



High-Performance GC Diaphragm Valve*

*Covered by Pat# 7,931,043 - 8,104,506 - EP2331858 and (5) patents pending.

The Only One With An Embedded Patented Purge System.

Finally, GC valves that allow your highly sensitive detectors to unleash their full potential.

Diaphragm based chromatographic valves have been around for more than a half century. Originally, they were in use in BTU analyzers and hydrocarbon measurement GC. With time, their size and built-in actuator feature made them attractive for other applications. Unfortunately, their sealing performance and problems associated with atmospheric diffusion through diaphragm have limited their usage. Users had no choice but to stick to conical rotary valve.

Now, this situation is behind us, thanks to all the innovative concepts we introduced in GC diaphragm valve technology.

Indeed, we are providing an entirely new set of performance parameters, which is many times greater than those found in today's market, with a sizable reduction in cost. Indeed, the valves shown in the following section overcome all the problems of previous diaphragm valve designs. They perform better and longer than GC rotary valves. In fact, the new valves can be used instead of GC rotary and sliding valves for most applications, with the exception of a few specific cases.

The unique purging feature, actuator design and assembly procedures result in an outstanding level of performance. Choice of performance grade, multiple ports fitting configuration and the possibility of custom designs allow maximum flexibility to instrument manufacturers and integrators.

THREE SERIES: ELDV1 / ELDV2 / MDVG

ELD V1	Standard level of performance, optimized for cost sensitive applications.
ELD V2	High performance level, better leak performance and lifetime, at medium cost.
MDVG	Premium performance grade, low, medium and high temperature grade.



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Features and Benefits

Purge

Add some intelligence to your system with real time valve smart diagnostic capability

- Eliminates permeation and diffusion for low level trace measurement.
- Eliminates inboard/outboard contamination. There are no fugitive emission.
- Creates an inert atmosphere underneath the diaphragm for hazardous application.
- Allows vacuum operation by balancing pressure over and under the diaphragm.
- Allows real time monitoring of valve condition by verifying the purge outlet quality.

This unique purging feature makes GC instrument much more reliable.

