



ANALYTICAL FLOW PRODUCTS

Product overview



HIGH PERFORMANCE GC DIAPHRAGM VALVE*

The only one with an embedded
patented purge system.

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

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

- **ELDV1 :** STANDARD LEVEL OF PERFORMANCE, OPTIMIZED FOR COST SENSITIVE APPLICATIONS.
- **ELDV2 :** HIGH PERFORMANCE LEVEL, BETTER LEAK PERFORMANCE AND LIFETIME, AT MEDIUM COST.
- **MDVG :** PREMIUM PERFORMANCE GRADE, LOW, MEDIUM AND HIGH TEMPERATURE GRADE.



Features and benefits

PURGE FEATURES AND BENEFITS

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.

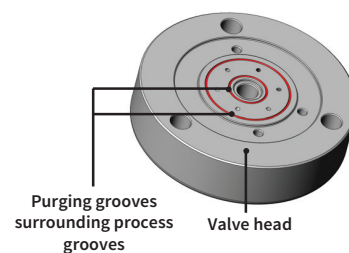


FIGURE A

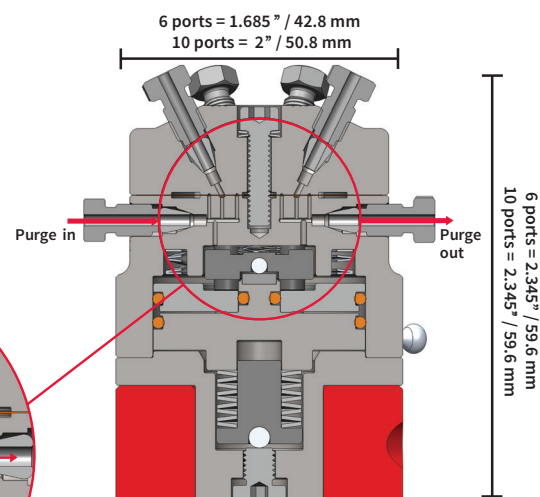


FIGURE C

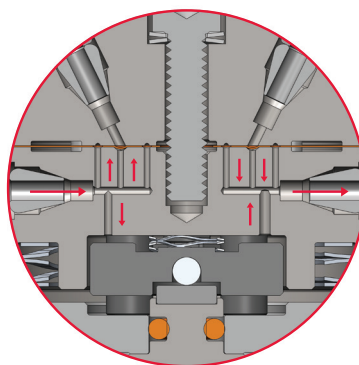


FIGURE B

SEE AN-04 FOR HOW TO GET MAXIMUM BENEFITS FROM THE PURGE FEATURE.

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.

