Pressure Regulators
K Series

- Pressure-reducing models
- Back-pressure models
- Gas cylinder changeover model
- Vaporizing models

Contents

Pressure Regulator Operation

Regulators reduce the pressure of a gas or liquid from a source, such as a cylinder or compressor, to a lower value needed by a device, such as an analyzer. A pressure regulator provides better resolution and control when its inlet and control range pressures closely match the pressure requirements of the fluid handling system. *Resolution* is the number of handle turns needed to adjust a regulator from its lowest to highest outlet pressure setting. *Control* is the ability of the regulator to hold a given outlet pressure set point.

Pressure-Reducing Regulators

Pressure-reducing regulators control outlet pressure by balancing an adjustable spring force against the forces caused by inlet and outlet pressures. The spring force is adjusted by turning the stem/handle, which sets the desired outlet pressure.

As inlet pressure decreases, the force balance changes. To compensate, outlet pressure will increase. This supply-pressure effect (SPE) is a function of the design and type of regulator. If a regulator is subjected to fluctuating inlet pressure, and outlet pressure variations are not desirable, a two-stage regulator is available.

Specialty Pressure-Reducing Regulators

Gas Cylinder Changeover

A two-stage gas cylinder changeover model automatically switches between two sources.

Vaporizing

Vaporization regulators are available with electric and steam heat to vaporize liquid samples or to preheat gas samples.

Supply-Pressure Effect

Supply-pressure effect (SPE) or dependency is a ratio describing the change in outlet pressure per 100 psi (6.8 bar) change in inlet pressure. In other words, for every 100 psi (6.8 bar) drop in inlet pressure, the outlet pressure will increase by *X* psi. *X* is the SPE. For standard pressure-reducing regulators, the outlet pressure increases as supply pressure decreases. The opposite is true as supply pressure increases. This effect can also be realized on system startup or shutdown.

The regulator should be set to the “off” position before turning the supply pressure on or off to prevent overpressurization of regulator diaphragms, outlet pressure gauges, or other equipment downstream. When selecting an antitamper

K Series Pressure Regulator Selection

Series	Diaphragm Sensing	Piston Sensing	2 Stage	Gas Cylinder Changeover	Electrical Vaporizing	Steam Vaporizing	Compact, MPC Platform	Maximum Inlet Pressure psig (bar)	Pressure Control Ranges, psig (bar) 0 to 2 (0.13)	10 (0.68)	25 (1.7)	50 (3.4)	100 (6.8)	250 (17.2)	375 (25.8)	500 (34.4)	750 (51.6)
Pressure-Reducing Models																	
KPR	✓							6000 (413)		✓	✓	✓	✓	✓		✓	
KCY	✓		✓							✓	✓	✓	✓	✓		✓	
KLF	✓							3600 (248)	✓	✓	✓	✓	✓	✓			
KHF	✓									✓	✓	✓	✓	✓			
KCP		✓					✓			✓	✓	✓	✓	✓		✓	
KPP		✓						6000 (413)									
KPF		✓															
KHP		✓						10 000 (689)								✓	✓
KHR		✓														✓	✓
Specialty Regulators																	
KCM	✓		✓	✓				4351 (300)		✓	✓	✓	✓	✓		✓	
KSV	✓					✓		3600 (248)		✓	✓	✓	✓	✓		✓	
KEV	✓①	✓①			✓					✓	✓	✓	✓	✓		✓	
Back-Pressure Models																	
KBP	✓							Equal to pressure control range		✓	✓	✓	✓	✓		✓	
KFB	✓									✓	✓	✓	✓	✓			
KCB		✓					✓			✓	✓	✓	✓	✓	✓		
KPB		✓															
KHB		✓														✓	✓

① Outlet pressures up to 500 psig (34.4 bar) require diaphragm sensing mechanism; outlet pressures above 500 psig (34.4 bar) require piston sensing mechanism.

model, it is important to make sure that SPE will not cause excessive overpressurization on opening and closing of the supply pressure.

Back-Pressure Regulators

Back-pressure regulators control inlet pressure by balancing an adjustable spring force against the force of the inlet pressure. The spring force is adjusted by turning the stem/handle, which sets the desired inlet pressure.

When the force caused by the inlet pressure rises above the force of the spring, the regulator opens until the spring force and inlet pressure are balanced again.

