

## TIGHT SHUT-OFF DIAPHRAGM VALVE

This is the first real analytical tight shut-off diaphragm valve. It has multiple uses in gas chromatographic systems, auto-samplers, sampling and general instrumentation. No dead volume effects, continuous flowpath and purge systems make them ideal in many situations. From simple 3-way to complex configurations with timing sequences, the job is easily done. Wide choice of configurations, from simple pneumatic actuator to fully loaded microprocessor controlled electrical actuator. DV series valves are available with welded tubes, VCR or analytical fittings. They can be made in a large selection of materials and configured for different operating conditions.

### COMMON FEATURE DESCRIPTION

- Purge feature to prevent inboard/outboard contamination/fugitive emissions and permeation through the diaphragm (optional).
- 100% Helium mass spectrometer leak tested.
- Elimination of dead volume effects.
- Continuously swept flow path.
- Tight positive port shut-off design.
- Working pressures from vacuum to 1000 psig.
- Usable with liquid or gas media.
- Low pressure drop.
- Ports are independently controlled.

### FIELDS OF APPLICATION

- Gas chromatograph/Liquid chromatograph/GCMS/LCMS
- On-line gas analyser/Various sampling systems
- Automated laboratory sample injection systems
- Sample preparation system/Sample concentration systems
- Continuous flow analyser
- Purge and trap GC Sampler/Head space Sampling
- Total organic compound analyser
- Automated process analyser panel
- Refining and hydrocarbon analyser/Natural gas analyser
- Ion chromatographic systems
- And more...