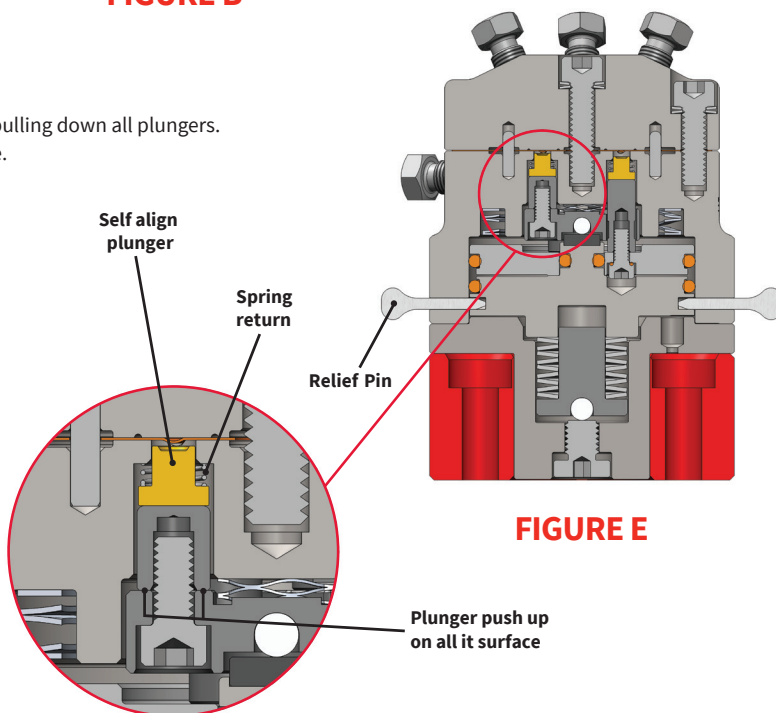


FIGURE E

FIGURE D

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

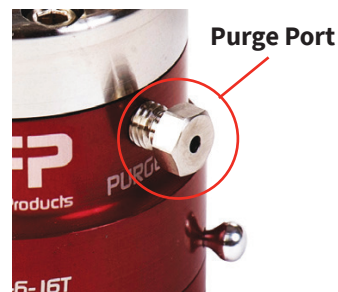
The user may choose only the configuration option he needs, contributing to a further cost reduction. The valve is available in two (2) configurations, ELDV 1 and ELDV 2.

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

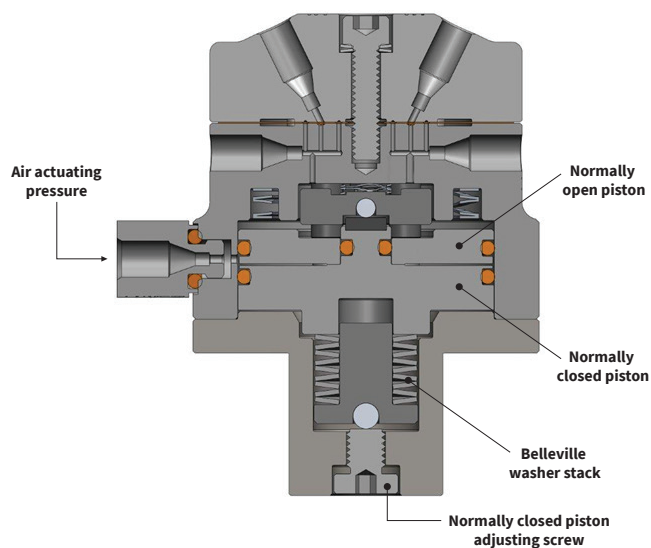
This series is the premium grade, all stainless steel purge valve. It allows higher pressure and temperature operation. It is also available with VCR 1/8" fittings. This is the choice for mission critical applications, process GC, fast temperature cycling and where a special coating is required. Ideal 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 (60-65psig) 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.

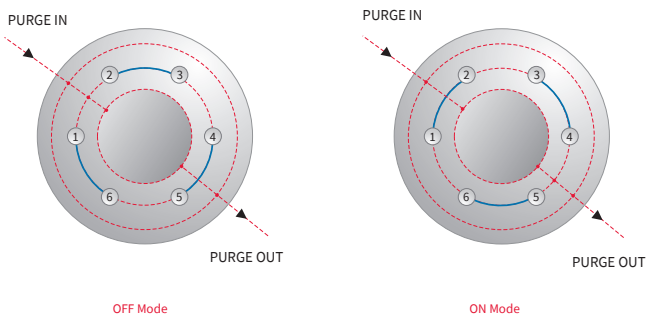


Flow paths

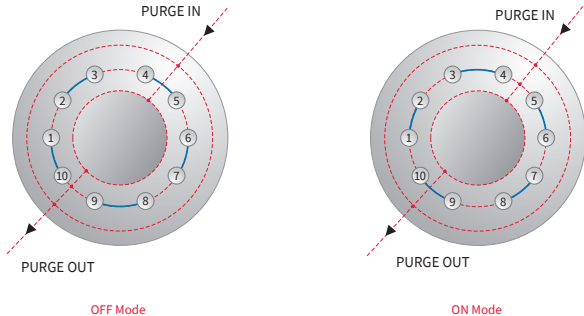
CONVENTIONAL FLOW PATH

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.

