ASDevices Improving the past...
Redefining The Future

µInProve™ PLSV series GC injection valve

THE MOST RELIABLE, DURABLE AND COMPACT GC VALVE TECHNOLOGY

µInProve™ PLSV series GC valve

The uInProve PLSV series GC valve is a disruptive valve technology achieving both the lifetime of a diaphragm valve and the constant pressure drop and the simplicity of a rotary valve. This new valve technology is based on a reduced sealing surface area offered by the valve's inserts that replaces the traditional rotor. This revolutionary valve has been designed to respect our most elevated standards that we demand for.

UNIQUE CHARACTERISTICS

- Available in 4, 6, 10, 12 ports (14 ports optional)
- Sample stream selection version
- Internal Sampling loop version
- Three temperature ranges version available
- Two pressure ranges version available
- Insert available in different materials

UNBEATABLE PERFORMANCE

- 1 million+ cycle in high purity trace gas application and still working without noticeable effect on chromatography
- Result never achieved before with a rotary valve
- Exceed diaphragm valve

INNOVATIVE INSERT SLIDING VALVE TECHNOLOGY*

- Reduced surface sealing area that improves leak integrity and reduces the required actuation torque
- Constant pressure to flow drop. Resolve diaphragm valve pressure/flow variation
- Slidable insert replaces the traditional rotor
- Valve inserts easily replacable
- Inserts are offered in different materials
- High resistance to particulates

MINIATURE DESIGN

- Smaller size than any other GC valve available on the market

ACTUATION CONFIGURATION

- Compact electrical actuator
- Compact pneumatic actuator

*patent pending

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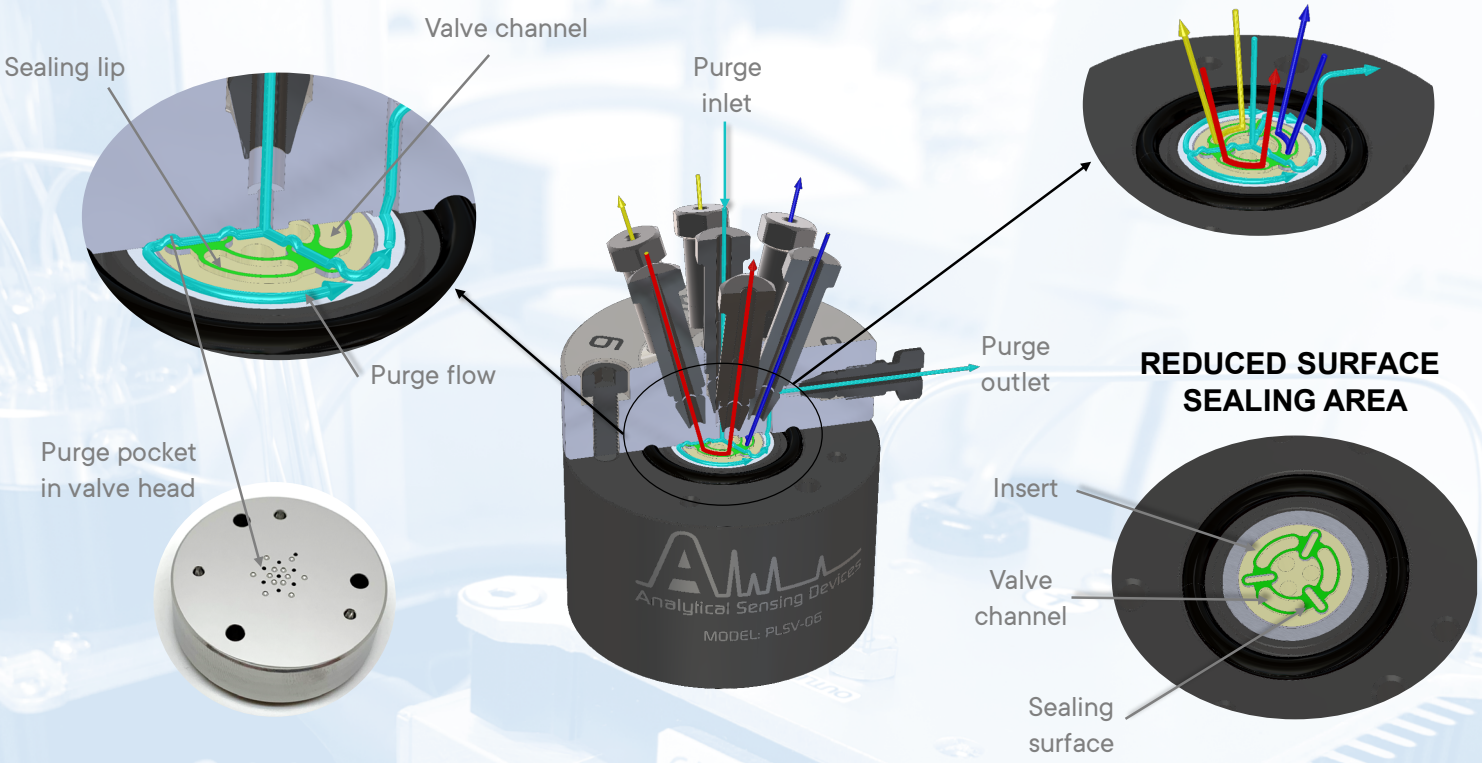
PURGED LIP SEALING VALVE (PLSV) TECHNOLOGY

