



Premium Manufacturer of Sanitary Fittings, Valves, Pumps & More

## TOP-FLO® Diaphragm Valves



Engineered Valve Solutions  
for High Purity Industries

**STEEL & O'BRIEN IS AT YOUR SERVICE**

585-492-5800

[sales@steelobrien.com](mailto:sales@steelobrien.com)

[www.steelobrien.com](http://www.steelobrien.com)

SIMPLIFYING SANITARY THROUGH SUPERIOR SERVICE.™

# TOP-FLO® Diaphragm Valves

**Steel &  
O'Brien**  
Manufacturing  
Sanitary Simplified™

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**Steel & O'Brien** is well known for providing its customers with products that will meet or exceed the quality standards found in the many markets we serve. Steel & O'Brien competes with the major suppliers in the industry in North and South America for weir type diaphragm valves and are CE conforming in accordance to PED. Pricing is very competitive and our lead times are typically outstanding compared to our competition.

**TOP-FLO®** diaphragm valves, because of their unique design, reliability, versatility, and ease of maintenance have been the ideal choice for high purity process piping applications. We combine world class industry experience with engineering and manufacturing facilities located in the USA and Canada. Our R&D, engineering, and manufacturing groups are committed to providing high quality valves that are unsurpassed by any of our competitors.

Here are some key standard features to consider for your next requirement:

- Low ferrite DIN 1.4435 316L forged body sizes 1/4"-4" with controlled sulfur content to BPE 0.005-0.017 with 3.1 Material Certification
- Autoclaveable FKM o-ring sealed 304SS stainless steel manual bonnet with PPS thermoplastic handwheel
- Thermoplastic piston type pneumatic actuators with your choice of popular controls for feedback (Westlock, Stonel, Burkert, etc.)
- FDA and USP Class VI (Sections 87 & 88) conforming steam grade EPDM, MPTE/EPDM, and MPTE/FKM backed diaphragms
- Specialty fabricated sterile access and GMP style valves
- ZERODL™ machined block body style valve types - Point of Use, T-pattern, Divert style, Tank Bottom, and many others specialties as designed
- Interchangeable diaphragms and topworks with most other manufacturers
- Extensive on the shelf inventory for project support

Steel & O'Brien's name adds essential value, including specification assistance, outstanding delivery performance, and on-site technical support. All of these benefits allow Steel O'Brien to offer a wide range of products and services designed specifically to meet your every requirement.

# TOP-FLO® BIOPRO® Forged Diaphragm Valves

The forged body has always been the optimum choice for applications within the bioprocessing and pharmaceutical industries.

**BIOPRO®** forged body diaphragm valves will be the valves of choice when high purity mechanical and electropolished surface finishes are required.

**BIOPRO®** forged bodies are manufactured from ASTM A182 GR F316L material with additional controls in regards to chemical content. The sulfur content is maintained to meet and exceed the stringent requirements of BPE. All forgings are solution annealed to maintain the ferrite content to be .05% or less. This low ferrite content eliminates the concern for contaminants and migration of oxides throughout the system. Machining of the contours are performed by using state of the art cad/cam system assuring repeatability of the weir and valve cavity profiles for full drainability. Each forging contains two hash marks clearly indicating the drain angle plane for ease of installation.

**BIOPRO®** forged bodies are in compliance with FDA guidelines as well as cGMP principles, and are specifically designed for use in ultra pure applications where sterility is critical. Steel & O'Brien provides these bodies with heat numbers etched into them for full traceability. Mill test summaries are provided with each shipment.

**BIOPRO®** forged diaphragm valves are available in sizes ranging from 1/2" through 6" with clamp or weld end connections and surface finishes ranging through 10Ra. Steel & O'Brien can also manufacture valve sin other material grades upon request.



## STANDARD END CONNECTIONS

14-16-18 Gauge  
O.D. Tube

Tube end style valves have 0.75"  
Minimum tangent length to  
facilitate orbital welding

## OPTIONAL END CONNECTIONS

Schedule 5,10,40

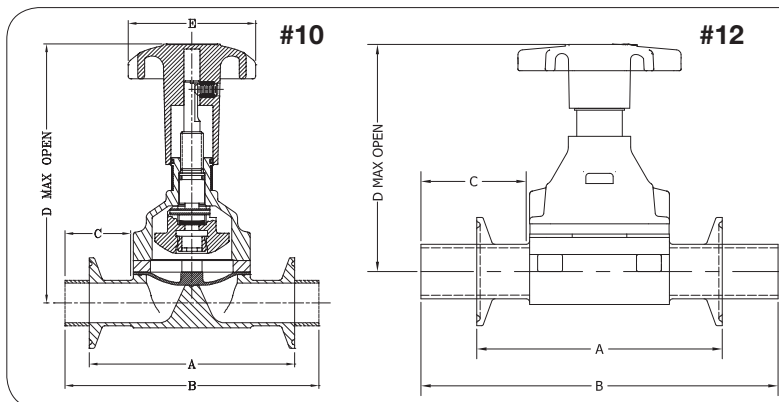
Various clamp type connections  
including ISO 2852  
(BS 4825-Part 3)

ISO 1127

DIN 11850

SMS 3008

Hygienic screwed connections  
inclusive of BS 1864, SMS, DIN  
11851, ISO 2853, (BS4825-Part 4)



## BIOPRO® Manual Valve Forged Dimensions

Size	A Clamp End	B Od Tube End	C Weld Tangent	D (#10) Center To Top	D (#12) Center To Top	E Handwheel	Drain Angle
1/2	3.50	4.88	1.50	4.47	3.27	3.00	30°
3/4	4.00	5.31	1.50	5.00	3.66	3.00	25°
1	4.50	5.56	1.50	5.69	4.17	3.00	28°
1-1/2	5.50	6.63	1.50	8.47	6.10	4.75	20°
2	6.25	7.50	1.63	9.88	7.065	4.75	20°
2-1/2	7.63	10.00	1.88	8.82		8.00	18°
3	8.75	10.00	1.88	10.00		8.00	20°
4	11.50	12.84	2.00	13.63		10.00	15°
6*	13.40	18.00	3.00	18.00		16.00	15°

\* MACHINED FROM 316L BAR

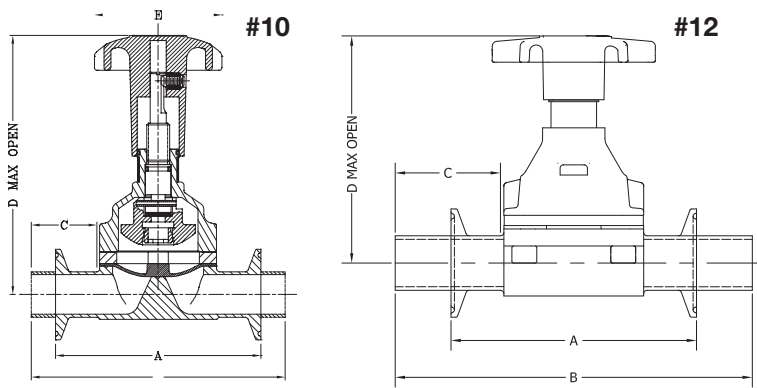
# TOP-FLO® BIOPRO® Cast Diaphragm Valves



**BIOPRO®** cast valves offer an economical alternative for less demanding service applications in food, beverage, dairy, cosmetics, biotechnology, pharmaceutical, and electronics processing industries.

**BIOPRO®** cast bodies are low carbon stainless steel investment castings that conform to ASTM A351 grade CF3M (316L) material. Castings are solution annealed to provide a sanitary and clean outside finish. Available in sizes 1-1/2" through 4" with either clamp or butt weld end connections.

**BIOPRO®** cast bodies are available with 20Ra or 20Ri with electropolish internal surface finish. Hash marks are provided on each body to optimize drainability and facilitate installation. Heat numbers are marked on the bodies to provide full traceability with material test summaries being furnished with each order.



