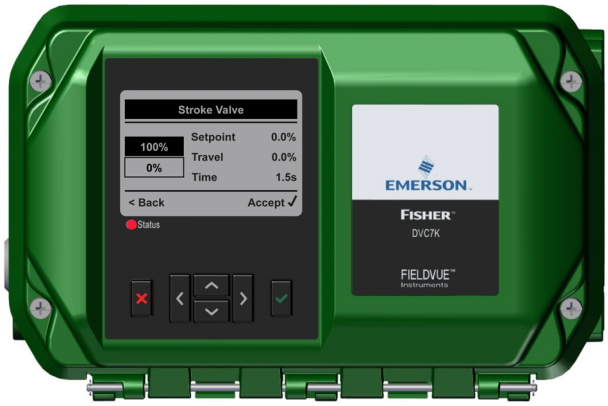
Fisher™ FIELDVUE™ DVC7K Digital Valve Controller for On/Off Applications

The FIELDVUE DVC7K digital valve controller is reliable and intuitive, featuring diagnostics that are targeted for your On/Off applications. It converts a 4-20 mA or 24 VDC input signal into a pneumatic output signal that controls the actuator on the valve. Perform setup and configuration procedures, check the valve health, and get Advice at the Device™ using the simple-to-use Local User Interface (LUI). The interface can be configured to support multiple languages with a few button pushes.



STROKE TIME ANALYSIS AVAILABLE FOR ON/OFF APPLICATIONS

Features

Reliability

- Linkage-Less Non-Contact Position Feedback— The high performance, linkage-less feedback system, shown in figure 1, eliminates physical contact between the valve stem and the instrument. There is no wearing of parts so cycle life is maximized. Additionally, the elimination of levers and linkages reduces the number of mounting parts and mounting complexity. Instrument replacement and maintenance is simplified because the feedback parts stay connected to the actuator stem.

- Built to Survive— The DVC7K's field proven conformal coated electronics resist the effects of vibration, temperature, and corrosive atmospheres. A weather-tight housing construction protects the wiring terminal box and critical components from harsh environmental conditions.

- Eliminate Solenoids— DVC7Ks in the On/Off Application Mode provide a more reliable solution over traditional solenoid valves. They also provide diagnostic alerts to support early identification of problems.

Performance

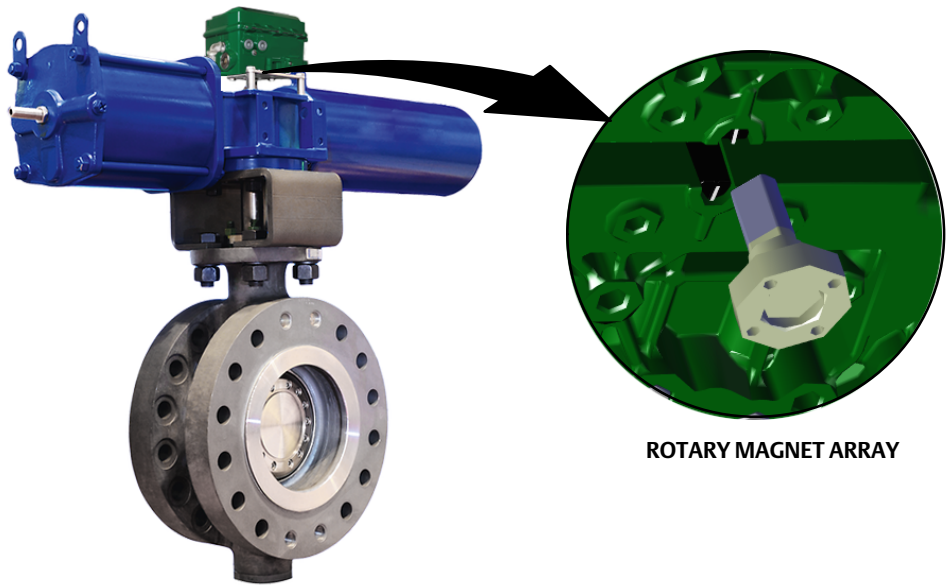
- Accurate and Responsive— The two-stage instrument design provides quick response. Additionally, the DVC7K allows users to customize the performance of their valve, with a configurable ramp open rate and ramp closed rate.

