

CRN: 26172

FISHER CONTROLS SA

MM567VOL.3

Z6	2025-02-19	EQUIV. I027/24E (REV. 1); DDR P24/0293		SZ	lt	MWP	ESKOM
Z5	2021-07-27	EQUIV. I015/19E (REV. 0); DDR 380/20		CM	EP	WM	ESKOM
Z4	2014-01-31	DDR 918/12		PK	SB	SLS	ESKOM
Z3	2011-05-09	DDR 534/11		SB	EP	EJK	ESKOM
Z2	2000-08-22	MOD. 90035; DDR 1119/00		RA	FGA	FD	ESKOM
REV	DATE	MODIFICATIONS		DR. By	CH. By	APPR. By	STATUS



KNPS
KOEBERG NUCLEAR POWER STATION

DOCUMENT NUMBER	K	B	A	1	2	2	0	B	0	4	0	5	9								
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Fisher® FIELDVUE™ DVC6000 Digital Valve Controllers

FIELDVUE DVC6000 digital valve controllers are communicating, microprocessor-based current-to-pneumatic instruments. In addition to the traditional function of converting a current signal to a valve-position pressure signal, DVC6000 digital valve controllers, using HART® communications protocol, give easy access to information critical to process operation. This can be done using a Field Communicator at the valve or at a field junction box, or by using a personal computer or a system console within the control room. Using HART communication protocol, information can be integrated into a control system or received on a single loop basis.

DVC6000 digital valve controllers can be used on

single- or double-acting actuators. The digital valve controller receives feedback of the valve travel position plus supply and actuator pneumatic pressure. This allows the instrument to diagnose not only itself, but also the valve and actuator to which it is mounted. This provides you with very cost effective maintenance information, as the required maintenance can be performed on the instrument and valve when there really is a need.

Wiring is economical because DVC6000 digital valve controllers use two-wire 4 to 20 mA loop power. This provides for low cost replacement of existing analog instrumentation. The two-wire design avoids the high cost of running separate power and signal wiring.



FIELDVUE DVC6010 DIGITAL VALVE CONTROLLER
MOUNTED ON A SLIDING-STEM VALVE ACTUATOR



FIELDVUE DVC6010 DIGITAL VALVE CONTROLLER
MOUNTED ON FISHER 585C PISTON ACTUATOR



Product Bulletin

62.1:DVC6000
July 2013

DVC6000 Digital Valve Controller D102758X012

Specifications

Available Configurations

Valve-Mounted Instrument:

DVC6010: Sliding-stem applications

DVC6020: Rotary applications and long-stroke sliding-stem applications

DVC6030: Quarter-turn rotary applications

Remote-Mounted Instrument⁽¹⁾:

DVC6005: Base unit for 2 inch pipestand or wall mounting

DVC6015: Feedback unit for sliding-stem applications

DVC6025: Feedback unit for rotary or long-stroke sliding-stem applications

DVC6035: Feedback unit for quarter-turn rotary applications

DVC6000 digital valve controllers can be mounted on Fisher and other manufacturers rotary and sliding-stem actuators.

Input Signal

Point-to-Point:

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

Minimum Voltage Available at Instrument Terminals must be 10.5 VDC for analog control, 11 VDC for HART communication (see instrument instruction manual for details)

Minimum Control Current: 4.0 mA

Minimum Current w/o Microprocessor

Restart: 3.5 mA

Maximum Voltage: 30 VDC

Overcurrent Protection: Input circuitry limits current to prevent internal damage

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

Multi-drop:

Instrument Power: 11-30 VDC at approximately 8 mA

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

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, and ■ Single Reverse

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

Air: Supply pressure must be clean, dry air that meets the requirements of ISA Standard 7.0.01.

Natural Gas: Natural gas must be clean, dry, oil-free, and noncorrosive. H₂S content should not exceed 20 ppm.

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

Steady-State Air Consumption⁽³⁾⁽⁴⁾

Standard Relay:

At 1.4 bar (20 psig) supply pressure:

Less than 0.38 normal m³/hr (14 scfh)

At 5.5 bar (80 psig) supply pressure:

Less than 1.3 normal m³/hr (49 scfh)

Low Bleed Relay⁽⁵⁾:

At 1.4 bar (20 psig) supply pressure:

Average value 0.056 normal m³/hr (2.1 scfh)

At 5.5 bar (80 psig) supply pressure:

Average value 0.184 normal m³/hr (6.9 scfh)

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)

Independent Linearity⁽⁶⁾

±0.50% of output span

Electromagnetic Compatibility

Meets EN 61326-1 (First Edition)

Immunity—Industrial locations per Table 2 of the EN 61326-1 standard. Performance is shown in table 2 below.

Emissions—Class A

ISM equipment rating: Group 1, Class A

-continued-

Specifications (continued)

Lightning and Surge Protection—The degree of immunity to lightning is specified as Surge immunity in table 2. 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, plus an additional two million cycles.

Input Impedance

The input impedance of the DVC6000 active electronic circuit is not purely resistive. For comparison to resistive load specifications, an equivalent impedance of 550 ohms may be used. This value corresponds to 11V @ 20 mA.

Operating Ambient Temperature Limits⁽²⁾⁽⁷⁾

-40 to 85°C (-40 to 185°F) for most approved valve-mounted instruments
-60 to 125°C (-76 to 257°F) for remote-mounted feedback units
-52 to 85°C (-62 to 185°F) for valve-mounted instruments utilizing the Extreme Temperature option (fluorosilicone elastomers)

Humidity Limits

0 to 100% condensing relative humidity with minimal zero or span shifts

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

IECEx—Intrinsically Safe, Flameproof, Type n

Refer to tables 3, 4, 5, and 6

Pollution Degree 2, Overvoltage Category III per ANSI/ISA-82.02.01 (IEC 61010-1 Mod).

Electrical Housing:

CSA—Type 4X, IP66

FM—Type 4X, IP66

ATEX—IP66

IECEx—IP66

Other Classifications/Certifications

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

FSETAN—Federal Service of Technological, Ecological and Nuclear Inspectorate (Russia)

GOST-R—Russian GOST-R

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

KGS—Korea Gas Safety Corporation (South Korea)

KISCO—Korea Industrial 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)

TIIS—Technology Institution of Industrial Safety (Japan)

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

IEC 61010 Compliance Requirements (Valve-Mounted Instruments Only)

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 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 conduit connection, M20 adapter optional

-continued-

Specifications (continued)

Stem/Shaft Travel

Linear Actuators with rated travel between 6.35 mm (0.25 inch) and 606 mm (23.375 inches)

Rotary Actuators with rated travel between 50 degrees and 180 degrees

Mounting

Designed for direct actuator mounting or remote pipestand or wall mounting. Mounting the instrument vertically, with the vent at the bottom of the assembly, or horizontally, with the vent pointing down, is recommended to allow drainage of moisture that may be introduced via the instrument air supply.

Weight

Valve-Mounted Instruments

Aluminum: 3.5 kg (7.7 lbs)

Stainless steel: 7.7 kg (17 lbs)

Remote-Mounted Instruments

DVC6005 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 (standard)

CF8M (cast 316 stainless steel) (optional for valve-mounted instruments only)

Cover: Thermoplastic polyester

Elastomers

Standard: Nitrile

Optional: Fluorosilicone

Options

- Supply and output pressure gauges or ■ Tire valves ■ Integral mounted filter regulator
- Stainless steel housing, module base and terminal box (valve-mounted instruments only)
- Low-Bleed Relay, ■ Extreme Temperature
- Remote Mount ■ Inline 10 micrometer air filter ■ Safety Instrumented System (SIS) Solutions
- Safety Related Nuclear Applications ■ Natural Gas Certified, Single Seal Device ■ Feedback Assembly
- PTFE Sleeve Protective Kit for aluminum units in saltwater or particulate environments

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 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 a single-acting direct relay; values at 5.5 bar (80 psig) based on double-acting relay.

