SEALING SYSTEMS

Engineering Equipment for Sanitary Applications

High Purity Diaphragm Valves

www.sealingsystems.gr

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A New Standard In High Purity Diaphragm Valves

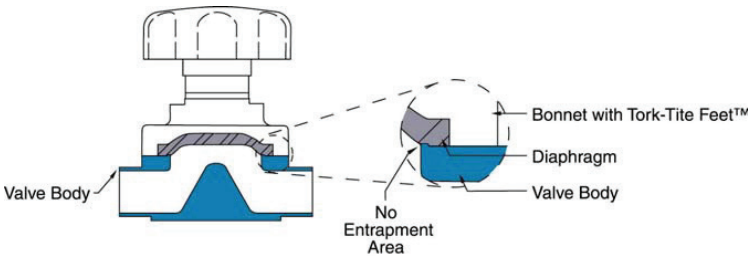
Our extensive process engineering and manufacturing experience has enabled us to provide the dynamic biotech and pharmaceutical markets with standard, as well as customized, valves and associated components which are highly innovative and of uncompromising quality.

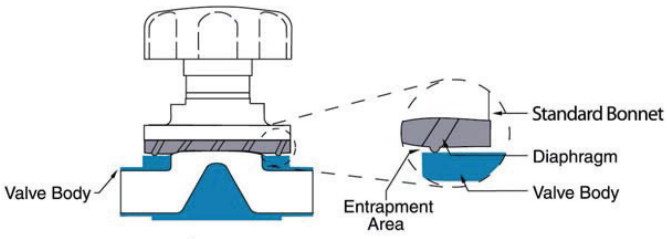
Products which are conceived and executed specifically to meet the needs of the bio-pharmaceutical industry. Ultraz® high performance diaphragm, the Valbow ® and Sample Bottle Assembly are just a few of the many standard products to resolve unique process problems.

The Difference

Most diaphragm valve manufacturers locate the principle seal on the diaphragm itself, away from the process steam, creating a ledge that can result in the entrapment of process fluids. The sealing ring on the valve body at the intersection of the flow chamber, leaving fewer places for process fluids to remain during cleaning. Additionally, our patented Tork-Tite® feet at the bonnet corners hold the diaphragm in a fixed position, with controlled compression. A zero leakage seal is achieved while preventing extruction of the diaphragm into the flow chmber.

These unique features provide the benefits of minimal entrapment potential, consistent, repeatable flow characteristics and extended diaphragm life.





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Biotech Valves

Applications

Small frame Biotech valves utilize a common valve body for 1/4”,3/8” and 1/2” nomimal sizes. They effectively provide a compact alternative to full sized valves on bioreactors, filtration and chromatography skids, freeze-thaw and other systems where available space is at a premium, with no sacrifice in performance. The fractional sized valves also share all of the same features as standard sized valves.

Unique Options

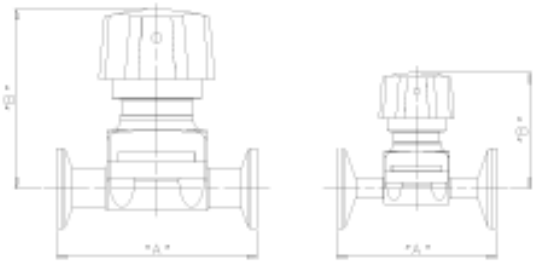
Custom built hydrid valves and assembly fabrications incorporating fractional valves are just on of areas of expertise. No other company can match the footprint, execution and quality of products in this very specialized area.

Micro-Bio Series Valves

Ultra Compact Performance

Recent developments in tangential flow filtration systems, small-scale bioreactors, chromatography skids and low-flow sampling applications have brought about numerous requests for smaller valve sizes. Roughly the size of an egg this valve is 40% smaller than our standard Biotech series valves.

As with our Biotech series valves, the Micro-Bio utilizes a common sized body but offer the added advantage of miniature 1/8”, 3/16” and 1/4” nomimal diameters. The Micro-Bio also shares the same inherent quality and features of our other valves, such as Tork-Tite® feet, integral sealing ridge on the body, a wide variety of materials of construction, surface finishes, end connections and other options.



ValveType	"A"	"B"
Biotech Series	2.50"	2.25"
Micro-Bio Series	2.00"	1.44"

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Two-Way Valves

The two-way valve is available in sizes 1/4” to 6” and can be supplied in any number of configurations with options involving body type, diapragm type, end connections and surface finish. Whether combined with manual bonnets featuring smooth operating high temperature plastic handwheels or our pneumatic actuators.

Quality

Two-way weir type diaphragm valves feature robust construction, precision machining and state of the art surface finishes, with ASME-BPE compliant chemistry.

Machining

All of two-way and special configuration valve bodies are machined from 316L austenitic stainless steel bar stock. No castings are used whatsoever.

Traceability

Valves are fully traceable with Material Test Reports (MTRs) and Heat Numbers provided as standard procedure.