STANDARD END CONNECTIONS	
14-16-18 Gauge O.D. Tube	Tube end style valves have 0.75" Minimum tangent length to facilitate orbital welding
OPTIONAL END CONNECTIONS	
Schedule 5,10,40	Various clamp type connections including ISO 2852 (BS 4825-Part 3)
ISO 1127 DIN 11850 SMS 3008	Hygienic screwed connections inclusive of BS 1864, SMS, DIN 11851, ISO 2853, (BS4825-Part 4)

## BIOPRO® Cast Manual Valve Dimensions

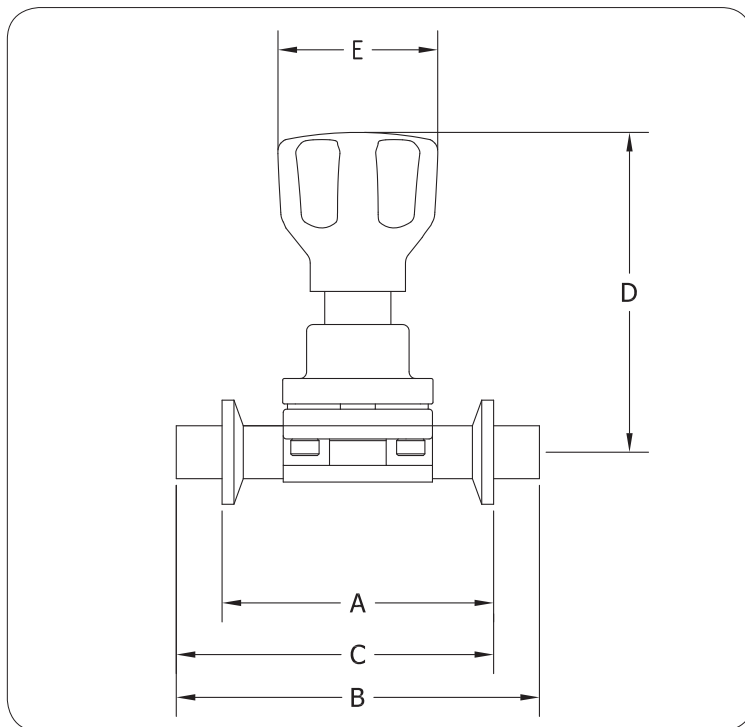
Size	A Clamp End	B Od Tube End	C Weld Tangent	D (#10) Center To Top	D (#12) Center To Top	E Handwheel	Drain Angle
1/2			See Cast Valves		3.27		
3/4			See Cast Valves		3.66		
1			See Cast Valves		4.17		
1-1/2	5.50	6.25	1.31	8.47	6.10	4.75	20°
2	6.25	7.50	1.59	9.88	7.065	4.75	20°
2-1/2			See Cast Valves				
3	8.75	10.00	1.75	10.00		8.00	20°
4	11.50	12.50	1.63	13.63		10.00	15°
6			See Cast Valves				

# TOP-FLO® BIOFLO® II Compact Diaphragm Valves

**BIOFLO®** II diaphragm valves are compact, forged, and lightweight valves designed to meet the stringent requirements within high purity systems. Applications include sampling, drain ports, steam ports, and specialty fabrications.

**BIOFLO®** II valve bodies are manufactured from the same forged 316L material as the standard BIOPRO® forged bodies. All **BIOFLO®** II valve sizes are machined from a common raw forging with controlled chemistry per BPE. Bodies are available with clamp or butt weld ends and surface finishes through 10Ra.

**BIOFLO®** II manual 304 stainless steel bonnets are provided with adjustable PPS handwheel, sanitary internals, and FKM o-ring seal. Bonnets are autoclavable and can withstand elevated temperatures to 300°F.



## STANDARD END CONNECTIONS

16-18-20 Gauge  
O.D. Tube

Tube end style valves have 0.75"  
Minimum tangent length to  
facilitate orbital welding

A = Standard Butt Weld

B = Standard Clamp

C = Extended Butt Weld\*

D = Standard Clamp X Butt Weld

E = Standard Clamp X Extended Butt Weld\*

\*per BPE

## BIOFLO® II Dimensions

Size	DN	Ød	T	A	B	C	D	E
1/4	8	0.250	0.035	2.563	3.06	2.81	3.00	1.50
3/8	10	0.375	0.035	2.563	3.06	2.81	3.00	1.50
1/2	15	0.500	0.065	2.563	3.06	2.81	3.00	1.50

All dimensions are in inches unless otherwise noted.



# Specialty Valve Assemblies

Steel & O'Brien for years has specialized in manufacturing custom fabricated products designed specifically to meet our customers requirements.

Our primary objective has always been to design and manufacture these specialty products by using state-of-the-art manufacturing practices and technologies.

Steel & O'Brien and its affiliates employ engineers with a vast range of expertise and knowledge in the bioprocessing and pharmaceutical industries. The benefit of this is our ability to provide quick and accurate solutions to even the most complicated problems that occur in the field.

All specialty products are manufactured using good manufacturing practices and are put through a very rigid quality control inspection before leaving our facility. These practices ensure that our customers receive quality parts ready for immediate installation.

In addition to the standard 2-way valve bodies,

**TOP-FLO®** diaphragm valves offer various configurations and assembly types.

- Tank Bottom
- Access
- T-Pattern
- Point-of-Use
- L-Pattern

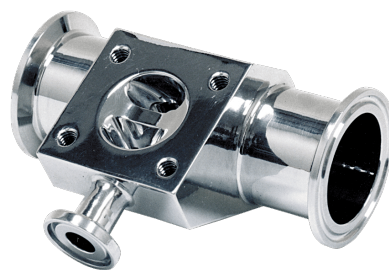


## TOP-FLO® ZERODL™ T-Pattern Diaphragm Valves

T-pattern type valves improve drainability and greatly eliminate dead leg. Typically installed in a horizontal position, this valve also provides for excellent sampling or diverting of critical process fluids throughout the process system.

ZERODL™ T-pattern valves are available in sizes ranging from 1/4" through 6". These valves are machined from a solid block of 316L SS with T characteristics through 6". A wide variety of end connections and surface finishes are offered to meet your specifications.

Integral sample valves available upon request.



## TOP-FLO® ZERODL™ Point-of-Use Diaphragm Valve

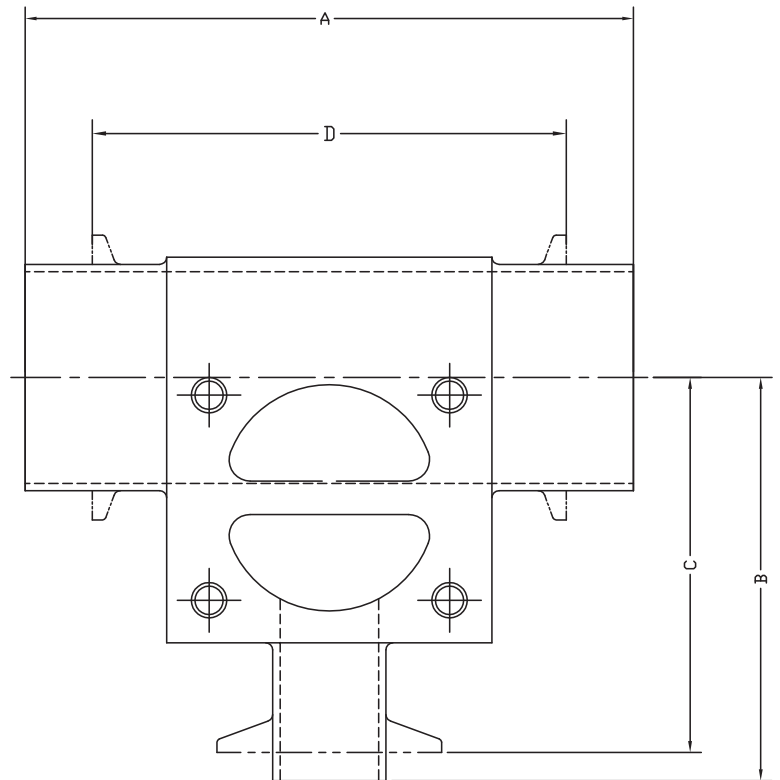
The ZERODL™ Point-of-Use Valve utilizes the T-pattern design to promote efficient installation when used on clean water loops. The main valve body is machined from a solid block of 316L SS. Its design improves drainability and eliminates dead legs within a processing system. Available in valve sizes 1/2" through 6" with tubing run sizes through 6" in clamp, butt weld ends, and other specialty connections.

Integral sample valves, and downstream purge ports available upon request.