5. The Low Bleed Relay is offered as standard relay for DVC6000 SIS, used for On/Off applications.

6. Typical value. Not applicable for DVC6020 digital valve controllers in long-stroke applications or remote-mounted DVC6005 digital valve controllers with long pneumatic tubing lengths.

7. Temperature limits vary based on hazardous area approval.

Features

- **Improved Control**—Two-way digital communications give you current valve conditions. You can rely on this real-time information to make sound process management decisions. By analyzing valve dynamics through ValveLink™ software you can identify control areas needing improvement and maintain a high level of system performance.
- **Environmental Protection**—You can avoid additional field wiring by connecting a leak detector or limit switch to the auxiliary terminals in the DVC6000 digital valve controller. In this way, the instrument will issue an alert if limits are exceeded.
- **Enhanced Safety**—You can check instrument and valve operation and keep the process running smoothly and safely from a remote location. Access is possible at a field junction box, marshalling panel, or within the safety of the control room using either a Field Communicator, a notebook PC, or a system workstation. Your exposure to hazardous environments is minimized and you can avoid having to access hard-to-reach valve locations.
- **Hardware Savings**—DVC6000 digital valve controllers, when used in an integrated system, allow you to realize significant hardware and installation cost savings by replacing other devices in the process loop, such as positioners and limit switches, with a FIELDVUE digital valve controller.

Table 1. FIELDVUE DVC6000 Diagnostic Level Capabilities

CAPABILITY	DIAGNOSTIC LEVEL					
	AC	HC	AD	PD	SIS(1)	ODV
Auto Calibration	✓	✓	✓	✓	✓	✓
Custom Characterization	✓	✓	✓	✓	✓	✓
Burst Communication		✓	✓	✓	✓	✓
Alerts		✓	✓	✓	✓	✓
Step Response, Drive Signal Test & Dynamic Error Band, Valve Signature			✓	✓	✓	✓
Performance Tuner			✓	✓	✓	✓
Travel Control - Pressure Fallback			✓	✓		✓
Performance Diagnostics				✓		✓
Partial Stroke Testing					✓	✓
Lead/Lag Input Filter(2)						✓

1. Refer to Bulletin 62.1:DVC6000 SIS for information on DVC6000 digital valve controllers for Safety Instrumented System (SIS) Solutions.
2. Refer to brochure part # D351146X012 / D351146X412 for information on Fisher optimized digital valves for compressor antisurge applications.

■ **Built to Survive**—Field-tough DVC6000 digital valve controllers have fully encapsulated printed wiring boards that resist the effects of vibration, temperature, and corrosive atmospheres. A separate weather-tight field wiring terminal box isolates field-wiring connections from other areas of the instrument.

■ **Increased Uptime**—With the self-diagnostic capability of the DVC6000, you can answer questions about a valve's performance, without pulling the valve from the line. You can run diagnostics (I/P and relay integrity, travel deviation, and on-line friction and deadband analysis and trending) while the valve is in service and operating. You can also compare the present valve/actuator signature (bench set, seat load, friction, etc.) against previously stored signatures to discover performance changes, before they cause process control problems.

■ **Faster Commissioning**—The two-way communication capability allows you to quickly commission loops by remotely identifying each instrument, verifying its calibration, reviewing stored maintenance notes, and more.

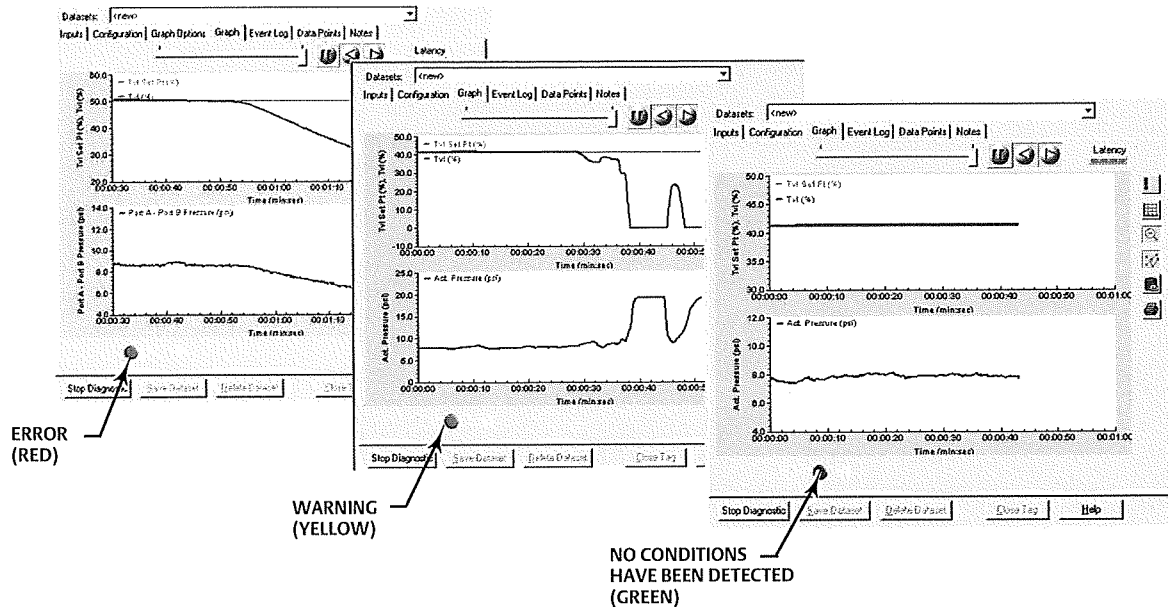
■ **Easy Maintenance**—The DVC6000 is modular in design. The module base can be removed from the instrument housing without disconnecting the field wiring, pneumatic connections or stem linkages. This module contains the critical sub-modules so component removal is quick and simple.

■ **Travel Control - Pressure Fallback**—Valve position feedback is critical to the operation of a digital valve controller. Without this feedback, the control valve assembly traditionally goes to its fail safe position. DVC6000 digital valve controllers can detect position feedback problems caused by a travel sensor failure or linkage failure and continue to operate in "pressure control" mode. If a problem with the valve position feedback is detected, the instrument will automatically disable the travel sensor, send an alert, and control its output pressure much like an I/P transducer. This allows the valve assembly to continue to operate with reduced accuracy until maintenance can be scheduled.

Diagnostics

DVC6000 digital valve controllers are packed with user-configurable alerts and alarms. When integrated with a HART communicating system, these flags provide real-time notification of current and potential valve and instrument problems. With ValveLink software, tests can be performed to identify problems with the entire control valve assembly. Diagnostic capabilities available are Performance Diagnostics (PD) and Advanced Diagnostics (AD). Refer to table 1 for details on the capabilities of each diagnostic level.

Figure 1. Red/Yellow/Green Condition Indicators, Shown in ValveLink Software



Performance Diagnostics

Performance Diagnostics enables the use of diagnostics while the valve is in service and operating.