⚠ **Swagelok 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.**

⚠ **Self-venting and captured-venting regulators can release system fluid to atmosphere. Position the self-vent hole or the captured vent connection away from operating personnel. See Venting Options, page 5, for more information.**

Testing

Every Swagelok K series pressure regulator is pressure tested with nitrogen.

Cleaning and Packaging

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

Cleaning and packaging to ensure compliance with product cleanliness requirements stated in ASTM G93 Level E is available for brass and stainless steel Swagelok regulators.

Cleaning and packaging in accordance with Swagelok *Special Cleaning and Packaging (SC-11)* catalog, MS-06-63, to ensure compliance with product cleanliness requirements stated in ASTM G93 Level C is available for select KPR, KCY, KCP, KBP, and KCB series regulators.

Oxygen Service Hazards

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

	Pressure Control Ranges, psig (bar)											**Flow Coefficient (C_v)**							
	0 to						**10 to 1500** (0.68 to 103)	**15 to 2500** (1.0 to 172)	**25 to 3600** (1.7 to 248)	**50 to 6000** (3.5 to 413)	**100 to 10 000** (6.8 to 689)								
	1000 (68.9)	**1500** (103)	**2000** (137)	**3000** (206)	**3600** (248)	**4000** (275)						**0.02**	**0.06**	**0.10**	**0.20**	**0.25**	**0.50**	**1.0**	**Page**
												✓	✓		✓		✓		6
													✓		✓		✓		8
												✓	✓		✓		✓		10
																		✓	12
	✓	✓										✓	✓		✓		✓		14
	✓	✓	✓	✓	✓							✓	✓						16
	✓		✓	✓		✓												✓	18
							✓	✓	✓	✓	✓		✓			✓			20
							✓	✓	✓	✓	✓		✓			✓			22
													✓						34
													✓		✓				36
	✓	✓	✓	✓	✓							✓	✓						38
															✓				24
																		✓	26
														✓	✓				28
	✓		✓	✓		✓							✓		✓				30
							✓	✓	✓	✓	✓		✓			✓			32

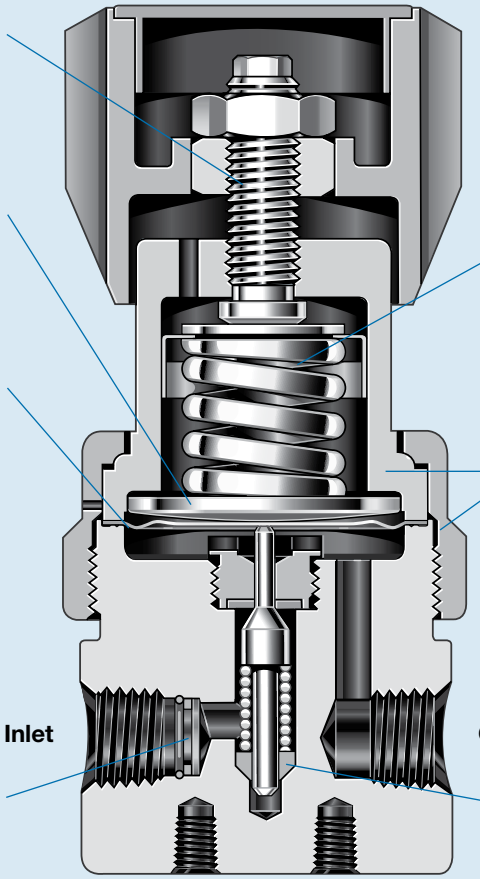
Swagelok® K Series Pressure Regulator Features

Stem
Fine-pitch threads enable precise spring adjustment with low torque.

Stop Plate
This disc provides positive backup to the diaphragm in case of diaphragm overpressure.

Convoluted Diaphragm
The all-metal diaphragm acts as the sensing mechanism between the inlet pressure and the range spring. The convoluted, nonperforated design ensures greater sensitivity and longer life. A piston sensing mechanism (shown below) can accommodate higher pressures.

Gauze Inlet Filter
Regulators are susceptible to damage from system particles. Swagelok pressure-reducing regulators include a 25 µm press fit filter. It can be removed to use the regulator in liquid service.



Range Spring
Turning the handle compresses the spring, pushing the poppet away from the seat and increasing outlet pressure.