# TOP-FLO® ZERODL™ T-Pattern Dimensions

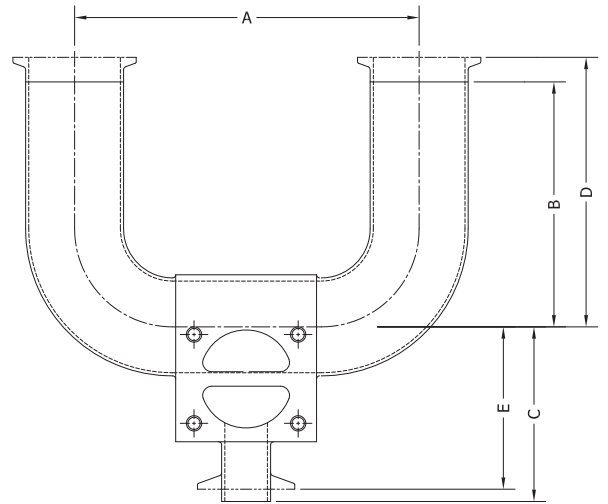
ZERO DL T-PATTERN TABLE					
OUTLET VALVE SIZE	RUN SIZE	A	B	C	D
½	½	5.38	2.94	2.56	4.63
½	¾	5.38	3.06	2.69	4.63
½	1	5.38	3.19	2.81	4.63
½	1-1/2	5.38	3.44	3.06	4.63
½	2	5.38	3.69	3.31	4.63
½	2-1/2	5.38	3.94	3.56	4.63
½	3	5.88	4.19	3.81	4.63
½	4	6.38	4.69	4.31	4.63
½	6	8.38	5.69	5.32	5.38
½	¾	5.88	3.28	2.91	5.13
¾	1	5.88	3.41	3.03	5.13
¾	1-1/2	5.88	3.66	3.28	5.13
¾	2	5.88	3.91	3.53	5.13
¾	2-1/2	5.88	4.16	3.78	5.13
¾	3	6.38	4.41	4.03	5.13
¾	4	6.88	4.91	4.53	5.13
¾	6	8.88	5.92	5.55	5.88
1	1	6.25	3.56	3.18	5.50
1	1-1/2	6.25	3.81	3.43	5.50
1	2	6.25	4.06	3.68	5.50
1	2-1/2	6.25	4.31	3.93	5.50
1	3	6.75	4.56	4.18	5.50
1	4	7.25	5.06	4.68	5.50
1	6	9.25	6.09	5.72	6.25
1-1/2	1-1/2	7.38	4.40	4.02	6.63
1-1/2	2	7.38	4.65	4.27	6.63
1-1/2	2-1/2	7.38	4.90	4.52	6.63
1-1/2	3	7.88	5.15	4.77	6.63
1-1/2	4	8.38	5.65	5.27	6.63
1-1/2	6	10.38	6.66	6.29	7.38
2	2	8.38	5.11	4.73	7.63
2	2-1/2	8.38	5.36	4.98	7.63
2	3	8.88	5.61	5.23	7.63
2	4	9.38	6.11	5.73	7.63
2	6	11.38	7.50	7.13	8.38
2-1/2	2-1/2	10.88	6.16	5.78	10.13
2-1/2	3	11.38	6.41	6.03	10.13
2-1/2	4	11.88	6.91	6.53	10.13
2-1/2	6	13.88	8.81	8.44	10.88
3	3	11.38	6.76	6.14	10.13
3	4	11.88	7.26	6.64	10.13
3	6	13.88	9.06	8.44	10.88
4	4	13.00	8.25	7.27	11.25
4	6	15.00	10.44	9.56	12.00
6	6	15.00	13.11	11.61	12.00



MATERIAL: 316LSS  
 ID FINISH: AS SPECIFIED BY CUSTOMER  
 OD FINISH: 32Ra (STANDARD) OTHER FINISHES UPON REQUEST

# TOP-FLO® ZERODL™ POU Dimensions

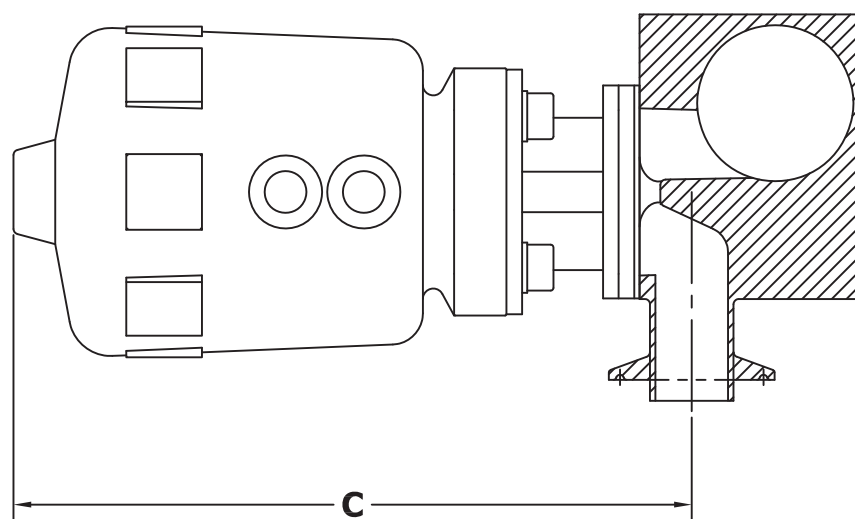
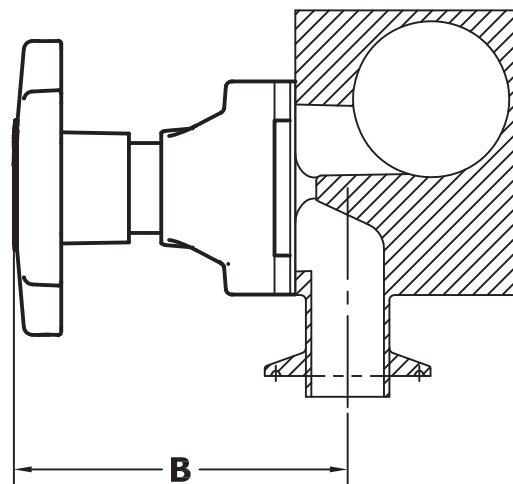
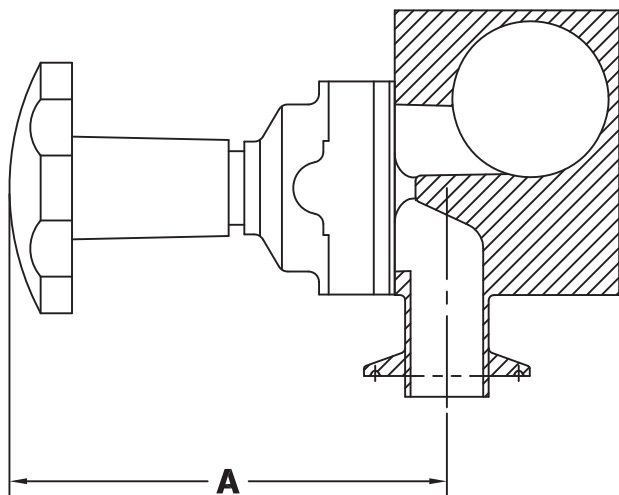
OUTLET VALVE SIZE	RUN SIZE	A	B	C	D	E
1/2	1/2	4.50	3.00	2.94	3.50	2.56
1/2	3/4	4.50	3.00	3.06	3.50	2.69
1/2	1	5.38	3.00	3.19	3.50	2.81
1/2	1-1/2	6.88	4.50	3.44	5.00	3.06
1/2	2	8.38	5.00	3.69	5.50	3.31
1/2	2-1/2	9.88	5.75	3.94	6.50	3.56
1/2	3	11.38	6.50	4.19	7.00	3.81
1/2	4	14.38	8.50	4.69	9.13	4.31
1/2	6	20.75	13.00	5.69	21.75	5.31
3/4	3/4	4.50	3.00	3.28	3.50	2.91
3/4	1	5.88	3.00	3.41	3.50	3.03
3/4	1-1/2	7.38	4.50	3.66	5.00	3.28
3/4	2	8.88	5.00	3.91	5.50	3.53
3/4	2-1/2	10.38	5.75	4.16	6.50	3.78
3/4	3	11.88	6.50	4.41	7.00	4.03
3/4	4	14.88	8.50	4.91	9.13	4.53
3/4	6	20.88	13.00	5.92	21.75	5.55
1	1	6.25	3.00	3.56	3.50	3.18
1	1-1/2	7.75	4.50	3.81	5.00	3.43
1	2	9.25	5.00	4.06	5.50	3.68
1	2-1/2	10.75	5.75	4.31	6.50	3.93
1	3	12.25	6.50	4.56	7.00	4.18
1	4	15.25	8.50	5.06	9.13	4.68
1	6	21.25	13.00	6.09	21.75	5.72
1-1/2	1-1/2	8.88	4.50	4.40	5.00	4.02
1-1/2	2	10.38	5.00	4.65	5.50	4.27
1-1/2	2-1/2	11.88	5.75	4.90	6.50	4.52
1-1/2	3	13.38	6.50	5.15	7.00	4.77
1-1/2	4	16.38	8.50	5.65	9.13	5.27
1-1/2	6	22.38	13.00	6.66	21.75	6.29
2	2	11.38	5.00	5.11	5.50	4.73
2	2-1/2	12.88	5.75	5.36	6.50	4.98
2	3	14.38	6.50	5.61	7.00	5.23
2	4	17.38	8.50	6.11	9.13	5.73
2	6	23.38	13.00	7.50	21.75	7.13
2-1/2	2-1/2	13.13	5.75	6.16	6.50	5.78
2-1/2	3	14.63	6.50	6.41	7.00	6.03
2-1/2	4	17.63	8.50	6.91	9.13	6.53
2-1/2	6	25.88	13.00	7.50	21.75	7.13
3	3	16.88	6.50	6.76	7.00	6.14
3	4	19.88	8.50	7.26	9.13	6.64
3	6	25.88	13.00	9.06	21.75	8.44
4	4	21.00	8.50	8.15	9.13	7.27
4	6	27.38	13.00	10.44	21.75	9.56
6	6	30.88	13.00	13.11	21.75	11.61