MDVG-6



MDVG-10

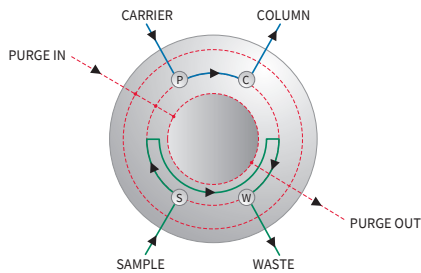


ISL - Internal sampling loop

The internal sampling loop is available in all models and the size of the sampling loop is available in 0.5 μ l, 1.0 μ l, 1.5 μ l, 2.0 μ l, 3.0 μ l, 5.0 μ l. 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 of 1.0 μ l to 5.0 μ l. 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.

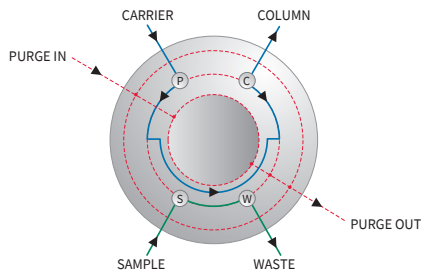
MDVG-4-ISL-SERIES

Internal sampling loop



OFF Mode

The sample is injected into the sampling loop



ON Mode

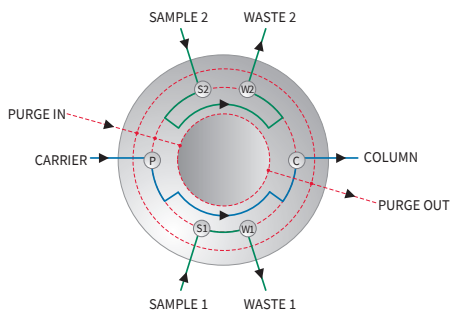
The sample is injected into the column



ELD2-06-16LT-0040

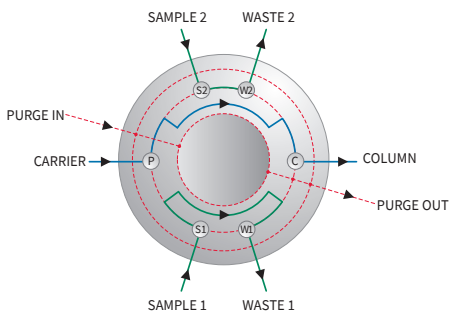
MDVG-10-ADSL-SERIES

Alternate double sampling loop



OFF Mode

Sample #1 is injected into the column
Sample #2 is loaded into the sampling loop

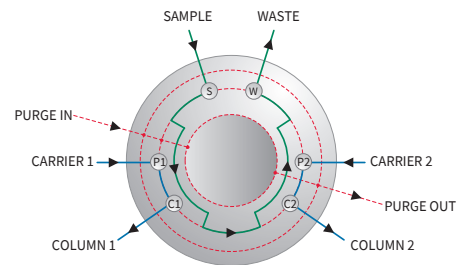


ON Mode

Sample #1 is loaded into the sampling loop

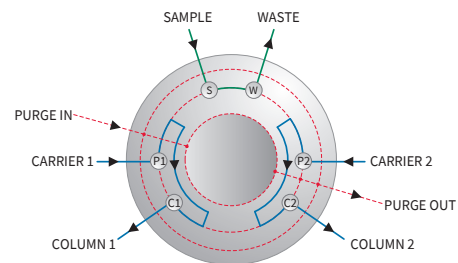
MDVG-10-SDSL-SERIES

Simultaneous double sampling loop



OFF Mode

Sample is loaded into the double sampling loop



ON Mode

Sample is injected into the column #1 and column #2

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.
- 100% HELIUM MASS SPECTROMETER LEAK TESTED.