INNOVATIVE PURGE CONCEPT

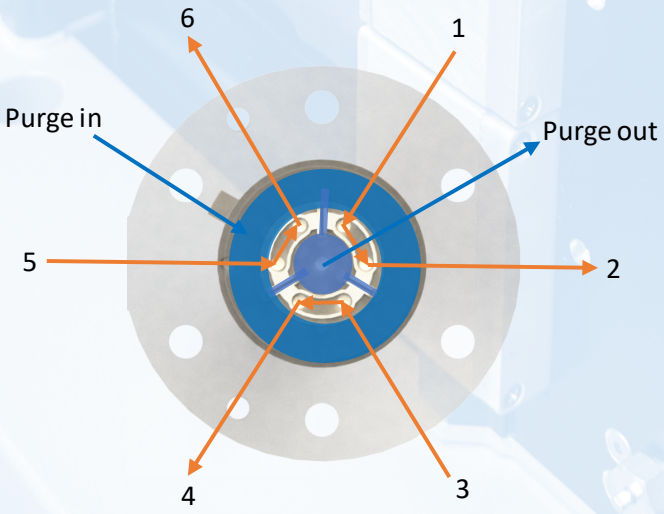


FLOW

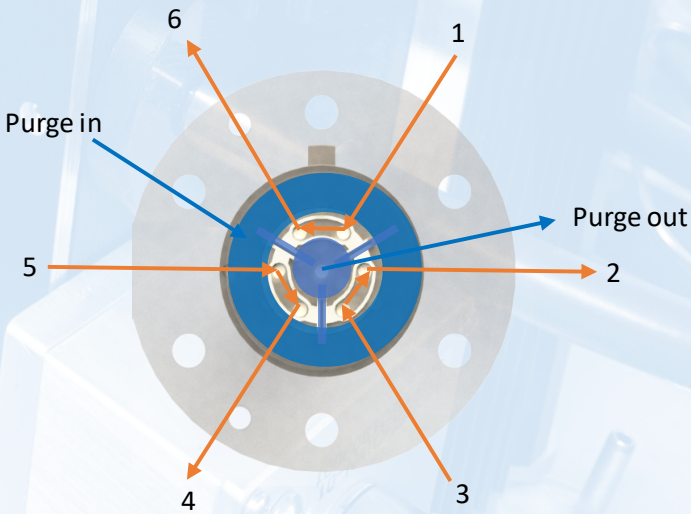
REDUCED SURFACE SEALING AREA

ACTUATION PRINCIPLE

TWO POSITIONS CONFIGURATION



Position 1



Position 2

*patent pending

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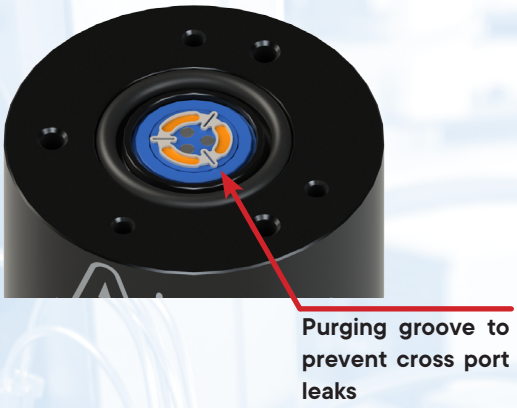
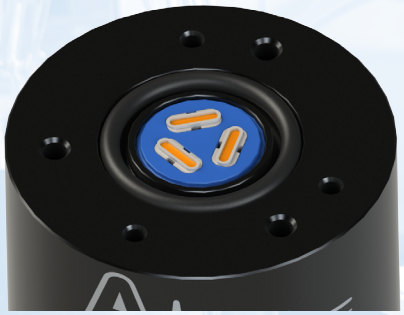
INSERT CONFIGURATION



