Compact, High-Flow Gas Regulators

HF Series

- Precise pressure control
- Tamper-free design
- High-purity design
- Preset and adjustable dome-loaded models

www.swagelok.com
Pressure Regulators and Filters

Features

- Compact, high-flow design
  - Less than half the size of conventional diaphragm pressure regulators
  - Flows up to 300 std L/min
- Innovative gas-actuated pressure-sensing assembly
  - Low supply-pressure effect ensures precise pressure control
  - Low droop eliminates the need for adjustment in many systems
  - Outlet tolerates maximum rated inlet pressure without damage
- Self-centering poppet
  - Minimizes outlet pressure creep
- Tamper-free design
  - Reduces potential of improper adjustment
  - Simplifies installation
- High-purity design
  - Tied poppet for clean operation and positive shutoff
  - All-welded design—no seals to atmosphere
  - 5 µin. $R_a$ electropolished finish
  - 316L VIM-VAR stainless steel body
- Choice of end connection/mounting styles
  - 1/4 in. VCR® split-nut connections
  - 1/4 and 3/8 in. butt weld connections
  - IGC™ II surface-mount

Swagelok® HF series gas pressure regulators use a gas-actuated pressure-sensing assembly to precisely control outlet pressure. A slight decrease or increase in the outlet pressure causes the pressure-sensing assembly to expand or contract, respectively. The expansion or contraction of the pressure-sensing assembly moves the poppet to provide precise pressure control.

Models

Preset Pressure Regulators

Preset pressure models are factory-charged with an inert gas mix to deliver 10, 20, 30, 50, or 80 psig (0.68, 1.3, 2.0, 3.4, or 5.5 bar) outlet pressures.

Dome-Loaded Pressure Regulators

Dome-loaded regulators may be adjusted during operation using a pilot regulator or can be factory-charged to deliver 10, 20, 30, or 50 psig (0.68, 1.3, 2.0, or 3.4 bar) outlet pressures.

Point-of-Use Models

(HFD3B and MSM-HFD3B Models)

Regulator Calibration

Preset pressure regulators are calibrated with filtered nitrogen at 1 std L/min flow rate.

- For outlet pressures up to 85 psig (5.8 bar), the inlet pressure is calibrated at 100 psig (6.8 bar).
- For outlet pressures greater than 85 psig (5.8 bar), the inlet pressure is calibrated at 160 psig (11 bar).
Technical Data

<table>
<thead>
<tr>
<th>Model Number</th>
<th>Pressure Rating psig (bar)</th>
<th>Temperature Rating °F (°C)</th>
<th>Supply-Pressure Effect (SPE)</th>
<th>Flow Coefficient ($C_v$)</th>
<th>Flow Capacity std L/min</th>
<th>Orifice Size in. (mm)</th>
<th>Internal Volume with 1/4 in. Butt Weld Ends in.³ (cm³)</th>
<th>Preset Outlet Pressure psig (bar)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HFS4A</td>
<td>3000 (206)²</td>
<td>–10 to 150 (~23 to 65)</td>
<td>0.4</td>
<td>0.1</td>
<td>200</td>
<td>0.090 (2.3)</td>
<td>0.97 (15.9)</td>
<td>80 (5.5)</td>
</tr>
<tr>
<td>HFS4B</td>
<td>1000 (68.9)</td>
<td>5 to 150 (0.35 to 10.3)</td>
<td>0.9</td>
<td>0.2</td>
<td>300</td>
<td>0.120 (3.0)</td>
<td>0.40 (6.6)</td>
<td>10 (0.68) 20 (1.3) 30 (2.0) 50 (3.4)</td>
</tr>
<tr>
<td>HFS3B</td>
<td>1000 (68.9)</td>
<td>–10 to 150 (~23 to 66)</td>
<td>1.3</td>
<td>0.2</td>
<td>200</td>
<td>0.120 (3.0)</td>
<td>0.28 (4.7)</td>
<td>10 (0.68) 20 (1.3) 30 (2.0) 50 (3.4)</td>
</tr>
</tbody>
</table>

Adjustable Dome-Loaded

<table>
<thead>
<tr>
<th>Model Number</th>
<th>Pressure Rating psig (bar)</th>
<th>Temperature Rating °F (°C)</th>
<th>Supply-Pressure Effect (SPE)</th>
<th>Flow Coefficient ($C_v$)</th>
<th>Flow Capacity std L/min</th>
<th>Orifice Size in. (mm)</th>
<th>Internal Volume with 1/4 in. Butt Weld Ends in.³ (cm³)</th>
<th>Preset Outlet Pressure psig (bar)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HFD3B</td>
<td>1000 (68.9)</td>
<td>–10 to 150 (~23 to 66)</td>
<td>1.6</td>
<td>0.2</td>
<td>200</td>
<td>0.120 (3.0)</td>
<td>0.24 (3.9)</td>
<td>10 (0.68) 20 (1.3) 30 (2.0) 50 (3.4)</td>
</tr>
<tr>
<td>MSM-HFD3B</td>
<td>1000 (68.9)</td>
<td>5 to 150 (0.35 to 10.3)</td>
<td>1.3</td>
<td>0.2</td>
<td>200</td>
<td>0.120 (3.0)</td>
<td>0.24 (3.9)</td>
<td>10 (0.68) 20 (1.3) 30 (2.0) 50 (3.4)</td>
</tr>
</tbody>
</table>

➀ Contact your authorized Swagelok sales and service representative for more information.