Features

- BPE Compliant machined bar stock bodies with controlled Sulfur (0.005-0.010%) Ferrite < 0.5%
- Integral valve body sealing ridge prevents excessive entrapment of process media
- Sizes from 1/4" to 6" provide process application flexibility
- Exterior body surfaces radiused and sloped promote cleanability by wash-down or COP methods
- Fully traceable bodies insure ease of validation/documentation
- Drain angle marks etched on end connections insure self-draining alignment
- Surface finishes available from 25Ra to 5Ra, mechanical and electropolished
- Exotic materials including Hastelloy[1] AL6XN[2] and Titanium available upon request
- Hygienic clamp, butt weld, orbital weld and special end connections available

[1]Hastelloy is a trademark of Haynes International
[2]AL6XN is a trademark of Allegheny Ludlum

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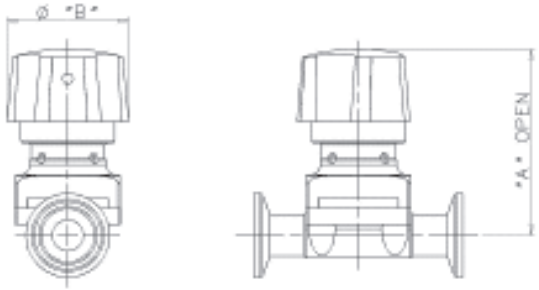
Manual Bonnet Assemblies

Troule Free

Bonnets are designed and manufactured from stainless steel to provide long, trouble free service. All internal parts are machined to exacting tolerances for smooth and consistently reliable operation. Tork-Tite® feet on the bonnet corners and compressors, which are precisely machined and finished to match the profile of the weir on the valve body, insure a fixed diaphragm position to provide consistent zero leakage closure and repeatable flow control characteristics.

Submersible Bonnet

The patent-pending sumersible bonnet assembly has been developed to meet the neds of recent developments in biopharm cleaning protocols. Designed to provide trouble free performance in demanding COP applications, these bonnets are fully drainable, autoclaveable, and incorporate a non-galling perfomance plastic stem. Available in size 1/4" through 2", the bonnet provides a compact, lightweight solution to complement range of diaphragm valves.

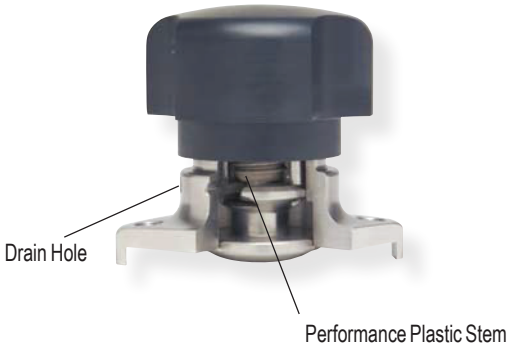


Dimensions

Size	"A"	Ø "B"
¼" - ½"	2.25"	1.25"
¾"	3.00"	2.00"
1"	4.25"	3.20"
1½"	5.63"	4.20"
2"	7.00"	5.00"

Features

- Readliy cleanable exterior
- Fully autoclavable
- Patented Tork-Tite® feet provide consistent fixed diaphragm position
- Stainless steel internals
- Ergonomic performance plastic handwheel
- Fully formed compressor exactlymatches weir profile for tight shut-off, smooth operation
- Custom bonnet options include: O-ring sealed, COP service, submersible and other specials
- Special stem threading options available for manual flow control
- Fixed internal travel stops
- Adjustable travel stop available



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Pneumatic Valve Actuation

Performance

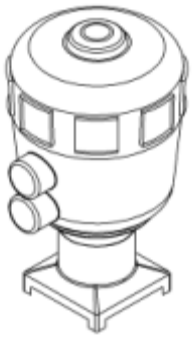
As with other components, pneumatic actuators provide design and construction which meet or exceed industry standards. The actuators feature lightweight performance plastic housing, precision stainless internals, and O'-rings machined and molded to tight tolerances. Only high quality materials are used for long, trouble free performance.

Control

Like our manual bonnets, all actuated bonnets feature patented Tork-Tite® feet and cover a complete range of automation requirements from basic on/off service to fine modulating control.

Positioner

The positioner serves to position pneumatically actuated diaphragm valves. The positioner is an electropneumatic position controller for the pneumatically actuated continuous diaphragm valve. The device includes the following main function groups: a feedback/positional transducer, an electropneumatic system and a microprocessor electronic system. The feedback/positional transducer measures the actual position of the continuous valve. The microprocessor electronic system continuously compares the actual position (actual valve) with a desired position value that was preset via the standard signal input and supplies the result to the position controller. If an error exists, the electropneumatic system causes the actual position to be appropriately corrected.



Features

- Compact lightweight design
- Choice of spring return or double acting operation
- Selected limit switch options available
- Banjo mount solenoid options available
- NAMUR adaptor available
- High cycle life
- Integral controlled travel stop

Stroke Limiter

Electrical Position Feedback

Intrinsically Safe Control On/Off head

Electrical Feedback Switch

Manual Override

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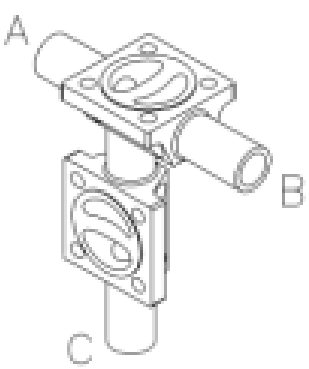
Sterile Access/GMP Combinations

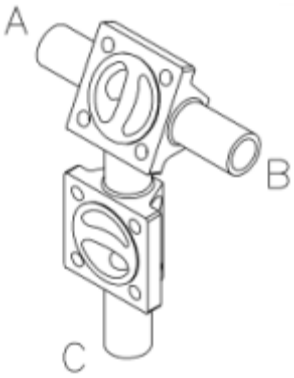
Capabilities

The unique capability to craft Sterile Access valves with any conceivable valve-to-valve or valve-to-fitting configuration within the industry, in both traditional valve-to-valve or block body styles. Our component stocking system, coupled with specially dedicated machining and polishing, also offers the added benefit of extremely fast lead times. Our fabrication, welding and polishing exhibit inherent quality to meet and exceed industry standards for drainability, minimal dead legs, surface finish and performance.

