

# DIAPHRAGM VALVES

## FOR CONTINUOUS AUTOMATED OPERATION

- Only 35 mm (1.375") in diameter
- >1,000,000 cycle lifetime
- Three configurations – 6 port, 10 port, and 4 port internal sample
- Built in actuator
- 1/16" or 1/32" Valco zero dead volume fittings

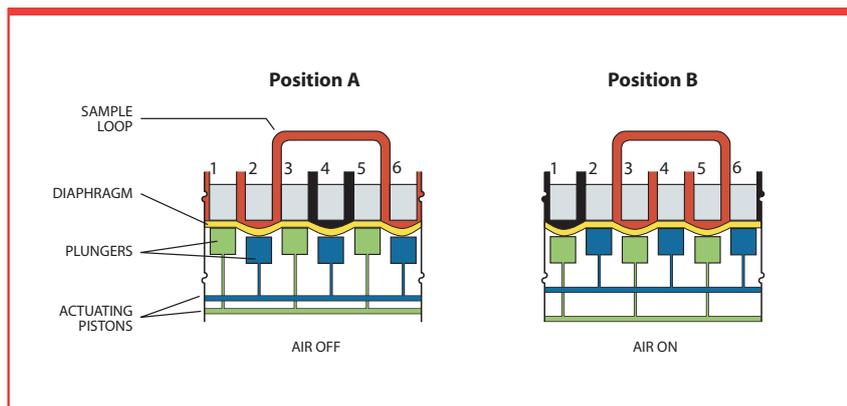
The VICI mini diaphragm valve is designed for trouble-free use in applications requiring minimal maintenance and maximum lifetime, making it an ideal choice for the process industry, automated lab analyzers, or continuous-monitoring environmental analyses.

## DESIGN

The mini diaphragm valve consists of plungers and ports arranged in a circular pattern, with the plungers controlled by the reciprocation action of two air actuated pistons. Maintenance procedures are greatly simplified, since a single screw holds the valve together and locating pins

ensure proper alignment. Extremely long lifetime, very short actuation time (10 milliseconds), minimum internal dead volume, and reliability have made this type of valve very successful in process gas chromatography for both sample injection and column switching.

## CROSS SECTION VIEW OF A DIAPHRAGM VALVE

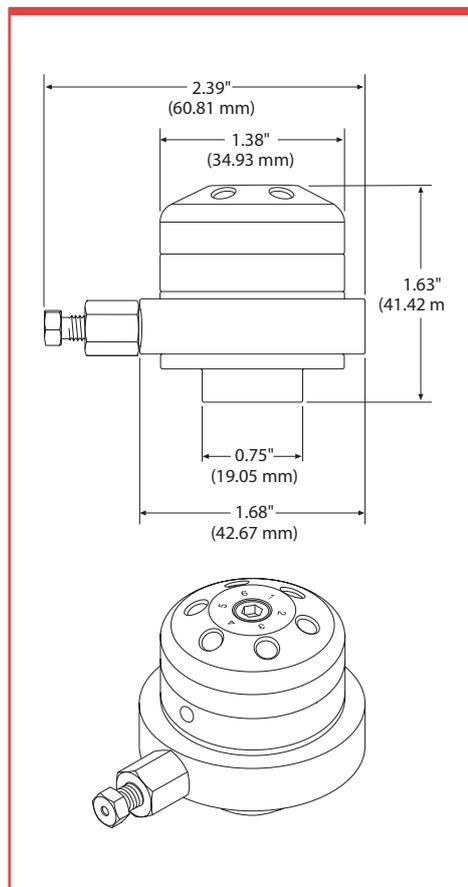


## TECH TIP

For optimal zero dead volume connections, make sure your tubing meets the best industry standards. OD tolerance should be nominal dimension  $\pm .002$ ".

Fractional dimension	Nominal dimension
1/32"	.031"
1/16"	.062"
1/8"	.125"
1/4"	.250"
3/8"	.375"
1/2"	.500"

## DIAPHRAGM VALVE DIMENSIONS



## DIMENSIONS

As shown in the drawing at left, the VICI diaphragm valve with built-in actuator comprises a very compact package. The valve and fittings (without purge ring) weigh only 240 grams.

## VALVE FITTINGS

The valve cap has Valco 1/32" or 1/16" ZDV fitting details – a rugged design which allows easy replacement of tubing or of the valve itself.

Standard bore size is 0.40 mm (.016"). Optional bore sizes are 0.25 mm (.010") and 0.75 mm (.030").

## LIFETIME

Diaphragm valve lifetime can exceed 1,000,000 cycles at ambient temperature or 500,000 cycles at 175°C.

## ACTUATION

Actuator air (50-60 psi) is supplied to a side port with 10-32 female threads, permitting use of a variety of compression or barbed fittings. A 3-way solenoid is required for actuation. (See page 180.)