- Red/Yellow/Green Condition Indicator (see figure 1)
- I/P and Relay Integrity Diagnostic
- Travel Deviation Diagnostic
- One-Button Diagnostic

The One-Button Diagnostic, (shown in figure 2), is a 20 second sweep which runs the I/P and Relay Integrity, Relay Adjustment, Travel Deviation, Supply Pressure, and Air Mass Flow Performance Diagnostic tests. When the sweep is complete, ValveLink software will show any errors, possible causes, and recommended actions to resolve the error(s).

- On-Line/In-Service Friction and Deadband Analysis (see figure 3)
- Friction and Deadband Trending

While all diagnostics can be run while the valve is inline, only the Performance Diagnostics can be performed while the valve is in service and operating.

Advanced Diagnostics

Advanced Diagnostics include the following dynamic scan tests:

- Valve Signature (see figure 4)
- Dynamic Error Band
- Instrument Drive Signal

These diagnostic scans vary the positioner set point at a controlled rate and plot valve operation to determine valve dynamic performance. The valve signature test allows you to determine the valve/actuator friction, bench set, spring rate, and seat load. The Dynamic Error Band test is a combination of hysteresis and deadband plus "slewing." Hysteresis and deadband are static measurements. However, because the valve is moving, a dynamic error, or "slewing" error is introduced.

Dynamic scan tests give a better indication of how the valve will operate under process conditions which are dynamic, not static.

Figure 2. One-Button Sweep—Air Mass Flow Diagnostic

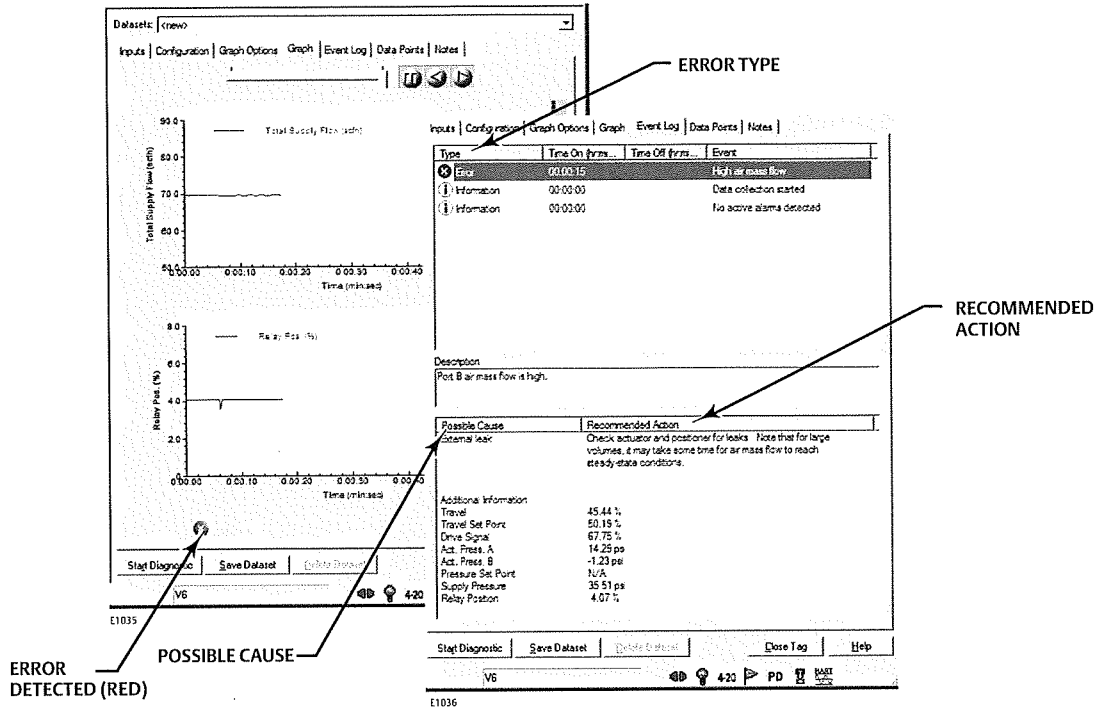


Figure 3. Valve Friction and Deadband Analysis

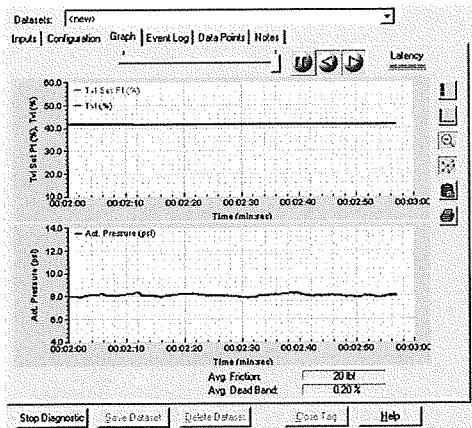
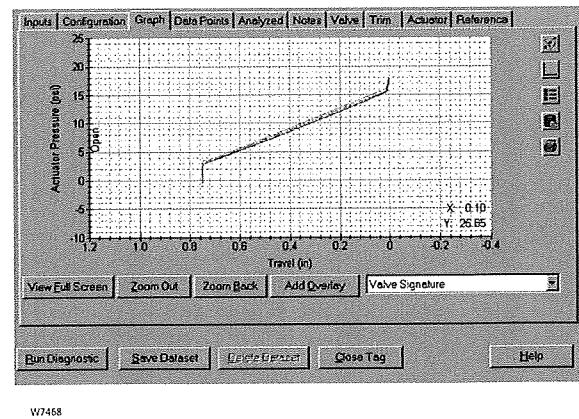


Figure 4. The Valve Signature Display

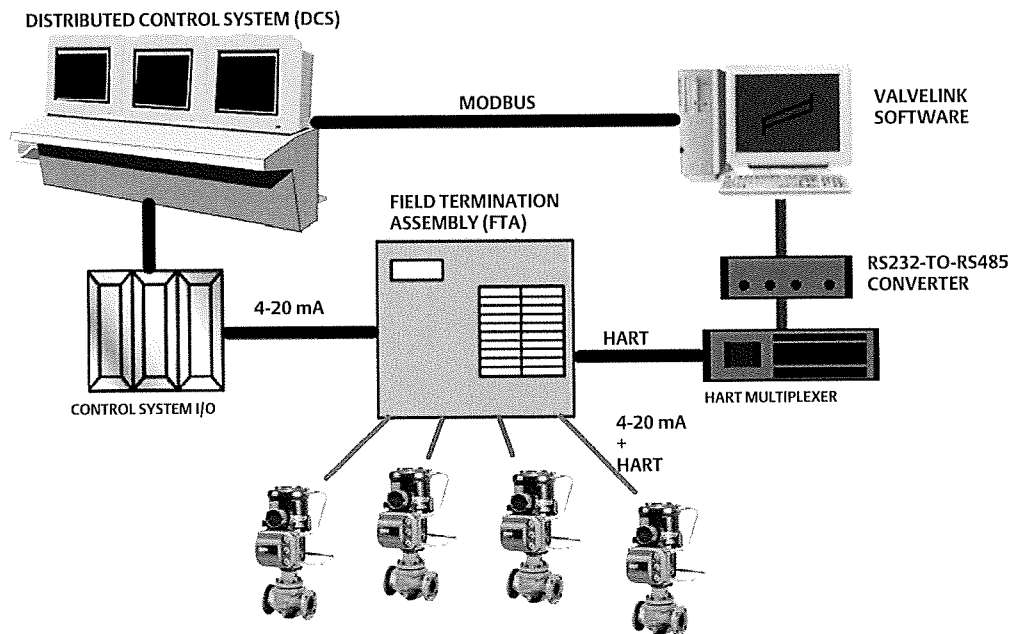


The Step Response Test checks the valve assemblies response to a changing input signal and plots travel versus time. The end results of this test allow you to evaluate the dynamic performance of the valve. The Performance Step Test (25 pre-configured points) provides a standardized step

test with which to evaluate your valve performance. It utilizes small, medium and large changes.