MATERIAL: 316LSS  
ID FINISH: AS SPECIFIED BY CUSTOMER  
OD FINISH: 32Ra (STANDARD) OTHER FINISHES UPON REQUEST



# TOP-FLO® ZEROIDL™ T-Pattern & POU Topworks Dimensions



VALVE OUTLET SIZE	"10" BONNET - A -	"12" BONNET - B -	FAIL CLOSE ACTUATOR - C -	ACTUATOR SERIES
1/2"	4.47	3.26	6.43	50
3/4"	5.00	3.65	8.05	50
1"	5.69	4.16	8.28	50
1 1/2"	8.47	6.11	12.33	50
2"	9.88	7.06	12.78	50
2 1/2"	10.00	-	15.04	50
3"	10.00	-	15.71	50
4"	13.63	-	16.11	50
6"	18.00	-	37.00	30

# TOP-FLO® ZERODL™ 45° Tank Bottom Diaphragm Valves

When bacteria entrapment or leaking gland seals associated with other types of valve problems in the system, the ZERODL™ tank bottom valve is a reliable solution that can be used to eliminate such concerns.

The ZERODL™ tank bottom valve, with its conical profile allows for complete drainability and the prevention of deadlegs or entrapment areas. These valves are installed by either bolting or welding to the tank surface.

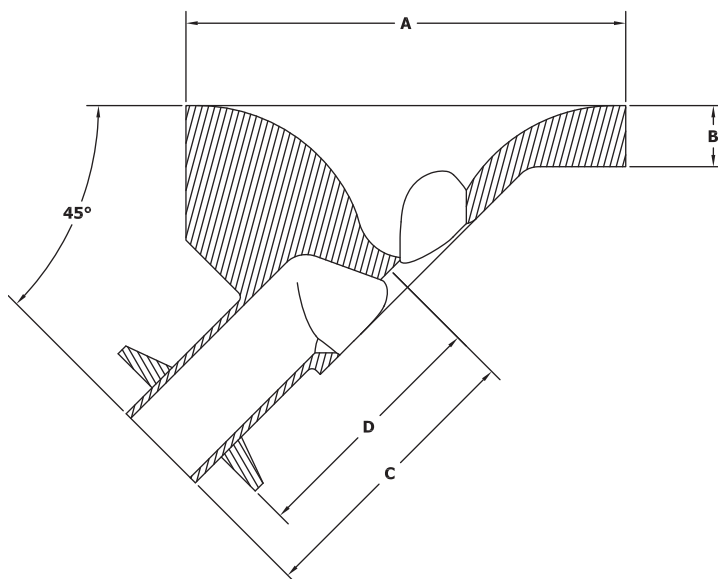
ZERODL™ tank bottom valves are available in sizes ranging from 1/4" through 4". They are manufactured using type SA-479 316L stainless steel and are available with a wide variety of drain ports and end connections. Positive closure can be achieved by means of manual or pneumatic actuation.

Steel & O'Brien offers many surface finish options to meet your specifications. In addition, heat numbers are etched into the body providing full traceability with mill test summaries provided.

45° outlet - standard

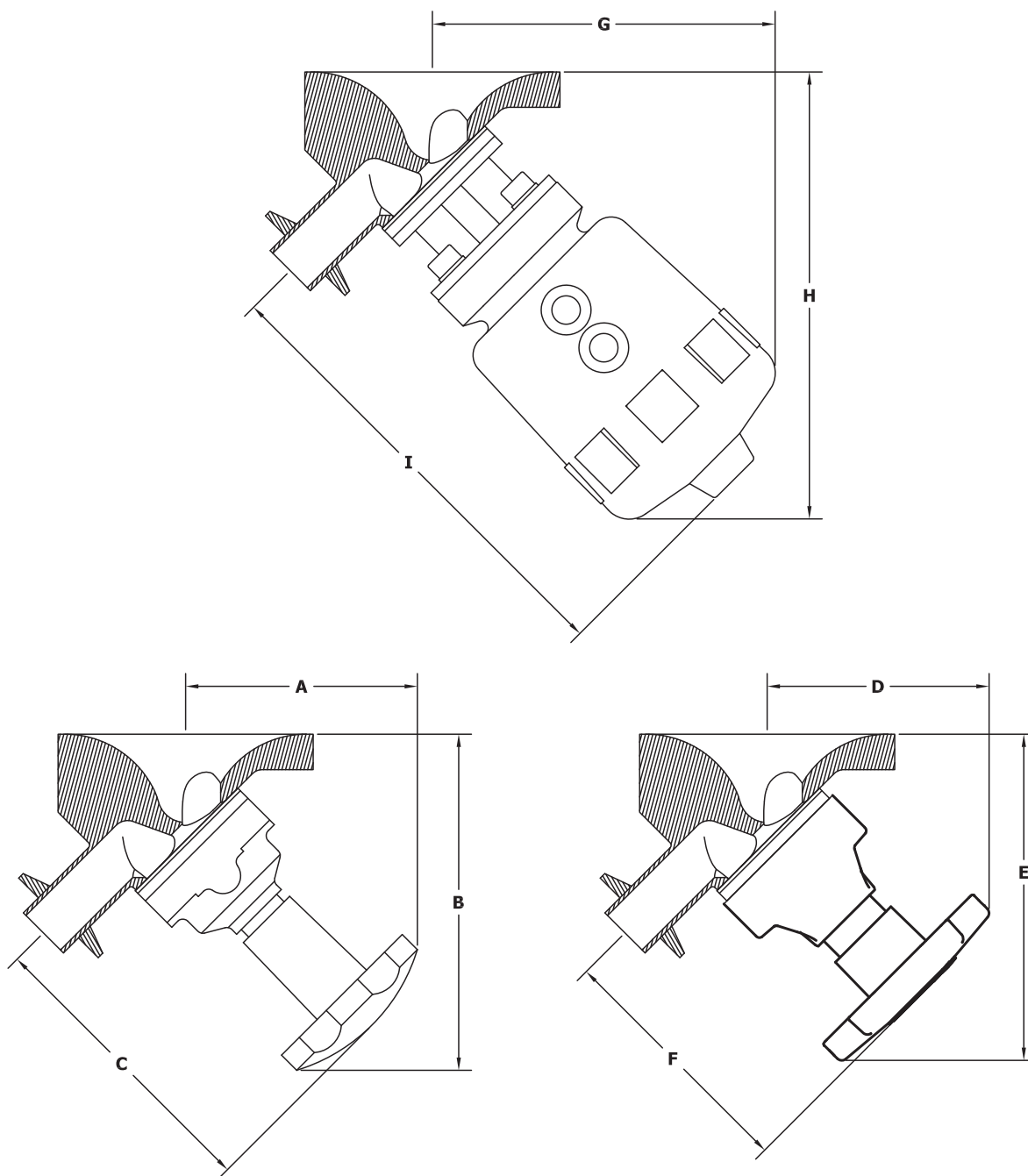


OUTLET VALVE SIZE	A	B	C	D
1/2	3.00	0.50	2.66	2.29
3/4	3.50	0.50	2.91	2.54
1	4.50	0.50	2.95	2.58
1-1/2	5.50	0.50	3.50	3.13
2	7.00	0.69	3.81	3.44
3	10.00	0.94	5.01	4.39
4	14.00	1.00	6.69	5.82



