

## Single Use Back Pressure Regulators FOR BIOPHARMACEUTICAL INDUSTRIES

The Equilibar® back pressure control valve is now available in a single use design (SD Series) to accommodate the rapidly expanding requirements of the biopharmaceutical industry. Single use systems require lower cost components that can be sterilized through irradiation and disposed of after use. The patent pending Equilibar SD series is manufactured using USP Class VI polymers and 316 stainless steel. The polymer body and diaphragms are disposable and are inserted into a reusable stainless steel support housing with wing nut closure for quick and easy assembly. They are specifically designed for use in single use systems and hybrid systems.

Please [contact us](#) for more information

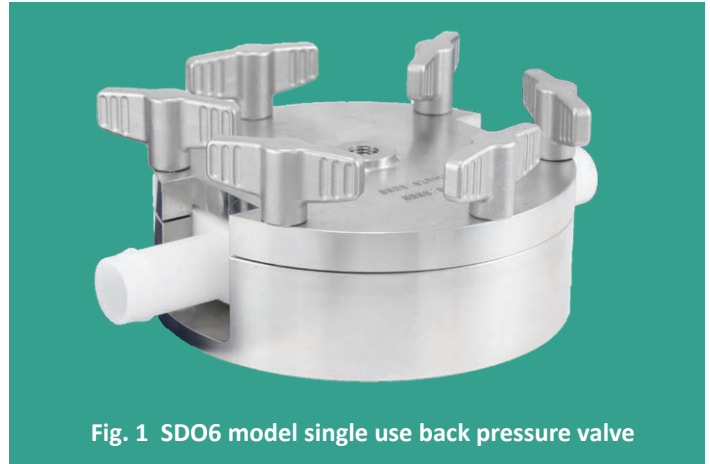


Fig. 1 SDO6 model single use back pressure valve

## Key Features

### EASE OF USE

The Equilibar SD is a dome-loaded pressure regulator with pilot operation. Inert gas or air is fed into the pilot port on the dome of the regulator to provide the pressure setpoint in a 1:1 ratio for the process. The pressure of the gas in the dome is set by a secondary standard regulator called a pilot regulator. The pilot regulator can be manual or electronic depending on the application's requirements.

### EXCELLENT STABILITY

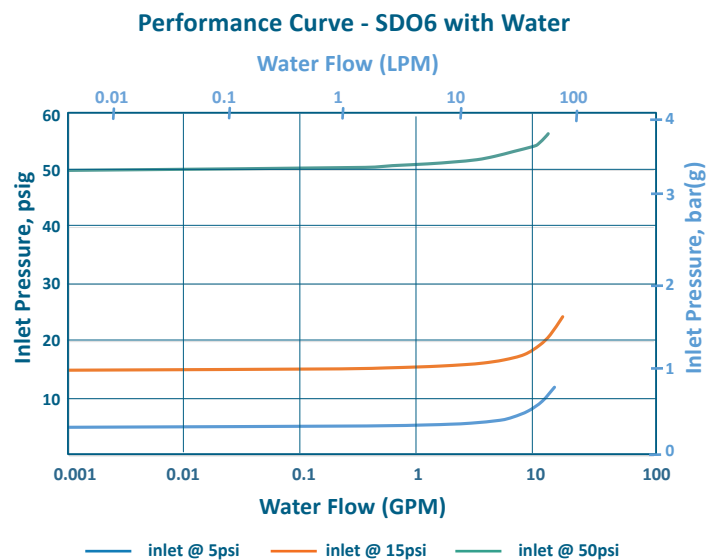
Equilibar regulators feature ultra sensitive diaphragm-operated back pressure technology capable of controlling pressure with high precision over a wide range of flows. The SD valve has negligible hysteresis and provides excellent stability. The graph at right shows the performance range of an SDO6 regulator with water.

### SMOOTH COMPUTER AUTOMATION

Equilibar regulators respond instantaneously to variations in flow or changes in setpoint to maintain the desired inlet pressure. Because of this lightning fast control capability, the SD Series is a perfect match for computer automated control. Paired with an electronic pilot regulator, the SD valve can be connected to the process control system making it ready for automation. See application example on p.3.