Two-Piece Cap
The two-piece design provides linear load on the diaphragm seal when the cap ring is tightened, eliminating torque damage to the diaphragm during assembly.

Poppet Damper
The poppet damper keeps the poppet aligned and reduces vibration and resonance.

Venting Options

The **self-vent** option allows excess outlet pressure to vent through the body cap. This can occur when downstream flow is suddenly reduced or when the handle is adjusted to a lower pressure with little or no flow downstream.

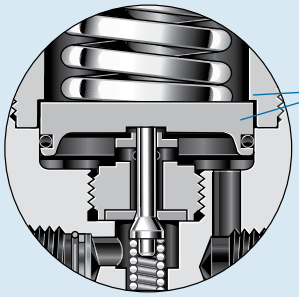
The **captured-vent** option includes a 1/8 in. female NPT connection and stem seal in the body cap① to allow monitoring of the diaphragm or piston sensing mechanism. It also allows containment of hazardous gas or liquid media should a diaphragm or piston rupture.

Self-vent and captured-vent options can be ordered together so that hazardous gas or liquid media can be contained if vented.

① The captured-vent port is in the bottom of the KHR series body.

Piston Sensing Mechanism

Piston sensing mechanisms typically are used to regulate higher pressures than a diaphragm can withstand. They are also more resistant to damage caused by pressure spikes and have a short stroke to maximize cycle life.



Fully-Contained Piston
The piston is contained by a shoulder in the regulator body cap to prevent piston blowout if the regulator outlet is overpressurized.

General-Purpose Diaphragm-Sensing, Pressure-Reducing Regulators (KPR Series)

The KPR series is a compact regulator with excellent accuracy, sensitivity, and set-point pressure stability.

Features

- Convoluted, nonperforated diaphragm
- Metal-to-metal diaphragm seal
- Low internal volume
- Two-piece cap design provides linear load on the diaphragm seal
- High-flow, dual-gauze type filter in inlet ports

Technical Data

Maximum Inlet Pressure

- 3600 psig (248 bar)
- 6000 psig (413 bar) with PEEK seat

Pressure Control Ranges

- 0 to 10 psig (0.68 bar) through 0 to 500 psig (34.4 bar)

Flow Coefficient (C_v)

- 0.06 and 0.20

See page 41 for flow graphs.

- 0.02 and 0.50 also available

Supply-Pressure Effect

Flow Coefficient (C_v)	Pressure Control Range	
	Up to 100 psig (6.8 bar)	250 psig (17.2 bar) and Higher
	Supply Pressure Effect, %	
0.02	0.3	0.5
0.06	1.0	1.5
0.20	1.7	2.5
0.50	2.3	3.3

Maximum Operating Temperature

- 176°F (80°C) with PCTFE seat
- 392°F (200°C) with PEEK seat
- 212°F (100°C) with PEEK seat and maximum inlet pressure greater than 3600 psig (248 bar)

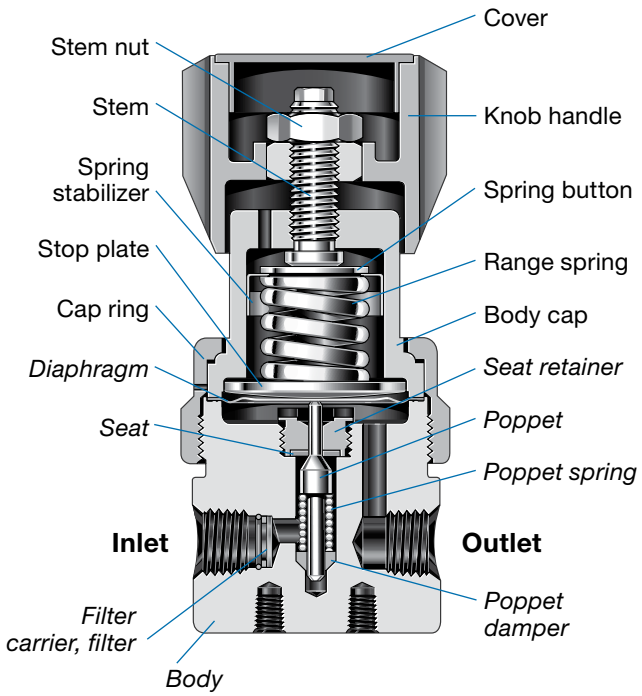
Weight

- 2.4 lb (1.1 kg)