MATERIAL: 316L PER SA-479 (MAIN WELD FLANGE)  
ID FINISH: AS SPECIFIED BY CUSTOMER  
OD FINISH: 32Ra (STANDARD) OTHER FINISHES UPON REQUEST

# TOP-FLO® ZERODL™ 45° Tank Bottom Valves Topworks Dimensions



VALVE OUTLET SIZE	"09" BONNET - A -	"09" BONNET - B -	"09" BONNET - C -	"12" BONNET - D -	"12" BONNET - E -	"12" BONNET - F -	FAIL CLOSE ACTUATOR - G -	FAIL CLOSE ACTUATOR - H -	FAIL CLOSE ACTUATOR - I -	ACTUATOR SERIES
1/2	3.57	5.00	4.47	2.91	4.12	3.15	4.70	6.13	6.43	50
3/4	3.83	5.09	5.00	3.11	4.57	3.61	5.88	7.39	8.05	50
1	4.09	5.35	5.69	3.37	5.31	4.16	6.04	7.85	8.28	50
1-1/2	6.57	8.92	8.47	5.36	7.33	6.15	9.28	11.47	12.33	50
2	7.44	9.94	9.88	5.93	8.01	7.05	9.35	11.84	12.78	50
3	7.99	11.76	10.00	-	-	-	12.34	16.36	15.71	50
4	9.84	14.87	13.63	-	-	-	12.62	17.33	16.11	50

# Tandem Valve Assemblies

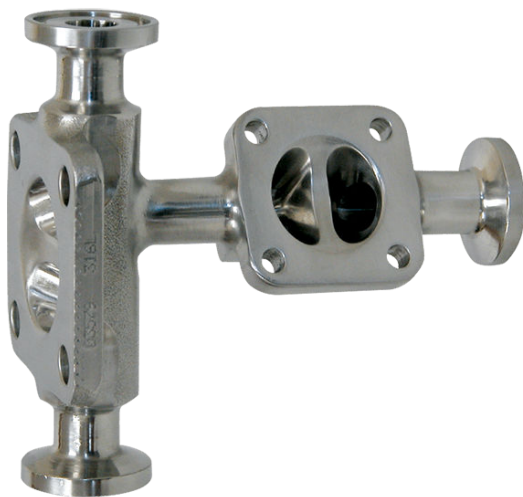
## TOP-FLO® Sterile Access Diaphragm Valves

The Sterile Access Valve assembly provides access to the horizontal valve body at the lowest cross sectional point. The access port can be used for sampling, steam sterilization, purging or condensate drainage. Ports are furnished with butt weld tube ends, clamp ends, or the utilization of a secondary valve.



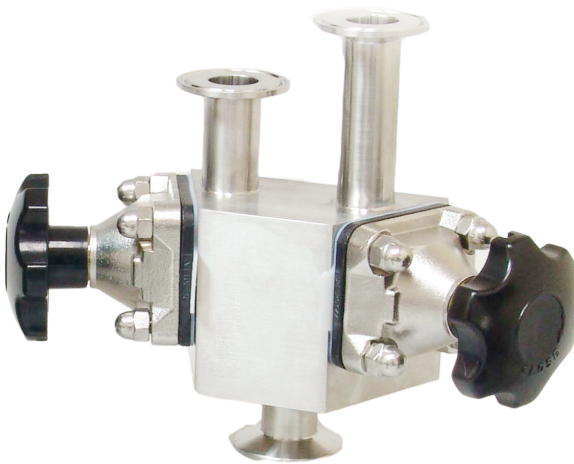
## TOP-FLO® L-Pattern Diaphragm Valves

The L-pattern type diaphragm valve, due to its unique design, minimizes dead legs in point-of-use outlets. The valve, while installed in a vertical position, serves as a 90° elbow. As fluid passes through the body, the valve can be opened to allow provision of uncontaminated samples. The outlet can also serve as a drain or a divert port.



Manufactured from forged 316L stainless steel in sizes ranging from 1/4" through 6". The L-pattern type can be supplied with butt weld or clamp end connections and a wide variety of finish options.

# TOP-FLO® Divert Diaphragm Valves

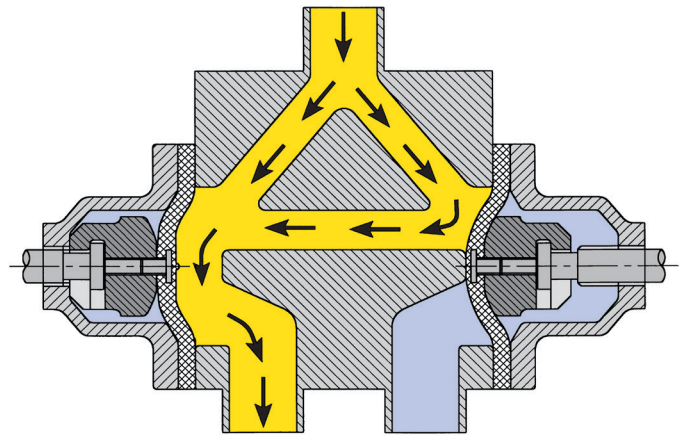


## Features and Benefits

- Manufactured from 316L SS or other alloys
- Wide variety of inlet and outlet tubing configurations and polish combinations are available
- Design eliminates dead leg inherent in typical mixing or diverting applications
- Available with actuated or manual bonnets
- Significantly reduces overall spacing requirements

Steel & O'Brien also offers a line of multi-ported divert valves that are very popular in process applications where space considerations are critical. These valves are compact and will significantly reduce the piping requirements and number of connections associated with more complex designs.

**TOP-FLO® Divert Valves** are available in 2-way through 8-way configurations and can be supplied with actuated or manual bonnets. Bodies that make up the valve are machined from 316L SS. Other material grades available provided upon request. These valves are supplied with a clamp or weld end connection in sizes ranging from 1/4" through 4". This patented design can be used to divert flow or as a mixing valve. The inlet flow passage with the divided flow prevents abrupt directional change and fluid impact, minimizing cell deterioration. **The TOP-FLO® 2-Way Divert Valve** will drain in either the horizontal or vertical position. All other combinations will fully drain in the vertical position.



The flow pattern on the closed side of the valve will allow for a continuous flow to the open side providing zero dead leg.



# Actuation

## SRS 50 Actuators

The **TOP-FLO®** pneumatic actuator is highly suited for today's modern space-saving environment within the high purity industry. Simplicity of design and robust structure ensures long service life and economical operation. Molded from a high performance polymer to withstand the rigors of cleaning and sterilization temperatures, this lightweight actuator has no corrosive components exposed to atmosphere. All internal and external components are corrosion resistant. In-line retrofitting is easily achieved without the use of special tooling. Available in size ranging from 1/4" through 4".

### Features and Benefits

- **Compact / Lightweight**  
Space-saving. Ease of installation and maintenance and mounts without additional support.
- **Fully Sealed**  
Prevents contaminants from entering the housing while minimizing the risk of leakage between chambers.
- **Durability**  
Longer life expectancy. Higher cycle performance.
- **Air Connections**  
Perpendicular to piping system
  - 1/8" BSPP thread (Compact valves)
  - 1/4" BSPP thread (Standard size valves)
- **Visual Indicator**  
Identifies valve position.
- **Material of construction**  
Molded from a high performance thermoplastic capable of withstanding elevated temperatures common to cleaning protocols.
- **Accessories**
  - Stroke Limiter
  - Electropneumatic 4-20MA positioner
  - Mechanical switch package
  - Proximity switch package

## SRS 20-30-40 Actuators

Designed to be economical, featuring a rugged cast iron housing and steel diaphragm plates, **TOP-FLO®** actuators are ideally suited for automatic and remote control of sanitary weir type diaphragm valves.