### DV1 2-WAY DIAPHRAGM VALVE



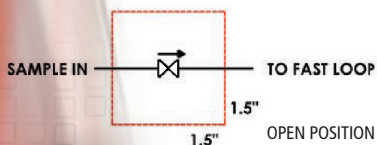
Pneumatic Actuation



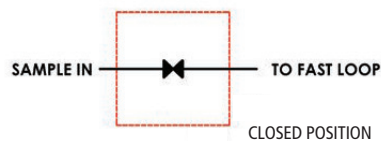
Electronic Actuation

### 2-way ON/OFF

■ OPERATIONAL STATE #1



■ OPERATIONAL STATE #2



■ FLOWPATH



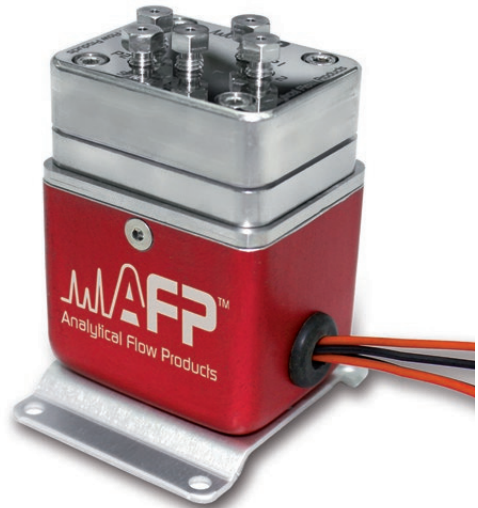
# DV3-SERIES 3-WAY DIAPHRAGM VALVE

■ DV3-SERIES



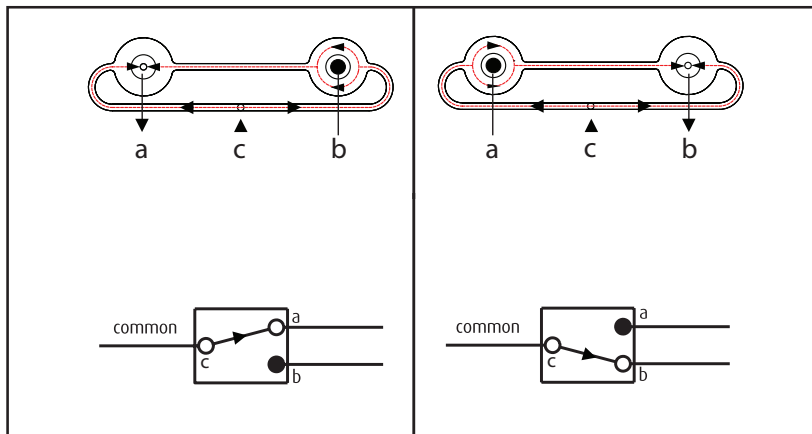
Pneumatic Actuation

■ EDV3-SERIES

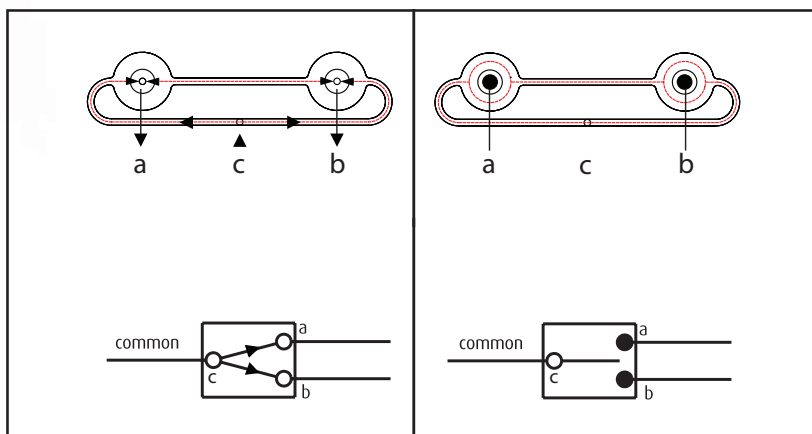


Electric Actuation

■ FLOWPATH



One port selected



Both ports open or closed

# DVS-SERIES SAMPLE STREAM SELECTION VALVE

■ DVS-SERIES

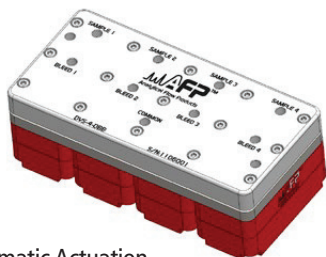


DVS-6 Pneumatic Actuation  
ON/OFF Configuration

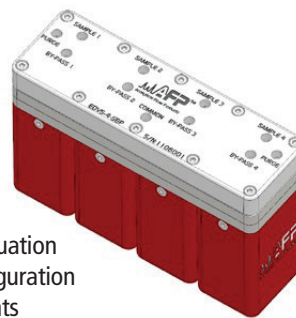
■ EDVS-SERIES



Electronic Actuation  
ON/OFF Configuration



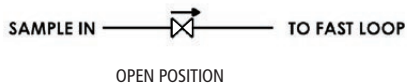
DVS-4 Pneumatic Actuation  
Double Block & Bleed Configuration  
Individual Bleed Vents



EDVS-4 Electronic Actuation  
Sample By-Pass Configuration  
Individual By-Pass Vents

## ON/OFF SAMPLE STREAM SELECTION CONFIGURATION

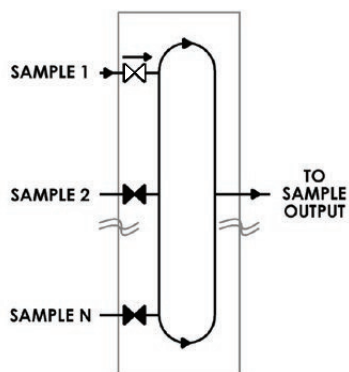
■ SINGLE STREAM OPERATIONAL STATE #1



■ SINGLE STREAM OPERATIONAL STATE #2

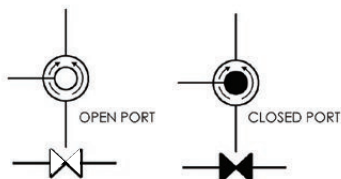
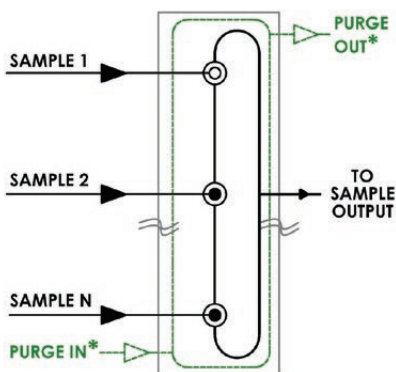