Specials

No other high purity diaphragm valve company can deliver the quality and quantity of specialty products!





Features

- Minimized dead legs
- Maximum drainability
- Configured to specific system layout
- Selection sheet available
- Stocked components enable “made-to-order” assemblies
- Short lead times

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Zero Static Tee Bodies

Innovation

Zero Static block body tee valves are the premiere product of their kind in the industry. The true Zero Static design offers the smallest footprint to facilitate installation within complicated piping geometries and is the lightest weight of any similar style body. And they can be customized into a variety of configurations, including sampling or diverting flow.

Features

- True Zero Static design
- Fully machined from block
- Ergonomic design
- Completely drainable
- Readily cleanable exterior, all surfaces sloped and radiused
- Industry's smallest footprint and lightest weight
- Integrated sampling valves and other custom options available
- Stocked components enable "made-to-order" assemblies in very short lead times.

Points of Use

Compact

State of the art block body design, coupled with the tighest bend radii in the industry allow point of use valves to be easily integrated into areas where space is at a premium. The design provides minimal pressure drop and superior system performance.

Features

- Minimized footprint
- Compact centerline dimensions
- Readily cleanable exterior, all surfaces sloped and radiused
- True Zero Static design
- Low pressure drop, high flow co-efficient (Cv) insures optimum performance
- Integrated sampling alves and other custom options available

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Sample Bottle Assembly

One of a kind

The unique sample bottle assembly with an integrated Valbow® solves a number of process problems and has become an industry standard. It is designed for those that prefer a reusable component over one that is disposable. Sample bottles can be provided with any number of options including different bottle sizes, color coded caps, and unusual Valbow® sample valve configurations.

Features

- Bottle sizes from 50ml to 1000ml
- Color coded caps
- Fully autoclavable
- Custom designs available
- Inventory of stocked product
- Industry standard acceptance
- Lightweight design

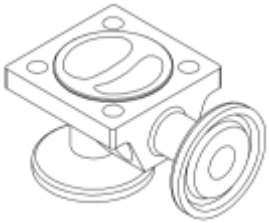
Valbow®

Unique Products

The Valbow® was created some years ago as a solution to one of our customer's unique problems. It has evolved into a popular product ans is stocked in a variety of sizes. The Valbow® is uniquely suited for that one spot where nothing else will do. Whether it's a hard to reach sample valve on an R/O system, or for a directional change valve on a Bioreactor, valbows just seem to come in handy.

Features

- Unique problem solving design, unlike any other in the industry
- 90 degree angle pattern for directional changes
- Minimal hold up volume
- Sampling capability
- Hygienic clamp, orbital weld, end cap and other connections available
- Custom designs and other special options available



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Instrumentation Valves

Flexibility

Patent-pending instrumentation valve has been designed to consoldiate both a valve and pressure transducer in one unit and take advantage of minimally available space by utilizing a hybrid block body concept in conjunction with instrument's unique CPM fitting as a base for the transducer.

The result is a very compact valve/instrument combination which takes up little more space than a single traditional diaphragm valves, as well as eliminating the need for an instrument tee. The instrument's diaphragm is positioned to one side of the valve weir to put it in direct contact with the flow of process media, and providing the advantage of eliminating the usual deadleg concerns encountered with instruments tees. The CPM fittings allows a positive, leak-proof means of instrument attachment through the use of an o-ring behind the diaphragm of the transducer and specially designed clamp arrangment.

The design is not limited to pressure measurement.
It can also incorporate the following instruments:
pH
DO
ORP
Conductivity
UV/Absorbance
Turbidity
Spectrophotometer

Features

- Self draining, compact hydrid block body design
- Eliminates need for instrument tees and deadleg concerns
- BPE compliant bar stock bodies with controlled sulfur content .005-.010%
- Available in 1" and 1½" sizes
- Manual or actuated operation
- Exotic materials, choice of end connections and diaphragms
- Optional Endress+Hauser transducer design available

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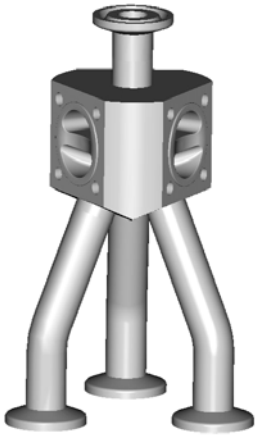
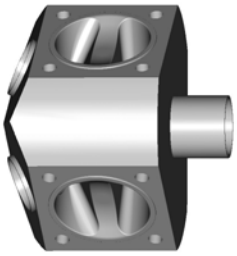
Multi Valve Combinations

Flexibility





Multi combination diverter style diaphragm valves have become a cost effective solution to overcrowding in complex piping layouts. Our customers want the same quality diverter valve they have come to expect from other products.

We can provide 3,4, and 5 way diverters, for both horizontal and vertical placement. The actuated and manual valves offer maximum drainability and process flexibility.

Features

- Machined block construction
- Compact solutions to overcome crowded multiple valve combinations
- Decreased dead legs to remedy complex drainage problems
- Less system welds
- Optinum drainability
- Quick and effective sterilization

Custom Valve Design

Exceptional Capabilities

Customized and hydrid valve assemblies for unusual applications have been forte since its inception.