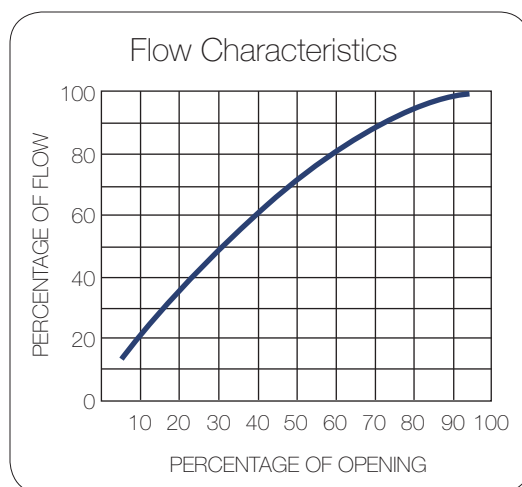
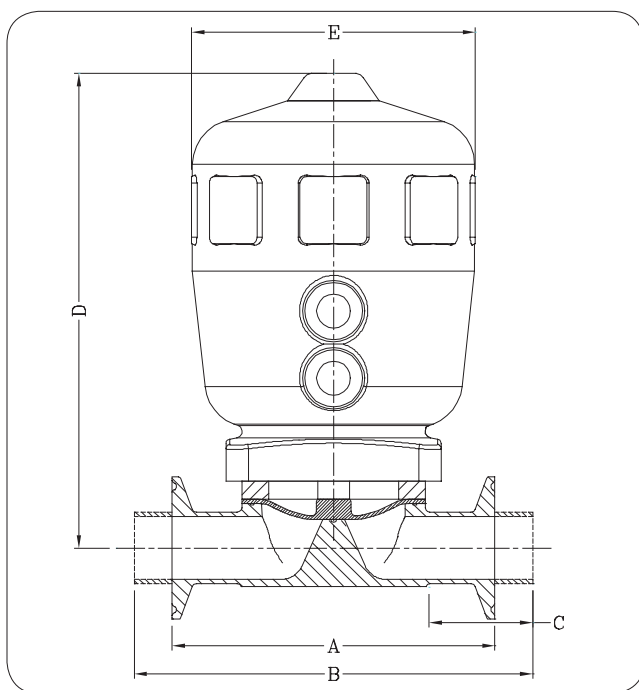
### Features and Benefits

- **Epoxy Coated Cast Iron Housing**  
Highly durable in demanding environments.
- **Steel Diaphragm Plates**  
Superior performance in high pressure service.
- **Positive Stop**  
Provides added safety when manual override is used.
- **Actuator Diaphragm**  
Highly flexible for repeated cycling.
- **Bonnet**  
Compact and integral to the actuator providing better alignment to insure exceptional cycling. This unique design allows for easy field installation and adapts to most diaphragm valve bodies.
- **Stem Guide**  
Unique seal arrangement prevents lateral stem movement.
- **Position Indicator**  
Indicates valve position
- **Spring Adjustment**  
Spring tension can be externally adjusted to provide optimum performance to compensate for high internal line pressures.

TOP-FLO® SRS 50 actuators provide the perfect solution to any valve automation requirement.



# Actuation Data (SRS 50)



BIOPRO® Forged Automated Valve Dimensions Elastomer Diaphragm Type

Size	A Clamp End	B Od Tube End	C Weld Tangent	D Center To Top	E Act Ø	Drain Angle
1/2	3.50	4.88	1.50	4.60	2.50	30°
3/4	4.00	5.31	1.50	5.70	3.15	25°
1	4.50	5.56	1.50	6.10	3.15	28°
1-1/2	5.50	6.63	1.50	9.10	5.00	20°
2	6.25	7.50	1.63	9.60	5.00	20°
2-1/2	7.63	10.00	1.88	15.04	8.31	18°
3	8.75	10.00	1.88	15.71	8.31	20°
4	11.50	12.84	2.00	16.11	10.28	15°
6*	13.40	18.00	3.00	37.00	18.13	15°

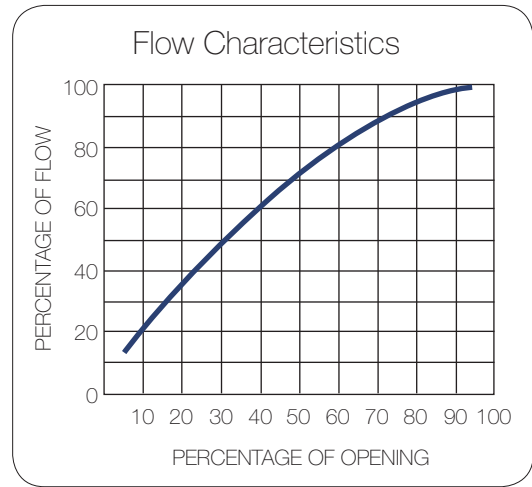
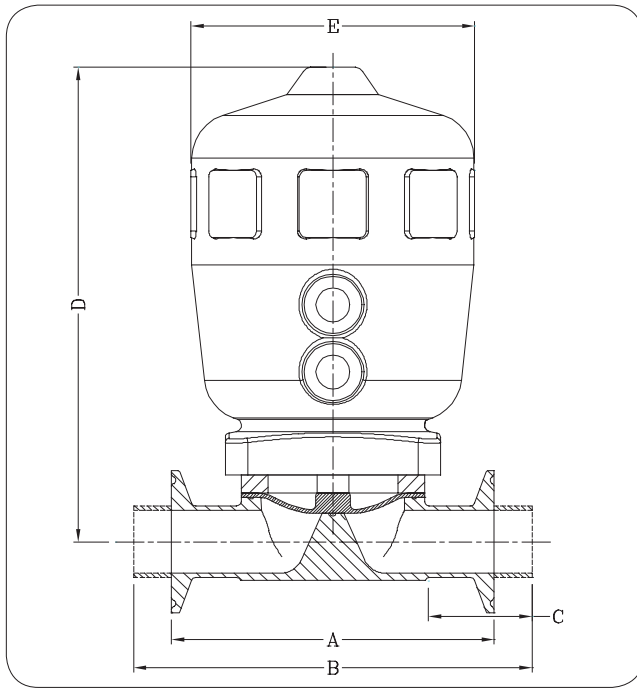
\* Machined From 316L Wrought Bar

BIOPRO® Forged Automated Valve Dimensions MPTFE Faced Diaphragm Type

Size	A Clamp End	B Od Tube End	C Weld Tangent	D Center To Top	E Act Ø	Drain Angle
1/2	3.50	4.88	1.50	5.30	3.15	30°
3/4	4.00	5.31	1.50	6.80	4.00	25°
1	4.50	5.56	1.50	6.90	4.00	28°
1-1/2	5.50	6.63	1.50	10.70	6.00	20°
2	6.25	7.50	1.63	10.90	6.00	20°
2-1/2	7.63	10.00	1.88	15.27	10.28	18°
3	8.75	10.00	1.88	15.51	10.28	20°
4	11.50	12.84	2.00	16.11	10.28	15°
6*	13.40	18.00	3.00	7.00	18.13	15°

\* Machined From 316L Wrought Bar

# Actuation Data (SRS 50)



BIOPRO® Cast Automated Valve Dimensions Elastomer Diaphragm Type

Size	A Clamp End	B Od Tube End	C Weld Tangent	D Center To Top	E Act Ø	Drain Angle
1/2			See Forged Valves			
3/4			See Forged Valves			
1			See Forged Valves			
1-1/2	5.50	6.25	1.31	9.10	5.00	20°
2	6.25	7.50	1.59	9.60	5.00	20°
2-1/2			See Forged Valves			
3	8.75	10.00	1.75	10.00	8.00	20°
4	11.50	12.50	1.63	13.63	10.00	15°
6			See Forged Valves			

BIOPRO® Cast Automated Valve Dimensions MPTFE Faced Diaphragm Type

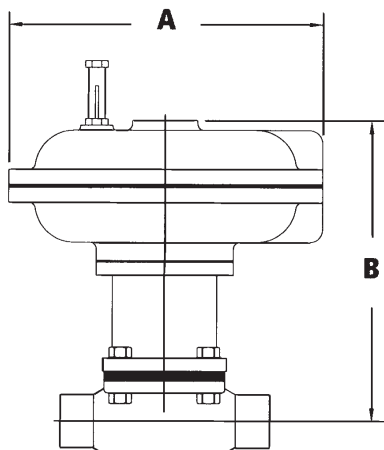
Size	A Clamp End	B Od Tube End	C Weld Tangent	D Center To Top	E Act Ø	Drain Angle
1/2			See Forged Valves			
3/4			See Forged Valves			
1			See Forged Valves			
1-1/2	5.50	6.25	1.31	10.70	6.00	20°
2	6.25	7.50	1.59	10.90	6.00	20°
2-1/2			See Forged Valves			
3	8.75	10.00	1.75	10.00	8.00	20°
4	11.50	12.50	1.63	13.63	10.00	15°
6			See Forged Valves			