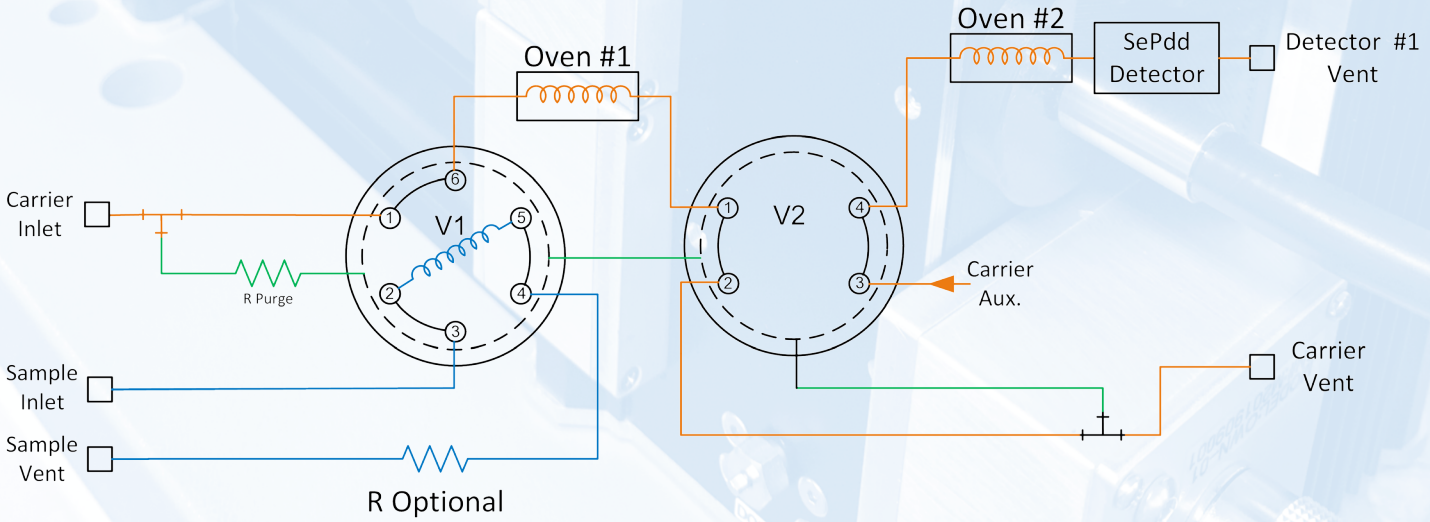
This insert design, which is the standard configuration in this valve series, has a sealing surface which is 7 times less then a traditionnal rotary valve. This reduced surface, in combination with our innovative purge concept, result in an increase lifetime and better leak integrity. This unique sliding insert design is what provides a valve with unbeatable performance exceeding rotary and diaphragm valves.



This insert is a variant of our standard insert design. It further reduces the sealing surface hence less friction, lower actuation torque and extended lifetime. It is used in the internal sampling loop and sample stream selection model.

TYPICAL CHROMATOGRAPHIC CONFIGURATION

Here is a typical chromatographic method based on the uInProve valve. Here, the valves are set in an heartcut method with a small restrictor for the purge. It is also to be noted that in this configuration, the sample loop is operated above ambient pressure. Our experience has demonstrated that this configuration, regardless of the valve technology, offers the best performance. It is however not a requirement, but a good design practice.



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ACTUATOR OPTION

COMPACT PNEUMATIC ACTUATOR

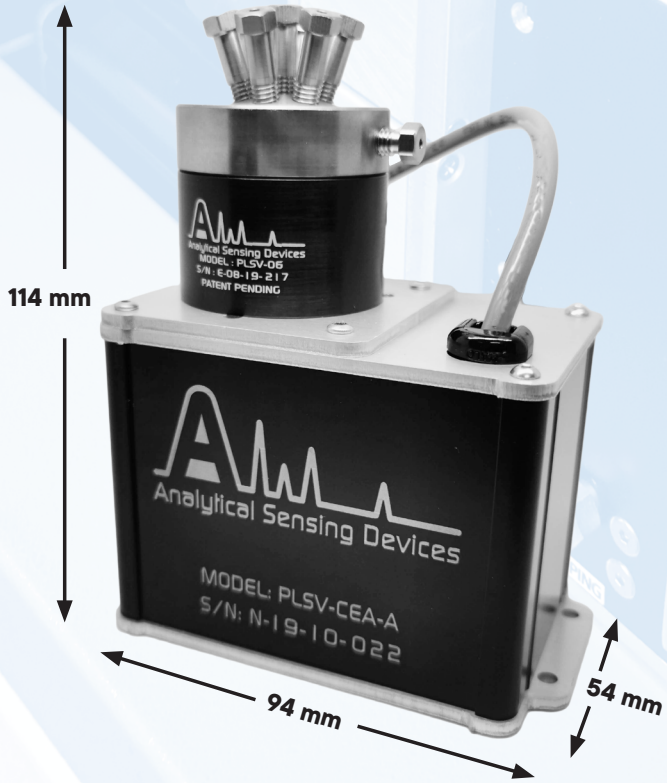
For gas chromatographs that require a pneumatic actuation, this compact design is the perfect choice. Its compact size allows you to fit multiple valves in a single chassis for the most demanding applications.