Ports

- 1/4 in. female NPT inlet, outlet, and gauge ports (all body materials)
- 1/4 in. tube butt weld inlet, outlet, and gauge ports (316 SS body material only)
- 1/4 in. VCR® inlet, outlet, and gauge ports (316 SS body material only)

Materials of Construction



Component	316 SS	Brass CW721R	Alloy 400	Alloy C-276
	Material			
Knob handle, cover	Nylon with 316 SS insert			
Spring button	Zinc-plated steel			
Spring stabilizer①	301 SS			
Range spring	316 SS or zinc-plated steel, depending on configuration			
Stem, stem nut, cap ring, stop plate, body cap, panel nuts②	316 SS			
VCR nuts②	316 SS	—		
Nonwetted lubricant	Hydrocarbon-based			
Seat retainer	*316 SS*		*Alloy 400*	*Alloy C-276*
Seat	*PCTFE or PEEK*			
Filter	*316 SS*		*Alloy C-22*	
*Diaphragm*③	*Alloy X-750 or alloy C-276*			
Poppet	*S17400 SS*		*Alloy 400*	*Alloy C-276*
Poppet spring	*Alloy X-750*			*Alloy C-276*
Poppet damper, filter carrier	*PTFE*			
*Self-vent seal*②	*Fluorocarbon FKM*		—	
Body	*316 SS*	*Brass CW721R*	*Alloy 400*	*Alloy C-276*
*Tube butt weld ports,*② *VCR gland ports*②	*316L SS*	—		
Wetted lubricant	*PTFE-based*			

Wetted components listed in *italics.*

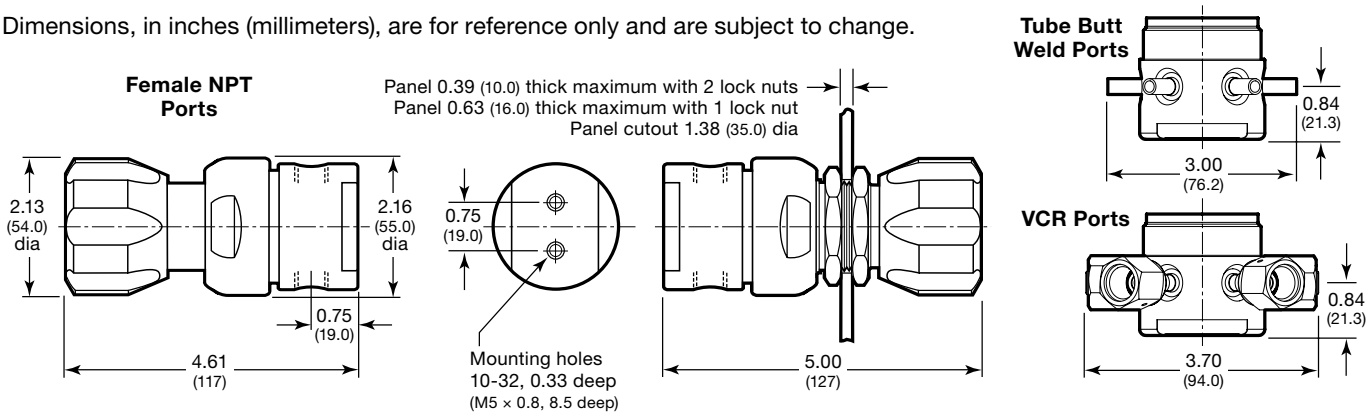
① Not required in all configurations.

② Not shown.

③ Regulators with control ranges higher than 0 to 100 psig (0 to 6.8 bar) are assembled with two diaphragms.

Dimensions

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



Ordering Information

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

	4	5	6	7	8	9	10	11	12	13	14	15	16
KPR	1	F	R	F	4	1	2	A	2	0	0	0	0

4 Body Material

1 = 316 SS
2 = Brass CW721R
4 = Alloy 400
5 = Alloy C-276
A = 316 SS, ASTM G93 Level E-cleaned
B = Brass, ASTM G93 Level E-cleaned
C = 316 SS, SC-11–cleaned
D = Brass, SC-11–cleaned

5 Pressure Control Range

C = 0 to 10 psig (0 to 0.68 bar)①
D = 0 to 25 psig (0 to 1.7 bar)①
E = 0 to 50 psig (0 to 3.4 bar)
F = 0 to 100 psig (0 to 6.8 bar)
G = 0 to 250 psig (0 to 17.2 bar)
J = 0 to 500 psig (0 to 34.4 bar)

① Select 0.02 or 0.06 flow coefficient if maximum inlet pressure is 4351 psig (300 bar) or 6000 psig (413 bar).