# Actuation Data (SRS 20, 30,40)

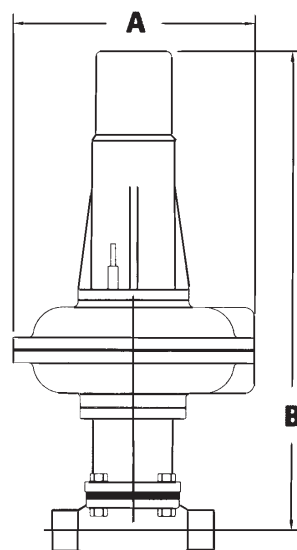
**21 Series** - Double acting:

Air to open/Air to close

**47 Series** Spring to open/Air to close



**34 Series** Air to open/Spring to close



## 20 Series - Double Acting Actuators

Model	Dia. (A)	Center to Top (B)						
		1	1-1/2	2	2-1/2	3	4	6
	6	8-15/16	-	-	-	-	-	-
	7-3/4	9-7/8	9-9/16	11-1/8	-	-	-	-
21	9-1/2	-	10-7/16	12	11-11/16	11-13/16	-	-
	12-1/4	-	-	12-7/8	12-9/16	12-11/16	13-7/8	-
	14-7/8	-	-	-	-	-	14-1/2	17-15/16

## 40 Series - Spring To Open Actuators

Model	Dia. (A)	Center to Top (B)						
		1	1-1/2	2	2-1/2	3	4	6
	6	8-15/16	-	-	-	-	-	-
	7-3/4	9-7/8	9-9/16	11-1/8	-	-	-	-
47	9-1/2	-	10-7/16	12	11-11/16	11-13/16	-	-
	12-1/4	-	-	12-9/16	12-9/16	12-11/16	13-7/8	-
	14-7/8	-	-	-	-	-	14-1/2	17-15/16

## 30 Series - Spring Close Actuators

Model	Dia. (A)	Center to Top (B)						
		1	1-1/2	2	2-1/2	3	4	6
	6	18-15/16	-	-	-	-	-	-
	7-3/4	19-7/8	19-9/16	-	-	-	-	-
34	9-1/2	20-3/4	20-7/16	22	-	-	-	-
	12-1/4	-	-	22-7/8	27-7/16	27-9/16	30-7/8	-
	14-7/8	-	-	-	28-1/16	28-3/16	31-1/2	-
	18-1/8	-	-	-	-	-	-	49-9/16

# TOP-FLO® Bonnet Assemblies For Diaphragm Valves

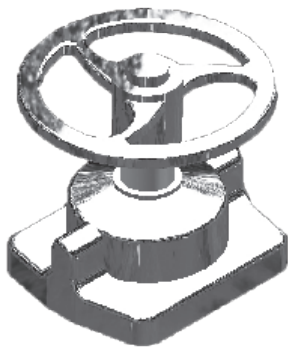
**TOP-FLO®** manual bonnets offer many features that have been carefully designed with the user in mind. The advanced bonnet design takes into account environmental stresses such as cleanability, reliability, autoclave use, adjustment, and ease of maintenance.

**TOP-FLO®** stainless steel bonnets are produced using the investment casting process resulting in a durable and lightweight valve operator. Stainless steel bonnets are electropolished externally providing a bright and sanitary exterior that also enhance its corrosion resistance. Ergonomically designed thermoplastic hand wheel and highly visible yellow indicator are standard on stainless steel bonnets sizes 1/2" through 2". Bonnet sizes 2-1/2" through 4" have electropolished stainless steel bodies with stainless steel handwheels. All **TOP-FLO®** manual bonnet versions have sanitary internals as standard.

## #09 Bonnet

Sizes 2-1/2" - 4"

- 304 SS base with 304 SS hand wheel
- Dual FKM O-ring sealed
- Sanitary internals



## #12 Bonnet

Sizes 1/2" - 2"

- Non-Adjustable Low Profile
- 304 SS Base with PPS Hand wheel
- Dual FKM O-ring Sealed
- Sanitary Internals



## #10 Bonnet

Sizes 1/2" - 2"

- Adjustable close stop
- 304 SS base with 304 SS hand wheel
- Dual FKM O-ring sealed
- Sanitary internals



## #15 Bonnet

Sizes 1/2" - 2"

- Adjustable Open Stop
- 304 SS Base with PPS Hand wheel
- Brass Visual Indicator with position gradient



## #60 Bonnet

Sizes 1/2" - 2"

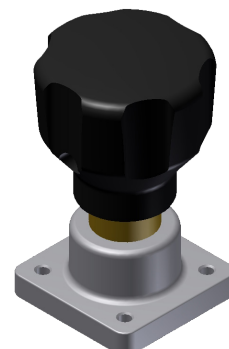
- Non-Adjustable low profile
- 304 SS base with 304 SS hand wheel
- Dual FKM O-ring sealed
- Sanitary internals



## #18A Bonnet

Sizes 1/4" - 3/8" - 1/2"

- Adjustable Close Stop
- 304 SS Base with PPS Hand wheel
- Dual FKM O-ring Sealed
- Sanitary Internals





# TOP-FLO® FDA & USP Weir Diaphragms

Steel & O'Brien understands that the most important factor of diaphragm valve reliability is the diaphragm itself. To achieve optimum diaphragm performance, only the highest-grade specially engineered materials are used in our diaphragm production.

All diaphragms are produced and controlled in the United States and Canada under a compliant and registered ISO 9001-2000 Quality Management System (QMS).

**TOP-FLO®** replacement diaphragms are interchangeable with key industry manufacturers when a threaded or bayonet type connection is required.

Each **TOP-FLO®** diaphragm valve can be supplied with a variety of elastomer or MPTFE faced materials. All diaphragms are compliant with FDA codes and USP Class VI standards and are fully traceable.

Diaphragms are molded in both the open and closed position dependent on type. All elastomer type diaphragms are attached to the compressor by a threaded stud. MPTFE diaphragms are attached by a bayonet type fixture that eliminates point loading, thus providing constant diaphragm compression across the weir resulting in a more uniform and reliable seal.



## EPDM elastomer diaphragm features:

- Proprietary low extractable steam grade material
- Superior cycle life
- FDA compliant & USP Class VI certified by NAMSA

## FKM elastomer diaphragm features:

- High chemical resistance with the life cycle benefits of an elastomer
- FDA compliant material

## MPTFE faced high-pressure molded diaphragm features:

- Steam grade material
- Superior cycle life
- Better density
- Virtually non-permeable
- FDA compliant & USP Class VI certified by NAMSA

CROSS REFERENCE CHART		DIAPHRAGM GRADES			
DIAPHRAGM - MATERIAL OF CONSTRUCTION	CONNECTION TYPE	S&O	SAUNDERS	ITT	BURKERT
PEROXIDE CURED EPDM*	THREADED	2E	E2 (425)	17 E1	AB
FKM FLUOROELASTOMER*	THREADED	2V	226 (NON-FDA)	-	FF
MPTFE FACED/EPDM BACKED - STEAM GRADE	BAYONET	1KS	P2 (214/425)	-	EA
			S5 (214S/425C)	-	EU
MPTFE FACED/FKM BACKED - STEAM GRADE	BAYONET	1PS	P3 (214/226)	-	-
			P3S (214S/226)	-	-

\*SIZES 1" (DN25) & ABOVE FOR SAUNDERS HC4 & BURKERT TYPE ONLY  
ALL DIAPHRAGM FACES AND BACKING MATERIALS ARE FDA CONFORMING  
ALL DIAPHRAGMS ARE USP CLASS VI CERTIFIED - EXCLUDING GRADE 2V