- Allow easy replacement for diaphragm valve
- Compact dimension
- Operating temperature up to 180°C
- Stand-off extender available

COMPACT ELECTRICAL ACTUATOR

This actuator has been designed for portable gas chromatographs or where no actuation air is available.

This is the most compact electrical actuator on the market, thanks to our valve design which requires much less torque compared to traditional rotary valves. Stand-off extenders are also offered for applications where the valve needs to be heated.



- The smallest electrical actuator on the market
- Perfect for portable gas chromatograph
- Used in ASDevices GCSense
- Stand-off extender available

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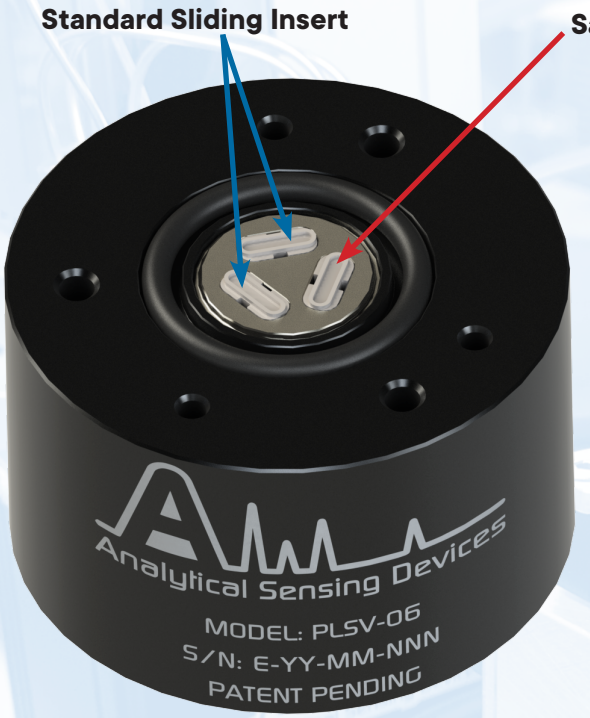
µInProve™ WITH INTERNAL SAMPLING LOOP

The same innovative sliding insert design can be used to offer valves with an internal sampling loop. In fact, one of the insert is used as the sampling loop. The insert internal volume is precisely machined to a specific volume. As the insert is made of rigid material, the volume remains constant regardless of the operating conditions, resolving the known issue of diaphragm valves with internal sampling loop. It is well known in the field that the internal sampling loop volume of diaphragm valves varies due to the elasticity of the flexible diaphragm membrane.

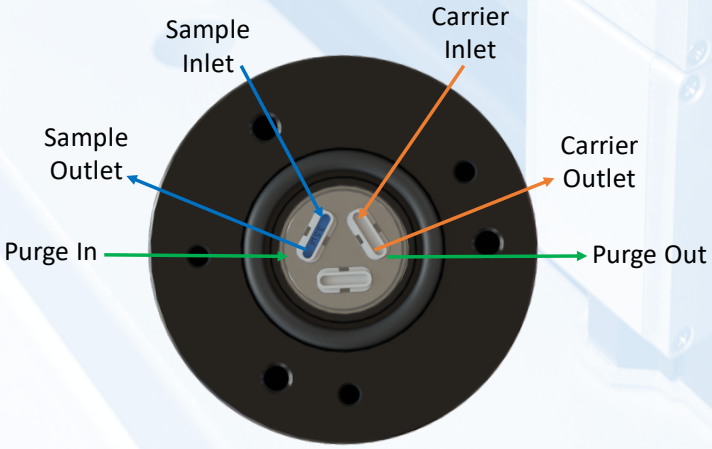


0.1 µl

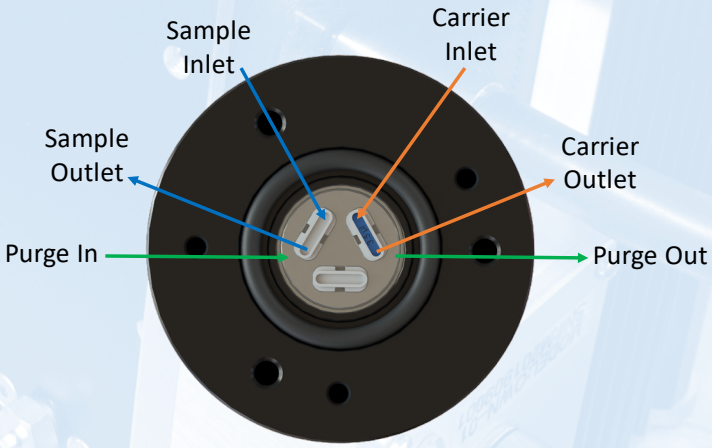
2.0 µl

- Micro-Machined to a specific volume
- Constant volume regardless of operating conditions
- Available in different materials
- Available between 0.1 to 2.0 µl
  Custom size available on request