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



(Aluminum Body & SS-316L valve valve head)

(Aluminum Body & SS-316L valve head)

(ALL SS-316L Body & valve head)

FEATURES			(Aluminum Body & SS-316L valve valve head)	(Aluminum Body & SS-316L valve head)	(ALL SS-316L Body & valve head)	
STANDARD MAXIMUM WORKING PRESSURE (PSI / kPa) ①			300 / 2068		500 / 3450	
MAXIMUM WORKING TEMPERATURE (°C / °F)		LT	100 / 212		100 / 212	
		MT	N/A		180 / 356	
		HT	N/A		250 / 482	
DIAPHRAGM TYPE (LT / MT / HT) ②			AFPD-1		AFPD-1 / AFPD-2	
LEAK RATE ③	Cross ports (max pressure)		9.0x10 ⁻⁹ Atm-cc/sec He		4.7x10 ⁻¹¹ Atm-cc/sec He	3.0x10 ⁻¹² Atm-cc/sec He
	Cross ports (100 PSI)		5.0x10 ⁻¹⁰ Atm-cc/sec He		9.4x10 ⁻¹² Atm-cc/sec He	6.0x10 ⁻¹³ Atm-cc/sec He
	In / Outboard		1.0x10 ⁻¹⁰ Atm-cc/sec He		4.7x10 ⁻¹² Atm-cc/sec He	3.0x10 ⁻¹³ Atm-cc/sec He
ESTIMATED WORKING LIFETIME (YEAR) ④			2		3	5
Valve Cap	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	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)	in³	.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)	GR	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 LT i.e. 100°C, 1.0 million actuations
MT i.e. 180°C, 700,000 actuations
HT i.e. 250°C, 500,000 actuations
Based on a cycle time of 5 minutes, 24 hours, 365 days / year.
- 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
MODELS	# OF PORT	FITTING	TEMPERATURE	SAMPLING	S.L. SIZE	OPTION
ELDV1	4	16 = Fitting 1/16"	LT = 100°C	0 = N/A	0 = N/A	S = SilcoNert2000™
ELDV2	6	LS16 = Lip Seal 1/16"	MT = 180°C	ISL	05 = 0.5 µl	D = Dursan™
MDVG	10	V8 = VCR 1/8"	HT = 250°C	ADSL	10 = 1.0 µl	V = Vacuum
				SDSL	15 = 1.5 µl	HC = Hastelloy®
					20 = 2.0 µl	P10 = .010" Ports Size
					30 = 3.0 µl	
					50 = 5.0 µl	
					XX = Custom 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. Please refer to Design Report 3 (DR-3) in the Analytical Flow Product Cookbook.

*Patent Pending

Spare parts :

Valve head



1	2	3	4	5	6	7
MODELS	# OF PORT	FITTING	TEMPERATURE	SAMPLING	S.L. SIZE	OPTION
VH	4 6 10	16 = fitting 1/16" LS16 = Lip Seal 1/16"* V8 = VCR 1/8"	LT = 100°C MT = 180°C HT = 250°C	0 = N/A ISL ADSL SDSL	0 = N/A 05 = 0.5 µl 10 = 1.0 µl 15 = 1.5 µl 20 = 2.0 µl 30 = 3.0 µl 50 = 5.0 µl XX = Custom size	S = SilcoNert2000™ D = Dursan™ HC = Hastelloy® P10 = .010" Ports Size

***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. Please refer to Design Report 3 (DR-3) in the Analytical Flow Product Cookbook.

*Patent Pending

Replacement diaphragm



1	2	3	4	5
MODELS	# OF PORT	TEMPERATURE	SAMPLING	S.L. SIZE
MDVGD	4 6 10	LT = 100°C MT = 180°C HT = 250°C	0 = N/A ISL ADSL SDSL	0 = N/A 05 = 0.5 µl 10 = 1.0 µl 15 = 1.5 µl 20 = 2.0 µl 30 = 3.0 µl 50 = 5.0 µl

Hardware spare parts (Screws & Belleville Washers)



