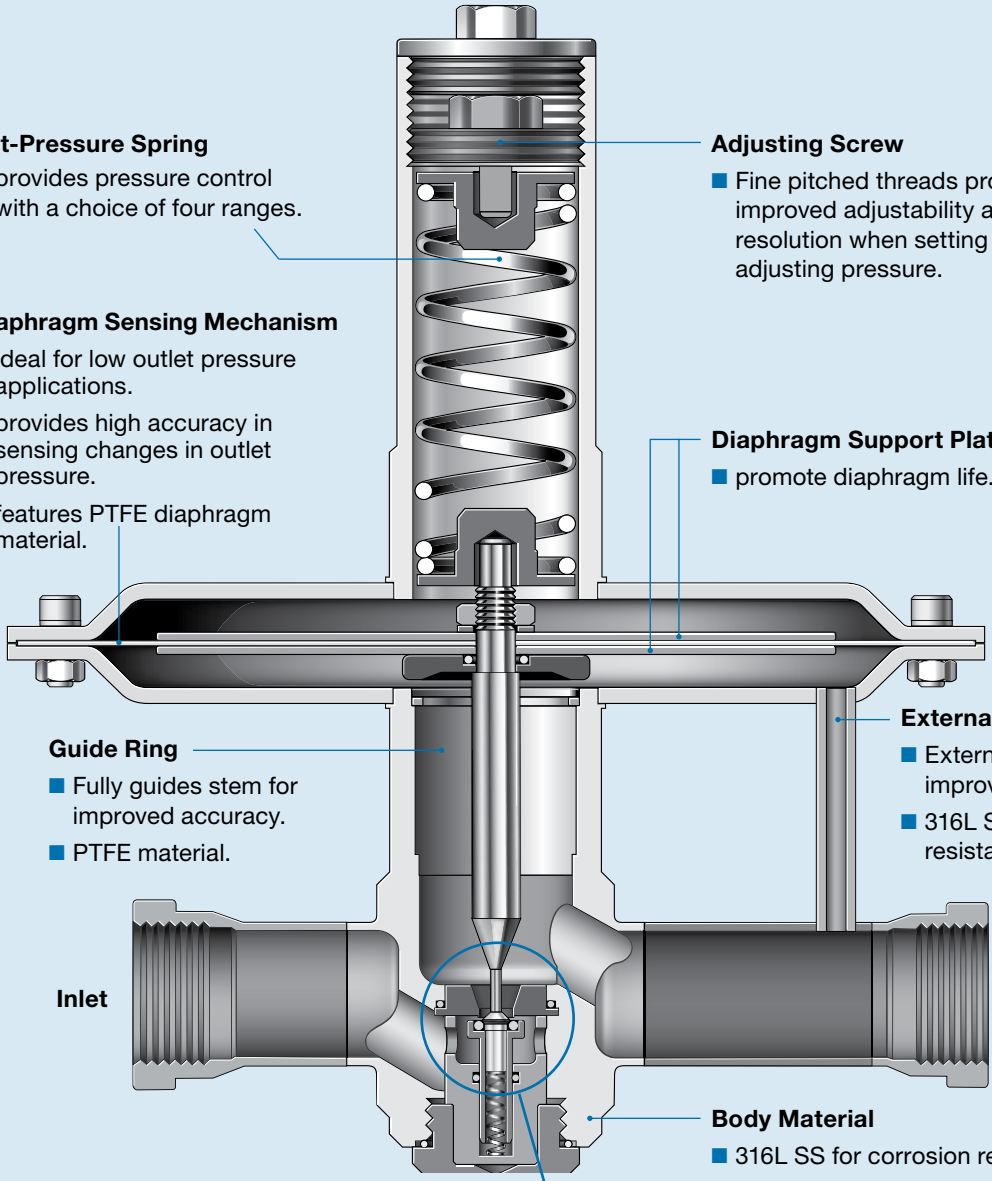
Features



Set-Pressure Spring
- provides pressure control with a choice of four ranges.

Adjusting Screw
- Fine pitched threads provide improved adjustability and resolution when setting or adjusting pressure.

Diaphragm Sensing Mechanism
- ideal for low outlet pressure applications.
- provides high accuracy in sensing changes in outlet pressure.
- features PTFE diaphragm material.

Diaphragm Support Plates
- promote diaphragm life.

Guide Ring
- Fully guides stem for improved accuracy.
- PTFE material.

External Feedback Tube
- External feedback loop for improved performance.
- 316L SS for corrosion resistance.