Ease of Use

- Enhanced Safety— The DVC7K is a HART® communicating device, 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.

- Local User Interface (LUI)— The full text display in the local interface is easy to navigate due to the six button LUI (figure 2). Each unit can be configured to display Arabic, Chinese, Czech, English, French, German, Italian, Japanese, Korean, Polish, Portuguese, Russian, or Spanish. View the Travel vs. Travel Setpoint, Instrument Mode, and Valve Health instantly from the home screen.

Figure 1. Linkage-Less Non-Contact Feedback System



- Valve Health— Identify the health status of the valve assembly at a distance with the NE 107 LED indicator. Quickly troubleshoot issues and identify recommended actions with Advice at the Device. Additionally, use the LUI to view primary variables like supply pressure and input current.

- Faster Commissioning— HART communications allow the user to quickly commission loops with a variety of tools from a remote location or locally at the valve assembly with the LUI.

- Flexible Connectivity— Emerson's secure Bluetooth® wireless technology implementation (future release) enables ability to see health across multiple valves.

- Easy Maintenance— The DVC7K is modular in design. Critical working components can be replaced without removing field wiring or pneumatic tubing.

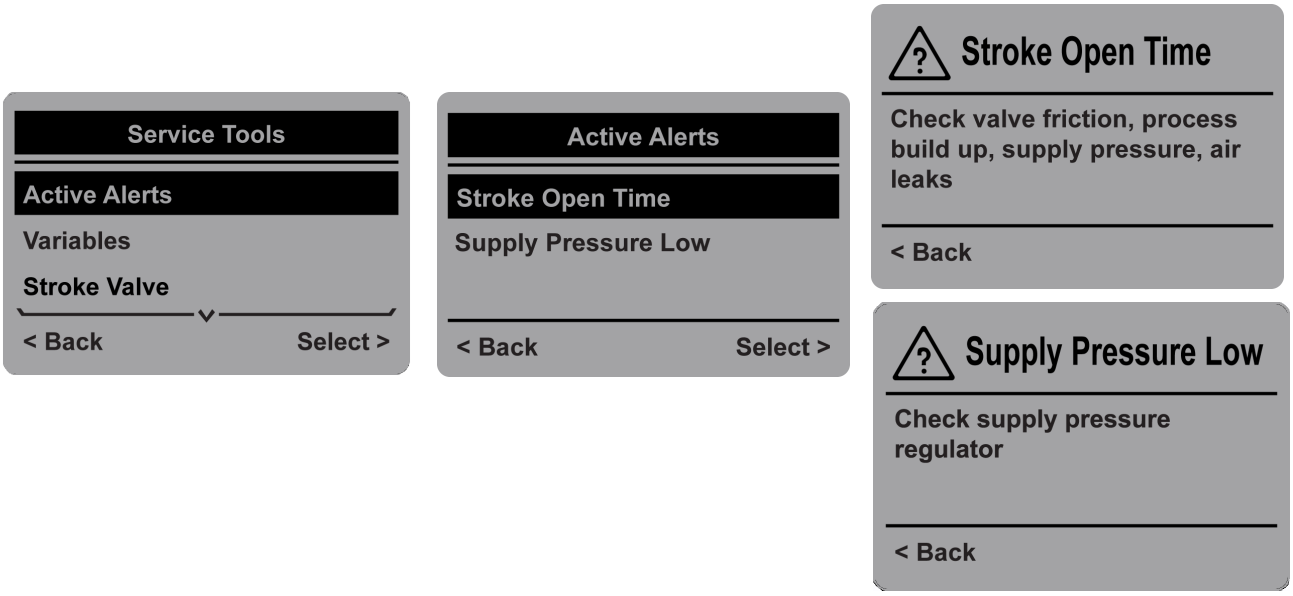
Value

- 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 and switch option. Solenoid valves can also be eliminated with the On/Off application mode capabilities.