1	2
MODELS	# OF PORT
BWBC	6 10

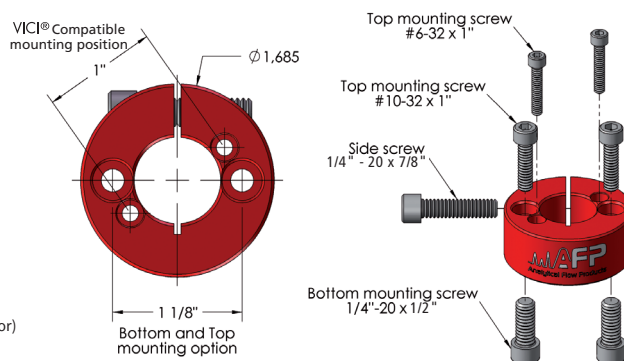
Clamp ring

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**



OPTION

S = SilcoNert 2000™ The ultimate passivation of treated surfaces. A required treatment for metal components when analyzing for parts-per-billion levels of organo-sulfur compounds & mercury. Greatly reduce moisture contamination, improve system performance and eliminates surface adsorption of active compounds on steel.

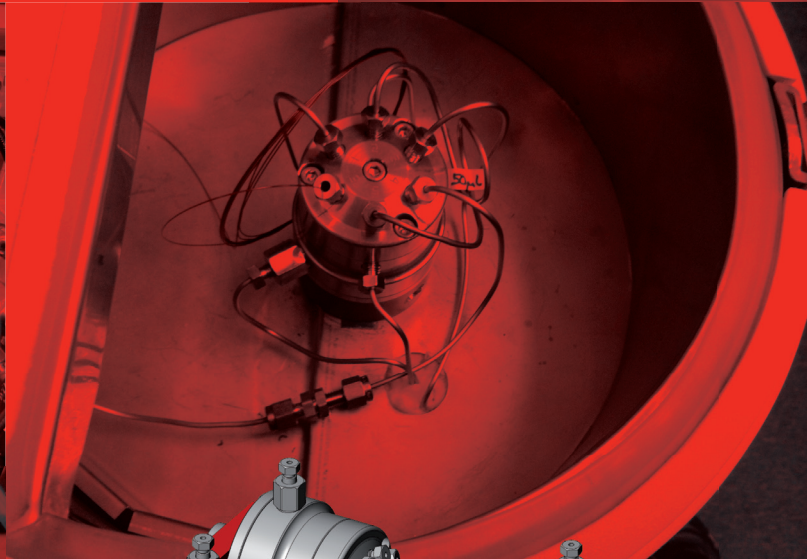
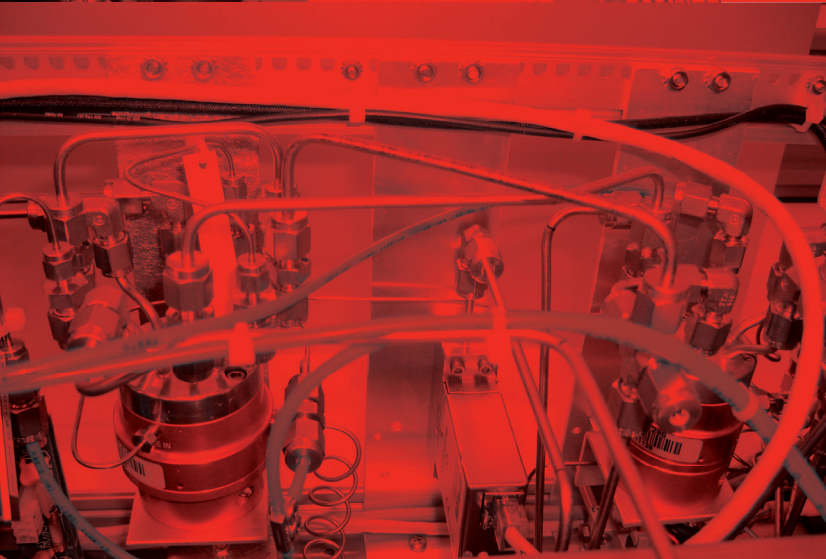
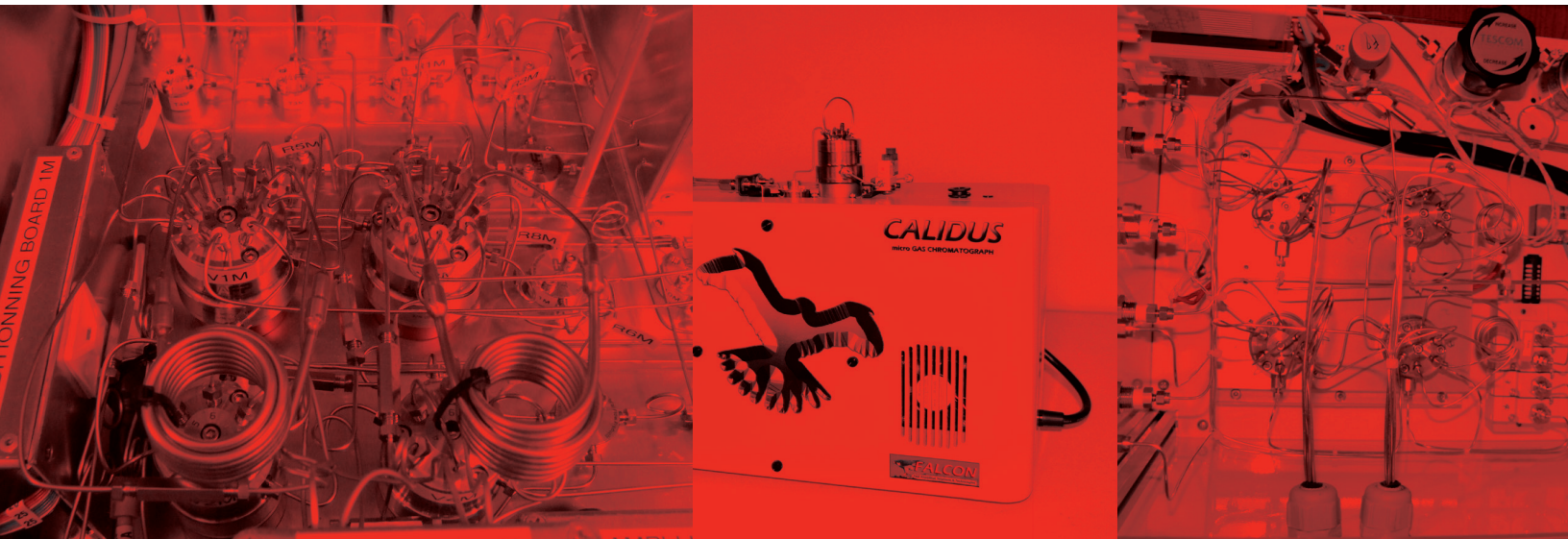
D = Dursan™ is a coating designed to improve the inertness, hardness, and corrosion resistance of stainless steel. Ideal for sulfur, H₂S, mercaptan, ammonia and mercury sampling.