Inlet

Outlet

Body Material
- 316L SS for corrosion resistance.

Seat Seal
- available in fluorocarbon FKM, EDPM, or perfluorocarbon FFKM for soft-seat shutoff.

Seat
- 316L SS for corrosion resistance.

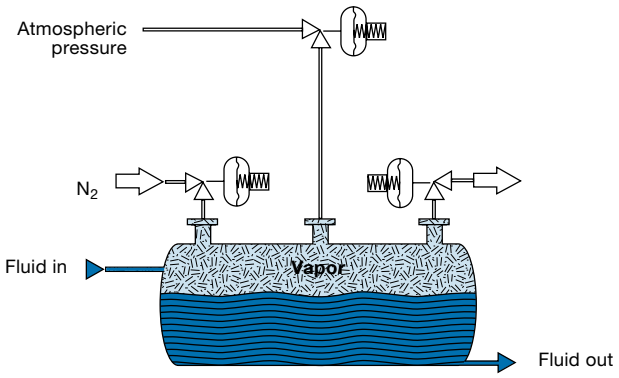
Poppet
- provides shutoff and flow control.
- 431 SS for strength and corrosion resistance.

Poppet Housing
- retains the poppet, seat seal, and poppet spring.
- 316L SS for corrosion resistance.

Tank Blanketing

What is Tank Blanketing

Tank blanketing, also known as padding, is the introduction of an inert gas into the vapor space of a storage tank. The pressure of the blanketing gas, usually nitrogen, is slightly higher than atmospheric pressure. The pressure requirement is low because higher pressures do not significantly improve results and waste expensive blanketing gas. Also storage tanks have thin walls which are not designed for high-pressure-containment applications. Tank blanketing is required in many industries where pressure-tight tanks are used for storage including the pharmaceutical, biochemical, electronics, sanitary, and waste water treatment industries.



Purpose of Tank Blanketing

Tank blanketing is used for several reasons depending on the application:

- **Increase product shelf life and prevent tank corrosion.** Tank blanketing can prevent air from entering the storage tank. Air contains oxygen, moisture, and other contaminants which can degrade or contaminate the stored product or could lead to internal tank corrosion.
- **Improve safety.** Tank blanketing can reduce the oxygen content in the vapor space. The reduced oxygen content lowers the risk of combustion.
- **Ensure compliance with environmental standards.** Tank blanketing can dilute toxic vapors with inert gas to keep volatile and hazardous vapors from escaping to the atmosphere, thus ensuring compliance with emission requirements.
- **Maintain structural integrity of tank.** Tank blanketing can prevent tank collapse when the internal pressure drops, or prevent tank rupture when the internal pressure increases. The Internal pressure can drop with a decrease in temperature or when liquid is removed from the tank. The internal pressure can rise with an increase in temperature or when liquid is added to the tank.

Types of Tank Blanketing Pressure Regulators

There are two types of RHPS series tank blanketing pressure regulators:

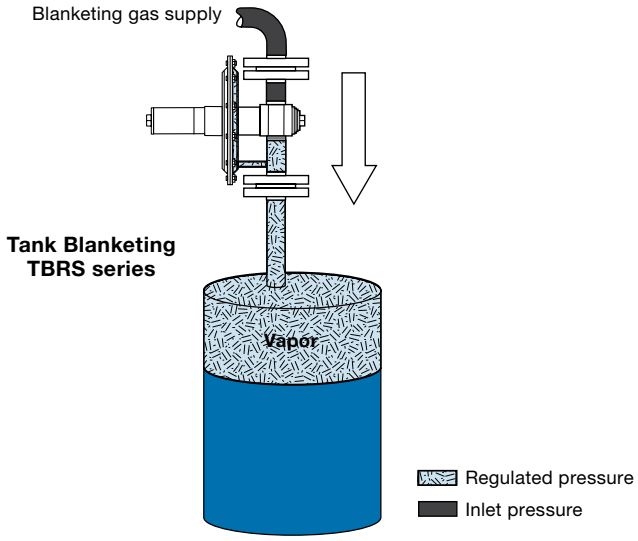
- pressure-reducing regulators
- vapor recovery regulators (back-pressure controllers)

Tank Blanketing with Positive Pressure

Gas blanketing and vapor recovery are two techniques that can safely and effectively contain volatile vapors in tanks and other process vessels, preventing them from escaping into the atmosphere. The combination of gas blanketing and vapor recovery devices maintains a constant pressure in the tank's vapor space above the stored fluid. As a result, there will always be a constant pressure in the tank during pumping operations or when the temperature changes.