# Engineering

## Sterile L-Pattern Configurations

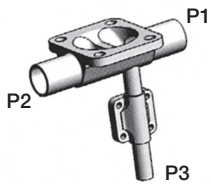


Fig. LA

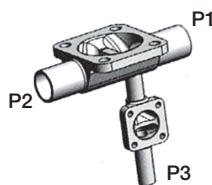


Fig. LB

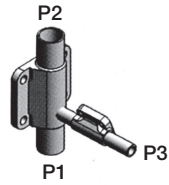


Fig. LC

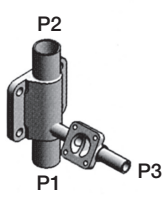


Fig. LD

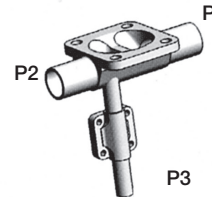


Fig. LE

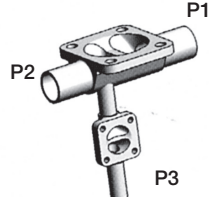


Fig. LF

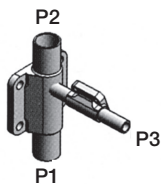


Fig. LG

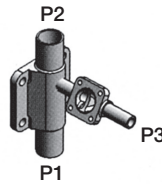


Fig. LH

## Sterile Access Configurations

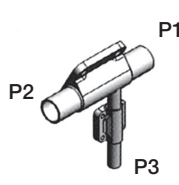


Fig. AA

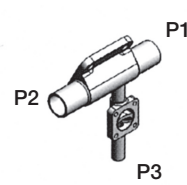


Fig. AB

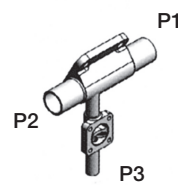


Fig. AC

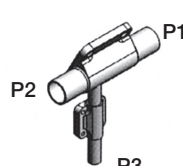


Fig. AD

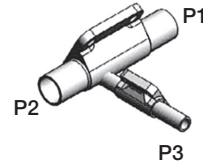


Fig. AE

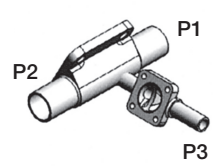


Fig. AF

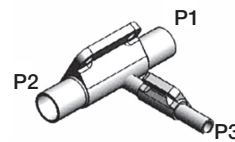


Fig. AG

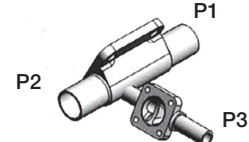
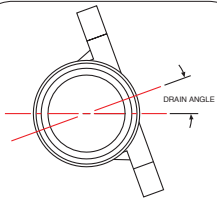


Fig. AH



### Drain Angle

Size	1/4	3/8	1/2	3/4	1	1-1/2	2	2-1/2	3	4	6
BIOFLO® II	35°	30°	25°	-	-	-	-	-	-	-	-
BIOPRO®	-	-	30°	25°	28°	20°	20°	18°	20°	15°	15°

## Flow Data - Forged & Cast 2-Way Valves

### CV Values USGPM At One PSI

Size % Open	BIOFLO® II			BIOPRO®							
	1/4	3/8	1/2	1/2	3/4	1	1-1/2	2	2-1/2	3	4
12.5	0.47	0.49	0.50	0.52	1.75	2.60	9.80	13.50	29.00	38.30	49.00
25	0.61	0.68	0.71	0.87	3.28	5.65	18.60	35.00	54.00	68.90	12.00
50	0.67	1.56	1.66	1.87	5.47	12.50	35.50	54.30	77.60	136.40	270.00
75	0.69	1.84	2.23	2.48	6.78	16.70	44.60	68.00	88.60	167.00	376.00
100	0.78	1.90	2.45	3.32	7.60	18.70	46.80	71.00	91.90	177.60	404.00

### KV Values Cubic Meter per Hour per At One Bar

Size % Open	BIOFLO® II			BIOPRO®							
	1/4	3/8	1/2	1/2	3/4	1	1-1/2	2	2-1/2	3	4
12.5	0.41	0.42	0.43	0.45	1.51	2.25	8.48	11.68	25.09	33.13	42.39
25	0.53	0.59	0.61	0.75	2.84	4.89	16.09	30.28	46.71	59.60	96.88
50	0.58	1.35	1.44	1.62	4.73	10.81	30.71	46.97	67.12	117.99	233.55
75	0.60	1.59	1.93	2.15	5.86	14.45	38.58	58.82	76.64	144.46	325.24
100	0.67	1.64	2.12	2.87	6.57	16.18	40.48	61.42	79.49	153.62	349.46

# Engineering

One of the effective methods known for removal of minor surface abnormalities after mechanical polishing and to improve the finish on a product is the electropolish process.

Electropolishing reduces minor scratches and other surface imperfections by removing metal from the product. The process creates a smoother and more level surface finish which cannot be achieved by mechanical polishing alone. The end result is the reduction of such imperfections from the product thus making them easier to be cleaned and lessens the potential for corrosion or contamination to occur.

## Diaphragm Materials And Temperature Range

Grade	Material	Temperature Range	
		Fahrenheit	Celsius
2E & BE	FDA/USP Black EPDM	-40° – 300°F	40° – 150°C
2V	FDA Black FKM	0° – 350°F	-15° – 150°C
BK	Compact MPTFE/EPDM	0° – 300°F	-15° – 150°C
1KS	Bayonet Steam MPTFE/EPDM	0° – 350°F	-15° – 175°C
1PS	Bayonet Steam MPTFE/FKM	25° – 350°F	-4° – 175°C

## Surface Finish Comparisons

MECHANICAL POLISH				MECHANICAL POLISH WITH ELECTROPOLISH			
Micron	Microinch (Ra)	Grit No.	BPE	Micron	Microinch (Ra)	Grit No.	BPE
0.75	30-35	150	SF3	0.62	25	180	SF6
0.62	25	180	SF2	0.50	20	240	SF5
0.50	20	240	SF1	0.37	15	320	SF4

## Benefits of the electropolishing process:

- Peaks and scratched surfaces caused by mechanical polishing are greatly reduced
- The passivation process provides greater corrosion resistance
- Any defective welds or pitting on the surface of the product will be revealed
- The overall appearance of the product can be enhanced
- Cleaning and sterilization of the product is made easier
- Assists removal of surface entrapped contaminants

Surface finish in the pharmaceutical and bio-processing industries is normally measured in (Ra) or roughness average, expressed in terms of microinch or micrometer (micron) values.

# Ordering Information 2-Way Valves

## BIOFLO® II Compact Valves

Body Type		End Connection		ID Surface Finish		Operator Type		Diaphragm Material		Valve Size	
6	BIOFLO® II - Forged	4	Clamp X Clamp	L3	20Ra (SF1)	18A	SS Base/Plastic Handwheel - Close Stop - (1/4" - 1/2")	BE	Peroxide Cured Black EPDM (Button)	25	1/4"
		8	Weld X Weld	L4	20Ra EP (SF5)	51	Thermoplastic - Double Acting - (1/4" - 4")	BK	MPTFE Faced / EPDM Backed (Button)	37	3/8"
	C	Clamp X Weld		L5	15Ra	54	Thermoplastic - Fail Close - (1/4" - 4")			50	1/2"
				L6	15Ra EP (SF4)	57	Thermoplastic - Fail Open - (1/4" - 4")				

## BIOPRO® Standard Valves

Body Type		End Connection		ID Surface Finish		Operator Type		Diaphragm Material		Valve Size	
7	BIOPRO® - Forged	4	Clamp X Clamp	L3	20Ra (SF1)	09	SS Base/SS Handwheel - Non-Adjustable - (2.5" - 4")	2E	Peroxide Cured Black EPDM (Threaded)	50	1/2"
8	BIOPRO® - Cast	8	Weld X Weld	L4	20Ra EP (SF5)	10	SS Base/SS Handwheel - Close Stop - (1/2" - 2")	2V	Black FKM (Threaded)	75	3/4"
						12	SS Base/Plastic Handwheel - Non-Adjustable - (1/2" - 2")	1K	MPTFE Faced / EPDM Backed (Bayonet)	10	1"
		C	Clamp X Weld	L5	15Ra	13	Epoxy Coated Cast Iron - Non-Adjustable - (6")	1P	MPTFE Faced / FKM Backed (Bayonet)	15	1-1/2"
						15	SS Base/Plastic Handwheel - Open Stop - (1/2" - 2")			20	2"
						21	Epoxy Coated Cast Iron - Double Acting - (1/2" - 6")			25	2-1/2"
						34	Epoxy Coated Cast Iron - Fail Close - (1/2" - 6")			30	3"
						47	Epoxy Coated Cast Iron - Fail Open - (1/2" - 6")			40	4"
						51	Thermoplastic - Double Acting - (1/4" - 4")			60	6"
						54	Thermoplastic - Fail Close - (1/4" - 4")				
						57	Thermoplastic - Fail Open - (1/4" - 4")				
						60	SS Base/SS Handwheel - Non Adjustable - (1/2" - 2")				

For all other valve types - consult factory for part numbers depending on your requirements

### EXAMPLE:

316 L Forged Body Valve	Clamp Ends	20Ra Finish (SF5)	Sealed Stainless, Bonnet W/SS Handwheel	MPTFE/EPDM	Valve Size(1")
7	4	L4	10	1K	10

# Automation Accessories



Many options exist within the product ranges shown.

Consult factory for specific control requirement and solutions.