### PACKAGING AND STERILIZATION

The disposable parts of the Equilibar SD valves are manufactured and packaged in a class 7 clean room and shipped in hermetically sealed plastic bags ready for sterilization.



# Design Highlights

## HOW IT WORKS

Simply apply a pilot pressure to the port in the dome of the Equilibar® back pressure valve equal to the desired setpoint and the valve does the rest. This pilot pressure forces the flexible diaphragm down onto a plate of orifices. A rise in inlet pressure lifts the diaphragm up to allow excess pressure to be relieved through the outlet orifices. Similarly, a loss of pressure at the inlet causes the diaphragm to be pushed closer to the orifices, restricting flow and rebuilding pressure upstream.

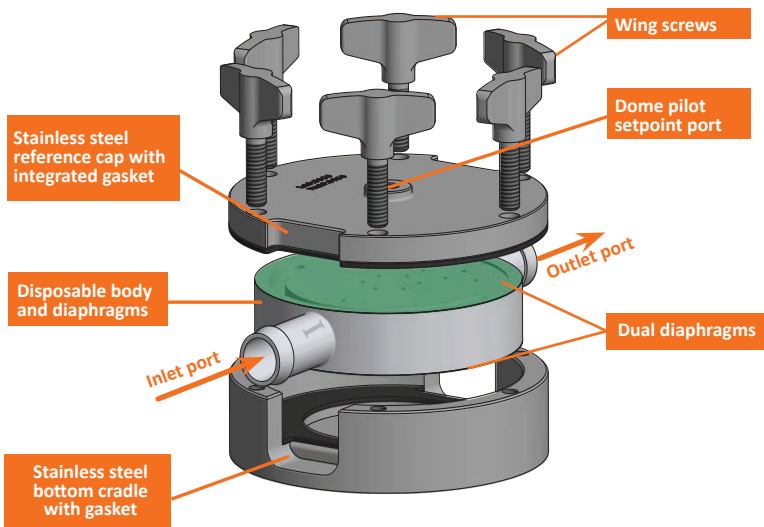


Fig. 3 SDO exploded view

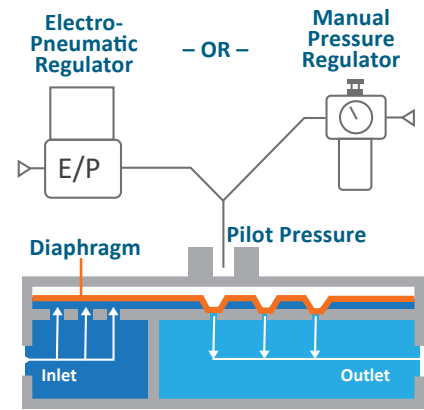


Fig. 2 How Equilibar technology works

The Equilibar SDO model back pressure valve (Fig. 3) is designed with in-line inlet and outlet ports. The valve body, ports and diaphragms are disposable and are enclosed in a 316 stainless steel enclosure held with bolts and wing nuts. This valve has a dual-diaphragm design like the [FDO Sanitary back pressure valve](#). The top diaphragm is the regulating diaphragm which controls the inlet pressure, and the bottom diaphragm is a sealing diaphragm which helps with pulsation dampening.

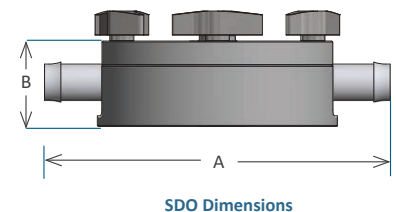
## WHERE IT WORKS

Equilibar SD valves are adaptable; in addition to pressure control applications, they can be used in flow control applications in single use processes. Read about some of the applications on the following page.

# Specifications

MODEL	INLET / OUTLET PORT	PILOT PORT	BODY MATERIALS <sup>1</sup>	MAX PRESSURE	CV RANGE (PRECISION)		DIMENSION IN (MM)	
					MIN	MAX	A	B
SDO2	1/4" (6.4mm)	1/8" NPT	USP CLASS VI HDPE	60 PSIG / 4 BAR(G)	1E-04	0.4	3.6 (91)	1.2 (30)
SDO3	3/8" (9.5mm)				1E-04	0.9	4.2 (107)	1.4 (36)
SDO4	1/2" (12.5mm)				1E-03	1.6	5.5 (140)	1.6 (41)
SDO6	3/4" (19mm)				1E-03	4.0	7.2 (183)	1.8 (46)

<sup>1</sup> BPA/TSE Free



## OPTIONAL CERTIFICATION PACKAGE

SD Series regulators have been designed for biopharmaceutical industries with materials that are USP Class VI tested and BPA/BSE free. A *Sanitary Certification Package* is available upon request.