## OPTIONAL MOUNTING KIT

The mounting kit consists of a ring which is mounted on a flat surface. A slot allows the ring to be tightened around the collar of the valve.

## TEMPERATURE/PRESSURE SPECIFICATIONS

Diaphragm valves can be operated at temperatures up to 200°C, at 300 psi. The standard valve is for applications in which the sample is above ambient pressure. An optional version works with subambient pressures, such as when the sample is "pulled" through the valve by a vacuum pump.

## MATERIALS OF CONSTRUCTION

The cap is Nitronic 60 stainless (optional Hastelloy C or Type 316 stainless), with remaining metal parts of 300 series stainless. The diaphragm is formed from a specialized polyimide.

## PURGE OPTION

Purging improves sensitivity when a diaphragm valve is used in conjunction with a VICI Pulsed Discharge Detector, for example, since air cannot diffuse into the flow path.

The optional purge ring, easy to install on any VICI diaphragm valve, is equipped with two 1/16" ports for the purge gas inlet and outlet.

Switching/sampling valves with a purge ring have a maximum temperature of 175°C.

**i** ACTUATION

A 3-way solenoid is required for actuation.  
3-way solenoid . . . p 180

**➔** MORE INFO

**Materials**  
Metals . . . . . 246-247

**Valve descriptions**  
Cheminert  
Injectors and valves . . . . . 129-131  
Selectors . . . . . 132-133  
Valco  
Injectors and valves . . . . . 82-83  
Selectors . . . . . 84-85

**Purge ring**

## Ordering information

### DIAPHRAGM VALVES

## Diaphragm valves

1/32" FITTINGS, 0.25 MM PORTS (.010")

Process GC

Includes stainless steel nuts and ferrules.  
A 3-way solenoid is required for actuation. Order separately on page 180.

1/32" 0.25 mm



4 port

.5 µl internal sample

Prod No

DV13-1114-.5



4 port

1 µl internal sample

Prod No

DV13-1114-1



6 port

sampling/switching

Prod No

DV13-1116



10 port

multifunctional

Prod No

DV13-1110

### SPECIFICATIONS

Internal sample:  
**750 psi liq**  
**50°C max**  
Sampling/switching:  
**300 psi gas**  
**175°C max**  
Sample:  
**Above ambient pressure\***  
Nitronic 60 valve body  
Polyimide diaphragm  
\* For vacuum applications, contact the factory.

## Diaphragm valves

1/16" FITTINGS, 0.40 MM PORTS (.016")

Process GC

Includes stainless steel nuts and ferrules.  
A 3-way solenoid is required for actuation. Order separately on page 180.

1/16" 0.40 mm

4 port

.5 µl internal sample

Prod No

DV23-2114-.5

4 port

1 µl internal sample

Prod No

DV23-2114-1

6 port

sampling/switching

Prod No

DV23-2116

10 port

multifunctional

Prod No

DV23-2110

### SPECIFICATIONS

Internal sample:  
**750 psi liq**  
**50°C max**  
Sampling/switching:  
**300 psi gas**  
**175°C max**  
Sample:  
**Above ambient pressure\***  
Nitronic 60 valve body  
Polyimide diaphragm  
\* For vacuum applications, contact the factory.

## Diaphragm valves

1/16" FITTINGS, 0.75 MM PORTS (.030")

Process GC

Includes stainless steel nuts and ferrules.  
A 3-way solenoid is required for actuation. Order separately on page 180.

1/16" 0.75 mm

4 port

.5 µl internal sample

Prod No

DV23-3114-.5

4 port

1 µl internal sample

Prod No

DV23-3114-1

6 port

sampling/switching

Prod No

DV23-3116

10 port

multifunctional

Prod No

DV23-3110

### SPECIFICATIONS

Internal sample:  
**750 psi liq**  
**50°C max**  
Sampling/switching:  
**300 psi gas**  
**175°C max**  
Sample:  
**Above ambient pressure\***  
Nitronic 60 valve body  
Polyimide diaphragm  
\* For vacuum applications, contact the factory.

### 6 PORT DIAPHRAGM VALVE

1/16" fittings

## Parts and accessories

Prod No

Purge ring	DV22-PURGE
Mounting kit	DVBRKIT
<b>Replacement diaphragms</b>	
Polyimide	.010" bore DV22-21D
	.016" bore DV22-21D
	.030" bore DV22-31D
PTFE	DV22-22D

## Sample loops

Each stainless steel loop includes two stainless nuts and ferrules.