Relief Pins

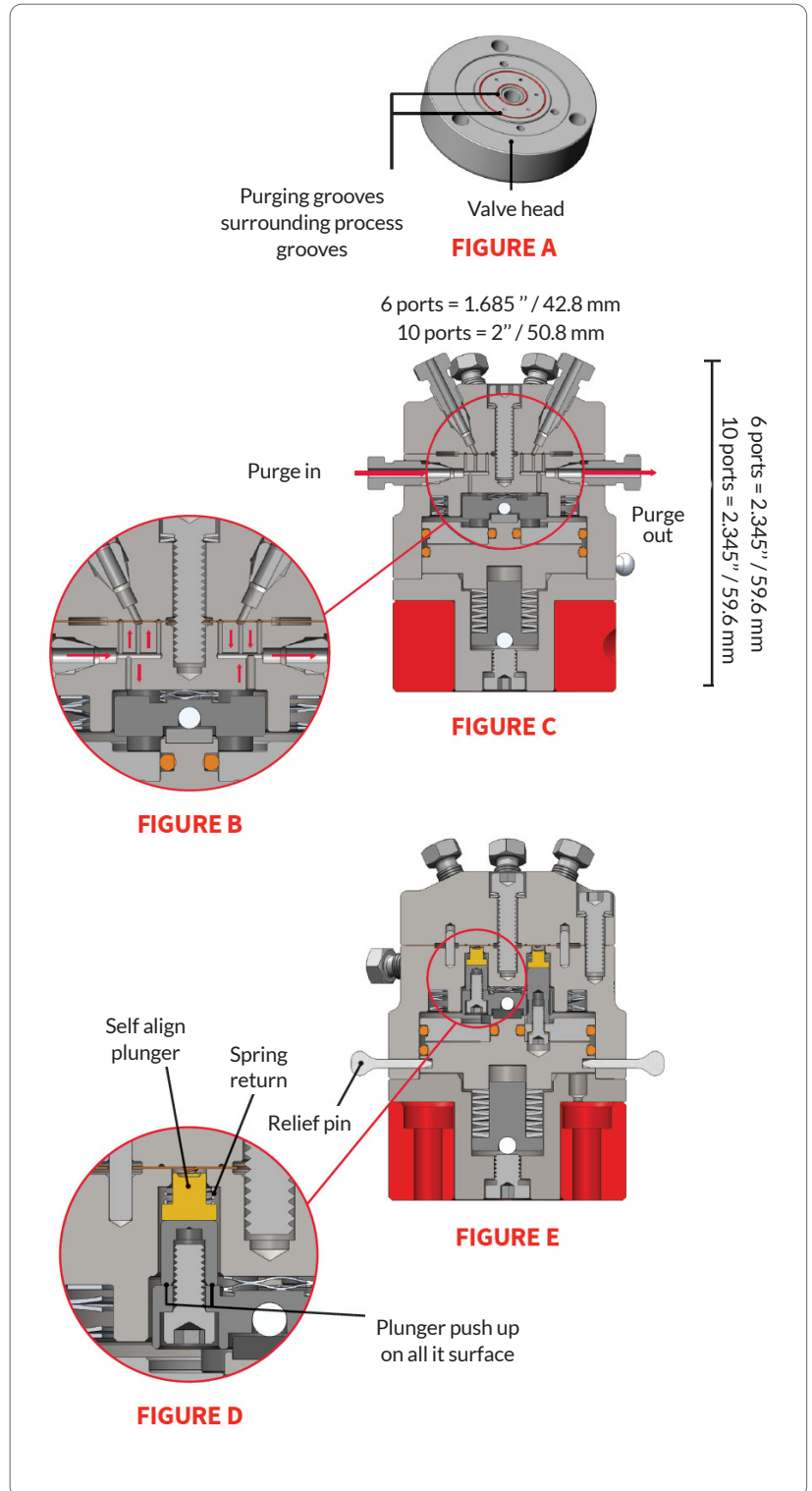
- Eases the process of diaphragm replacement in the field by pulling down all plungers.
- Relief pins remove stress on diaphragm for long term storage.

Diaphragm Design

- Mutli-layer diaphragm.
- Optional coating / metallization.
- Choice of material.

Plunger Design

- Precisely machined in metal.
- Tight length tolerance.
- Patented self aligned compressible (spring return), two-part-plungers.
- Tied base plunger design.
- Valve can be operated in any position. Plungers will not stick, and there is no friction.
- Force is applied to the total plunger surface area.
- Uniforms sealing force on the diaphragm.



3 Choices of Performance Mode

ELDV 1 Standard and ELDV 2 High-Performance Grade GC Diaphragm Valve

Mission critical applications demand the best available product, but not every system requires the Premium Grade MDVG series. This family of chromatographic diaphragm valves have been designed to fill the need for standard and high performance specifications.

The ELDV series will fill the need of most bench top laboratory GC while providing a high level of sealing performance and lifetime, better than the standard GC rotary valve generally available on the market and this at a lower cost and better offering value.

Description

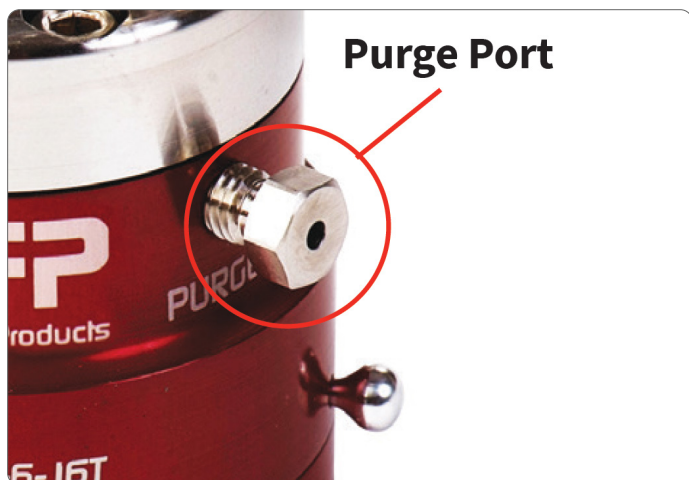
The user may choose only the configuration option needed, contributing to a further cost reduction. The valve is available in two (2) configurations, ELDV 1 and ELDV 2.