■ MULTIPLE STREAM FLOWPATH SCHEMATIC



- ALL CHANNELS BUILT ON THE SAME SUBSTRATE  
- INTERNAL FAST LOOP INCLUDED

■ MULTIPLE STREAM PHYSICAL FLOWPATH

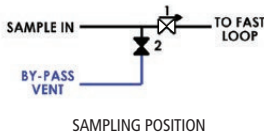


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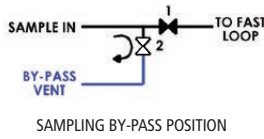
\* PURGE IS AVAILABLE AS AN OPTION

# SAMPLE BY-PASS SAMPLE STREAM SELECTION CONFIGURATION

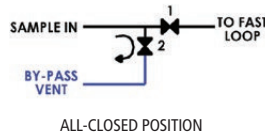
■ SINGLE STREAM OPERATIONAL STATE #1



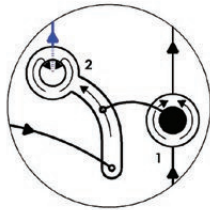
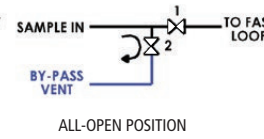
■ SINGLE STREAM OPERATIONAL STATE #2



■ SINGLE STREAM OPERATIONAL STATE #3



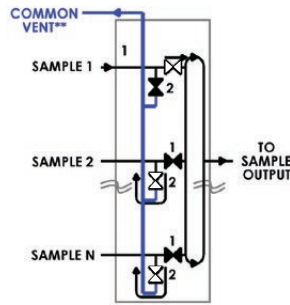
■ SINGLE STREAM OPERATIONAL STATE #4



■ MULTIPLE STREAM PHYSICAL FLOWPATH SAMPLE BY-PASS POSITION

NOTE: VALVE PORTS 1 AND 2 CAN BE INDEPENDENTLY CONTROLLABLE

■ MULTIPLE STREAM FLOWPATH SCHEMATIC



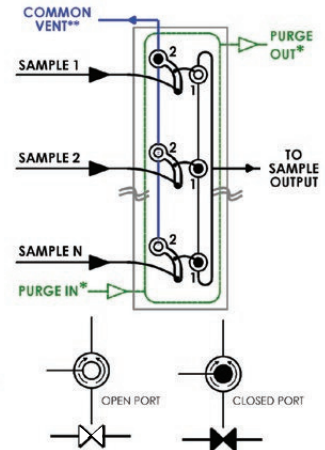
- ALL CHANNELS BUILT ON THE SAME SUBSTRATE  
- INTERNAL FAST LOOP INCLUDED

US.PAT.: 7,216,528

\* PURGE IS AVAILABLE AS AN OPTION

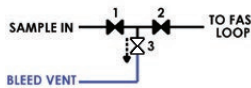
\*\* COMMON BY-PASS VENT IS AVAILABLE AS AN OPTION