Advanced Diagnostics are performed with ValveLink software. The valve must be out of service for Advanced Diagnostics to be performed.

Figure 5. Integrate Information from the Digital Valve Controller into a Non-HART Compatible Control System With ValveLink Software's Modbus Interface



Integration

- **Non-HART Systems**—Because DVC6000 digital valve controllers operate with a traditional 4 to 20 mA control signal, they directly replace older analog instruments. Microprocessor-based electronics provide improved performance along with repeatable and reliable configuration and calibration.
- **Modbus with ValveLink software and HART multiplexers**—HART communication allows you to extract more value from DVC6000 digital valve controllers beyond their inherent improved performance. When integrated into a multiplexer network and using ValveLink 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. ValveLink software can communicate via Modbus to the distributed control system (DCS) to provide critical information such as valve travel alerts and alarms (figure 5).

- **Integrated Control System**—A control system with HART communication capabilities has the ability to directly gather information from DVC6000 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.

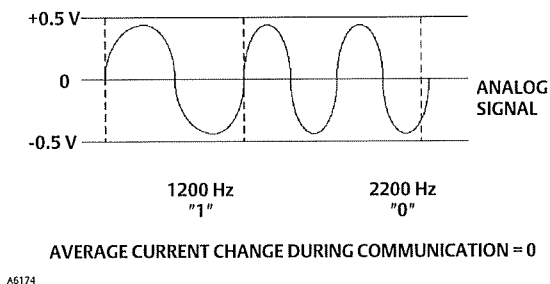
Communication

HART Protocol Overview

The HART (Highway Addressable Remote Transducer) protocol gives field devices the capability of communicating instrument and process data digitally. This digital communication occurs over the same two-wire loop that provides the 4 to 20 mA process control signal, without disrupting the process signal (figure 6). In this way, the analog process signal, with its faster response, can be used for control. At the same time, the HART digital communication gives access to calibration, configuration, diagnostic, maintenance, and additional process data. The protocol provides total system integration via a host device.

The HART protocol gives you the capability of multidropping, where you can network several devices to a single communications line. This process is well suited for remote applications such as pipelines, custody transfer sites, and tank farms.

Figure 6. HART Frequency Shift Keying Technique



A6174

Field Communicator

You can perform configuration and calibration at the valve or anywhere on the two-wire loop via a Field Communicator (see figure 7). Powerful tools such as Setup Wizard and Auto Travel Calibration automate the tasks of commissioning DVC6000 digital valve controllers. These automation tools not only save time, but also provide accurate and repeatable results.

Figure 7. Perform Configuration and Calibration at the Valve or Anywhere on the 4 to 20 mA Loop with the 475 Field Communicator



ValveLink Software

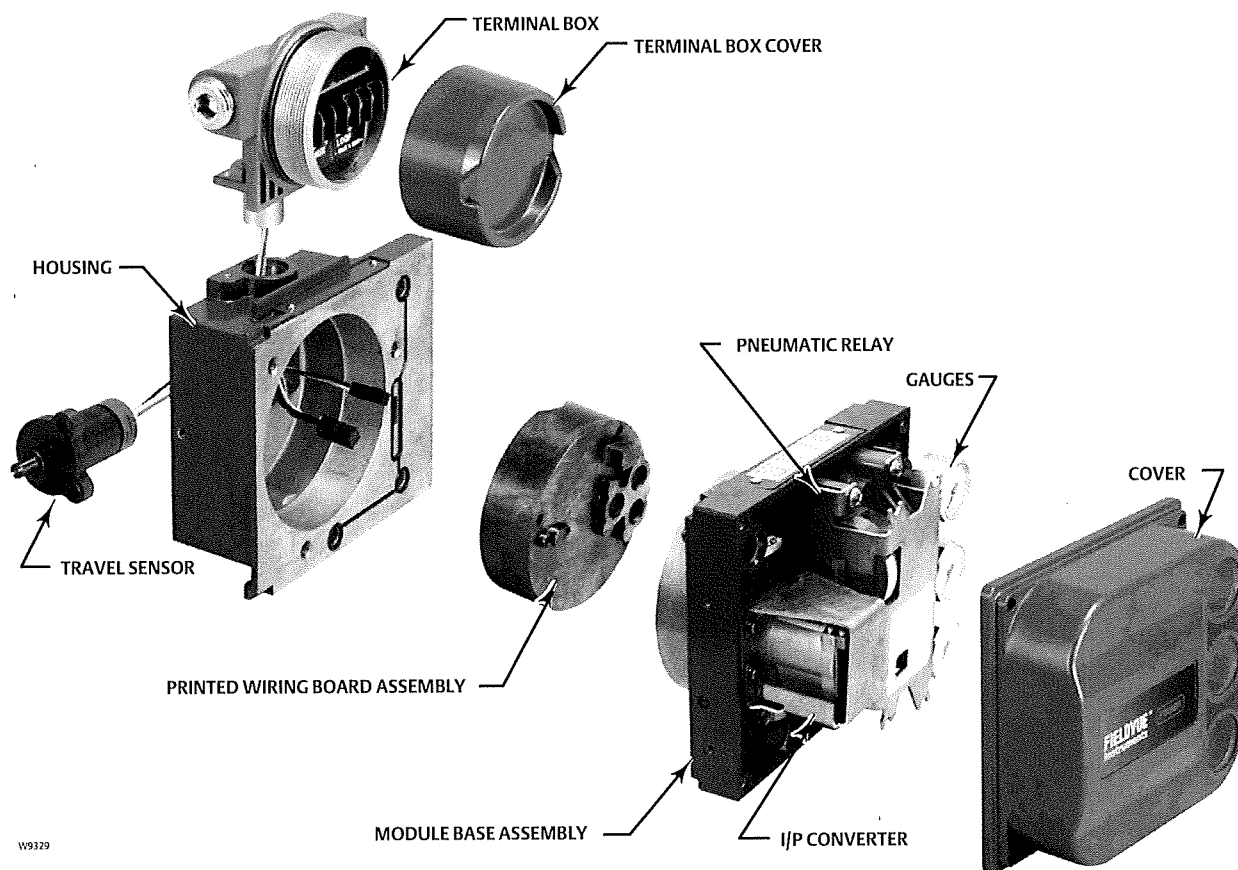
ValveLink software is a Windows®-based software package that allows easy access to the information available from DVC6000 digital valve controllers.

Using ValveLink software, you can monitor the performance characteristics of the valve and obtain vital information without having to pull the valve from the line. I/P and Relay Integrity and Travel Deviation Diagnostics, as well as On-Line Friction and Deadband Analysis and Trending can be run while the valve is in service and operating. Valve Signature, Dynamic Error Band, and Step Response are displayed in an intuitive user-friendly environment that allows easy interpretation of data.