ELDV Series Configuration

- Aluminum actuator body, SS-316L valve head
- Both configurations are purge, as per premium grade MDVG series, but can also be ordered without purge. See purging description section to understand the purge concept and its benefits.

Selection Guideline

- ELDV1 (standard grade): Optimize for cost sensitive application.
- ELDV2 (high performance grade): Better leak performance and lifetime at medium cost.



MDVG

Premium Grade, GC Diaphragm Valve

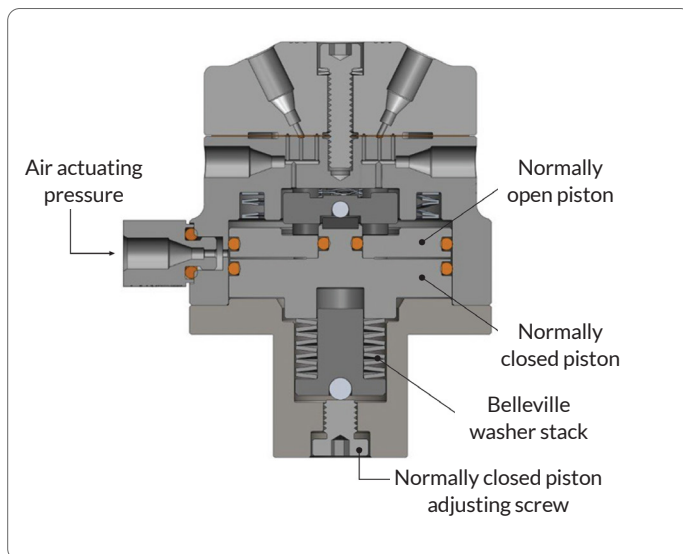
It allows higher pressure and temperature operation. It is also available with VCR 1/8" fittings. This is the choice for mission critical applications, process GC, fast temperature cycling and where a special coating is required. Ideal for sensitive GC/MS vacuum application.

Actuator Type

ELDV/MDVG

Standard actuator type i.E. pneumatic, single acting

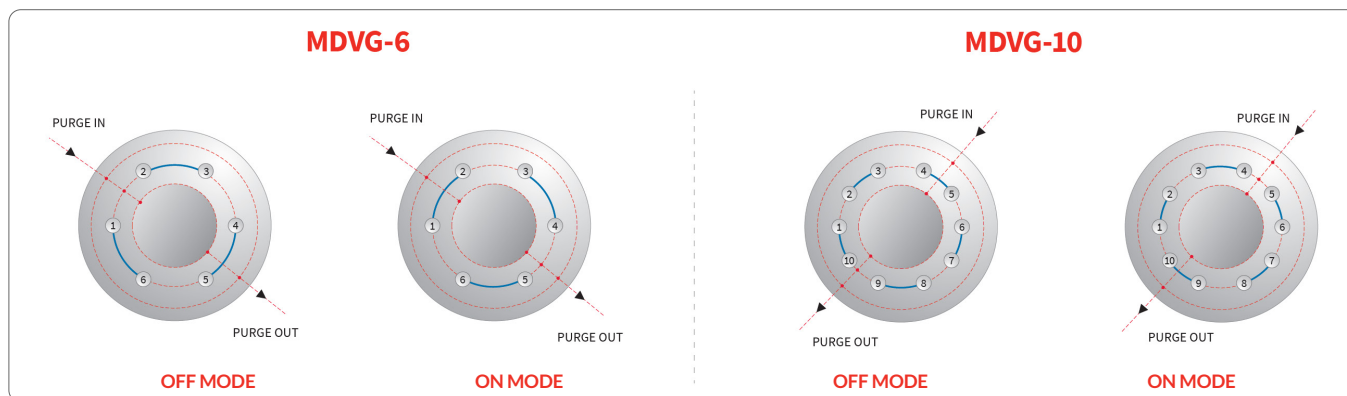
This standard version is in use in most of the ELDV / MDVG-series valves. It's based on a single acting pneumatic actuator, supplied by an only inlet actuation port. When pressure (60-65 psig) is applied, the normally open piston and plungers will move up closing connections between ports, while the normally closed piston and plungers will go down opening new connections. The non-mixing time is determined by adjusting the compression of the belleville washer stack. The non-mixing time is defined as the time that all plungers are up during the actuation process. This make sure that there is no cross-port flow contamination during actuation. Indeed all ports are isolate before to move to next position. This is true when actuating and de-actuating the valve.