Positive Pressure Tank Blanketing with TBRS Series Pressure-Reducing Regulators

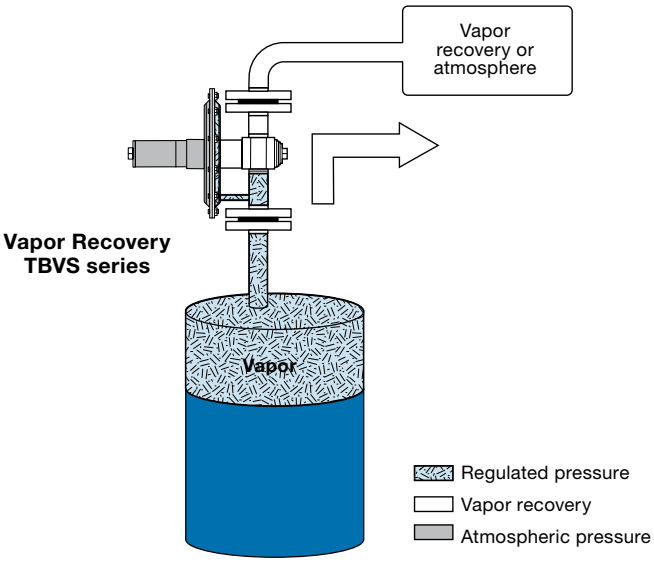
When the tank suddenly cools, the vapors inside the tank condense causing the tank pressure to decrease. The regulator opens which allows blanketing gas into the tank. Blanketing regulators also maintain a constant pressure in the tank during pump out to prevent the tank from collapsing.



Tank Blanketing

Vapor Recovery with TBVS Series Back-Pressure Regulators

When pressure inside the tank rises due to pump-in or thermal heating, the back-pressure regulator vents the excess pressure to an appropriate vapor recovery system. This prevents vapors from escaping into the atmosphere. Emergency vents or safety relief valves must be installed in the event of back-pressure regulator failure.



Testing

Every RHPS series tank blanketing regulator is factory tested for shell and seat leakage with nitrogen or air at 232 psig (16.0 bar), or its maximum rated pressure if less than 232 psig (16.0 bar). Shell testing is performed to a requirement of no detectable leakage with a liquid leak detector.

Cleaning and Packaging

Every RHPS series tank blanketing regulator is cleaned and packaged in accordance with Swagelok *Standard Cleaning and Packaging (SC-10),* MS-06-62.

Cleaning and packaging to ensure compliance with product cleanliness requirements stated in ASTM G93 Level C, is available as an option.

Oxygen Service Hazards

For more information about hazards and risks of oxygen-enriched systems, see the Swagelok *Oxygen System Safety* technical report, MS-06-13.

⚠ **RHPS series tank blanketing regulators are not "Safety Accessories" as defined in the Pressure Equipment Directive 97/23/EC.**

⚠ **Do not use the regulator as a shutoff device.**

Spring-Loaded, Pressure-Reducing Regulators—TBRS(H)8 Series

Features

- Spring-loaded pressure control
- Diaphragm sensing mechanism
- Ultrasensitive with millibar control
- Balanced poppet
- Diaphragm support plates allow for use in vacuum
- 316L stainless steel materials of construction
- Adjustable from 0.07 psig (2.0 in. H_2O, 5 mbar) pressure
- Supply pressure effect ratio: 1:3000
- Compliance with FDA/USP class VI