Diagnostic graphs can be superimposed over those previously stored to view areas of valve degradation. This allows plant personnel to concentrate efforts on equipment that needs repair, avoiding unnecessary maintenance. This diagnostic capability is readily accessible and available to you either in the control room or on the plant floor. In addition to the diagnostic features, ValveLink software contains an Audit Trail, Batch Runner for automating repetitive tasks, and Trending to view valve performance.

ValveLink software provides integration into AMS and DeltaV™ systems with HART and fieldbus communications.

Figure 8. FIELDVUE DVC6000 Digital Valve Controller Assembly (Valve-Mounted Instrument)



W9329

Principle of Operation

DVC6000 instruments (figures 8 and 9) receive a set point and position the valve where it needs to be.

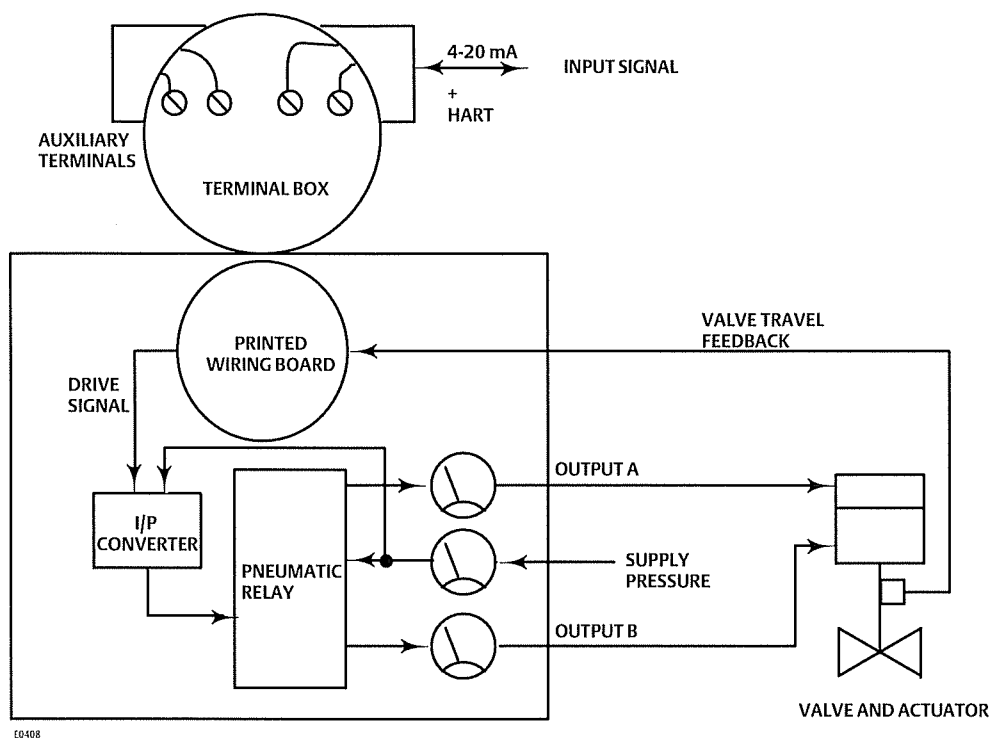
- The input signal provides electrical power and the set point simultaneously. It is routed into the terminal box through a twisted pair of wires.
- The input signal is then directed to the printed wiring board assembly where the microprocessor runs a digital control algorithm resulting in a drive signal to the I/P converter.
- The I/P converter assembly is connected to supply pressure and converts the drive signal into a pressure output signal.
- The I/P output is sent to the pneumatic relay assembly. The relay is also connected to supply

pressure and amplifies the small pneumatic signal from the I/P converter into a single larger pneumatic output signal used by a single-acting actuator. For double-acting actuators, the relay accepts the pneumatic signal from the I/P converter and provides two pneumatic output signals.

- The change in relay output pressure to the actuator causes the valve to move.
- Valve position is sensed through the feedback linkage by the instrument's travel sensor. 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.

Figure 9. FIELDVUE DVC6000 Digital Valve Controller Block Diagram



Installation

The DVC6010 digital valve controller is designed for yoke mounting to sliding stem actuators. DVC6020 digital valve controllers are designed for mounting to rotary actuators or long-stroke sliding-stem actuators (over 4 inches travel). DVC6030 digital valve controllers are designed for mounting on virtually any quarter-turn actuator.

The DVC6005 digital valve controller base unit may be remote mounted on 2 inch pipestand or wall. The remote-mounted DVC6005 base unit connects to the DVC6015, DVC6025, or DVC6035 feedback unit mounted on the actuator. Feedback wiring and pneumatic tubing to the control valve assembly must be connected in the field.

Refer to Fisher bulletin 62.1:DVC6000(S1) (D103308X012) for DVC6000 digital valve controller dimensional information.

The digital valve controllers are 4 to 20 mA loop powered and do not require additional power. Electrical connections are made in the terminal box.

All pressure connections on the digital valve controllers are 1/4 NPT internal connections. The digital valve controller outputs are typically connected to the actuator inputs using 3/8-inch diameter tubing. Remote venting is available.

Ordering Information

When ordering, specify:

1. Actuator type and size
2. Maximum actuator travel or rotation
3. Options
 - a. Supply pressure regulator
 - b. Supply and output gauges
 - c. HART filter
 - d. Stainless steel housing (valve-mounted instruments only)
 - e. Remote mounting

Table 2. EMC Summary Results—Immunity

Port	Phenomenon	Basic Standard	Test Level	Performance Criteria ⁽¹⁾	
				Point-to-Point Mode	Multi-drop Mode
Enclosure	Electrostatic discharge (ESD)	IEC 61000-4-2	4 kV contact 8 kV air	A ⁽²⁾	A
	Radiated EM field	IEC 61000-4-3	80 to 1000 MHz @ 10V/m with 1 kHz AM at 80% 1400 to 2000 MHz @ 3V/m with 1 kHz AM at 80% 2000 to 2700 MHz @ 1V/m with 1 kHz AM at 80%	A	A
	Rated power frequency magnetic field	IEC 61000-4-8	30 A/m at 50/60 Hz	A	A
I/O signal/control	Burst	IEC 61000-4-4	1 kV	A ⁽²⁾	A
	Surge	IEC 61000-4-5	1 kV (line to ground only, each)	B	B
	Conducted RF	IEC 61000-4-6	150 kHz to 80 MHz at 3 Vrms	A	A

Performance Criteria: +/- 1% effect.
1. A = No degradation during testing. B = Temporary degradation during testing, but is self-recovering.
2. Excluding auxiliary switch function, which meets Performance Criteria B.