- Increased Uptime— The self-diagnostic capability of the DVC7K 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 decisions can be made by analysis of valve information through any HART communicating asset management software.

Figure 2. Local User Interface



Valve Diagnostics

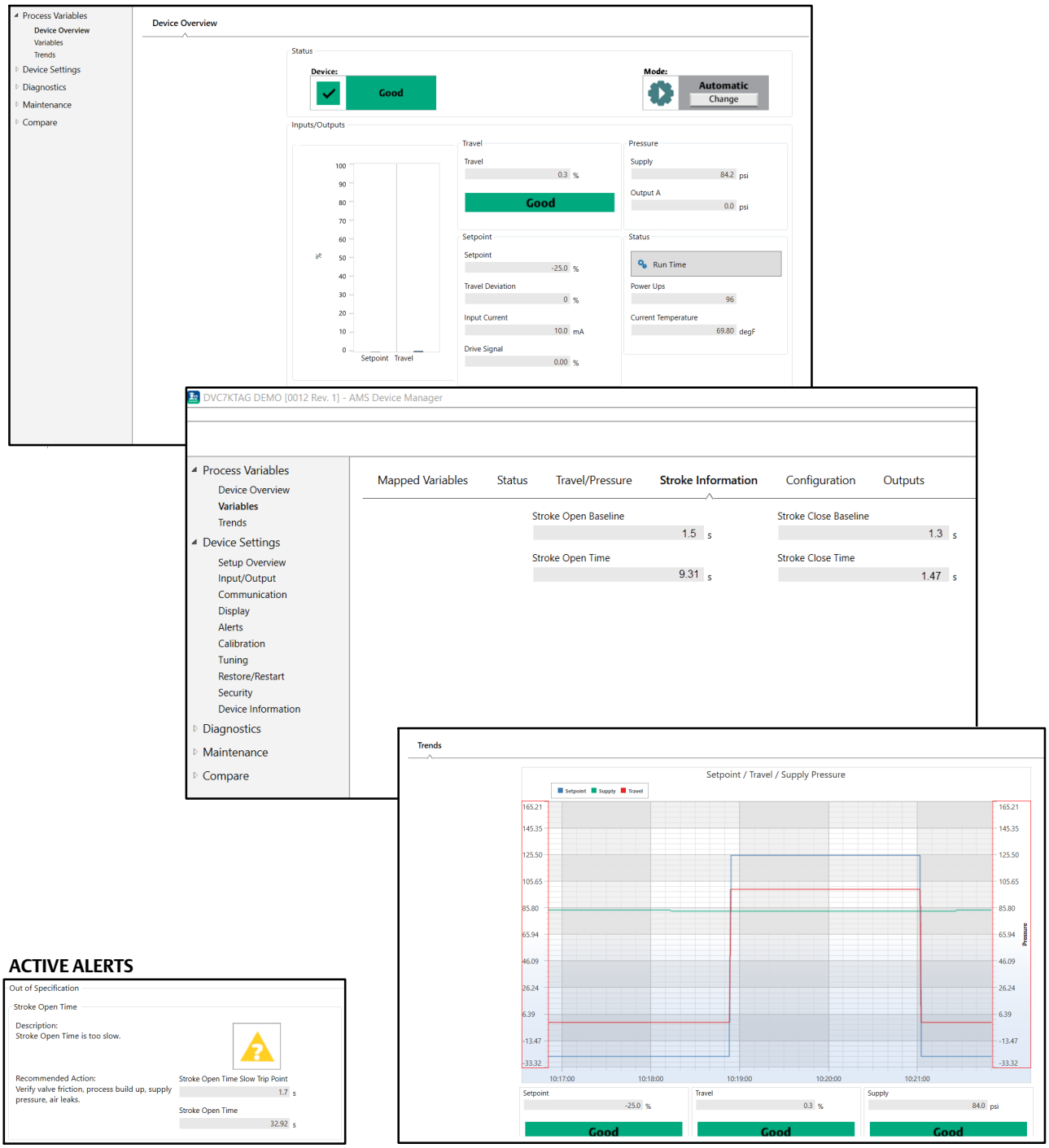
With the DVC7K digital valve controller's enhanced memory, it's able to provide a comprehensive library of valve diagnostic alerts, as shown in figure 3. These diagnostics and recommended actions are easily accessed with an Emerson handheld communicator or from the LUI. When installed as part of a HART communicating system, the DVC7K delivers prompt notification of current or potential equipment issues directly to the asset management system and supports NAMUR NE107 alert categorization.