Options

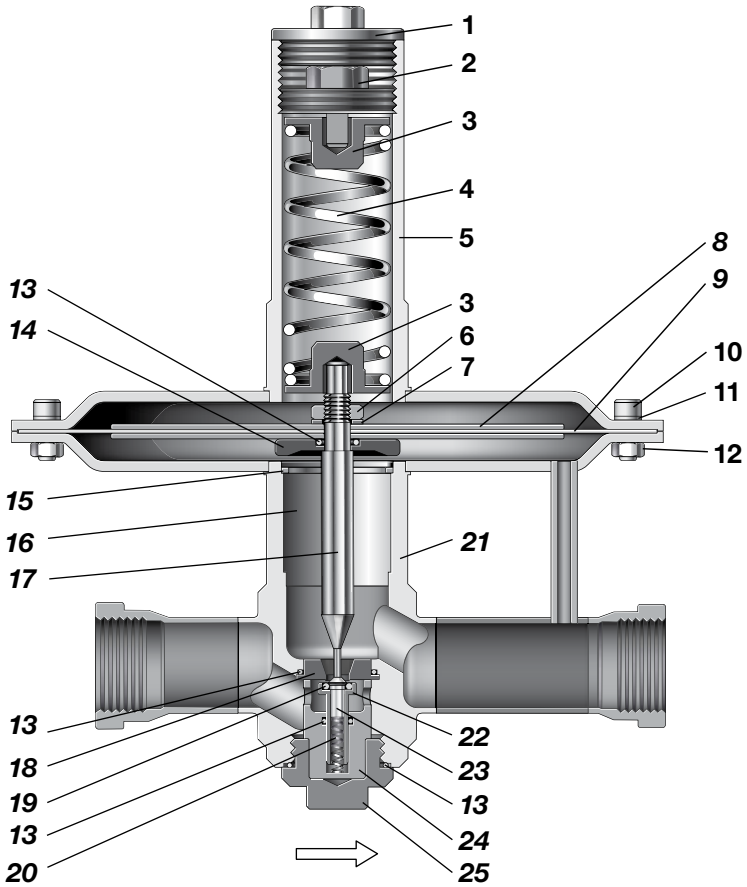
- Factory set and locked
- Wetted components finished to 15.7 µin. (0.4 µm) or 31.5 µin. (0.8 µm)
- Special cleaning to ASTM G93 Level C

Technical Data

Series	Maximum Inlet Pressure psig (bar)	Maximum Outlet Control Pressure psig (in. H_2O, mbar)	Sensing Type	Temperature Range °F (°C)	Flow Coefficient (C_v)	Seat Diameter in. (mm)	Inlet and Outlet Connections	Weight lb (kg)
TBRS8	87.0 (6.0)	7.2 (200, 500)	Diaphragm	–4 to 212 (–20 to 100)	1.0	0.31 (8.0)	1 in. NPT, ISO/BSP parallel thread, sanitary clamp (BSOD), ASME or DIN flange	Threaded 14.3 (6.5)
TBRSH8	232 (16.0)				0.3	0.20 (5.0)		Flanged 18.7 (8.5)

Materials of Construction

TBRS8 Series Regulator

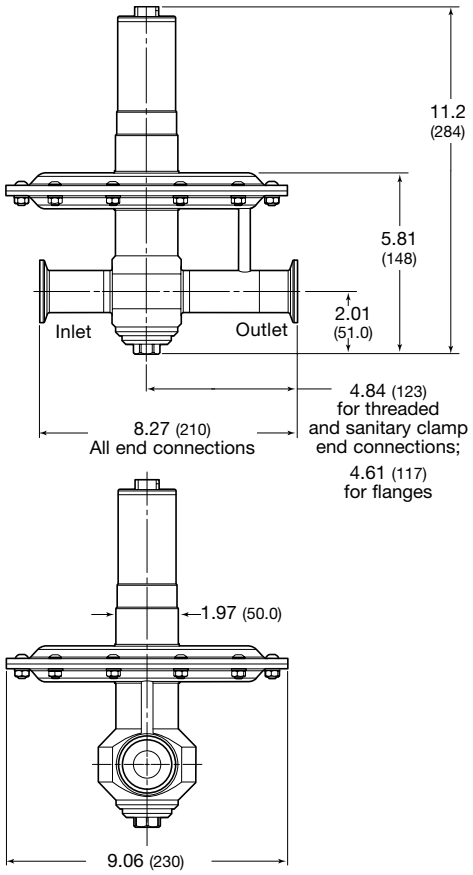


Component	Material / Specification
1 Cover	316L SS / A479 or EN10088
2 Adjusting screw	
3 Spring guide	
4 Set spring	302 SS / A240
5 Spring housing assembly	316L SS / A479 or EN10088
6 Nut	A2
7 Lock washer	A4
***8** Diaphragm plate*	*316L SS/ A479 or EN10088*
***9** Diaphragm / support*	*PTFE / fluorocarbon FKM*
10 Socket-head cap screw	A4-80
11 Lock washer	A2
12 Nut	
***13** O-ring*	*FKM, EDPM, Kalrez 6230*
***14** Seal housing*	*316L SS/ A479 or EN10088*
***15** Retaining ring*	
***16** Guide ring*	*PTFE*
***17** Stem*	*316L SS/ A479 or EN10088*
***18** Seat*	
***19** Seat seal*	*FKM, EDPM, Kalrez 6230*
***20** Poppet spring*	*302 SS / A240*
***21** Body assembly (body, outlet tube, EF tube, fittings, lower dish)*	*316L SS/ A479 or EN10088*
***22** Poppet housing*	
***23** Poppet*	
***24** Balance housing*	
***25** Body plug*	
Wetted lubricants: Silicone-based and synthetic hydrocarbon-based	

Wetted components listed in *italics*.