➁ Operating ranges for 10 and 20 psig (0.68 and 1.3 bar) preset HFS4B models are limited to 1000 and 2000 psig (70 and 137 bar) inlet pressure, respectively, due to the calibration method specified on page 2. To increase the operating range, a special calibration is available.

Process Specifications

Refer to Swagelok Ultrahigh-Purity Process Specification (SC-01) catalog, MS-06-61, for details on processes, process controls, and process verification.

Materials of Construction

<table>
<thead>
<tr>
<th>Wetted Component</th>
<th>Material / Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Body (inlet, outlet)</td>
<td>316L SS VIM-VAR / SEMI F20</td>
</tr>
<tr>
<td>2 Support housing</td>
<td>Alloy 625 / AMS 5879</td>
</tr>
<tr>
<td>3 Face plate</td>
<td>Alloy X-750 / ASTM B637</td>
</tr>
<tr>
<td>4 Diaphragm</td>
<td>Nickel 200 / ASTM B160</td>
</tr>
<tr>
<td>5 Fill screw</td>
<td>316L SS / ASTM A479</td>
</tr>
<tr>
<td>6 Fill screw gasket</td>
<td>Nickel 200 / ASTM A479</td>
</tr>
<tr>
<td>7 Stem</td>
<td>316L SS / ASTM A479</td>
</tr>
<tr>
<td>8 Poppet-retaining wafer</td>
<td>PCTFE / AMS 3650</td>
</tr>
<tr>
<td>9 Poppet</td>
<td>Nickel 200 / ASTM B160</td>
</tr>
</tbody>
</table>

① 20 % minimum elongation allowed.
Flow Data

HFS4A Model

Calculation Outlet Pressures for Other Inlet Pressures

A change in inlet pressure will have an inverse effect on the outlet pressure. The adjusted outlet pressure is a function of the supply-pressure effect (SPE) and can be calculated by the equation:

\[ p_4 = p_3 + \left( \frac{(p_1 - p_2)}{100} \right) \times \text{SPE} \]

where:

- \( p_4 \) = adjusted outlet pressure
- \( p_3 \) = initial outlet pressure
- \( p_1 \) = initial inlet pressure
- \( p_2 \) = new inlet pressure
Dimensions
Dimensions, in inches (millimeters), are for reference only and are subject to change.

Preset Pressure Regulators

**HFS4A and HFS4B Models**

HFS3B Model

Dome-Loaded Pressure Regulators

**HFD3B Model**

**MSM-HFD3B Surface-Mount Model**

Four mounting holes, M5 × 0.8-6H thread, 0.25 in. (6.4 mm) deep, located 45° from center line, on a 1.00 in. (25.4 mm) bolt circle. M5 × 0.8-6H holes are compatible with 10-32 mounting screws.

Four through holes, 0.22 (5.6) dia
Ordering Information

Create a regulator ordering number by adding the designators as shown below.

**Body Material**
316L VIM-VAR stainless steel

**Model**
- HFS4A = Preset cylinder
- HFS4B = Preset inline point-of-use
- HFS3B = Preset compact inline point-of-use
- HFD3B = Dome-loaded, point-of-use
- MSM-HFD3B = Dome-loaded, point-of-use surface-mount

**Poppet Material**
- None = PCTFE
- V = Polyimide

**End Connections**
- HVCR4 = 1/4 in. high-flow VCR gland (all except HFD3B)**
- VCR4 = 1/4 in. VCR gland (HFD3B only)**
- BW4 = 1/4 in. tube butt weld
- BW6 = 3/8 in. tube butt weld (HFS4 only)
- None = C-seal surface-mount (MSM-HFD3B only)

**Preset Outlet Pressure**
- All models except HFS4A
  - 10 = 10 psig (0.68 bar)
  - 20 = 20 psig (1.3 bar)
  - 30 = 30 psig (2.0 bar)
  - 50 = 50 psig (3.4 bar)
  - HFS4A model only
  - 80 = 80 psig (5.5 bar)

**Process**
Swagelok Ultrahigh-Purity Process Specification (SC-01); electropolished, $R_a$ 5 µin. (0.13 µm) average

Swagelok VCR Split-Nut Assemblies
Swagelok VCR split-nut technology offers:
- Flexibility of inventory
- Shorter end-to-end dimensions
- Rotatable, nonwelded S17400 end connections.

When ordering a regulator with VCR end connections, VCR split-nut assemblies must be ordered separately. VCR split-nut assemblies are field assembled. To order, select the ordering number for the male or female assemblies.

**Caution:** Do not mix or interchange parts with those of other manufacturers.

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Introduction
Since 1947, Swagelok has designed, developed, and manufactured high-quality, general-purpose and specialty fluid system products to meet the evolving needs of global industries. Our focus is on understanding our customers' needs, finding timely solutions, and adding value with our products and services.

We are pleased to provide this global edition of the book-bound Swagelok Product Catalog, which compiles more than 100 separate product catalogs, technical bulletins, and reference documents into one convenient, easy-to-use volume. Each product catalog is up to date at the time of printing, with its revision number shown on the last page the individual catalog; for example, the Swagelok Gaugeable Tube Fittings and Tube Adapters catalog is MS-01-140, RevW. Subsequent revisions will supersede the printed version and will be posted on the Swagelok website and in the Swagelok electronic Desktop Technical Reference (eDTR) tool.

For more information, visit your Swagelok website or contact your authorized Swagelok sales and service representative.

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.

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

Caution: Do not mix or interchange parts with those of other manufacturers.