Alerts assist in identification and notification of the following situations:

- Stroke open and/or stroke close degradation
- Valve travel deviation identifies stuck valves that don't make full travel
- Cycle count / Travel Accumulator
- Various instrument mechanical and electrical issues

Leverage an Emerson handheld communicator to view the instrument Event Log which stores alerts in memory on board the DVC7K, view graphical data, and quickly identify the stroke open and stroke close times.

Figure 3. Remote Interface Examples [via DD (Device Description) and FDI (Field Device Integration) Package]



ACTIVE ALERTS

Specifications

Available Mounting

■ Integral mounting to Fisher rotary and sliding-stem actuators

■ Mounting to Bettis and Emerson rotary, sliding-stem, and isolation actuators

■ Quarter-turn rotary actuators

DVC7K 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 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 10.2 VDC for analog control, 10.7 VDC for HART communication
Minimum Control Current: 4.0 mA
Minimum Current w/o Microprocessor Restart: 3.8 mA
Maximum Voltage: 30 VDC
Overcurrent protected
Reverse Polarity protected

24VDC

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 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.

Pressure dew point: At least 10°C less than the lowest ambient temperature expected

Per ISO 8573-1
Maximum particle density size: Class 7
Oil content: Class 3
Pressure dew point: Class 3

Output Signal

Pneumatic signal, up to full supply pressure

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

Steady-State Air Consumption(2)(3)

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(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)

Standard: -40 to 80°C (-40 to 176°F) includes nitrile elastomers
Extreme Temperature Option: -45 to 80°C (-49 to 176°F) includes fluorosilicone elastomers
High Temperature Option: -40 to 80°C (-40 to 176°F) includes fluorosilicone elastomers

Independent Linearity(5)

Typical Value: ±0.5% 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

General Electrical Safety - Environmental Conditions

Use: Indoor and Outdoor

Altitude: up to 2000 m

Temperature: see operating ambient temperature limits

Humidity Testing Method: Tested per IEC61514-2

Supply Voltage Fluctuations: N/A, not connected to Mains

continued on next page

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Specifications (continued)

General Electrical Safety - Environmental Conditions (continued)

Transient Overvoltage: Category I

Pollution Degree: 2

Wet Locations: Yes

Vibration Testing Method

Tested per ANSI/ISA-S75.13.01 Section 5.3.5.

Input Impedance

An equivalent impedance of 550 ohms may be used. This value corresponds to 11 V @ 20 mA.

Humidity Testing Method

Tested per IEC 61514-2

Hazardous Area Approvals (PENDING)

CSA— Intrinsically Safe, Explosion-proof, Dust-Ignition-proof, Increased Safety, Class/Div/Zone (Canada and/or United States, see Selection Matrix)

ATEX— Intrinsically Safe, Flameproof, Dust-Ignition-proof, Increased Safety

IECEx— Intrinsically Safe, Flameproof, Dust-Ignition-proof, Increased Safety

NEPSI— Intrinsically Safe, Flameproof, Dust-Ignition-proof, Increased Safety

Not all certifications apply to all constructions. Contact your Emerson sales office or refer to the DVC7K product page at Fisher.com for approval specific information.