■ MULTIPLE STREAM PHYSICAL FLOWPATH



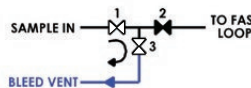
# DOUBLE BLOCK & BLEED SAMPLE STREAM SELECTION CONFIGURATION

■ SINGLE STREAM OPERATIONAL STATE #1



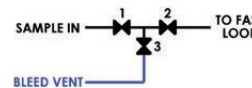
DOUBLE BLOCK & BLEED POSITION :  
SAMPLE INLET CLOSED

■ SINGLE STREAM OPERATIONAL STATE #2



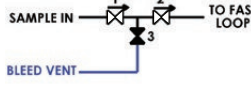
SAMPLE BY-PASS POSITION: ACCELERATES SAMPLE REFRESH RATE BEFORE SELECTION

■ SINGLE STREAM OPERATIONAL STATE #5



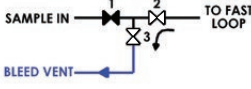
ALL-CLOSED POSITION

■ SINGLE STREAM OPERATIONAL STATE #3



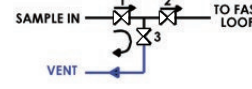
SAMPLE SELECTION POSITION

■ SINGLE STREAM OPERATIONAL STATE #4

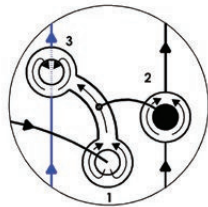


BACK PURGING POSITION: MOMENTARY BACK PURGES THE UNSELECTED STREAMS

■ SINGLE STREAM OPERATIONAL STATE #6



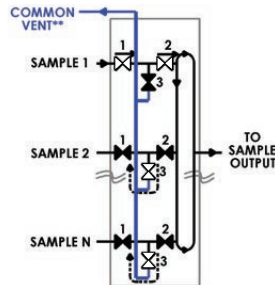
ALL-OPEN POSITION



■ MULTIPLE STREAM PHYSICAL FLOWPATH SAMPLE BY-PASS POSITION

NOTE: VALVE PORTS 1, 2 AND 3 CAN BE INDEPENDENTLY CONTROLLABLE

■ MULTIPLE STREAM FLOWPATH SCHEMATIC



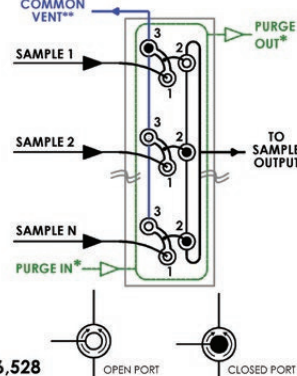
- ALL CHANNELS BUILT ON THE SAME SUBSTRATE  
- INTERNAL FAST LOOP INCLUDED

US.PAT.: 7,216,528

\* PURGE IS AVAILABLE AS AN OPTION

\*\* COMMON BLEED VENT IS AVAILABLE AS AN OPTION

■ MULTIPLE STREAM PHYSICAL FLOWPATH

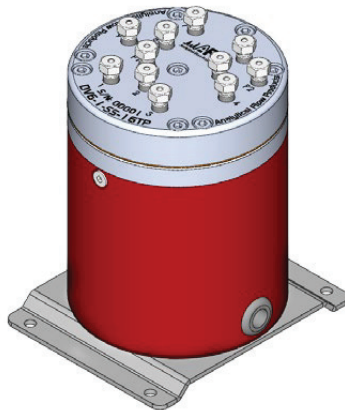


# DV6-SERIES

GC POSITIVE PORT SHUT-OFF DIAPHRAGM VALVE  
HIGH PRESSURE GAS APPLICATION



Pneumatic Actuation

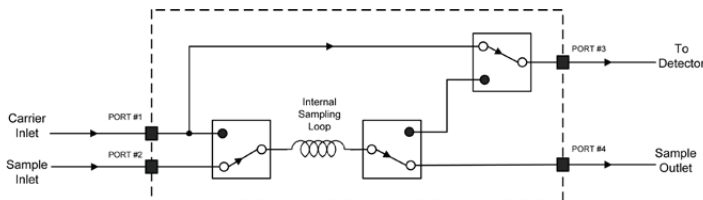


Electronic Actuation

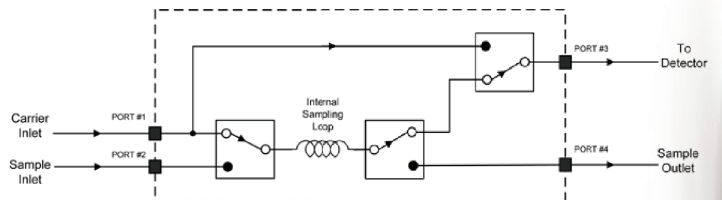
- Unique design that allows new GC methods.
- Internal sampling loop available.