# Tangential Flow Filtration

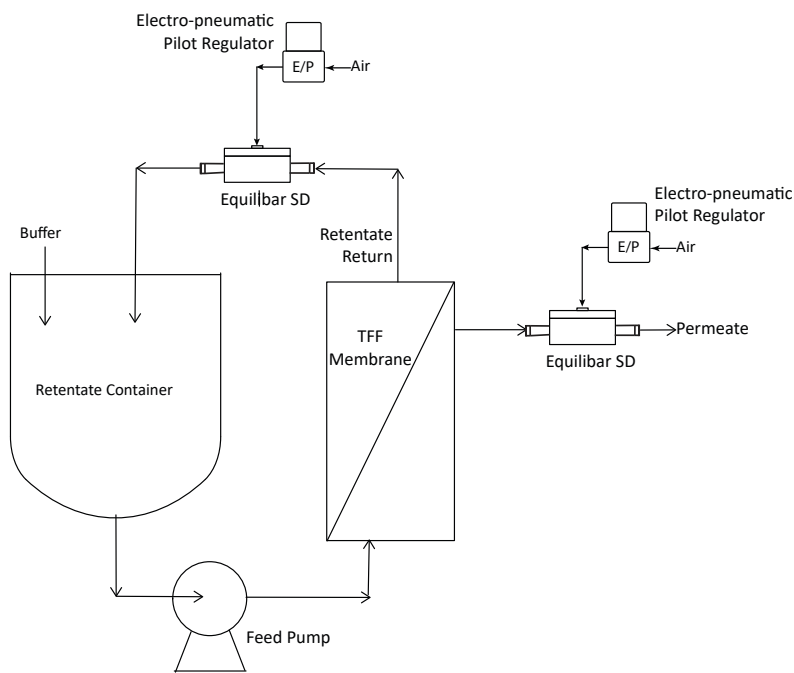


Fig. 4 Membrane dP control in TFF process

Tangential flow filtration, or TFF, is used in the biopharmaceutical industry as an efficient ultrafiltration method for purifying biomolecules. During the process, the differential pressure across the TFF membrane must be maintained within a narrow range, in some cases as low as 1 psi. The Equilibr SD delivers superior precision and can accurately control transmembrane pressure in a wide range of flow rates.

In the Figure at left, Equilibr SD valves are installed in both the retentate and permeate lines of the TFF process. Using electronic pilot regulators, setpoints are established to the domes of the SD valves to deliver the desired TFF transmembrane pressure differential. The SD valves are able to adjust quickly to changes in upstream pressure or flow in order to maintain stable target dP for effective TFF process control.

The SD regulator may also be used in other downstream ultrafiltration processes where precise pressure regulation improves process performance.

## Gradient Chromatography

A “gradient elution skid” or “gradient buffer skid” upstream of the chromatography skid adds buffers at varying ratios and specific timing to perform the gradient chromatography process.

Multiple buffer solutions are stored on the gradient elution skids and delivered via feed pumps to the chromatography column based on a pre-set conductivity profile specific to an elution process.

The Equilibr SD can act as a flow control valve, delivering precise blending with its millisecond response to changes in the conductivity profile setpoint. The immediate response of the SD regulator controls the upstream process quickly, delivering cost savings due to less waste.

The Equilibr SD can maintain consistent flow over a wide range of flow rates, resulting in fine blending for a variety of pharmaceutical blending processes.

Commonly, a flow turndown of 100:1 is possible using the SD valve, which covers a range equivalent to four standard control valves.