Electrical Housing (PENDING)

CSA— Type 4X, IP66

FM— Type 4X, IP66

ATEX— IP66

IECEx— IP66

Connections

Supply Pressure: 1/4 NPT internal or G1/4 and integral pad for mounting 67CFR regulator
Output Pressure: 1/4 NPT internal or G1/4
Tubing: 3/8-inch recommended
Vent: 1/2 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(6)

Weight

Aluminum: 3.9 kg (8.9 lbs)

Construction Materials

Housing and Front Cover:
EN AC-43400/EN AC-AlSi10Mg(Fe) copper free die cast aluminum (standard)
LUI Cover: polycarbonate
Elastomers: Silicone Environmental / Nitrile Internal (standard temperature), Silicone Environmental / Fluorosilicone Internal (extreme temperature)

Control Tier

Throttling Control (TC): Supports Throttling and On/Off Application Modes
Discrete Control (DC): Supports On/Off Application Mode only

Options

■ Integral mounted filter regulator ■ Low-Bleed Relay(7) ■ Extreme Temperature ■ High Temperature ■ Integral 4-20 mA Position Transmitter(8)(9) ■ Integral Switches(10)(11) ■ Pipe-away Vent Connection

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.
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 DVC7K 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. 4-20 mA output, isolated; *Supply Voltage:* 11-30 VDC; *Reference Accuracy:* 1% of travel span.
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 instrument is powered.
10. Two isolated switches, 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.
11. Switch 1 is a normally open circuit and Switch 2 is a normally closed circuit.

DVC7K Product Selection Matrix

Base Instrument Model	
DVC7K	Electro-Pneumatic Digital Valve Controller
1. Communication Protocol	
1H	HART 7 Communication
2. Hazardous Area Approval Agency/Location/Protection Method	
2A	None - EMC Compliance to CE, IEC 61010 and IEC 61000-4
2B	cCSAus - Intrinsically Safe, Explosion-proof, Dust-Ignition-proof, Increased Safety, Class/Div/Zone (Canada and United States)
2C	IECEx - Intrinsically Safe, Flameproof, Dust-Ignition-proof, Increased Safety (Includes Certified Blanking Element)
2D	ATEX - Intrinsically Safe, Flameproof, Dust-Ignition-proof, Increased Safety (Includes Certified Blanking Element)
2E	NEPSI (China) - Intrinsically Safe, Flameproof, Dust-Ignition-proof, Increased Safety
2F	cCSA - Intrinsically Safe, Explosion-proof, Dust-Ignition-proof, Increased Safety, Class/Div (Canada)
2G	CSAus - Intrinsically Safe, Explosion-proof, Dust-Ignition-proof, Increased Safety, Class/Div/Zone (United States)
2H	ATEX/IECEx - Intrinsically Safe, Flameproof, Dust-Ignition-proof, Increased Safety (includes Certified Blanking Element)
3. Housing Material	
3A	VOC Free Powder Coated Copper-Free Aluminum
4. Temperature Range	
4A	Standard -40 to +80°C (see specific Ex markings for deratings); Clock Battery Backup included
4B	Extreme Temperature -45 to +80°C (see specific Ex markings for deratings); Clock Battery Backup not supported
4C	High Temperature -40 to +80°C (see specific Ex markings for deratings); Clock Battery Backup included
5. Electrical/Pneumatic Connections	
5A	Imperial - 1/2 NPT Electrical / 1/4 NPT Pneumatic
5B	Metric - M20 Electrical / G1/4 Pneumatic
5C	Metric/Imperial - M20 Electrical / 1/4 NPT Pneumatic
6. I/O Functions	
6A	None (I/O Electronics not included)
6B	I/O Options: (Qty 1) 4-20 mA Position Transmitter, (Qty 2) Solid State Dry Contact Switches
7. Local User Interface	
7B	Local User Interface (LED, LCD, Buttons)
8. Pneumatic Action	
8A	DOUBLE-Acting Operation (Relay A)
8B	Single-Acting REVERSE Operation (Relay B)
8C	Single-Acting DIRECT Operation (Relay C)
8D	Single-Acting DIRECT Operation (Relay A)
8E	DOUBLE-Acting Low Bleed Operation (Relay A Low Bleed)
8F	Single-Acting REVERSE Low Bleed Operation (Relay B Low Bleed)
8G	Single-Acting DIRECT Low Bleed Operation (Relay C Low Bleed)
8H	Single-Acting DIRECT Low Bleed Operation (Relay A Low Bleed)

