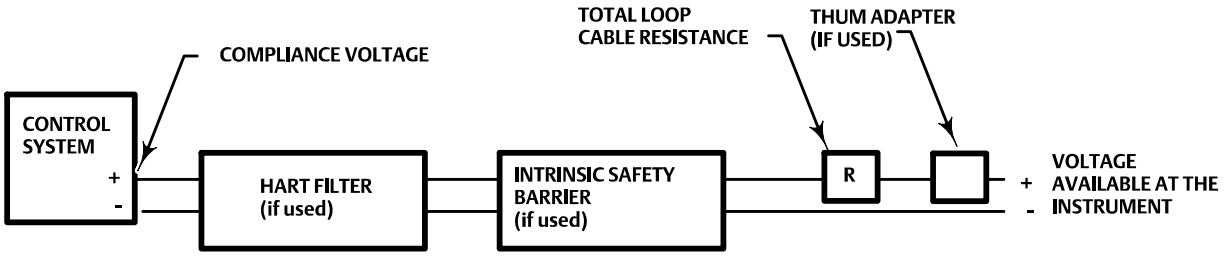
The following example shows how to calculate the voltage available for a Honeywell™ TDC2000 control system with a HF340 HART filter, and 1000 feet of Belden™ 9501 cable:

Voltage available = [18.5 volts (at 21.05 mA)] - [2.3 volts] - [48 ohms $\times$ 0.02105 amps]

Voltage available = [18.5] - [2.3] - [1.01]

Voltage available = 15.19 volts

Figure 2-2. Determining Voltage Available at the Instrument



Calculate Voltage Available at the Instrument as follows:	**Example Calculation**
Control system compliance voltage	**18.5 volts (at 21.05 mA)**
– Filter voltage drop (if used) 1	**– 2.3 volts (for HF300 filter)**
– Intrinsic safety barrier resistance (if used) x maximum loop current	**– 2.55 volts (121 ohms x 0.02105 amps)**
– Smart Wireless THUM adapter voltage drop (if used) 2	
– Total loop cable resistance x maximum loop current	**– 1.01 volts (48 ohms x 0.02105 amps for 1000 feet of Belden 9501 cable)**
= Voltage available at the instrument 3	**= 15.19 volts, available—if safety barrier (2.55 volts) 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 3.

2 The voltage drop of the THUM adapter is linear from 2.25 volts at 3.5 mA to 1.2 volts at 25 mA.

3 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 volts.