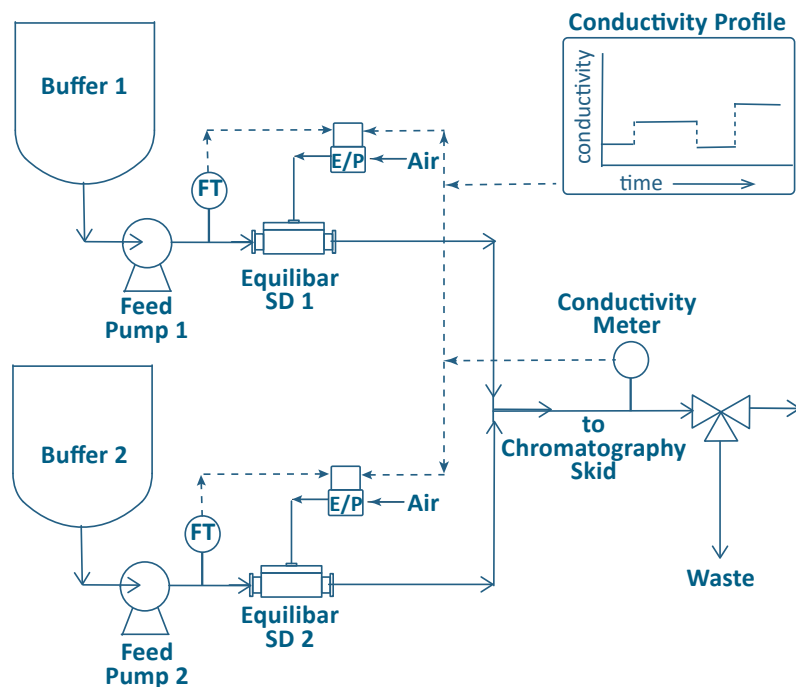


Fig. 5 Buffer blending in gradient elution skid

### PATENTS

These regulators are subject to one or more of these patents: US6,886,591, US7,080,660, US7,673,650, US8,215,336, DE60322443D1, GB1639282, FR1639282. Other patents pending. [www.equilibr.com/support/patents/](http://www.equilibr.com/support/patents/)

# About Equilibar

Equilibar provides innovative and robust pressure and flow control technology for researchers and engineers worldwide. We are proud to design, manufacture, and test our patented back pressure regulators in our factory overlooking the Blue Ridge Mountains near Asheville, NC, and we are equally proud to work with clients around the world each and every day.

## APPLICATION ENGINEERING— WHAT SETS US APART

Unlike mass-market regulator distributors, we focus on working with you, the scientist or engineer with a complex pressure control scenario.

Our application engineers work collaboratively with clients to identify the optimal model, trim, and diaphragm for each application's unique challenges. No matter where you are on the globe, you can stay in close contact with your engineer by email, telephone, videoconferencing, or fax.

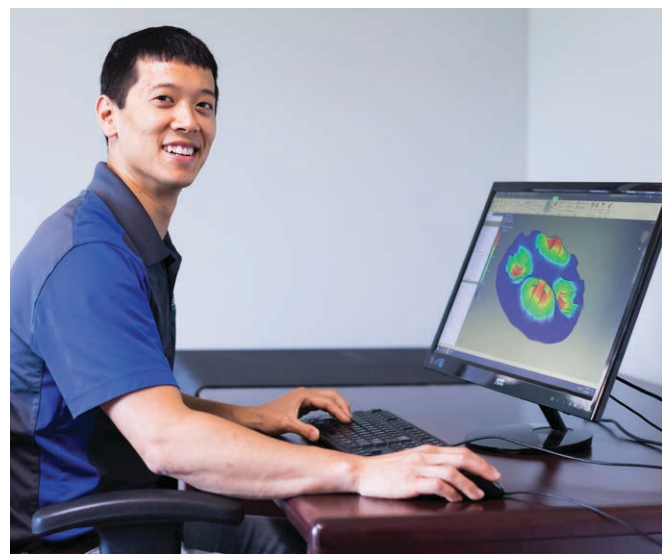
After installation, your application engineer will support you with start-up information and fine-tuning as needed.



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Each application is reviewed by our engineering team to ensure quality performance of our products.



Our engineers offer custom designed solutions for the most difficult pressure control challenges. Feel free to contact us to discuss your situation.



Made in the  
**USA**

Equilibar's quality system is  
**ISO 9001:2015** certified.