Unique Applications

- Special end connections, configurations and material
- Innovative designs assist in providing application specific process solutions
- Sole source responsibility from concept through production
- CAE design in state of the art 3-D formats in NX-Ideas SolidWorks & AutoCAD
- Fully detailed drawings for review and approval
- Rapid customer turnaround with concepts, drawings and production
- Exotic materials a specialty
- Expert fabrication, welding, and polishing by skilled craftsmen
- Advanced maching capabilities optimize manufacture of complex assemblies

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Diaphragms

Precision Materials

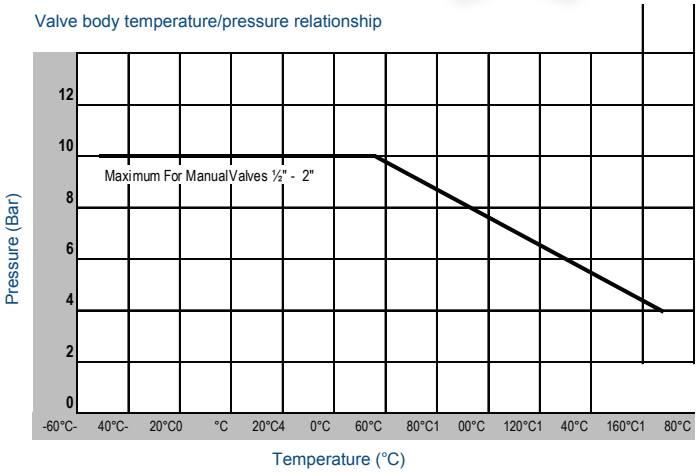
Diaphragms are unlike any others in the bio-pharmaceutical industry. Diaphragms are precision molded to tight tolerances for superior service life and crafted of approved materials which will not sacrifice the purity of the most sensitive of processes.

Certification

All diaphragms are fully traceable and are manufactured of USP and/or FDA compliant materials. Certificates of Conformance and lot traceable information are supplied as standard procedure.

Diaphragm Temperature Range

-70˚C	EPDM RUBBER	130˚C
-20˚C	RUBBER/PTFE	150˚C
-20˚C	ULTRAZ™ RUBBER	160˚C



These temperature ranges are for guidance only under static conditions

Maximum Rating Working Pressure(Bar) For Manually Operated Valves

Valve Size	1/4”	3/8”	1/2”	3/4”	1”	1½”	2”
Pressure (Bar)	10	10	10	10	10	10	10

It is essential with any valve selection to provide accurate process and operating details

Features

- Full traceability
- Certificates of conformance supplied with all diaphragms
- Molded in the open position for long service life
- Material options include
- EPDM
- Fluoropolymer faced (TFM 1700)/EPDM
- Black Ultraz® Fluoroelastomer
- White Ultraz® Fluoroelastomer
- Viton
- All diaphragms conform to USP Class VI specifications
- Ultraz® diaphragms conform to USP Class VI, ASME-BPE and FDA Title 21, CFR Part 177 indirect food additives, polymers section 177.2600-Rubber articles intended for repeated use and has passed th CFR 21 177.2600 extractables test

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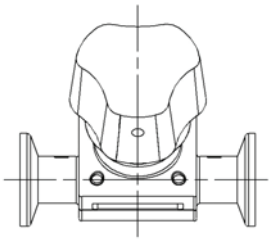
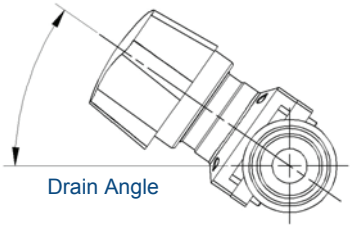
Optimum Self Drain Angles

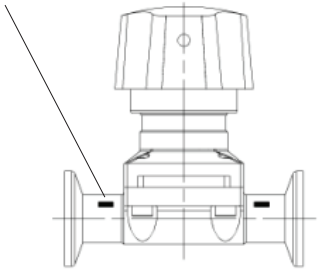
Precision Materials

Valve Size	Self Drain Angle
1/4"	41°
3/8"	30°
1/2"	25°
3/4"	18°
1"	30°
1½"	25°
2"	23°





Etched drain marks

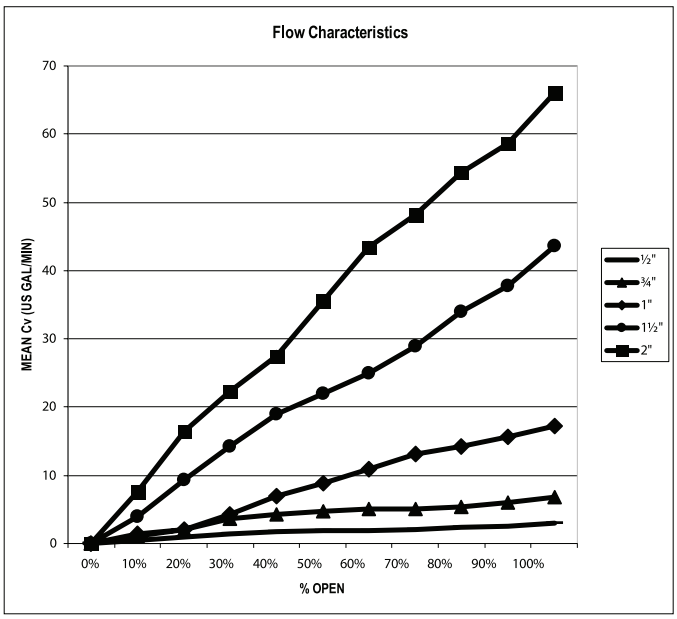


Flow Co-Efficients (Cv Data)