9. Pneumatic Block (Imperial or Metric Pneumatic Connections per Housing Construction)	
9A	None
9B	Gauge Block with Pipe Plugs
9C	Gauge Block with Tire Valve Connections
9D	Gauge Block with Supply & Output Gauges, dual scaled 0-60 psig, 0-4 bar
9E	Gauge Block with Supply & Output Gauges, dual scaled 0-60 psig, 0-0.4 Mpa
9F	Gauge Block with Supply & Output Gauges, dual scaled 0-60 psig, 0-4 kg/cm2
9G	Gauge Block with Supply & Output Gauges, dual scaled 0-160 psig, 0-11 bar
9H	Gauge Block with Supply & Output Gauges, dual scaled 0-160 psig, 0-1.1 Mpa
9I	Gauge Block with Supply & Output Gauges, dual scaled 0-160 psig, 0-11 kg/cm2
10. Wireless Interface Tier	
BLR	Bluetooth ready (future firmware update required to field enable - no additional purchase required)
BLD	Bluetooth disabled PERMANENTLY from the factory
11. Control Tier	
TC	Throttling Control (Field configurable to Throttling or End Point Open/Close with Application Mode)
DC	On/Off Control (End Point Open/Close Only)
12. Instrument Tier	
XX	None
13. Power Source(1)	
CS	4-20 mA
VS	24 VDC
14. Local User Interface Language(1)	
AR	Arabic
CH	Chinese
CZ	Czech
EN	English
FR	French
DE	German
IT	Italian
JA	Japanese
KO	Korean
PO	Polish
PT	Portuguese
RU	Russian
ES	Spanish
15. Electrical Conduit Connection 1 (Left Side)	
XX	None
SBE	Standard Blanking Element
CBE	Certified Blanking Element(2)
CG1	Cable Gland: Intrinsically Safe, blue plastic
CG2	Cable Gland: Flameproof, ENC Brass
TPP	Protective Plastic Pipe Plugs for electrical conduit opening

16. Electrical Conduit Connection 2 (Left Bottom)	
XX	None[3]
SBE	Standard Blanking Element
CBE	Certified Blanking Element
CG1	Cable Gland: Intrinsically Safe, blue plastic
CG2	Cable Gland: Flameproof, ENC Brass
TPP	Protective Plastic Pipe Plugs for electrical conduit opening
17. Electrical Conduit Connection 3 (Right Bottom)	
XX	None
SBE	Standard Blanking Element
CBE	Certified Blanking Element[2]
CG1	Cable Gland: Intrinsically Safe, blue plastic
CG2	Cable Gland: Flameproof, ENC Brass
TPP	Protective Plastic Pipe Plugs for electrical conduit opening
18. Additional Options[4]	
XX	None
PP	Protective plastic pipe plugs for pneumatic or conduit openings
PI	Pipeaway vent connection for 1/2 inch pipe
VD	Configured for Direct Mount (adaptor included) to Pneumatic Module per VDI/VDE 3847-1 and VDI/VDE 3847-2, Single-Acting Direct without Rebreather and Double-Acting
VDR	Configured for Direct Mount (adaptor included) to Pneumatic Module per VDI/VDE 3847-1 and VDI/VDE 3847-2, Single-Acting Direct with Rebreather[5]
SF	10-micron in-line air supply filter
HF	HART Filter (DIN rail-mounted to support HART communications with HART incompatible hosts)
LC	LC340 Line Conditioner[6]
CC	Custom configuration - detail requirements separately

1. Option is field configurable
2. Standard for ATEX and IECEx approved devices on Electrical Conduit Connection 1 and 3
3. Default for all orders
4. Select more than one option if required
5. European Sourcing Only
6. Use 24VDC, Multi-Drop for HART communications

Typical model number:

	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**
DVC7K	1H	2G	3A	4A	5A	6A	7B	8G	9A	BLR	DC	XX	CS	EN	SBE	XX	SBE	XX

Enter your choices to start the selection process:

	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**
DVC7K	1H		3A				7B					XX						

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