Flow Paths

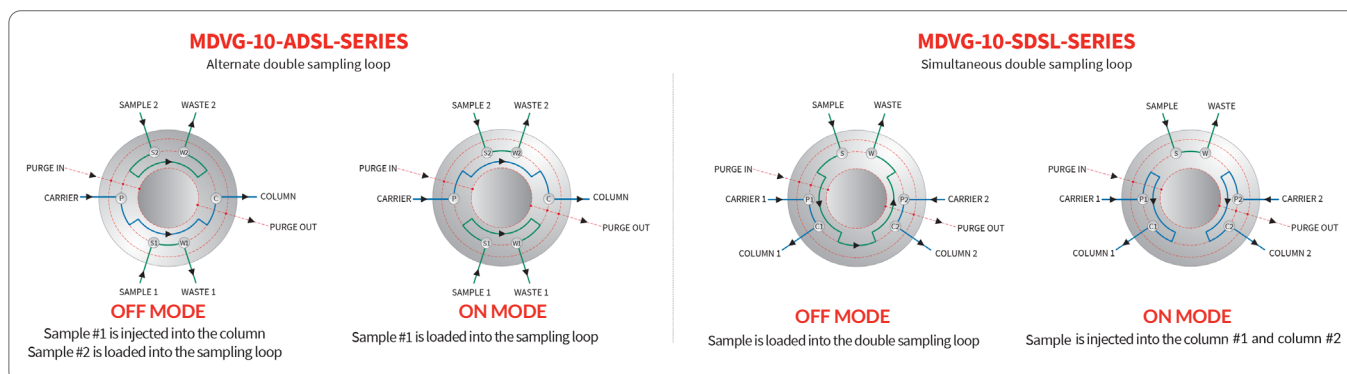
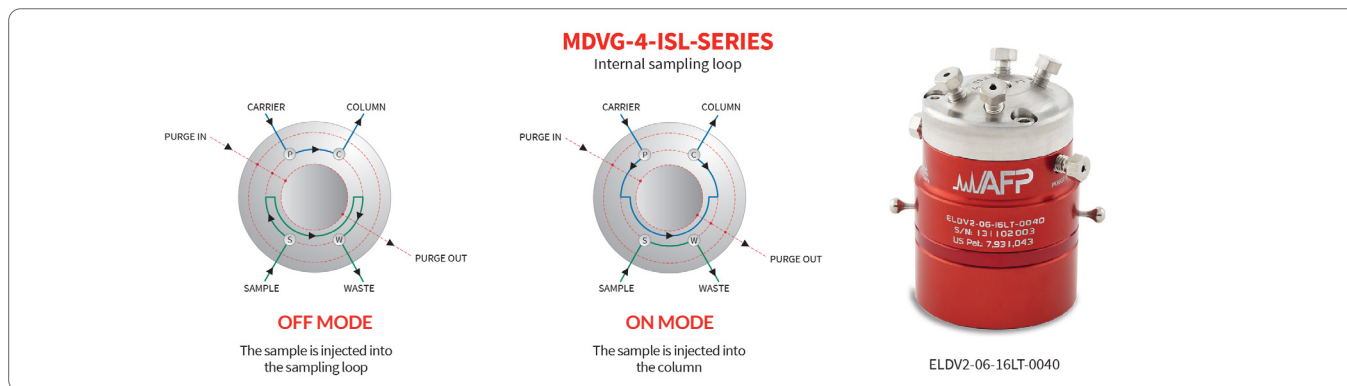
Conventional Flow Path