2-Way Valves

	% Open Cv Value										
Valve Size	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
1/2"	0	0.5	1	1.4	1.7	1.9	1.9	2	2.3	2.6	3
3/4"	0	1.1	2	3.7	4.3	4.8	5	5	5.4	6	6.8
1"	0	1.4	2.1	4.3	6.9	8.8	10.9	13.1	14.2	15.6	17.3
1½"	0	4	9.3	14.2	18.9	22	25	28.9	34	37.8	43.6
2"	0	7.6	16.5	22.3	27.5	35.6	43.5	48.2	54.3	58.6	66

Tolerance +/- 10% Cv Units - US gallons/minute



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Design and Production Cabability

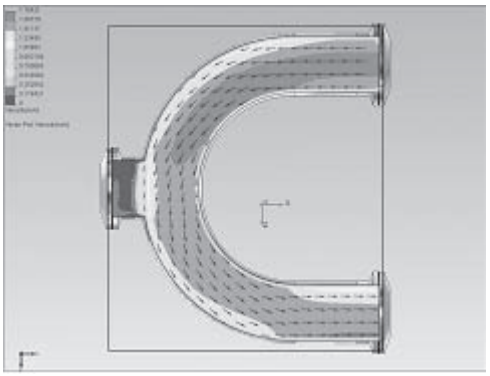
Precision Materials

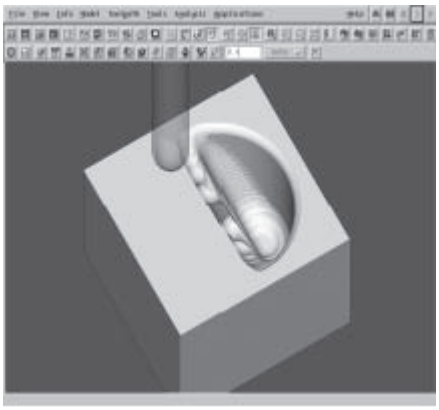
Design Capabilities

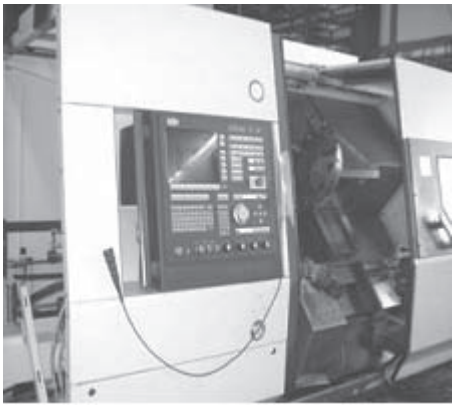
- High end CAE design
- NX-Ideas, Solidworks & AutoCAD
- CAD/CAM Software
- Computational Fluid Dynamics

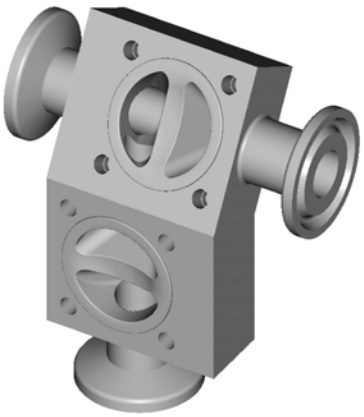
Production Features

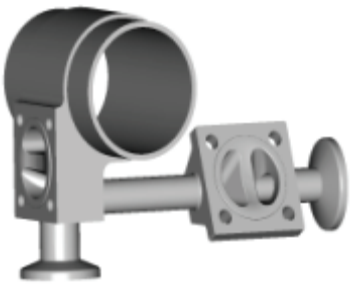
- Orbital welding
- Polishing & Electropolishing
- High Volume production capability
- State of the art 5-axis machining centers











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Ordering Information

Standard Valves, U-Bends, Tee Bodies, Ported Valves and Valbows®

Type | Size | Material | Finish | Outlet A | Outlet B | Outlet C (leave blank if only 2 outlets) | Diaphragm | Operation

Valve Type	Code
Straight Thru	A
Tee Body	T
Valbow	W
GMP Port	GAP1
	GAP2
Sterile Access Port	SAP1
	SAP2
Point of Use	P1
	P2
	P3

Size	Code
1/4"	04
3/8"	06
1/2"	08
3/4"	12
1"	16
1½"	24
2"	32
2½"	40
3"	48
4"	64
6"	96

Material	Code
316L	L
Hastelloy[1]	H
AL6XN[2]	A

ASME BPE	Finish	Code
	10Ra/EP	1
SFV4	15Ra/EP	2
SFV5	20Ra/EP	3
SFV6	25Ra/EP	4
	10Ra	5
	15Ra	6
SFV1	20Ra	7
SFV2	25Ra	8

Outlet A / Outlet B / Outlet C — Standard Clamp	Code
1/4" Sanitary Clamp	AA
3/8" Sanitary Clamp	AB
1/2" Sanitary Clamp	AC
3/4" Sanitary Clamp	AD
1" Sanitary Clamp	AE
1½" Sanitary Clamp	AG
2" Sanitary Clamp	AH
2½ Sanitary Clamp	AJ
3" Sanitary Clamp	AK
4" Sanitary Clamp	AL
6" Santary Clamp	AM

Step Up Clamps	Code
1/4" to 1/2" Sanitary Clamp	AP
3/8" to 1/2" Sanitary Clamp	AT
1/2" to 1" Sanitary Clamp	AY
1/2" to 1½" Sanitary Clamp	AZ
3/4" to 1" Sanitary Clamp	BA
3/4" to 1½" Sanitary Clamp	BB
1" to 2" Sanitary Clamp	BD
1½" to 2" Sanitary Clamp	BE