6 Maximum Inlet Pressure①②

F = 100 psig (6.8 bar)
J = 500 psig (34.4 bar)
L = 1000 psig (68.9 bar)
P = 3000 psig (206 bar)
R = 3600 psig (248 bar)
T = 4351 psig (300 bar)③
W = 6000 psig (413 bar)③④

① For better resolution and control, select a pressure that closely matches system pressure.
② Cylinder Connections and Hose accessories may limit inlet pressure ratings, see pages 53 and 56.
③ Available only with 316 SS body material and PEEK seat material. Not available with SC-11 cleaning.
④ Not available for regulators assembled with isolation valves.

7 Port Configuration

A, B, C, E, F, H, K, L, M, N
*See **Port Configurations,** page 52.*

8 Ports

4 = 1/4 in. female NPT
T = 1/4 in. × 0.035 in. tube butt weld①
V = 1/4 in. VCR gland, no nuts①②
X = 1/4 in. rotatable female VCR fitting①
Y = 1/4 in. rotatable male VCR fitting①

① Available only with 316 SS body material in **A** and **F** port configurations; does not contain a filter. Not available with maximum inlet pressure greater than 3600 psig (248 bar). Not available ASTM G93 Level E-cleaned.
② For use with VCR split-nuts, which can be ordered separately. Refer to Swagelok *VCR Metal Gasket Face Seal Fittings* catalog, MS-01-24.

9 Seat Material

1 = PCTFE
2 = PEEK

10 Flow Coefficient (C_v)

1 = 0.02
2 = 0.06
5 = 0.20
7 = 0.50

11 Sensing Mechanism, Vent

A = Alloy X-750 diaphragm, no vent
C = Alloy X-750 diaphragm, self vent①
E = Alloy X-750 diaphragm, captured vent, no self vent
F = Alloy X-750 diaphragm, self and captured vent①
H = Alloy C-276 diaphragm, no vent

① Available only with 316 SS and brass body materials and 0.06 and 0.20 C_v.

12 Handle, Mounting

2 = Knob
3 = 316 SS antitamper nut
6 = Knob, panel mount
7 = 316 SS antitamper nut, panel mount

For knob handle color options, see page 56.

13 Isolation and Relief Valves

0 = No valves

For isolation and relief valve options, see page 54.

14 Cylinder Connections

0 = No connections

For cylinder connection options and pressure ratings, see page 53.

15 Gauges

0 = No gauges

For inlet and outlet gauge options, see page 54.

16 Options

0 = No options
H = Inboard helium leak test to a maximum leak rate of 1×10^{-5} std cm^3/s①
3 = 3 ft, 1/4 in. FX series metal flexible hose, 1/4 in. female NPT inlet①
4 = 3 ft, 1/4 in. TH series PTFE-lined, stainless steel braided hose, 1/4 in. female NPT inlet②

For hose options and pressure ratings, see page 56.

① Not available with self vent.
② Not available for ASTM G93 Level E-cleaned and SC-11–cleaned regulators.

Select KPR series regulators are available that meet the testing requirements of ASTM G175, "Standard Test Method for Evaluating the Ignition Sensitivity and Fault Tolerance of Oxygen Regulators Used for Medical and Emergency Applications." Contact your authorized Swagelok sales and service representative.

Two-Stage Diaphragm-Sensing, Pressure-Reducing Regulators (KCY Series)

The KCY series is designed for use in applications requiring constant outlet pressure even with wide variations in inlet pressure. This two-stage regulator is comparable to two single-stage regulators connected in series. The first stage is factory set to reduce the inlet pressure to 500 psig (34.4 bar). The second stage can be adjusted with the handle to achieve the required outlet pressure.

This two-stage arrangement minimizes the supply-pressure effect caused by fluctuating inlet pressure, such as with a depleting gas cylinder. As inlet pressure drops below the setting of the first stage, the regulator then functions as a single-stage regulator. The first-stage pressure setting can be reduced while monitoring the pressure at the interstage port, but lower flow may result.