## INTERNAL SAMPLING LOOP

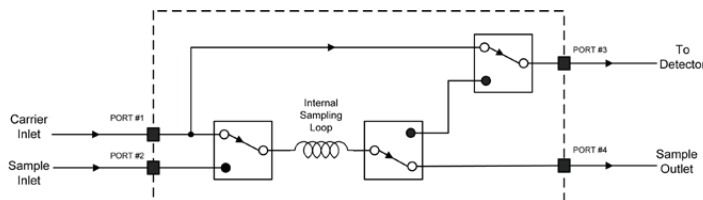
### ■ SAMPLING POSITION



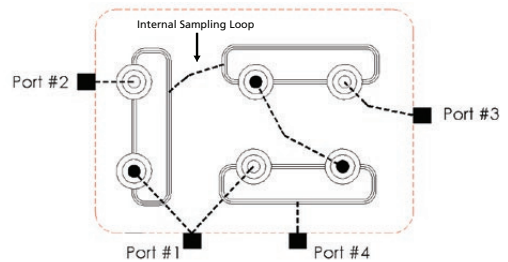
### ■ INJECTION POSITION



### ■ WASHING SAMPLE VOLUME POSITION

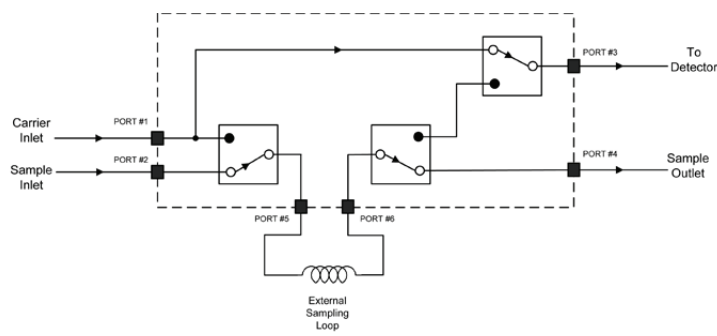


### ■ (E) DGC PHYSICAL FLOWPATH

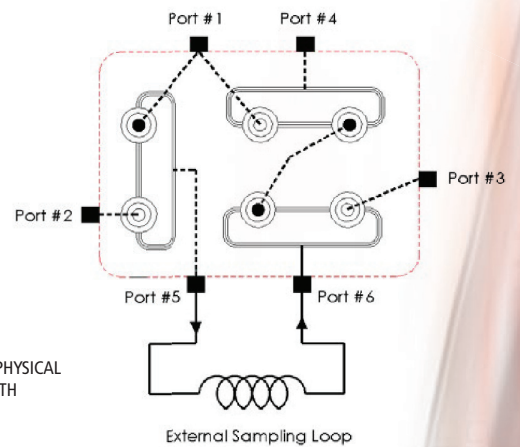


## EXTERNAL SAMPLING LOOP

### ■ DGC BLOCK SCHEMATIC - CONFIGURATION



### ■ (E) DGC PHYSICAL FLOWPATH



\* Since all ports are independently controlled, other sequences are possible such as sequencing injection, washing cycle, sample concentration, etc... See application note for more information.