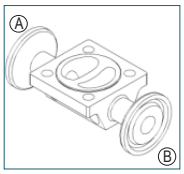
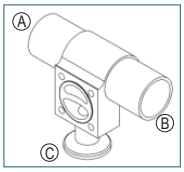
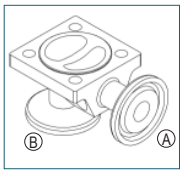
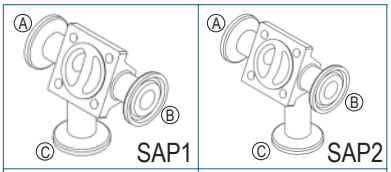
Autoweld Ends	Code
1/4" .049 wall OD Tube	17
3/8" .049 wall OD Tube	18
1/2" .065 wall OD Tube	09
3/4" .065 wall OD Tube	10
1" .065 wall OD Tube	11
1½" .065 wall OD Tube	12
2" .065 wall OD Tube	13
2½" .065 wall OD Tube	14
3" .065 wall OD Tube	15
4" .083 wall OD Tube	08
6" .109 wall OD Tube	00

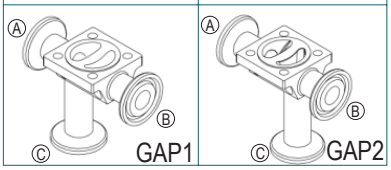
Standard Hosebarb	Code
1/4" Hosebarb	HA
3/8" Hosebarb	HB
1/2" Hosebarb	HC
3/4" Hosebarb	HD

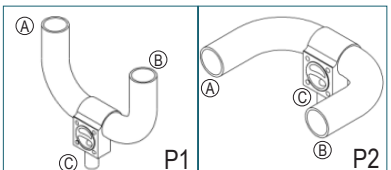
Reducing Hosebarb	Code
3/8" to 1/4" Hosebarb	HK
1/2" to 3/8" Hosebarb	HL
1/2" to 1/4" Hosebarb	HM
3/4" to 1/2" Hosebarb	HN
3/4" to 1/4" Hosebarb	HP

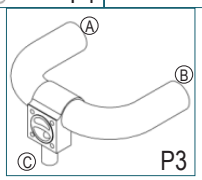
Diaphragm	Code
EPDM	E
PTFE	P
Silicone	S
Ultraz®	U
Viton	V

Operation	Code
Standard Manual Bonnet	16
O-Ring Sealed Manual Bonnet	17
Pneumatic Actuator N/O	18
Pneumatic Actuator N/C	19
Pneumatic Actuator A/A	20
Submersible Bonnet Assembly	21







Examples

A 24 H 4 AG AG U 19 — Straight Thru Valve

Type	2-Way Valve
Size	1½"
Material	Hastelloy[1]
Finish	25Ra/Electropolished
Outet A	1½" Sanitary Clamp
Outlet B	1½" Sanitary Clamp
Diaphragm	Ultraz®
Operation	Actuator Normally Closed (N/C)

GAP 08 L 8 AC AC P 16 — GMP Access Port

Type	GMP Access Port Right Side (GAP2)
Size	1/2"
Material	316L Stainless Steel
Finish	25Ra (No Electropolish)
Outet A	1/2" Sanitary Clamp
Outlet B	1/2" Sanitary Clamp
Outlet C	1/2" Sanitary Clamp
Diaphragm	PTFE
Operation	SS Manual Bonnet Assembly

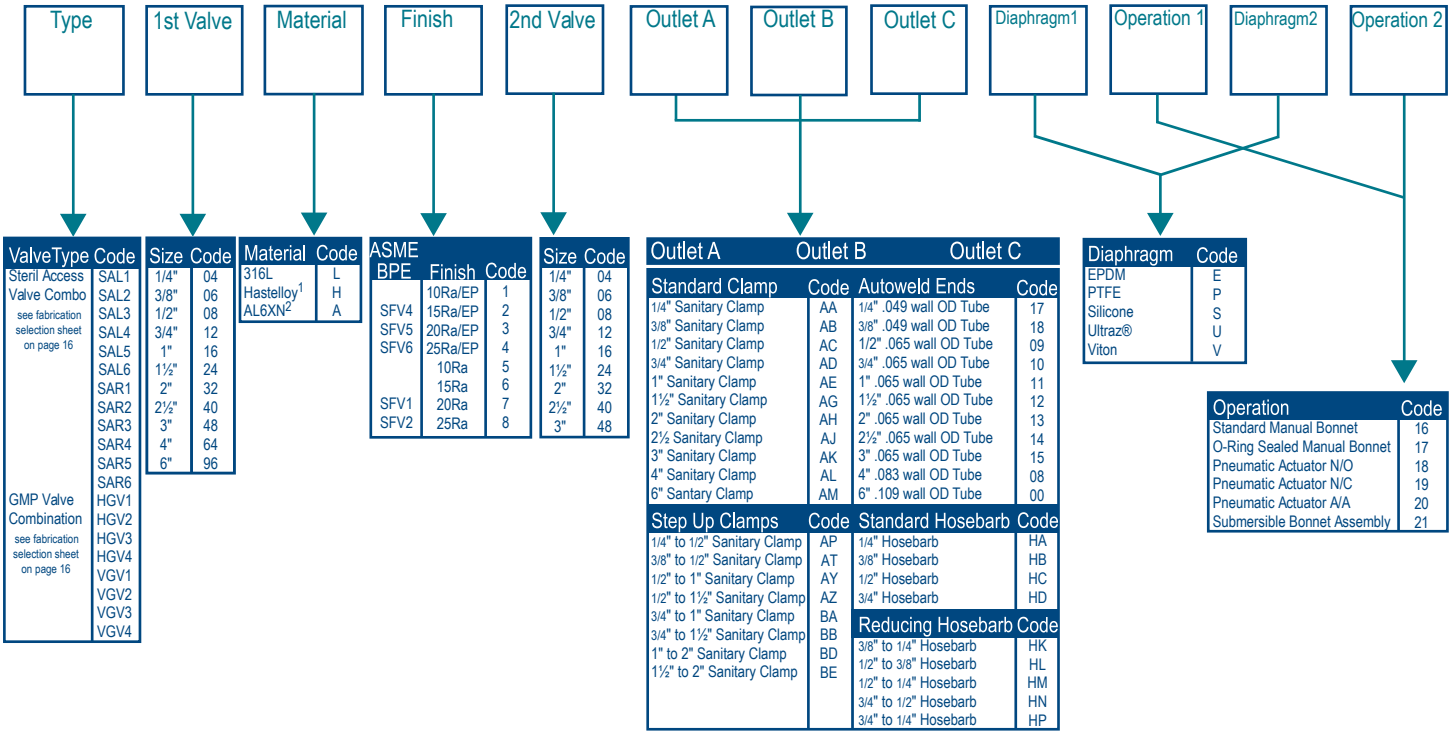
P1 12 L 2 11 11 AD S 16 — Point of Use Valve