Volume	Prod No	Volume	Prod No
<b>1/16"</b>			
2 µl	CSL2	250 µl	CSL250
5 µl	CSL5	500 µl	CSL500
10 µl	CSL10	1 ml	CSL1K
20 µl	CSL20	2 ml	CSL2K
50 µl	CSL50	5 ml	CSL5K
100 µl	CSL100	10 ml	CSL10K
<b>1/32"</b>			
1 µl	CSLN1K		
2 µl	CSLN2K		
5 µl	CSLN5K		
10 µl	CSLN10K		

### OPTIONS

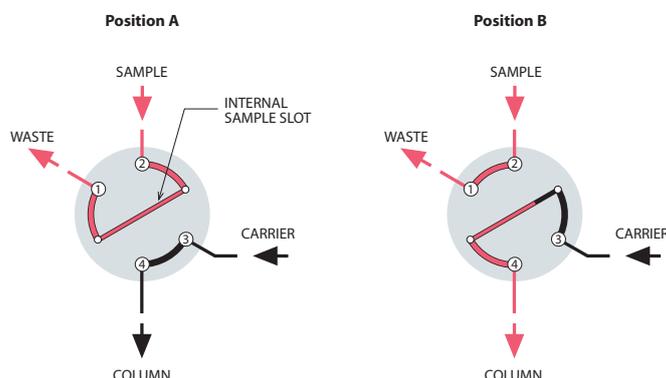
- High temperature version is available for range of 250-300 °C
  - Materials:  
Hastelloy C  
Type 316 stainless
- For more information, refer to the metals info on pages 246-247.

### MORE INFO

More applications... pp 99-103  
3-way solenoid ..... 180

DIAPHRAGM VALVES

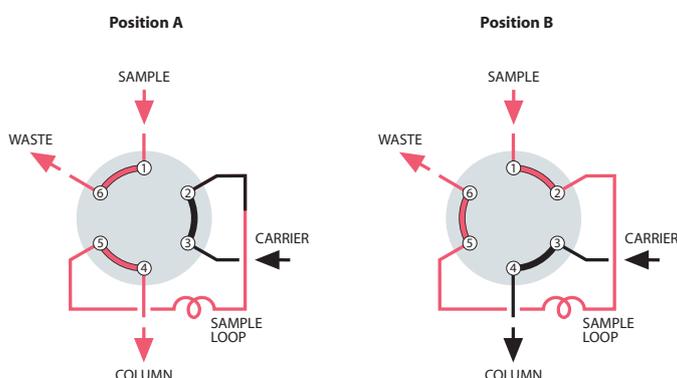
4 PORT – SAMPLE INJECTOR



**MICROVOLUME SAMPLE INJECTION**

The internal sample (fixed volume) flowpath is used when very small sample volumes are required. The sample size is determined by a passage engraved on the valve cap, allowing precise, repeatable injections. In Position A, the sample flows through the sample passage while the carrier flows through to the column. In Position B, the sample passage is in line with the column and the carrier injects the contents of the sample passage into the column.

6 PORT – SAMPLE INJECTOR



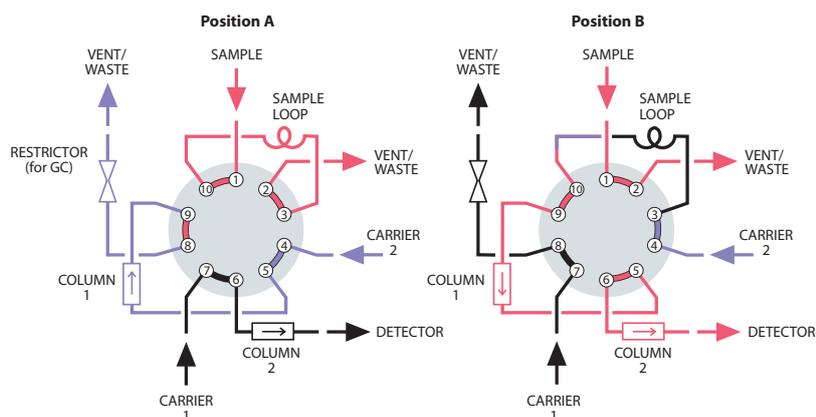
**SAMPLE INJECTION**

With the valve in Position A, sample flows through the external loop while the carrier flows directly through to the column. When the valve is switched to Position B, the sample contained in the sample loop and valve flow passage is injected into the column.

**MORE INFO**

More applications . . . . . pages 100-101

10 PORT – SAMPLE INJECTOR



**LOOP SAMPLING WITH BACKFLUSH OF PRE-COLUMN TO VENT**

When components of interest are low boiling, this plumbing scheme allows "heavy" components with long retention times to be backflushed to waste. After the sample loop is loaded in Position A, the valve is switched to Position B to inject the sample into column 1. As soon as all components of interest have entered column 2, the valve is switched back to Position A. Column 1 is backflushed to vent during the analysis, reducing the total analysis time.

**MORE INFO**

More applications . . . . . pages 102-103