Tank Blanketing Pressure Regulators
RHPS Series

- Types: pressure reducing and vapor recovery
- 316L stainless steel construction
- 1/2, 1, and 2 in. end connections
- Working pressures up to 232 psig (16.0 bar)
- Temperatures from –4 to 212°F (-20 to 100°C)
Contents
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Tank Blanketing, 4
Testing, 5
Cleaning and Packaging, 5

Pressure-Reducing Regulators
Spring-Loaded—TBRS Series
TBRS4 Series, 6
TBRS(H)8 Series, 8
TBRS16 Series, 10

Back-Pressure Regulators
Spring-Loaded—TBVS Series
TBVS4 Series, 12
TBVS8 Series, 14
Maintenance Kits, 16
**Features**

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

- **Diaphragm Sensing Mechanism**
  - Ideal for low outlet pressure applications.
  - Provides high accuracy in sensing changes in outlet pressure.
  - Features PTFE diaphragm material.

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

- **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.

- **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.

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.

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
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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 2014/68/EU.

⚠️ Do not use the regulator as a shutoff device.
Tank Blanketing Pressure Regulators

**Low-Pressure, Spring-Loaded, Pressure-Reducing Regulators—TBRS4 Series**

**Features**
- Spring-loaded pressure control
- Diaphragm sensing mechanism
- 316L stainless steel materials of construction
- Large diaphragm to seat ratio

**Options**
- Special cleaning to ASTM G93 Level C
- Diaphragm material compliance to FDA and Seal compliance to FDA/USP class VI

**Technical Data**

<table>
<thead>
<tr>
<th>Series</th>
<th>Maximum Inlet Pressure psig (bar)</th>
<th>Maximum Outlet Control Pressure psig (in. H₂O, mbar)</th>
<th>Sensing Type</th>
<th>Temperature Range °F (°C)</th>
<th>Flow Coefficient (Cᵥ)</th>
<th>Seat Diameter in. (mm)</th>
<th>Inlet and Outlet Connections</th>
<th>Weight lb (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TBRS4</td>
<td>87.0 (6.0)</td>
<td>11.6 (321, 800)</td>
<td>Diaphragm</td>
<td>–4 to 212 (–20 to 100)</td>
<td>0.20</td>
<td>0.16 (4.0)</td>
<td>1/2 in. ISO/BSP parallel thread, sanitary clamp (BSOD), ASME or DIN flange</td>
<td>3.5 (1.6) without flanges</td>
</tr>
</tbody>
</table>

**Materials of Construction**

**TBRS4 Series Regulator**

<table>
<thead>
<tr>
<th>Component</th>
<th>Material / Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Set screw A2-70</td>
</tr>
<tr>
<td>2</td>
<td>Nut A2</td>
</tr>
<tr>
<td>3</td>
<td>Spring housing assembly 316L SS / A479 or EN10088</td>
</tr>
<tr>
<td>4</td>
<td>Spring guide 302 SS / A240</td>
</tr>
<tr>
<td>5</td>
<td>Set spring A240</td>
</tr>
<tr>
<td>6</td>
<td>Clamp ring 316L SS / A479 or EN10088</td>
</tr>
<tr>
<td>7</td>
<td>Lock washer A4</td>
</tr>
<tr>
<td>8</td>
<td>Diaphragm plate 316L SS / A479 or EN10088</td>
</tr>
<tr>
<td>9</td>
<td>PTFE</td>
</tr>
<tr>
<td>10</td>
<td>Socket-head cap screw A4-80</td>
</tr>
<tr>
<td>11</td>
<td>Lock washer A2</td>
</tr>
<tr>
<td>12</td>
<td>Nut A2</td>
</tr>
<tr>
<td>13</td>
<td>Seat retainer</td>
</tr>
<tr>
<td>14</td>
<td>Seat 316L SS / A479 or EN10088</td>
</tr>
<tr>
<td>15</td>
<td>Poppet screw</td>
</tr>
<tr>
<td>16</td>
<td>Body assembly (body, bottom dish) 316L SS / A479 or EN10088</td>
</tr>
<tr>
<td>17</td>
<td>Poppet 316L SS / A479 or EN10088</td>
</tr>
<tr>
<td>18</td>
<td>Seat seal PTFE</td>
</tr>
<tr>
<td>19</td>
<td>Poppet O-ring Kralrez® 6230</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>End Connection Size and Type</th>
<th>A in. (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2 in. female ISO/BSP parallel thread</td>
<td>2.95 (75.0)</td>
</tr>
<tr>
<td>DN15 PN16 flange</td>
<td>8.31 (211)</td>
</tr>
<tr>
<td>1/2 in. ASME class 150 flange</td>
<td>9.09 (231)</td>
</tr>
<tr>
<td>1/2 in. sanitary clamp (BSOD)</td>
<td>9.06 (230)</td>
</tr>
</tbody>
</table>