Type	Point of Use (Orientation 1 - 0°)
Size	3/4"
Material	316L Stainless Steel
Finish	15Ra/Electropolished
Outet A	1" Tubing
Outlet B	1" Tubing
Outlet C	3/4" Sanitary Clamp
Diaphragm	Silicone
Operation	SS Manual Bonnet Assembly

[1]Hastelloy is a trademark of Haynes International
[2]AL6XN is a trademark of Allegheny Ludlum

Ordering Information

Valve to Valve Combinations



ValveType	Code
Steril Access Valve Combo (see fabrication selection sheet on page 16)	SAL1
	SAL2
	SAL3
	SAL4
	SAL5
	SAL6
	SAR1
	SAR2
	SAR3
	SAR4
	SAR5
	SAR6
GMP Valve Combination (see fabrication selection sheet on page 16)	HGV1
	HGV2
	HGV3
	HGV4
	VGV1
	VGV2
	VGV3
	VGV4

Size	Code
1/4"	04
3/8"	06
1/2"	08
3/4"	12
1"	16
1½"	24
2"	32
2½"	40
3"	48
4"	64
6"	96

Material	Code
316L	L
Hastelloy[1]	H
AL6XN[2]	A

ASME BPE	Finish	Code
SFV4	10Ra/EP	1
SFV5	15Ra/EP	2
SFV6	20Ra/EP	3
	25Ra/EP	4
	10Ra	5
	15Ra	6
SFV1	20Ra	7
SFV2	25Ra	8

Size	Code
1/4"	04
3/8"	06
1/2"	08
3/4"	12
1"	16
1½"	24
2"	32
2½"	40
3"	48

Outlet A / Outlet B / Outlet C — Standard Clamp	Code
1/4" Sanitary Clamp	AA
3/8" Sanitary Clamp	AB
1/2" Sanitary Clamp	AC
3/4" Sanitary Clamp	AD
1" Sanitary Clamp	AE
1½" Sanitary Clamp	AG
2" Sanitary Clamp	AH
2½ Sanitary Clamp	AJ
3" Sanitary Clamp	AK
4" Sanitary Clamp	AL
6" Santary Clamp	AM

Step Up Clamps	Code
1/4" to 1/2" Sanitary Clamp	AP
3/8" to 1/2" Sanitary Clamp	AT
1/2" to 1" Sanitary Clamp	AY
1/2" to 1½" Sanitary Clamp	AZ
3/4" to 1" Sanitary Clamp	BA
3/4" to 1½" Sanitary Clamp	BB
1" to 2" Sanitary Clamp	BD
1½" to 2" Sanitary Clamp	BE

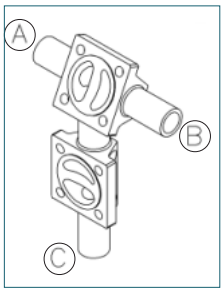
Autoweld Ends	Code
1/4" .049 wall OD Tube	17
3/8" .049 wall OD Tube	18
1/2" .065 wall OD Tube	09
3/4" .065 wall OD Tube	10
1" .065 wall OD Tube	11
1½" .065 wall OD Tube	12
2" .065 wall OD Tube	13
2½" .065 wall OD Tube	14
3" .065 wall OD Tube	15
4" .083 wall OD Tube	08
6" .109 wall OD Tube	00

Standard Hosebarb	Code
1/4" Hosebarb	HA
3/8" Hosebarb	HB
1/2" Hosebarb	HC
3/4" Hosebarb	HD

Reducing Hosebarb	Code
3/8" to 1/4" Hosebarb	HK
1/2" to 3/8" Hosebarb	HL
1/2" to 1/4" Hosebarb	HM
3/4" to 1/2" Hosebarb	HN
3/4" to 1/4" Hosebarb	HP

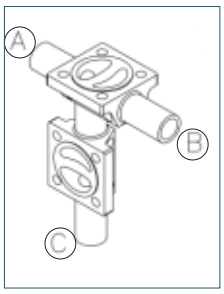
Diaphragm	Code
EPDM	E
PTFE	P
Silicone	S
Ultraz®	U
Viton	V