Features

- Convoluted, nonperforated diaphragm
- Metal-to-metal diaphragm seal
- Excellent set-point stability
- High-flow, dual-gauze type filter in inlet ports

Technical Data

Maximum Inlet Pressure

- 3600 psig (248 bar)
- 6000 psig (413 bar) with PEEK seat

Pressure Control Ranges

- 0 to 10 psig (0.68 bar) through 0 to 500 psig (34.4 bar)

Flow Coefficient (C_v)

- 0.06 and 0.20

See page 42 for flow graphs.

- 0.50 also available

Supply-Pressure Effect

Flow Coefficient (C_v)	Pressure Control Range	
	Up to 100 psig (6.8 bar)	250 psig (17.2 bar) and Higher
	Supply Pressure Effect, %	
0.06	0.01	0.02
0.20	0.02	0.06
0.50	0.05	0.13

Maximum Operating Temperature

- 176°F (80°C) with PCTFE seat
- 392°F (200°C) with PEEK seat
- 212°F (100°C) with PEEK seat and maximum inlet pressure greater than 3600 psig (248 bar)

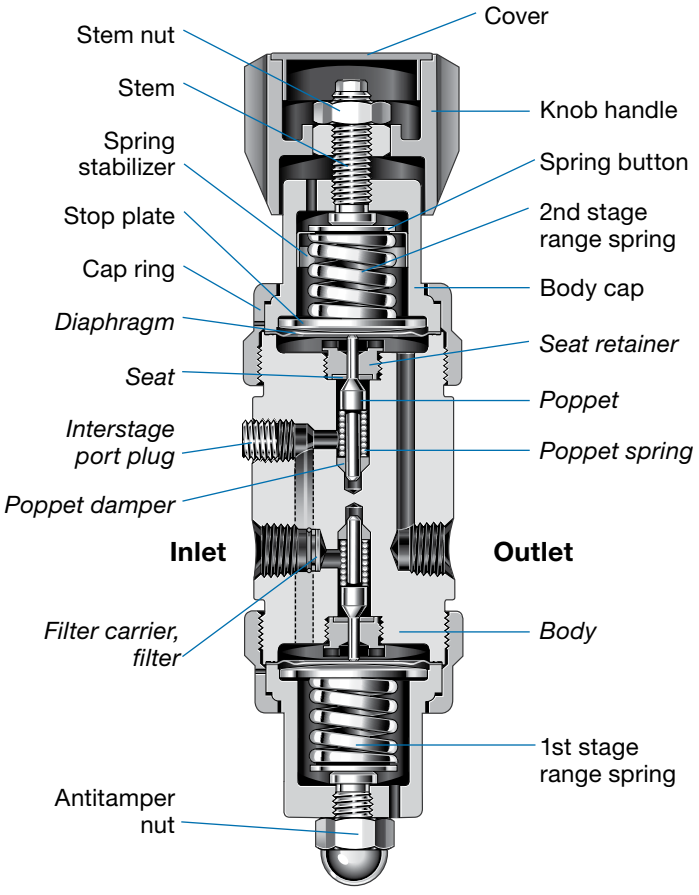
Weight

- 4.2 lb (1.9 kg)