Ordering Information

Build a TBRS4 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 4 A 1 02 - 3 - T T F - G93
```

1. **Series**
   - TBRS = 87.0 psig (6.0 bar) maximum inlet pressure

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

3. **Size**
   - 4 = 1/2 in. / DN15

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**
   - 3 = 0.72 to 1.4 psig (20 to 40 in. H₂O, 50 to 100 mbar)
   - 4 = 0.72 to 2.9 psig (20 to 80 in. H₂O, 50 to 200 mbar)
   - 5 = 0.72 to 7.2 psig (20 to 200 in. H₂O, 50 to 500 mbar)
   - 6 = 0.72 to 11.6 psig (20 to 321 in. H₂O, 50 to 800 mbar)

8. **Seal Material**
   - T = PTFE

9. **Diaphragm Material**
   - T = PTFE

10. **Seat Seal Material**
    - F = Kalrez 6230

11. **Options**
    - G93 = ASTM G93 Level C-cleaned
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

Options
■ Factory set and locked
■ Special cleaning to ASTM G93 Level C
■ Diaphragm material compliance to FDA and Seal compliance to FDA/USP class VI

Technical Data

<table>
<thead>
<tr>
<th>Series</th>
<th>Maximum Inlet Pressure psig (bar)</th>
<th>Maximum Outlet Control Pressure psig (in. H₂O, mbar)</th>
<th>Sensing Type</th>
<th>Temperature Range °F (°C)</th>
<th>Flow Coefficient (Cᵥ)</th>
<th>Seat Diameter in. (mm)</th>
<th>Inlet and Outlet Connections</th>
<th>Weight lb (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TBRS8</td>
<td>87.0 (6.0)</td>
<td>7.2 (200, 500)</td>
<td>Diaphragm</td>
<td>–4 to 212 (–20 to 100)</td>
<td>1.0</td>
<td>0.31 (8.0)</td>
<td>1 in. NPT, ISO/BSP parallel thread, sanitary clamp (BSOD), ASME or DIN flange</td>
<td>Threaded 14.3 (6.5)</td>
</tr>
<tr>
<td>TBRSH8</td>
<td>232 (16.0)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Flanged</td>
<td>Flanged 18.7 (8.5)</td>
</tr>
</tbody>
</table>

Materials of Construction

Component | Material / Specification
---|---
1 Cover | 316L SS / A479 or EN10088
2 Adjusting screw | 316L SS / A479 or EN10088
3 Spring guide | 316L SS / A479 or EN10088
4 Set spring | 316L SS / A479 or EN10088
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 | A2
13 O-ring | FKM, EDPM, Kairez 6230
14 Seal housing | 316L SS / A479 or EN10088
15 Retaining ring | 316L SS / A479 or EN10088
16 Guide ring | PTFE
17 Stem | 316L SS / A479 or EN10088
18 Seat | 316L SS / A479 or EN10088
19 Seat seal | FKM, EDPM, Kairez 6230
20 Poppet spring | 316L SS / A479 or EN10088
21 Body assembly (body, outlet tube, EF tube, fittings, lower dish) | 316L SS / A479 or EN10088
22 Poppet housing | 316L SS / A479 or EN10088
23 Poppet | 316L SS / A479 or EN10088
24 Balance housing | 316L SS / A479 or EN10088
25 Body plug | 316L SS / A479 or EN10088

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.

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. H₂O, 5 to 10 mbar)
2 = 0.14 to 0.72 psig (4.0 to 20 in. H₂O, 10 to 50 mbar)
3 = 0.29 to 2.9 psig (8.0 to 80 in. H₂O, 20 to 200 mbar)
4 = 0.72 to 7.2 psig (20 to 200 in. H₂O, 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
G93 = ASTM G93 Level C-cleaned

Flow Tables

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

<table>
<thead>
<tr>
<th>Outlet Pressure Range psig (in. H₂O, mbar)</th>
<th>Inlet Pressure, psig (bar)</th>