Operation	Code
Standard Manual Bonnet	16
O-Ring Sealed Manual Bonnet	17
Pneumatic Actuator N/O	18
Pneumatic Actuator N/C	19
Pneumatic Actuator A/A	20
Submersible Bonnet Assembly	21



SAL1 08 L 2 08 09 09 09 E 19 E 16
Sterile Access Valve to Valve Combination

Type	Sterile Access Valve Left Side (SAL1)
1st Valve	1/2"
Material	316L Stainless Steel
Finish	15Ra/Electropolished
2nd Valve	1/2"
Outet A	1/2" Tubing
Outlet B	1/2" Tubing
Oulet C	1/2" Tubing
Diaphragm 1	EPDM
Operation 1	Actuator Normally Closed (N/C)
Diaphragm 2	EPDM
Operation 2	SS Manual Bonnet Assembly



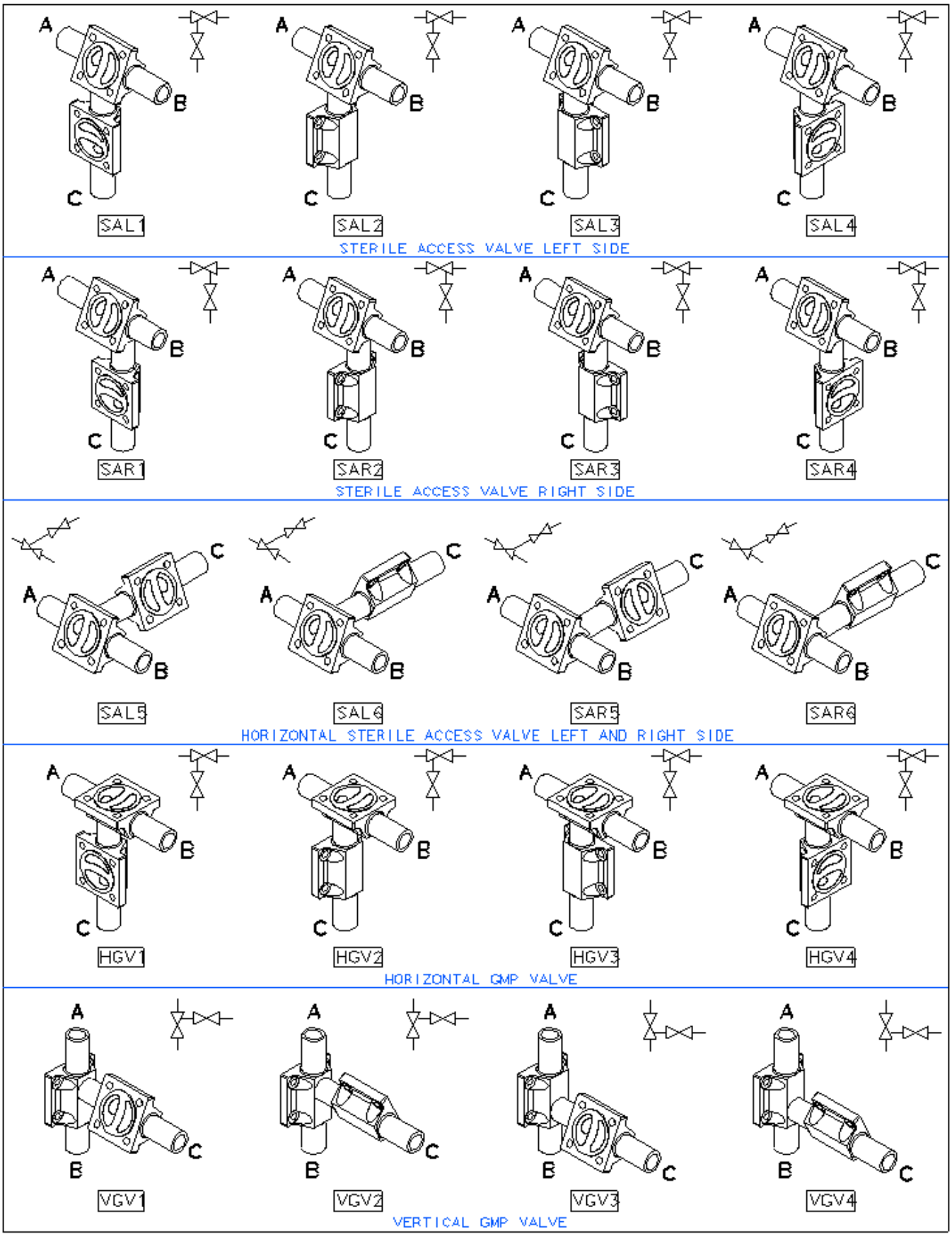
HGV1 16 L 7 12 AE AE AD P 16 P 16
GMP Valve to Valve Combination

Type	Horizontal GMP Valve (HGV1)
1st Valve	1"
Material	316L Stainless Steel
Finish	20Ra (No Electropolish)
2nd Valve	3/4"
Outet A	1" Sanitary Clamp
Outlet B	1" Sanitary Clamp
Oulet C	3/4" Sanitary Clamp
Diaphragm 1	PTFE
Operation 1	SS Manual Bonnet Assembly
Diaphragm 2	PTFE
Operation 2	SS Manual Bonnet Assembly

[1]Hastelloy is a trademark of Haynes International
[2]AL6XN is a trademark of Allegheny Ludlum

SEALING SYSTEMS
Engineering Equipment for Sanitary Applications

Selection Chart



SEALING SYSTEMS

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