Table 3. Hazardous Area Classifications—CSA (Canada)

Certification Body	Type	Certification Obtained	Entity Rating		Temperature Code	Enclosure Rating
CSA	DVC60x0 DVC60x0S (x = 1,2,3)	Ex ia Intrinsically Safe Class I,II,III Division 1 GP A,B,C,D,E, F,G per drawing GE42818 Natural Gas Approved	Vmax = 30 VDC Imax = 226 mA Ci = 5 nF Li = 0.55 mH Pi = 1.4 W		T5(Tamb ≤ 80°C) T6(Tamb ≤ 75°C)	Type 4X, IP66 Single Seal Device
		Explosion-proof Class I Division 1 GP B,C,D Natural Gas Approved	---		T5(Tamb ≤ 80°C) T6(Tamb ≤ 75°C)	Type 4X, IP66 Single Seal Device
		Class I Division 2 GP A,B,C,D Class II Division 1 GP E,F,G Class II Division 2 GP F,G Class III Natural Gas Approved	---		T5(Tamb ≤ 80°C) T6(Tamb ≤ 75°C)	Type 4X, IP66 Single Seal Device
	DVC6005	Ex ia Intrinsically Safe Class I,II,III Division 1 GP A,B,C,D, E,F,G per drawing GE42818 Natural Gas Approved	Vmax = 30 VDC Imax = 226 mA Ci = 5 nF Li = 0.55 mH Pi = 1.4 W	Voc = 30 VDC Isc = 12 mA Ca = 66 nF La = 246 mH Po = 86 mW	T5(Tamb ≤ 80°C) T6(Tamb ≤ 75°C)	Type 4X, IP66 Single Seal Device
		Explosion-proof Class I Division 1 GP B,C,D Natural Gas Approved	---		T5(Tamb ≤ 80°C) T6(Tamb ≤ 75°C)	Type 4X, IP66 Single Seal Device
		Class I Division 2 GP A,B,C,D Class II Division 1 GP E,F,G Class II Division 2 GP F,G Class III Natural Gas Approved	---		T5(Tamb ≤ 80°C) T6(Tamb ≤ 75°C)	Type 4X, IP66 Single Seal Device
	DVC60x5 (x = 1,2,3)	Ex ia Intrinsically Safe Class I,II,III Division 1 GP A,B,C,D, E,F,G per drawing GE42818	Vmax = 30 VDC Imax = 100 mA Ci = 0 uF Li = 0 mH Pmax = 160 mW		T4(Tamb ≤ 125°C) T5(Tamb ≤ 95°C) T6(Tamb ≤ 80°C)	Type 4X, IP66
		Explosion-proof Class I Division 1 GP B,C,D	---		T4(Tamb ≤ 125°C) T5(Tamb ≤ 95°C) T6(Tamb ≤ 80°C)	Type 4X, IP66
		Class I Division 2 GP A,B,C,D Class II Division 1 GP E,F,G Class II Division 2 GP F,G Class III	---		T4(Tamb ≤ 125°C) T5(Tamb ≤ 95°C) T6(Tamb ≤ 80°C)	Type 4X, IP66

Table 4. Hazardous Area Classifications—FM (United States)

Certification Body	Type	Certification Obtained	Entity Rating		Temperature Code	Enclosure Rating
FM	DVC60x0 DVC60x0S (x = 1,2,3)	IS Intrinsically Safe Class I,II,III Division 1 GP A,B,C,D, E,F,G per drawing GE42819 Natural Gas Approved	Vmax = 30 VDC Imax = 226 mA Ci = 5 nF Li = 0.55 mH Pi = 1.4 W		T5(Tamb ≤ 80°C) T6(Tamb ≤ 75°C)	Type 4X, IP66 Single Seal Device
		XP Explosion-proof Class I Division 1 GP B,C,D NI Non-incendive Class I Division 2 GP A,B,C,D DIP Dust Ignition-proof Class II, III Division 1 GP E,F,G S Suitable for Use Class II, III Division 2 GP F,G Natural Gas Approved	---		T5(Tamb ≤ 80°C) T6(Tamb ≤ 75°C)	Type 4X, IP66 Single Seal Device
	DVC6005	IS Intrinsically Safe Class I,II,III Division 1 GP A,B,C,D,E, F,G per drawing GE42819 Natural Gas Approved	Vmax = 30 VDC Imax = 226 mA Ci = 5 nF Li = 0.55 mH Pi = 1.4 W	Voc = 9.6 VDC Isc = 3.5 mA Ca = 3.6 uF La = 100 mH Po = 8.4 mW	T5(Tamb ≤ 80°C) T6(Tamb ≤ 75°C)	Type 4X, IP66 Single Seal Device
		XP Explosion-proof Class I Division 1 GP B,C,D NI Non-incendive Class I Division 2 GP A,B,C,D DIP Dust Ignition-proof Class II, III Division 1 GP E,F,G S Suitable for Use Class II, III Division 2 GP F,G Natural Gas Approved	---		T5(Tamb ≤ 80°C) T6(Tamb ≤ 75°C)	Type 4X, IP66 Single Seal Device
	DVC60x5 (x = 1,2,3)	IS Intrinsically Safe Class I,II,III Division 1 GP A,B,C,D, E,F,G per drawing GE42819	Vmax = 30 VDC Imax = 100 mA Ci = 0 uF Li = 0 mH Pi = 160 mW		T4(Tamb ≤ 125°C) T5(Tamb ≤ 95°C) T6(Tamb ≤ 80°C)	Type 4X, IP66
		XP Explosion-proof Class I Division 1 GP A,B,C,D NI Non-incendive Class I Division 2 GP A,B,C,D DIP Dust Ignition-proof Class II, III Division 1 GP E,F,G S Suitable for Use Class II, III Division 2 GP F,G	---		T4(Tamb ≤ 125°C) T5(Tamb ≤ 95°C) T6(Tamb ≤ 80°C)	Type 4X, IP66

Table 5. Hazardous Area Classifications—ATEX

Certificate	Type	Certification Obtained	Entity Rating		Temperature Code	Enclosure Rating
ATEX	DVC60x0 DVC60x0S (x = 1,2,3)	Ⓔ II 1 G & D Intrinsically Safe Gas Ex ia IIC T5/T6 Ga Dust Ex ia IIIC T85°C (Ta ≤ +73°C), T92°C (Ta ≤ +80°C) Da Per drawing GE60771 Natural Gas Approved	Ui = 30 VDC Ii = 226 mA Ci = 5 nF Li = 0.55 mH Pi = 1.4 W		T5(Tamb ≤ 80°C) T6(Tamb ≤ 75°C)	IP66 Single Seal Device
		Ⓔ II 2 G Flameproof Gas Ex d IIC T5/T6 Gb Natural Gas Approved	---		T5(Tamb ≤ 85°C) T6(Tamb ≤ 80°C)	IP66 Single Seal Device
		Ⓔ II 3 G Type n Gas Ex nCnL IIC T5/T6 Natural Gas Approved	---		T5(Tamb ≤ 80°C) T6(Tamb ≤ 75°C)	IP66 Single Seal Device
	DVC6005	Ⓔ II 1 G & D Intrinsically Safe Gas Ex ia IIC T5/T6 Ga Dust Ex ia IIIC T85°C (Ta ≤ +76°C), T89°C Ta ≤ +80°C) Da Per drawing GE60771 Natural Gas Approved	Ui = 30 VDC Ii = 226 mA Ci = 5 nF Li = 0.55 mH Pi = 1.4 W	Uo = 9.6 VDC Io = 3.5 mA Co = 3.6 uF Lo = 100 mH Po = 8.4 mW	T5(Tamb ≤ 80°C) T6(Tamb ≤ 75°C)	IP66 Single Seal Device
		Ⓔ II 2 G Flameproof Gas Ex d IIC T5/T6 Gb Natural Gas Approved	---		T5(Tamb ≤ 85°C) T6(Tamb ≤ 80°C)	IP66 Single Seal Device
		Ⓔ II 3 G Type n Gas Ex nCnL IIC T5/T6 Natural Gas Approved	---		T5(Tamb ≤ 80°C) T6(Tamb ≤ 75°C)	IP66 Single Seal Device
	DVC60x5 (x = 1,2,3)	Ⓔ II 1 G & D Intrinsically Safe Gas Ex ia IIC T4/T5/T6 Ga Dust Ex ia IIIC T85°C (Tamb ≤ +64°C) T100°C (Tamb ≤ +79°C), T135°C (Tamb ≤ +114°C), T146°C (Tamb ≤ +125°C) Da Per drawing GE60771	Ui = 30 VDC Ii = 100 mA Ci = 0 uF Li = 0 mH Pi = 160 mW		T4(Tamb ≤ 125°C) T5(Tamb ≤ 95°C) T6(Tamb ≤ 80°C)	IP66
		Ⓔ II 2 G Flameproof Gas Ex d IIC T4/T5/T6 Gb	---		T4(Tamb ≤ 125°C) T5(Tamb ≤ 95°C) T6(Tamb ≤ 80°C)	IP66
		Ⓔ II 3 G Type n Gas Ex nA IIC T4/T5/T6	---		T4(Tamb ≤ 125°C) T5(Tamb ≤ 95°C) T6(Tamb ≤ 80°C)	IP66