<th>Air Flow, std ft³/min (Nm³/h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.07 to 0.14 (2.0 to 4.0, 5 to 10)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.14 to 0.72 (4.0 to 20, 10 to 50)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.29 to 2.9 (8.0 to 80, 20 to 200)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.72 to 7.2 (20 to 200, 50 to 500)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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**

<table>
<thead>
<tr>
<th>Outlet Pressure Range psig (in. H₂O, mbar)</th>
<th>Inlet Pressure, psig (bar)</th>
<th>Air Flow, std ft³/min (Nm³/h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.07 to 0.14 (2.0 to 4.0, 5 to 10)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.14 to 0.72 (4.0 to 20, 10 to 50)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.29 to 2.9 (8.0 to 80, 20 to 200)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.72 to 7.2 (20 to 200, 50 to 500)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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. H₂O, 1.0 mbar).
Spring-Loaded, Pressure-Reducing Regulators—TBRS16 Series

Features
■ Spring-loaded pressure control
■ Diaphragm sensing mechanism
■ Ultrasensitive with millibar control
■ Balanced poppet
■ 316L stainless steel materials of construction

Options
■ External feedback
■ Adjustable from 0.07 psig (2.0 in. H₂O, 5 mbar) pressure
■ Supply pressure effect ratio: 1:3000
■ Factory set and locked
■ Special cleaning to ASTM G93 Level C

Technical Data

<table>
<thead>
<tr>
<th>Maximum Inlet Pressure psig (bar)</th>
<th>Maximum Outlet Control Pressure psig (in. H₂O, mbar)</th>
<th>Temperature Range °F (°C)</th>
<th>Flow Coefficient (Cᵥ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>232 (16.0)</td>
<td>2.9 (80, 200)</td>
<td>–4 to 212 (~20 to 100)</td>
<td>6.9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Seat Diameter in. (mm)</th>
<th>Inlet and Outlet Connections</th>
<th>Gauge / EF Connections</th>
<th>Weight lb (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.75 (19.0)</td>
<td>2 in. ASME or DIN flanges</td>
<td>Gauge: 1/4 in. NPT</td>
<td>25 (14.3)</td>
</tr>
</tbody>
</table>

Materials of Construction

Swagelok

Component | Material / Specification
---|---
1 Lock screw | A2-70
2 Set screw | A2
3 Cover | 316L SS / A479 or EN10088
4 Adjusting screw | 316L SS / A479 or EN10088
5 Spring guide | 302 SS / A240
6 Set spring | A4
7 Lock nut | 316L SS / A479 or EN10088
8 Diaphragm plate | 316L SS / A479 or EN10088
9 Socket-head cap screw | A4-80
10 Lock washer | A2
11 Nut | 316L SS / A479 or EN10088
12 Diaphragm / liner | PTFE / butyl
13 Diaphragm screw | 316L SS / A479 or EN10088
14 Bushing | 316L SS / A479 or EN10088
15 Hex head screw | 316L SS / A479 or EN10088
16 Gauge and EF fittings | 316L SS / A479 or EN10088
17 Poppet spring | 316L SS / A479 or EN10088
18 Poppet insert | 316L SS / A479 or EN10088
19 Seat | 316L SS / A479 or EN10088
20 Plug | 316L SS / A479 or EN10088
21 Poppet O-ring | EPDM, FFKM, FKM, nitrile
22 Plug O-ring | EPDM, FFKM, FKM, nitrile
23 Body plug | EPDM, FFKM, FKM, nitrile
24 Body assembly (body, reducers, flanges, lower dish) | 316L SS / A479 or EN10088
25 Holder O-ring | EPDM, FFKM, FKM, nitrile