Sampling Position



Injection Position



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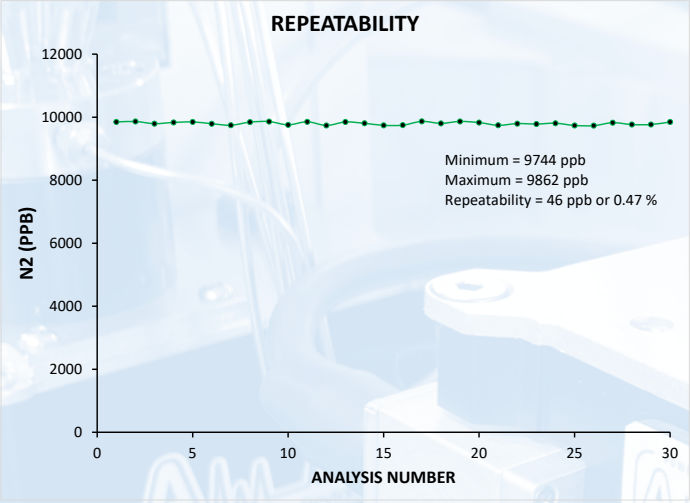
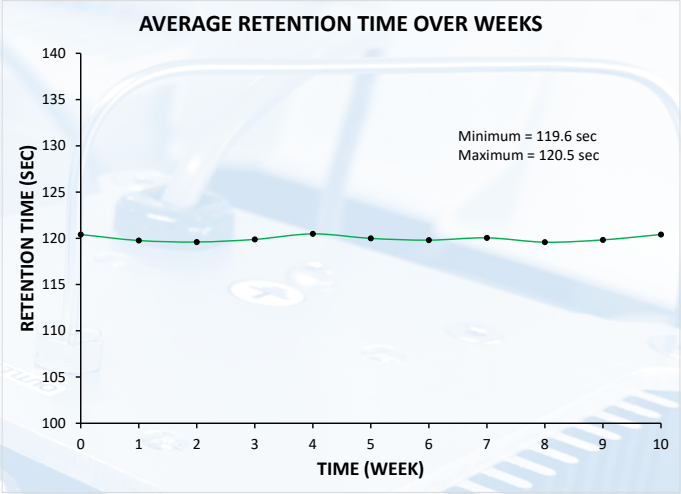
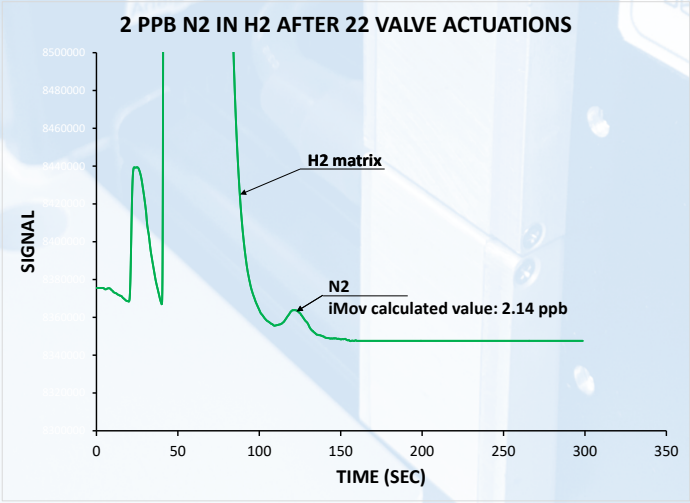
PERFORMANCE TESTING – NEVER ACHIEVED BEFORE

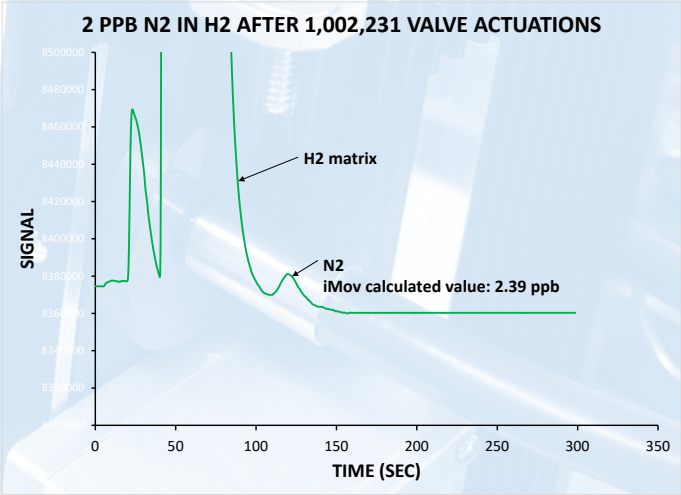
The uInProve chromatographic valve has been designed to offer a superior leak integrity and life time. In order to demonstrate its performance, the uInProve valve has been subject to many tests and the ultimate one is a real trace measurement chromatographic application. Using the ultra sensitive ASDevices SePdd and iMov gas chromatographic platform, a GC method to measure trace ppb level N2 in H2 was setup and ran for over 1,000,000 actuations. This application, based on a heartcut method with two valves, was chosen has it is the best one to demonstrate leak integrity, life time, repeatability and constant flow characteristic over time.