## DV SERIES ACTUATION OPTION

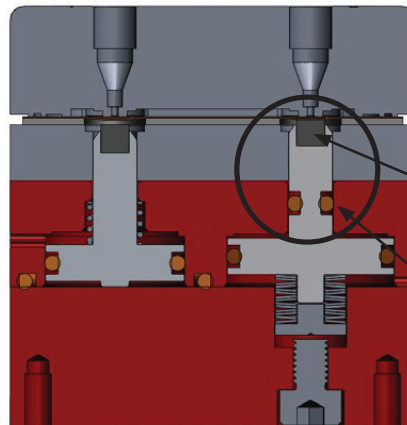
All ports are independently controlled by supplying the pneumatic actuation pressure to its corresponding piston. A port is closed when its associated piston is forced against the corresponding valve's seat, interrupting the flow by directly closing the port. This is what is called positive port shut-off action. The small displacement needed to close or open the port results in a fast switching time.

The DV series valves can be used as a simple stand alone valve or multiple combinations could be used to realize complex applications.

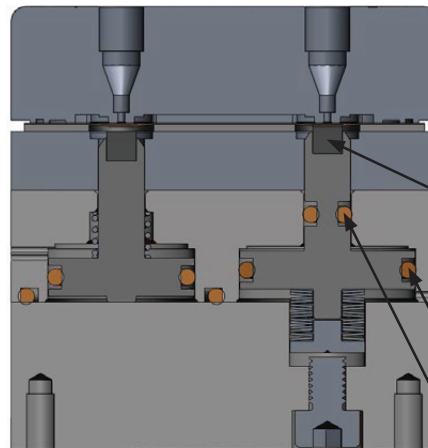
In critical applications extra protection can be added by the use of purging/sealing grooves machined into the valve head and a sealing plate that can be swept by an appropriate fluid media.



Standard DV3 Valve's Head



Independent actuation LT model Normally Closed/Normally Open configuration



Independent actuation HT model Normally Closed/Normally Open configuration

### Pneumatic Valve Actuation Specification

	DV SERIES
Actuation pressure (psig / kPa) (Process gas pressure of 300 psig)	60 / 415
Actuation pressure (psig / kPa) (Process gas pressure of 1000 psig) In Option	125 / 860
Gas Consumption per Actuation (in <sup>3</sup> / cc <sup>3</sup> )	.030 / .50

# ELECTRIC ACTUATION

ELECTRIC ACTUATION IS AVAILABLE FOR ALL THE DV-SERIES VALVES.

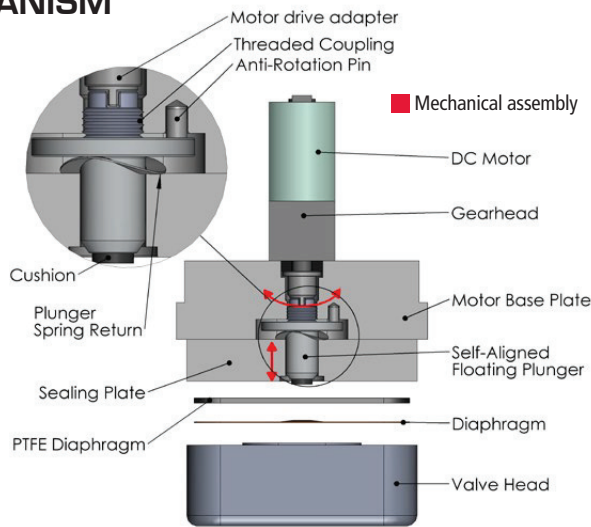
## Common features:

- Included diagnostic and configuration software
- Microprocessor controlled motors
- Green Power: Consumes power only during actuation. Sleep mode between actuation.
- User selectable default position; normally closed (NC), or normally open (NO). Position selected on power up.
- Servolop torque controlled, compensating for long term wear; maintaining sealing level over time.
- Various interfaces for control:
  - Motor Direct Drive.
  - Digital input; Interface with PLC, dry contact, digital electronic.
  - Serial interface, allows daisy chain of multiple valve modules through RS-485.
  - Allows system status report and user programmable timing sequences and control from PC or microcontroller.
- CE, RoHS compliant