26 Valve holder | 316L SS / A479 or EN10088
27 Guide bushing | 316L SS / A479 or EN10088
28 Poppet housing | 316L SS / A479 or EN10088
29 Seat seal | EPDM, FFKM, FKM, nitrile
30 Poppet | 316L SS / A479 or EN10088
31 Hex head screw | 316L SS / A479 or EN10088
32 Lever | 316L SS / A479 or EN10088
33 Spring housing assembly | 316L SS / A479 or EN10088

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.

Flow Table

<table>
<thead>
<tr>
<th>Outlet Pressure Range, psig (in. H₂O, mbar)</th>
<th>Inlet Pressure, psig (bar)</th>
</tr>
</thead>
<tbody>
<tr>
<td>14 (1.0)</td>
<td>29 (2.0)</td>
</tr>
<tr>
<td>0.07 to 0.14 (2.0 to 4.0, 5 to 10)</td>
<td>0.14 to 0.72 (4.0 to 20, 10 to 50)</td>
</tr>
<tr>
<td>52.9 (90)</td>
<td>106 (180)</td>
</tr>
</tbody>
</table>

Air Flow, std ft³/min (Nm³/h)

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. H₂O, 1.0 mbar).

Ordering Information
Build a TBRS16 series regulator ordering number by combining the designators in the sequence shown below.

TBRS FA 16 A 1 - 02 - 3 - V T V - FS

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

2 Inlet /Outlet
FA = ASME B16.5 flange
FD = DIN flange

3 Size
16 = 2 in. / DN50

4 Pressure Class
A = ASME class 150
M = DN class PN16

5 Flange Facing
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. H₂O, 5 to 10 mbar)
2 = 0.14 to 0.72 psig (4.0 to 20 in. H₂O, 10 to 50 mbar)
3 = 0.29 to 2.9 psig (8.0 to 80 in. H₂O, 20 to 200 mbar)

8 Seal Material
V = Fluorocarbon FKM
E = EPDM
F = FFKM

9 Diaphragm Material
T = PTFE

10 Seat Seal Material
V = Fluorocarbon FKM
E = EPDM
F = FFKM

11 Option
FS = Factory set and locked
G93 = ASTM G93 Level C-cleaned
Low-Pressure, Spring-Loaded, Back-Pressure Regulators—TBVS4 Series

Features
■ Spring-loaded pressure control
■ Diaphragm sensing mechanism
■ 316L stainless steel materials of construction
■ Large diaphragm to seat ratio

Options
■ Special cleaning to ASTM G93 Level C
■ Diaphragm material compliance to FDA and Seal compliance to FDA/USP class VI

Technical Data

<table>
<thead>
<tr>
<th>Series</th>
<th>Maximum Inlet Pressure psig (bar)</th>
<th>Maximum Inlet Control Pressure psig (in. H₂O, mbar)</th>
<th>Sensing Type</th>
<th>Temperature Range °F (°C)</th>
<th>Flow Coefficient (Cᵥ)</th>
<th>Seat Diameter in. (mm)</th>
<th>Inlet and Outlet Connections</th>
<th>Weight lb (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TBVS4</td>
<td>14.5 (1.0)</td>
<td>11.6 (321, 800)</td>
<td>Diaphragm</td>
<td>–4 to 212 (–20 to 100)</td>
<td>0.2</td>
<td>0.16 (4.0)</td>
<td>1/2 in. ISO/BSP parallel thread, sanitary clamp (BSOD), ASME or DIN flange</td>
<td>3.5 (1.6)</td>
</tr>
</tbody>
</table>

Materials of Construction

<table>
<thead>
<tr>
<th>Component</th>
<th>Material / Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Set screw</td>
<td>A2-70</td>
</tr>
<tr>
<td>2 Nut</td>
<td>A2</td>
</tr>
<tr>
<td>3 Spring housing assembly</td>
<td>316L SS / A479 or EN10088</td>
</tr>
<tr>
<td>4 Spring guide</td>
<td>302 SS / A240</td>
</tr>
<tr>
<td>5 Set spring</td>
<td>316L SS / A479 or EN10088</td>
</tr>
<tr>
<td>6 Clamp ring</td>
<td>316L SS / A479 or EN10088</td>
</tr>
<tr>
<td>7 Nut</td>
<td>A4</td>
</tr>
<tr>
<td>8 Washer</td>
<td>A2</td>
</tr>
<tr>
<td>9 Diaphragm plate</td>