With more than 1,000,000 actuations, the valves still offer the same outstanding performance.







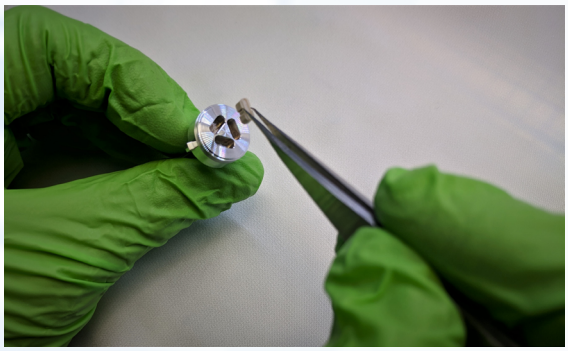


Note: In order to achieve 1,000,000 cycles, the instrument was run continuously for one day on normal analysis mode with a cycle time of 5 minutes followed by an accelerated life testing mode where the valves were actuated every 5 seconds. This process, which was generating 104,256 actuations per week, was repeated 10 times for a total of 10 weeks.

QUALITY TESTING

The ASDevices team has quite a long track record in developing high quality and high performance analytical and industrial valves. Consequently, we know what is required in term of design and process control to deliver the best quality valve.

Before entering the manufacturing process, every single components is thoroughly inspected for any defects.



Cleanliness

During manufacturing, great care is taken to ensure that all parts are kept clean. Not only the wetted parts, but all parts. After being cleaned in an ultrasonic bath with water soluble detergents, all parts are cleaned with high pressure hot UHP water. Following this step, all wetted parts are subject to a proprietary inerting process. From that point, parts are continuously stored in clean packaging and handled with special gloves.

Leak testing

Our unique patent pending purge system means our valves can't leak when operated within specification. However, it is still necessary during manufacturing to do a leak testing to make sure all parts are properly assembled and within specification.

Some manufacturers only do batch testing. We don't. We test every single valve with our ultra sensitive Enhanced Plasma Discharge technology* and unique innovative leak testing method*.

HOW WE CATEGORISE VALVE

Chromatographic valves have always been categorised by their operating temperature with a fixed maximum operating pressure. The specified maximum operating pressure is also most of the time way too high for most chromatographic applications. Most chromatographic methods only involve pressures below 100 PSIG. Most capillary or packed column operate in the range of 10 to 50 PSIG. Pressure in the area of 300 PSIG are generally required for liquid sample only. Tuning a valve for high pressure operation means more stress on components hence an impact on its lifetime. Also, a valve tuned at 300 PSIG does not necessarily work better at 100 PSIG. In fact, its performance will be worst over time. This is why we offer not only different temperature ranges but also different pressure ranges. With this approach, we make sure that you have the best valve for your application.