V = Vacuum operation configuration.

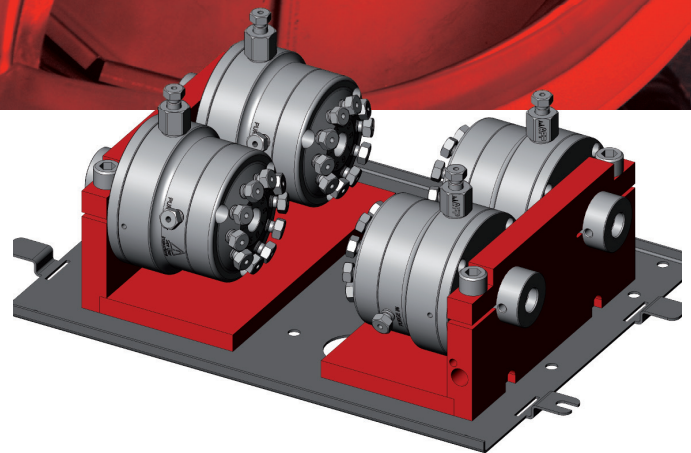
HC = Valve head made of Hastelloy®.

P10 = Valve head with .010" Ports Size.

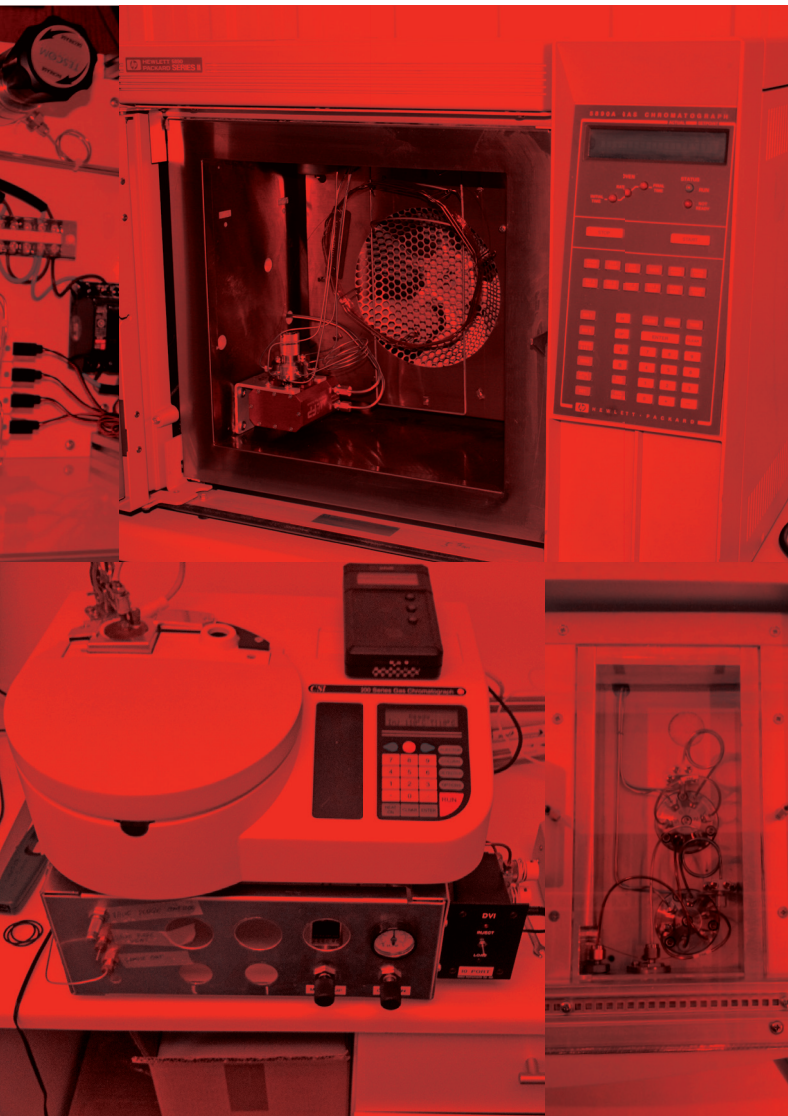
Picture gallery



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**Specially designed
heated valve box**



See AN-02 in the technical section for application ideas for the ELDV and MDVG



Base on a specific valve configuration and working condition, warranty period and valve maintenance procedure, (i.e.) parts replacement are different. Please refer to Analytical Flow Products™ specific valve documentation for more information.

Is still the responsibility of the user to make sure that for the selected valve configuration is safe and reliable for his application.

Analytical Flow Products engineering team will do their best to help customers for any application that may require custom modification. Analytical flow products will be please to supply demonstration parts to qualified O.E.M.

***SEE WEBSITE FOR WARRANTY AND DISCLAIMER NOTICE. PRODUCT SPECIFICATION MAY CHANGE WITHOUT NOTICE, ASK FOR UPTODATE NOTIFICATION.**



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ANALYTICAL FLOW PRODUCTS



PERFECTION MULTIPLIED

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