<td>316L SS / A479 or EN10088</td>
</tr>
<tr>
<td>10 Diaphragm</td>
<td>PTFE</td>
</tr>
<tr>
<td>11 Socket-head cap screw</td>
<td>A4-80</td>
</tr>
<tr>
<td>12 Washer</td>
<td>A2</td>
</tr>
<tr>
<td>13 Nut</td>
<td>A4</td>
</tr>
<tr>
<td>14 Seat retainer</td>
<td>316L SS / A479 or EN10088</td>
</tr>
<tr>
<td>15 Seat</td>
<td>316L SS / A479 or EN10088</td>
</tr>
<tr>
<td>16 Seat seal</td>
<td>PTFE</td>
</tr>
<tr>
<td>17 Poppet</td>
<td>316L SS / A479 or EN10088</td>
</tr>
<tr>
<td>18 Poppet screw</td>
<td>316L SS / A479 or EN10088</td>
</tr>
<tr>
<td>19 Poppet O-ring</td>
<td>Kalrez 6230</td>
</tr>
<tr>
<td>20 Body assembly (body, bottom dish)</td>
<td>316L SS / A479 or EN10088</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>End Connection</th>
<th>Size and Type</th>
<th>A (in. (mm))</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2 in. female ISO/BSP parallel thread</td>
<td></td>
<td>2.95 (75.0)</td>
</tr>
<tr>
<td>DN15 PN16 flange</td>
<td></td>
<td>8.31 (211)</td>
</tr>
<tr>
<td>1/2 in. ASME class 150 flange</td>
<td></td>
<td>9.09 (231)</td>
</tr>
<tr>
<td>1/2 in. sanitary clamp (BSOD)</td>
<td></td>
<td>9.06 (230)</td>
</tr>
</tbody>
</table>

Ordering Information
Build a TBVS4 series regulator ordering number by combining the designators in the sequence shown below.

1 Series
TBVS = 14.5 psig (1.0 bar) maximum inlet pressure

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

3 Size
4 = 1/2 in. / DN15

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
3 = 0.72 to 1.4 psig (20 to 40 in. H₂O, 50 to 100 mbar)
4 = 0.72 to 2.9 psig (20 to 80 in. H₂O, 50 to 200 mbar)
5 = 0.72 to 7.2 psig (20 to 200 in. H₂O, 50 to 500 mbar)
6 = 0.72 to 11.6 psig (20 to 321 in. H₂O, 50 to 800 mbar)

8 Seal Material
T = PTFE

9 Diaphragm Material
T = PTFE

10 Seat Seal Material
F = Kalrez 6230

11 Options
G93 = ASTM G93 Level C-cleaned
### Spring-Loaded, Back-Pressure Regulators—TBVS8 Series

#### Features
- Spring-loaded pressure control
- Diaphragm sensing mechanism
- Diaphragm support plates allow for use in vacuum
- 316L stainless steel materials of construction
- Adjustable from 0.07 psig (2.0 in. H₂O, 5 mbar) pressure

#### Options
- Factory set and locked
- Special cleaning to ASTM G93 Level C
- Diaphragm material compliance to FDA and Seal compliance to FDA/USP class VI

#### Technical Data

<table>
<thead>
<tr>
<th>Series</th>
<th>Maximum Inlet Pressure psig (bar)</th>
<th>Maximum Inlet Control Pressure psig (in. H₂O, mbar)</th>
<th>Sensing Type</th>
<th>Temperature Range °F (°C)</th>
<th>Flow Coefficient (Cv)</th>
<th>Seat Diameter in. (mm)</th>
<th>Inlet and Outlet Connections</th>
<th>Weight lb (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TBVS8</td>
<td>87.0 (6.0)</td>
<td>7.2 (200, 500)</td>
<td>Diaphragm</td>
<td>–4 to 212 (~20 to 100)</td>
<td>8.35</td>
<td>0.83 (21.0)</td>
<td>1 in. NPT, ISO/BSP parallel thread, sanitary clamp (BSOD), ASME or DIN flange</td>
<td>Threaded 14.3 (6.5) Flanged 18.7 (8.5)</td>
</tr>
</tbody>
</table>

#### Materials of Construction

**TBVS8 Series Regulator**

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

Wetted components listed in italics.
Dimensions

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