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*patent pending

VARIOUS CHROMATOGRAPHIC CONFIGURATION

See AN-05 document for more configurations

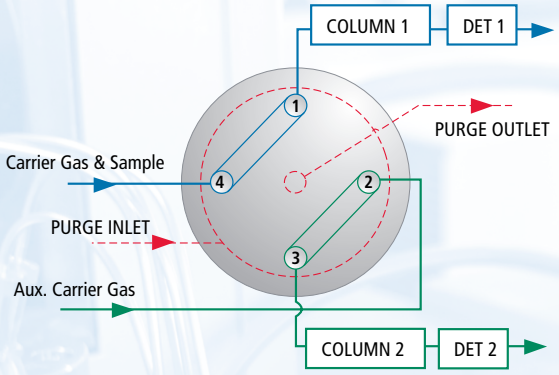


Figure 1: Column selection

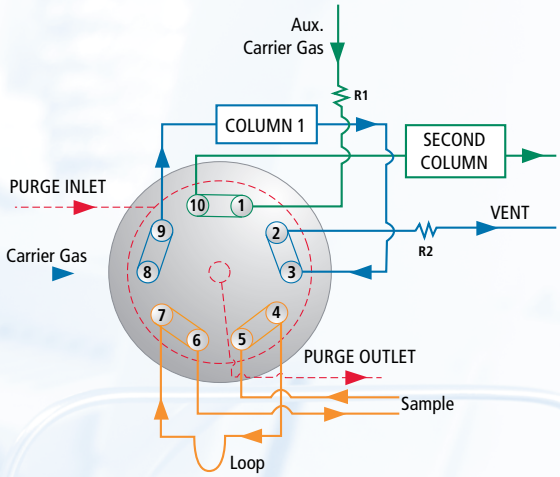


Figure 2: Gas sampling and backflush to vent

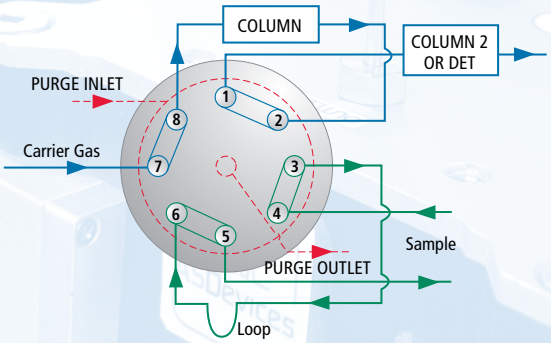


Figure 3: Gas sampling and backflush to detector

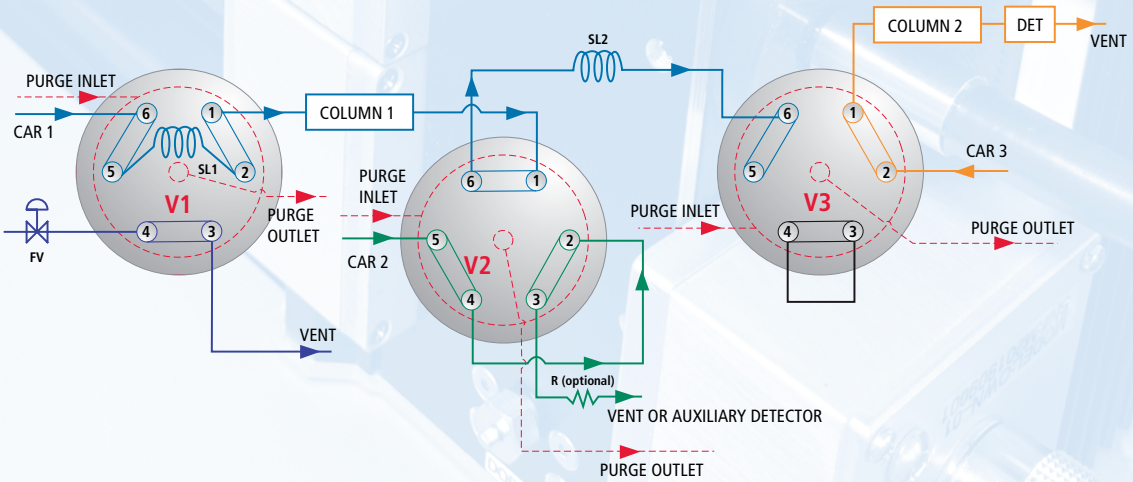
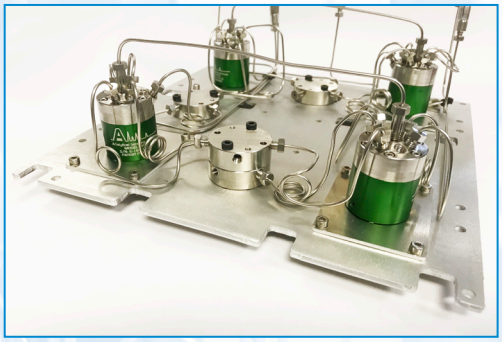
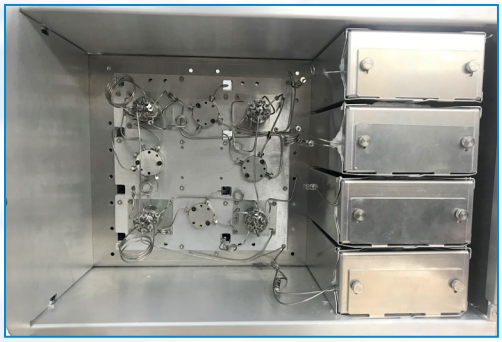


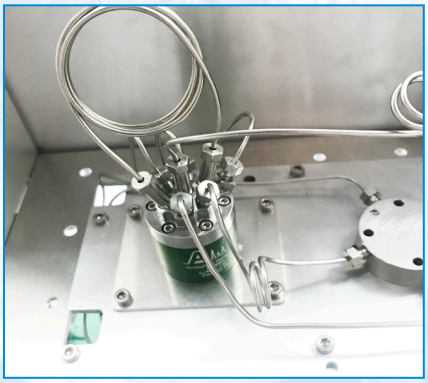
Figure 4:

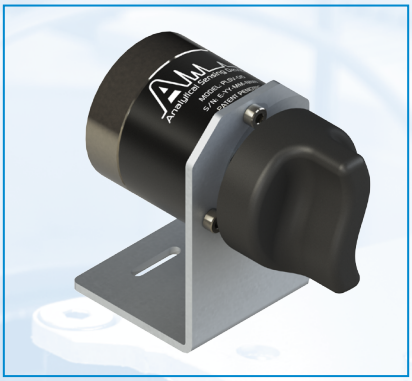
- Filling SL2 with the selected peak or group of column 1
- Injecting SL1 on column 1

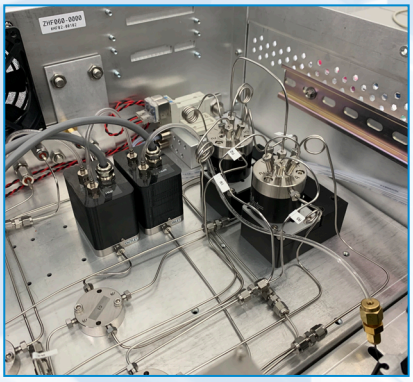
PHOTO GALLERY

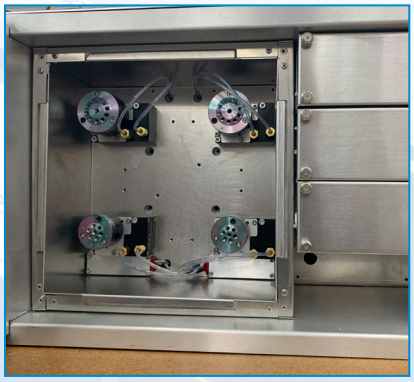












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NOTE:

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Specifications / Model μInProve™

	PLSV-XX-XX-XX-LT-XX	PLSV-XX-XX-XX-MT-XX	PLSV-XX-XX-XX-HT-XX
Standard maximum working pressure (PSI/kPa)			
SP: Standard pressure	1034/150	1034/150	1034/150
HP: High pressure	2068/300	2068/300	2068/300
Optional	Up to 700 Psig for liquid sample		
Maximum working temperature (°C/°F)	100/212	180/356	350/662
Cross ports (Atm-cc/sec He)	Due to our patented design, it is impossible for our valve to develop a cross port leak when operated within specifications.		
In / Outboard (Atm-cc/sec He)			
Flow path to purge (Atm-cc/sec He)	3.0x10−12 6.0x10−13 (UHP version)	3.0x10−12	3.0x10−12
Estimated actuations	1,000,000	750,000	500,000
Valve cap material	300 Series stainless steel		
Cylinder body material	Anodized aluminium		Stainless steel
Insert material	PEEK, Teflon, Vespel, other available		
Number of ports available	4, 6, 8, 10, 12, 14		
Sample stream configuration	Up to 10 ports		
Internal Sampling Loop Available	0.1 to 2 µL		
Port size (mm/in)	1/0.040		
Actuator type	Electrical / Pneumatic / Manual		
Actuation torque (lbs.in)	1 to 6 (# of Ports dependant)		
Pneumatic actuation pressure (PSIG/kPa)	65 to 145 PSIG		
Surface cleaning procedure	Ultrasonic washing, O2 compatible		
Purged flow requirement	1 to 3 ml/min or no flow with miniature vaccum pump		

	4 Ports	6 Ports	8 Ports	10 Ports	12 Ports	14 Ports
Weight	205 g (0,45 lbs)	205 g (0,45 lbs)	296 g (0,65 lbs)	296 g (0,65 lbs)	296 g (0,65 lbs)	296 g (0,65 lbs)
Dimension (D x H)	39.2 x 66.7 mm (1,54 x 2.62 in)	39.2 x 66.7 mm (1,54 x 2.62 in)	48.2 x 66.7 mm (1,89 x 2.62 in)	48.2 x 66.7 mm (1,89 x 2.62 in)	48.2 x 66.7 mm (1,89 x 2.62 in)	48.2 x 66.7 mm (1,89 x 2.62 in)

PLSV VALVE CONFIGURATION

PLSV - XX - XX - XX - XX - XX - XX (XX: OPTIONAL)

# OF PORT	TYPE	OPERATING PRESSURE	OPERATING TEMPERATURE	COATING	VERSION
04 = 4 Ports 06 = 6 Ports 08 = 8 Ports 10 = 10 Ports 12 = 12 Ports	00 = Standard 02 = Internal Sampling Loop	SP = 150PSI/1034kPa HP = 300PSI/2068kPa	LT = 100°C/212°F MT = 180°C/356°F HT = 260°C/500°F	ST = Standard SN = SilcoNert DU = Dursan	UHP = Ultra High Purity

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