Table 6. Hazardous Area Classifications—IECEX

Certificate	Type	Certification Obtained	Entity Rating		Temperature Code	Enclosure Rating
IECEX	DVC60x0 DVC60x0S (x = 1,2,3)	Intrinsically Safe Gas Ex ia IIC T5/T6 per drawing GE42990 Natural Gas Approved	Ui = 30 VDC Ii = 226 mA Ci = 5 nF Li = 0.55 mH Pi = 1.4 W		T5(Tamb ≤ 80°C) T6(Tamb ≤ 75°C)	IP66 Single Seal Device
		Flameproof Gas Ex d IIC T5/T6 Natural Gas Approved	---		T5(Tamb ≤ 80°C) T6(Tamb ≤ 75°C)	IP66 Single Seal Device
		Type n Gas Ex nC IIC T5/T6 Natural Gas Approved	---		T5(Tamb ≤ 80°C) T6(Tamb ≤ 75°C)	IP66 Single Seal Device
	DVC6005	Intrinsically Safe Gas Ex ia IIC T5/T6 per drawing GE42990 Natural Gas Approved	Ui = 30 VDC Ii = 226 mA Ci = 5 nF Li = 0.55 mH Pi = 1.4 W	Uo = 9.6 VDC Io = 3.5 mA Ca = 3.6 uF La = 100 mH Po = 8.4 mW	T5(Tamb ≤ 80°C) T6(Tamb ≤ 75°C)	IP66 Single Seal Device
		Flameproof Gas Ex d IIC T5/T6 Natural Gas Approved	---		T5(Tamb ≤ 80°C) T6(Tamb ≤ 75°C)	IP66 Single Seal Device
		Type n Gas Ex nC IIC T5/T6 Natural Gas Approved	---		T5(Tamb ≤ 80°C) T6(Tamb ≤ 75°C)	IP66 Single Seal Device
	DVC60x5 (x = 1,2,3)	Intrinsically Safe Gas Ex ia IIC T4/T5/T6 per drawing GE42990	Ui = 30 VDC Ii = 100 mA Ci = 0 uF Li = 0 mH Pi = 160 mW		T4(Tamb ≤ 125°C) T5(Tamb ≤ 95°C) T6(Tamb ≤ 80°C)	IP66
		Flameproof Gas Ex d IIC T4/T5/T6	---		T4(Tamb ≤ 125°C) T5(Tamb ≤ 95°C) T6(Tamb ≤ 80°C)	IP66
		Type n Gas Ex nA IIC T4/T5/T6	---		T4(Tamb ≤ 125°C) T5(Tamb ≤ 95°C) T6(Tamb ≤ 80°C)	IP66