<table>
<thead>
<tr>
<th>End Connection Size and Type</th>
<th>A in. (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 in. female ISO/BSP parallel thread</td>
<td>4.84 (123)</td>
</tr>
<tr>
<td>1 in. female NPT</td>
<td>4.84 (123)</td>
</tr>
<tr>
<td>DN25 PN16 flange</td>
<td>4.61 (117)</td>
</tr>
<tr>
<td>1 in. ASME class 150 flange</td>
<td>4.61 (117)</td>
</tr>
<tr>
<td>1 in. sanitary clamp (BSOD)</td>
<td>4.84 (123)</td>
</tr>
</tbody>
</table>

Flow Table

<table>
<thead>
<tr>
<th>Set Pressure</th>
<th>Inlet Pressure, psig (in. H₂O, mbar)</th>
<th>Air Flow, std ft³/min (Nm³/h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25% overpressure</td>
<td>0.14 (4.0, 10)</td>
<td>3.2 (5.5)</td>
</tr>
<tr>
<td></td>
<td>0.29 (8.0, 20)</td>
<td>7.0 (12.0)</td>
</tr>
<tr>
<td></td>
<td>0.58 (16, 40)</td>
<td>11.1 (19.0)</td>
</tr>
<tr>
<td></td>
<td>1.4 (40, 100)</td>
<td>19.4 (33.0)</td>
</tr>
<tr>
<td></td>
<td>2.9 (80, 200)</td>
<td>31.7 (54.0)</td>
</tr>
<tr>
<td></td>
<td>7.2 (200, 500)</td>
<td>64.7 (110)</td>
</tr>
<tr>
<td>50% overpressure</td>
<td>0.14 (4.0, 10)</td>
<td>4.4 (7.5)</td>
</tr>
<tr>
<td></td>
<td>0.29 (8.0, 20)</td>
<td>8.8 (15.0)</td>
</tr>
<tr>
<td></td>
<td>0.58 (16, 40)</td>
<td>15.8 (27.0)</td>
</tr>
<tr>
<td></td>
<td>1.4 (40, 100)</td>
<td>24.7 (42.0)</td>
</tr>
<tr>
<td></td>
<td>2.9 (80, 200)</td>
<td>40.0 (68.0)</td>
</tr>
<tr>
<td></td>
<td>7.2 (200, 500)</td>
<td>76.5 (130)</td>
</tr>
<tr>
<td>75% overpressure</td>
<td>0.14 (4.0, 10)</td>
<td>5.0 (8.5)</td>
</tr>
<tr>
<td></td>
<td>0.29 (8.0, 20)</td>
<td>10.2 (17.5)</td>
</tr>
<tr>
<td></td>
<td>0.58 (16, 40)</td>
<td>18.4 (31.4)</td>
</tr>
<tr>
<td></td>
<td>1.4 (40, 100)</td>
<td>29.4 (50.0)</td>
</tr>
<tr>
<td></td>
<td>2.9 (80, 200)</td>
<td>49.4 (84.0)</td>
</tr>
<tr>
<td></td>
<td>7.2 (200, 500)</td>
<td>82.3 (140)</td>
</tr>
<tr>
<td>100% overpressure</td>
<td>0.14 (4.0, 10)</td>
<td>6.4 (11.0)</td>
</tr>
<tr>
<td></td>
<td>0.29 (8.0, 20)</td>
<td>11.1 (19.0)</td>
</tr>
<tr>
<td></td>
<td>0.58 (16, 40)</td>
<td>21.7 (37.0)</td>
</tr>
<tr>
<td></td>
<td>1.4 (40, 100)</td>
<td>31.7 (54.0)</td>
</tr>
<tr>
<td></td>
<td>2.9 (80, 200)</td>
<td>54.7 (93.0)</td>
</tr>
<tr>
<td></td>
<td>7.2 (200, 500)</td>
<td>88.2 (150)</td>
</tr>
</tbody>
</table>

Ordering Information

Build a TBVS8 series regulator ordering number by combining the designators in the sequence shown below.

TBVS FA 8 A 1 - 02 - 3 - T T V - FS

1. **Series**
   - TBVS = 87.0 psig (6.0 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**
   - 02 = ASME class 150
   - M = DN class PN16

5. **Flange Facing**
   - 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. H₂O, 5 to 10 mbar)
   - 2 = 0.14 to 0.72 psig (4.0 to 20 in. H₂O, 10 to 50 mbar)
   - 3 = 0.29 to 2.9 psig (8.0 to 80 in. H₂O, 20 to 200 mbar)
   - 4 = 0.72 to 7.2 psig (20 to 200 in. H₂O, 50 to 500 mbar)

8. **Seal Material**
   - T = PTFE

9. **Diaphragm Material**
   - T = PTFE

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

11. **Options**
    - FS = Factory set and locked
    - G93 = ASTM G93 Level C-cleaned