Dimensions

Dimensions, in inches (millimeters), are for reference only and are subject to change.



Shown with sanitary clamp end connections.

Flow Tables

TBRS8 Series Regulators with 0.31 in. (8.0 mm) Seat

Outlet Pressure Range psig (in. H_2O, mbar)	Inlet Pressure, psig (bar)										
	1.4 (0.10)	2.9 (0.20)	5.8 (0.40)	8.7 (0.60)	11.6 (0.80)	14 (1.0)	29 (2.0)	43 (3.0)	58 (4.0)	72 (5.0)	87 (6.0)
	Air Flow, std ft^3/min (Nm^3/h)										
0.07 to 0.14 (2.0 to 4.0, 5 to 10)	2.3 (4.0)	4.7 (8.0)	9.4 (16)	14.1 (24)	18.8 (32)	23.5 (40)	38.2 (65)	50.0 (85)	61.7 (105)	73.5 (125)	85.3 (145)
0.14 to 0.72 (4.0 to 20, 10 to 50)											
0.29 to 2.9 (8.0 to 80, 20 to 200)	—	—									
0.72 to 7.2 (20 to 200, 50 to 500)	—	—	—	—	—						

If inlet pressure is less than 14 psig (1.0 bar), the outlet pressure should not exceed 50 % of inlet pressure in order to reach the stated flow.

TBRSH8 Series Regulators with 0.20 in. (5.0 mm) Seat

Outlet Pressure Range psig (in. H_2O, mbar)	Inlet Pressure, psig (bar)					
	29 (2.0)	58 (4.0)	87 (6.0)	130 (9.0)	174 (12.0)	232 (16.0)
	Air Flow, std ft^3/min (Nm^3/h)					
0.07 to 0.14 (2.0 to 4.0, 5 to 10)	9.4 (16)	18.8 (32)	28.2 (48)	41.1 (70)	52.9 (90)	70.6 (120)
0.14 to 0.72 (4.0 to 20, 10 to 50)						
0.29 to 2.9 (8.0 to 80, 20 to 200)						
0.72 to 7.2 (20 to 200, 50 to 500)						

Inlet pressure determines the maximum flow because the outlet pressure is less than 50 % of inlet pressure, and in this situation, the gas flows through the seat at sonic velocity. This is known as critical or choked flow. Flow will not increase even if outlet pressure decreases to 0.014 psig (0.40 in. H_2O, 1.0 mbar).

Ordering Information

Build a TBRS(H)8 series regulator ordering number by combining the designators in the sequence shown below.

1		2	3	4	5	6	7	8	9	10	11
TBRS	**FA**	8	**A**	1	-	02	-	**3**	-	**V**	T	**V**	-	**FS**

1 Series
TBRS = 87.0 psig (6.0 bar) maximum inlet pressure
TBRSH = 232 psig (16.0 bar) maximum inlet pressure

2 Inlet /Outlet
B = Female ISO/BSP parallel thread
N = Female NPT
FA = ASME B16.5 flange
FD = DIN flange
TC = Sanitary clamp (BSOD)

3 Size
8 = 1 in. / DN25

4 Pressure Class
Omit designator if flanges are not ordered.
A = ASME class 150
M = DN class PN16

5 Flange Facing
Omit designator if flanges are not ordered.
1 = Raised face smooth

6 Body Material
02 = 316L SS

7 Pressure Control Range
1 = 0.07 to 0.14 psig (2.0 to 4.0 in. H_2O, 5 to 10 mbar)
2 = 0.14 to 0.72 psig (4.0 to 20 in. H_2O, 10 to 50 mbar)
3 = 0.29 to 2.9 psig (8.0 to 80 in. H_2O, 20 to 200 mbar)
4 = 0.72 to 7.2 psig (20 to 200 in. H_2O, 50 to 500 mbar)

8 Seal Material
V = Fluorocarbon FKM
E = EPDM
F = Kalrez 6230

9 Diaphragm Material
T = PTFE

10 Seat Seal Material
V = Fluorocarbon FKM
E = EPDM
F = Kalrez 6230

11 Options
FS = Factory set and locked
P4 = Wetted components finished to 15.7 µin. (0.4 µm)
P8 = Wetted components finished to 31.5 µin. (0.8 µm)
G93 = ASTM G93 Level C-cleaned