The conventional flow path is the most common one used in gas chromatography. The main benefit of this configuration is to never interrupt the fluid, upon normal operation. So, fluid is continuously flowing in all ports, whether the valve is actuated or not. This particularity comes from the fact that actuation plungers are stopping the flow between the ports, instead of acting directly on the port.



ISL - Internal sampling loop

The internal sampling loop is available in all models and the size of the sampling loop is available in 1.0 uL and 2.0 uL, contact AFP to discuss other volumes. There is also the double internal sampling loop diaphragm valve. It can be configured in two different modes i.e. alternate or simultaneous. The ADSL version (Alternate Double Sampling Loop) will inject the two samples on an alternate base. On the other end we also have the SDSL version (Simultaneous Double Sampling Loop) that will inject both samples simultaneously. We offer the possibility to have different size of sampling loop in the same valve in a range, be sure to contact AFP to discuss application. It is also possible to have one internal sampling loop and one external on the same valve head. Useful when the instrument measuring range must be change in real time.



GC Diaphragm Valves Performance Specifications

- Longer lifetime, and better performance than rotary valves.
- Eliminates/reduces detector upset and valve artifacts.
- Allows new GC methods, not possible with commercial GC diaphragm valves.
- Includes all fittings, adaptors and mounting clamps.
- Parts traceability.

ELDV Series		MDVG Series
Standard grade, low temperature	High performance grade, medium temperature	Premium grade valves high pressure / high temperature
ELDV 1	ELDV 2	MDVG



Features		(Aluminum Body & SS-316L Valve Head)	(Aluminum Body & SS-316L Valve Head)	(All SS-316L Body & Valve Head)
Standard Maximum Working Pressure (PSI / kPA)*1		300 / 2068	300 / 2068	500 / 3450
Maximum Working Temperature (°C / °F)	LT	100 / 212	100 / 212	100 / 212
	MT	N/A	180 / 356	180 / 356
	HT	N/A	N/A	250 / 482
Diaphragm Type (LT / MT / HT)*2		AFPD-1	AFPD-1 / AFPD-2	AFPD-1 / AFPD-2
Leak Rate*3	Cross Ports (Max Pressure)	10 ⁻⁹ Atm-cc/sec He	10 ⁻¹¹ Atm-cc/sec He	10 ⁻¹² Atm-cc/sec He
	In / Outboard	10 ⁻¹⁰ Atm-cc/sec He	10 ⁻¹² Atm-cc/sec He	10 ⁻¹² Atm-cc/sec He
Estimated Working Lifetime (Actuation Cycles)*4		> 1,000,000 cycles		
Valve Cap Material*5		SS-316L	SS-316L	SS-316L
Number Of Ports (6/10)		6/10	6/10	6/10
Port Connection ("*)*6		1/16	1/16	1/16
Port Size ("*)*7		.030	.030	.030
Actuator Type*8		Pneumatic single actuation (spring return) with relief pin		
Actuating Pressure (PSI / kPA)*9		65 / 450	65 / 450	65 / 450
Gas Consumption Per Actuation (6/10)	IN ³	.05 / .07	.05 / .07	.05 / .07
	CC	.75 / 1.00	.75 / 1.00	.75 / 1.00
Cylinder Body Material		Anodized aluminum	Anodized aluminum	SS-316L
Typical Applications		GC / Standard performance / Low temperature	GC / High performance / Low and Medium temperature	GC / LC, Low / Medium / High performance
Weight (6/10)	g	285 / 365	285 / 365	440 / 565
	oz	10 / 12.9	10 / 12.9	15.5 / 19.9

NOTES:

1. Working pressure of the internal sampling loop configuration is available up to 1500 PSI. Please see ISL section.
2. AFPD-1 and AFPD-2 refer to the diaphragm type being use in the valve. Special surface treatment is also involved. Be sure to always use your valve with the specified diaphragm type.
3. Leak rates are verified at maximum operation conditions with an AFP® proprietary online leak detection system.
4. Lifetime of valve can be affected by sample chemistry and temperature of operation.
5. Standard material is SS 316L, Hastelloy is also a common one. Silcotek coating are also available. High temperature grade, HT, have the valve head with special coating.
6. Standard port fitting are 1/16" and 1/8" VCR could be ordered with a minimum quantity.
7. Other port size are available like .010" for capillary column application.
8. Standard actuation is the pneumatic single acting (spring return) type, with a single actuation inlet port.
9. See specific valve configuration (i.e. LT, MT, HT or vacuum) for proper actuation pressure.

ELDV/MDVG/Series Configuration

1 - 2 - 3 - 4 - 5 - 6 - 7

1	2	3	4	5	6	7
Models	# Of port	Fitting	Temperature	Sampling	S.L. Size	Option
ELDV1	4	16 = fitting 1/16"	LT = 100 °C	0 = N/A	10 = 1.0 µL	S = SilcoNert2000™
ELDV2	6		MT = 180 °C	ISL	20 = 2.0 µL	D = Dursan™
MDVG	10		HT = 250 °C			HC = Hastelloy® P10 = .010" Ports Size

Ex: MDVG-6-16MT-0-0

Mini Diaphragm Valve Grooved, with purge, 6 ports of .030", Fitting 1/16", 180°C, 500 psi, diaphragm AFPD-2, All SS-316L valve.

***Lip Seal:** Lip Seal fitting is our new patent pending AFP fitting detail. This reduces the dead volume, eliminates the rotation of the ferrule and improves the sealing resulting in an improved connection for valve and fitting. This is very beneficial for any analytical high sensitivity instrumentation. Sealing integrity of a VCR fitting with the flexibility of a compression fitting.

*Patent Pending

Spare parts

Valve head 1 - 2 - 3 - 4 - 5 - 6 - 7

1	2	3	4	5	6	7
Models	# Of port	Fitting	Temperature	Sampling	S.L. Size	Option
VH	4	16 = fitting 1/16"	LT = 100 °C	0 = N/A	10 = 1.0 µL	S = SilcoNert2000™
	6		MT = 180 °C	ISL	20 = 2.0 µL	D = Dursan™
	10		HT = 250 °C			HC = Hastelloy® P10 = .010" Ports Size

Replacement diaphragm

1 - 2 - 3 - 4 - 5

1 - 2

1	2	3	4	5
Models	# Of port	Temperature	Sampling	S.L. Size
MDVGD	4	LT = 100 °C	0 = N/A	10 = 1.0 µL
	6	MT = 180 °C	ISL	20 = 2.0 µL
	10	HT = 250 °C		

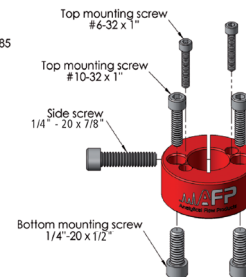
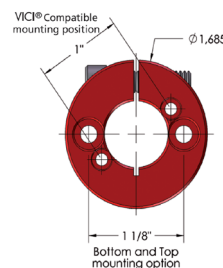
1	2
Models	# Of port
BWBC	6
	10

OPTION

S = Silconert 2000 is a surface treatment recommended for the analysis of ppb levels of organo-sulfur compounds and mercury. It reduces the surface adsorption of active compounds on steel.

D = Dursan is a coating designed to improve inertness and corrosion resistance of stainless steel. Ideal for H₂S, mercaptan, ammonia, HCl and other corrosive compounds.

HC = Valve head made of Hastelloy®.
P10 = Valve head with .010" Ports Size.



Clamp Ring
Part number: CR-MDV

Tool Kit (This include all the tools and spare relief pins to do the maintenance i.e. replacing a valve head, diaphragm, actuator)

Part number: TK-01