**Shown with female ISO/BSP parallel thread end connections**
Regular maintenance of pressure regulator components is an important part of keeping pressure regulators operating successfully. Swagelok offers several maintenance kit options to help keep components and systems performing well. Outlined below are the standard maintenance kit offerings and an example of which parts are included in each kit. For more detailed information of which parts will be included within a kit for a specific regulator model, please reference the appropriate owner’s manual or contact your authorized Swagelok Sales and Service center.

**Designator** | **Kit Type** | **Typical Contents**
--- | --- | ---
A1 | Valve kit | Poppet and housing (19, 22, 23), O-rings (13c), Seat (18)
A2 | Soft valve kit | Poppet and housing (19, 22, 23)
B1 | Service kit | Poppet and housing (19, 22, 23), O-rings (13a, 13b, 13c, 13d), Diaphragm (9), Seat (18)
B2 | Seal kit | O-rings (13a, 13b, 13c, 13d), Diaphragm (9)
C1 | Overhaul kit | Spring guides (3), Set spring (4), Poppet and housing (19, 22, 23), O-rings (13a, 13b, 13c, 13d), Poppet spring (20), Body plug (25), Diaphragm (9), Diaphragm plates (8), Seat (18), Nut (6), Lock washer (7), Stem (17), Seal housing (14), Balance housing (24), Guide ring (16)
C2 | Body plug kit | O-ring (13a, 13b), Body plug (25), Balance housing (24)
C3 | Sensing kit | Diaphragm (9)
C4 | Range spring kit | Range spring (4)
C5 | Poppet spring kit | Poppet spring (20)
D1 | Handle kit | Cover (1), Adjusting screw (2)
E1 | Hardware kit | Socket-head cap screw (10), Lock washer (11), Nut (12)

**Ordering Information**

To order a maintenance kit, add the kit type designator to the regulator ordering number.

Example: TBRSN8-02-2-VTV-B1
Other Regulators

- For general-use RHPS series regulators, see the Swagelok Pressure Regulators, RHPS Series catalog, MS-02-430.

- For additional Swagelok pressureregulators, see the Swagelok Pressure Regulators catalog, MS-02-230.

Additional Products.

- For Swagelok tube fitting products, see the Swagelok Gaugeable Tube Fittings and Adapter Fittings catalog, MS-01-140.

- For flange adapters, see the Swagelok Flange Adapters catalog, MS-02-200.

- For 60 series ball valves, see the Swagelok Ball Valves, General Purpose and Special Application catalog, MS-01-146.

- For piping products, see the Swagelok Process Interface Valves catalog, MS-02-340.

- For pressure gauges, see the Swagelok Industrial and Process Pressure Gauges catalog, MS-02-170.

⚠️ RHPS series pressure regulators are not “Safety Accessories” as defined in the Pressure Equipment Directive 2014/68/EU.

⚠️ Do not use the regulator as a shutoff device.
Safe Product Selection
When selecting a product, the total system design must be considered to ensure safe, trouble-free performance. Function, material compatibility, adequate ratings, proper installation, operation, and maintenance are the responsibilities of the system designer and user.

WARNING
Do not mix/interchange Swagelok products or components not governed by industrial design standards, including Swagelok tube fitting end connections, with those of other manufacturers.

Warranty Information
Swagelok products are backed by The Swagelok Limited Lifetime Warranty. For a copy, visit swagelok.com or contact your authorized Swagelok representative.