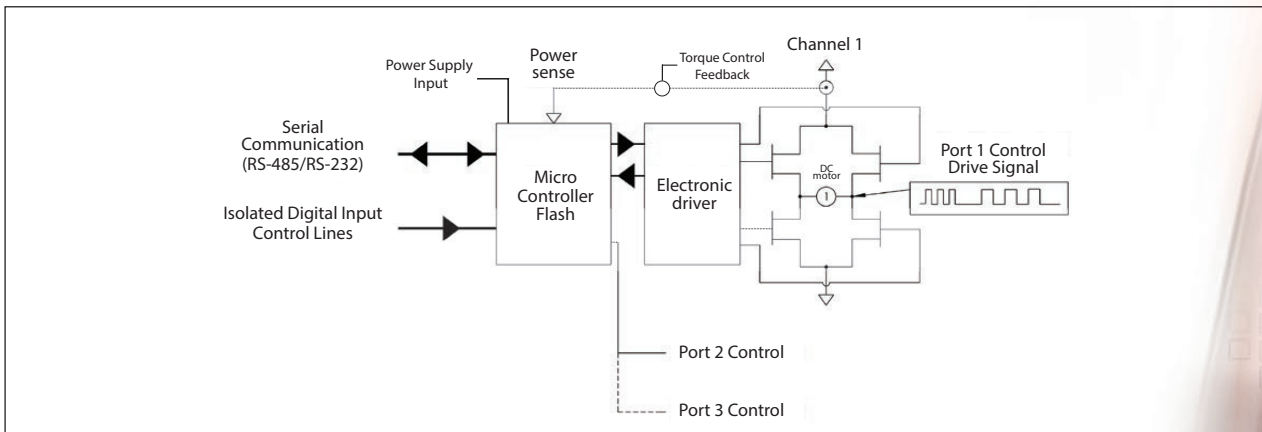
## Applications:

- Electrically controlled sample stream selection systems.
- Analyzer auto-calibration systems.
- Built-in analyzer sample and calibration gas selection.
- Complex GC configurations.
- Liquid autosamplers.
- Sample panel automation.
- Purge and trap systems.
- GC front end sample processing (Concentration/Purication)
- Syringe pump / dispenser / diluter systems.

## ACTUATION MECHANISM



- A simplified block diagram of the electronic actuation system.



## OPTION AND CUSTOM CONFIGURATION

### EXTRA PURGE CONNECTION

The DV is also available with extra purge connections. These purge connections allow the selected purge fluid to purge the back side of the diaphragm, depending on particular system requirements.

This allows :

- Working at higher pressure by equalising the pressure on both sides of the diaphragm
- Eliminating permeation problems through the diaphragm. (Gas application)
- Reducing hazard risk when working with dangerous media.
- Real time diagnostics for critical operations. This is done by monitoring the purge fluid from the purge vent.



### DV3 WITH 1/8" VCR AND/OR OTHER FITTING CONNECTIONS

DV3 could be also fitted with 1/8" VCR brazed fittings for the process port connection. This configuration could be required for semiconductor and vacuum applications. It is better for extended time columns, traps or sample isolation due to the high level of sealing integrity.

Other fitting connections may also be used for your needs, such as 1/4-28, NPT, compression fittings, etc...



### STANDARD CONFIGURATION

The DV basic version has a valve head made of 316L grade stainless steel. The diaphragm is made of a multilayer polymer, i.e. Teflon®/ Polyimide. The maximum operating temperature standard range is 180°C. The standard maximum operating and test pressure is 500 psig (3345 kPa). Minimum operating pressure is vacuum. The diaphragm and other parts of the valve are easily replaceable. All the port connections are 1/16" single ferrule type with AFP® high quality finish.



### OPTIONAL VALVE HEAD MATERIALS FOR CHEMICALLY INERT AND CORROSIVE APPLICATION

For applications requiring chemically inert materials in regard to the process fluid, for example, corrosive or organic compounds, the DV valve head can be made of polymer, such as PEEK™, ceramic or other appropriate materials. This is often required in the field of liquid chromatography or mass spectrometry. In such configurations, all wetted parts would be made in materials compatible with your applications.