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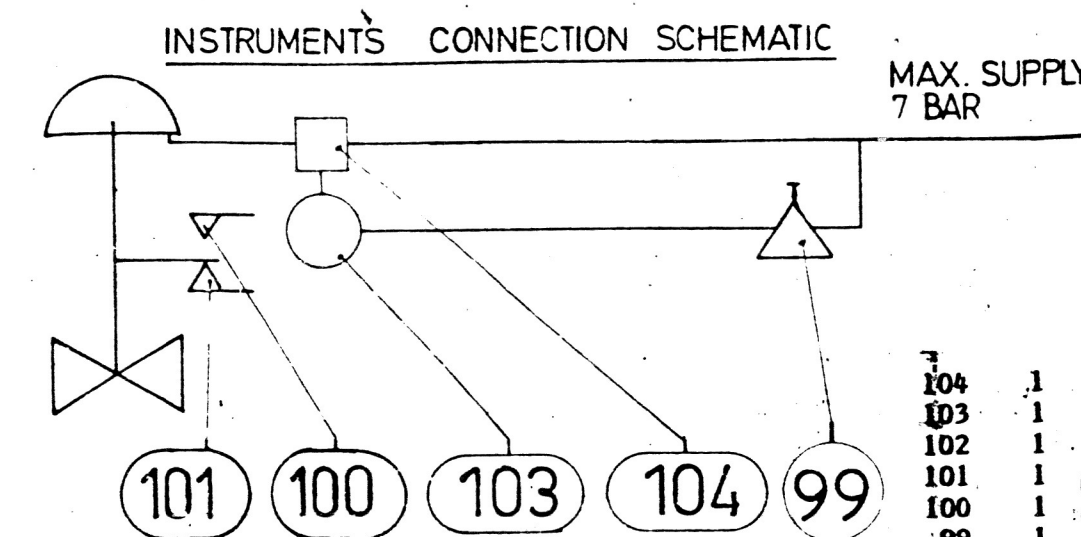
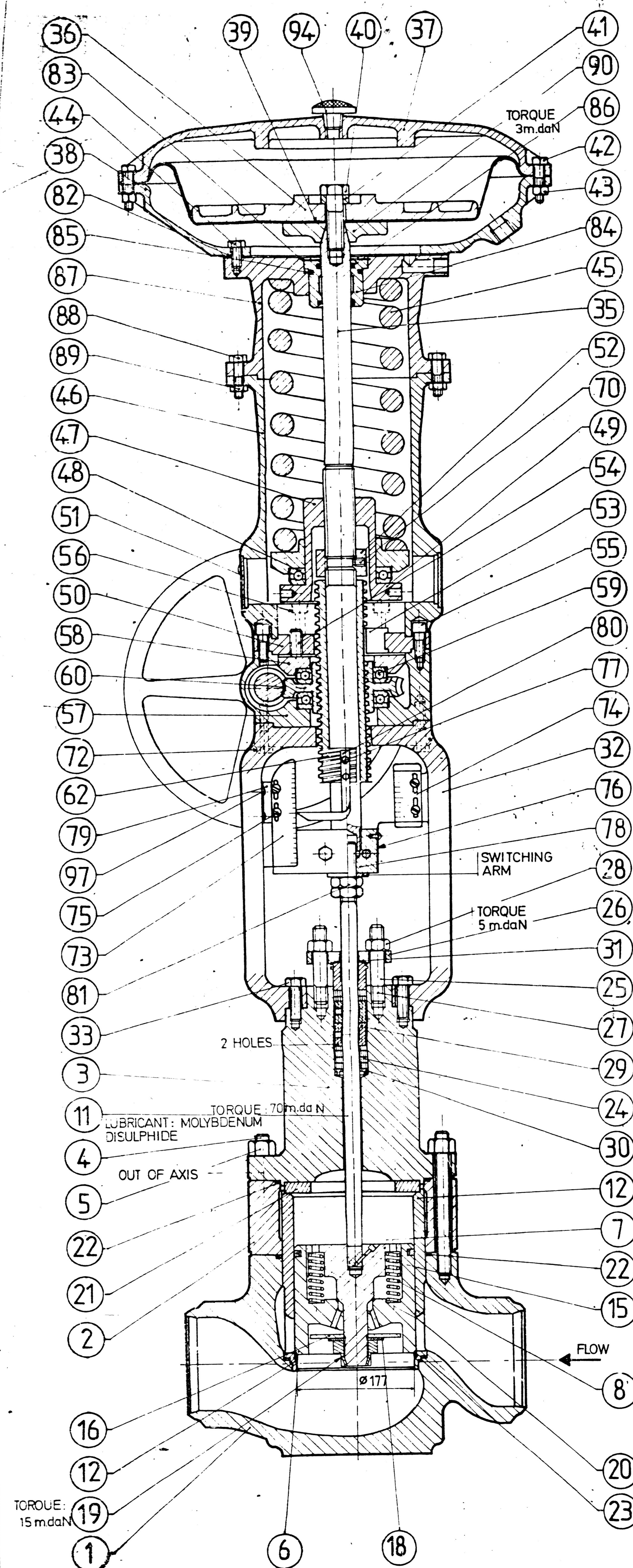
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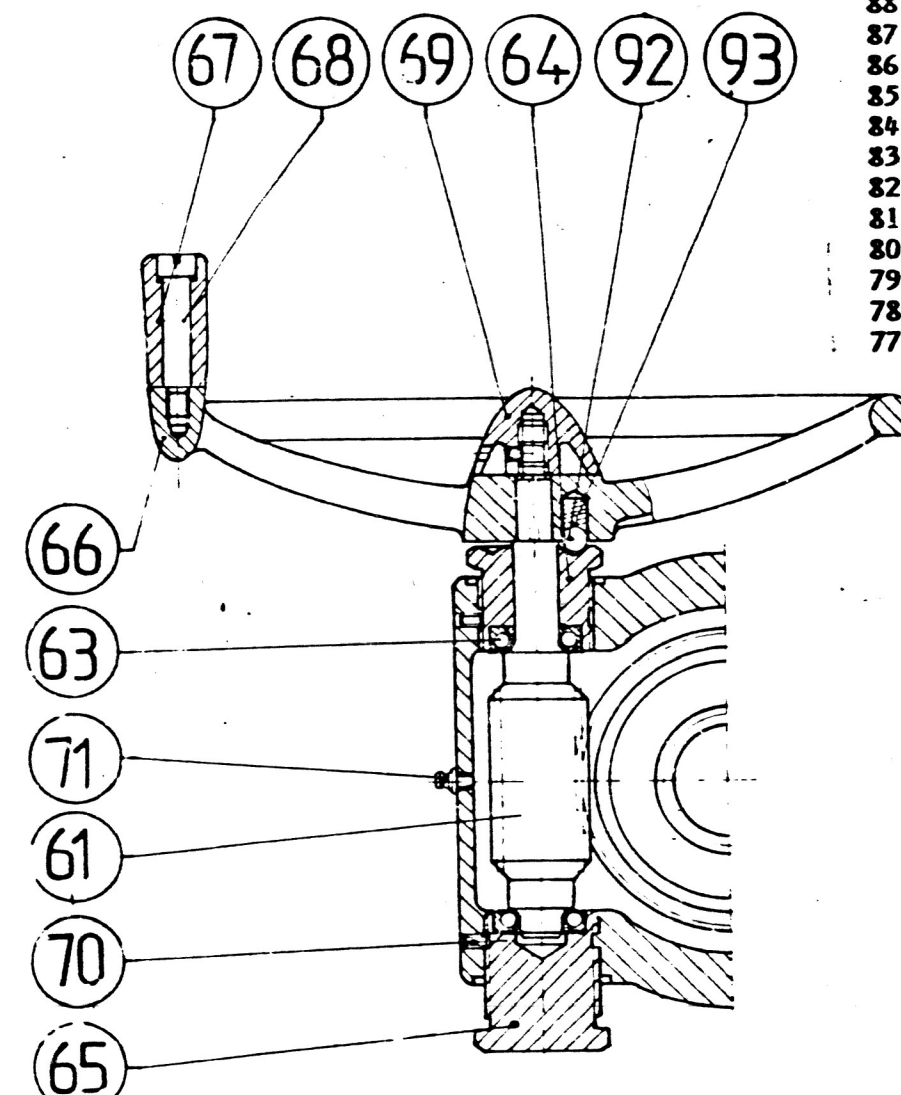


KBA 1220 B04059



ELECTRICAL CONNECTION SCHEMATIC
DWG. 554 KBY 2021 FIG. 2

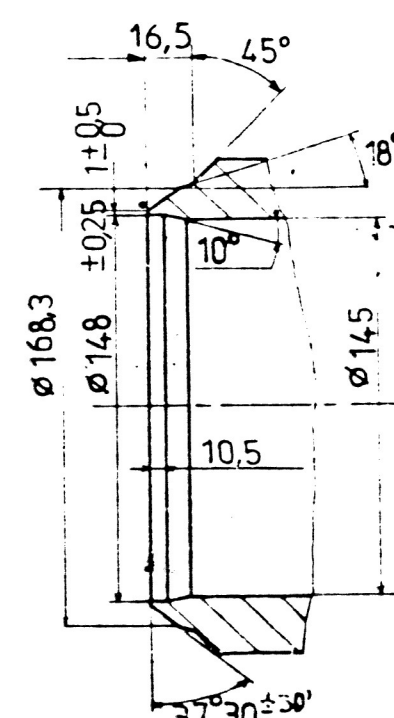
Section AA



- MAXIMUM TANGENTIAL FORCE TO HANDWHEEL: 23 daN

SIEMENS SUPRANITE 251 VR 5A
SEALING RINGS
ØB = 44.5 mm
H = 25.2 mm
HEIGHT = 9.65 mm

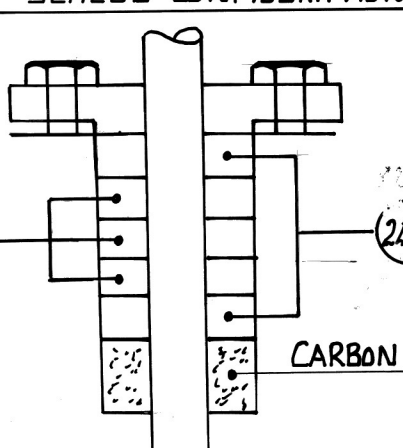
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BY	19/12/84
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REVISION	104



BODY ENDS DETAIL
6 SCH 80-SP 1370/B003
REV 4

PNEUMATIC CONNECTION
1/4" - 18 NPT

SEALED CONFIGURATION



SEALED VALVES

UNIT 1	UNIT 2
1 GCT 131VV	2 GCT 131VV
132VV	132VV
133VV	133VV

TORQUE = 25 Nm

NOTE:

FOR THE PACKING CONFIGURATION AND GLAND NUT

TORQUE, REFER TO KLU-006.

FOR THE PACKING TYPE, REFER TO THE

MAINTENANCE BILL OF MATERIAL.

IF THE VALVE IS NOT LISTED IN KLU-006, THE

ITEM Q

AS BUILT CONFIGURATION AS ORIGINALLY REFLECTED

ON THE DRAWING MUST BE USED.

ACTUATOR CLEARANCE REMOVAL:

350

Ø635

CG1

CG2

102

104

99

103

100

101

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