Ports

- 1/4 in. female NPT inlet, outlet, and gauge ports

Materials of Construction

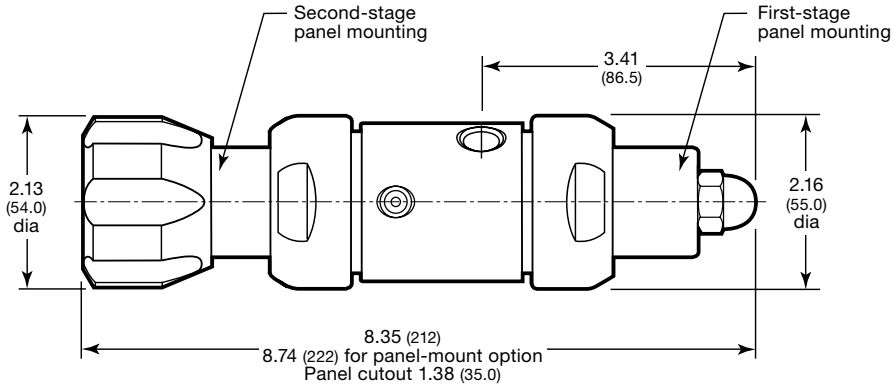


Component	316 SS	Brass CW721R
	Material	
Knob handle, cover	Nylon with 316 SS insert	
Spring buttons	316 SS (1st stage) Zinc-plated steel (2nd stage)	
Spring stabilizer①	301 SS	
Range springs	316 SS (0 to 10 through 0 to 100 psig control ranges)② Zinc-plated steel (0 to 250 and 0 to 500 psig control ranges)	
Stems, stem nut, cap rings, stop plates, body caps, panel nuts,③ antitamper nut	316 SS	
Nonwetted lubricant	Hydrocarbon-based	
Seat retainers, filter	*316 SS*	
Seats	*PCTFE or PEEK*	
Diaphragms,④ poppet springs	*Alloy X-750*	
Poppets	*S17400 SS*	
Poppet dampers, filter carrier	*PTFE*	
Interstage port plug	*316 SS with PTFE tape*	
*Self-vent seal*③	*Fluorocarbon FKM*	
Body	*316 SS*	*Brass CW721R*
Wetted lubricant	*PTFE-based*	

Wetted components listed in *italics*.
① Not required in all configurations.
② Regulators with control range 0 to 100 psig (0 to 6.8 bar) and 0.20 C_v have zinc-plated steel range spring.
③ Not shown.
④ Regulators with control ranges higher than 0 to 100 psig (0 to 6.8 bar) are assembled with two diaphragms.

Dimensions

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



Ordering Information

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

	4	5	6	7	8	9	10	11	12	13	14	15	16
KCY	1	F	R	F	4	1	2	A	2	0	0	0	0

4 Body Material
- **1** = 316 SS
- **2** = Brass CW721R
- **A** = 316 SS, ASTM G93 Level E-cleaned
- **B** = Brass, ASTM G93 Level E-cleaned
- **C** = 316 SS, SC-11–cleaned
- **D** = Brass, SC-11–cleaned

5 Pressure Control Range
- **C** = 0 to 10 psig (0 to 0.68 bar)
- **D** = 0 to 25 psig (0 to 1.7 bar)
- **E** = 0 to 50 psig (0 to 3.4 bar)
- **F** = 0 to 100 psig (0 to 6.8 bar)
- **G** = 0 to 250 psig (0 to 17.2 bar)
- **J** = 0 to 500 psig (0 to 34.4 bar)

6 Maximum Inlet Pressure①
- **P** = 3000 psig (206 bar)
- **R** = 3600 psig (248 bar)
- **T** = 4351 psig (300 bar)②
- **W** = 6000 psig (413 bar)②③

① Cylinder Connections and Hose accessories may limit inlet pressure ratings, see pages 53 and 56.

② Available only with 316 SS body material and PEEK seat material. Not available with SC-11 cleaning.

③ Not available for regulators assembled with isolation valves.

7 Port Configuration
A, B, C, E, F, H, K, L, M, N

*See **Port Configurations,** page 52.*

8 Ports
- 4 = 1/4 in. female NPT

9 Seat Material
- **1** = PCTFE
- **2** = PEEK

10 Flow Coefficient (C_v)
- **2** = 0.06
- **5** = 0.20
- **7** = 0.50

11 Sensing Mechanism, Vent
- **A** = Alloy X-750 diaphragm, no vent
- **C** = Alloy X-750 diaphragm, self vent①
- **E** = Alloy X-750 diaphragm, captured vent, no self vent
- **F** = Alloy X-750 diaphragm, self and captured vent①

① Available with 0.06 and 0.2 C_v only. Self vent through second stage only.

12 Handle, Mounting①
- **2** = Knob
- **3** = Antitamper nut
- **6** = Knob, second-stage panel mount
- **7** = Antitamper nut, second-stage panel mount
- **9** = Knob, first-stage panel mount

For knob handle color options, see page 56.

① First stage assembled with antitamper nut.

13 Isolation and Relief Valves
- **0** = No valves

For isolation and relief valve options, see page 54.

14 Cylinder Connections
- **0** = No connections

For cylinder connection options and pressure ratings, see page 53.

15 Gauges
- **0** = No gauges

For inlet and outlet gauge options, see page 54.

16 Options
- **0** = No options
- **3** = 3 ft, 1/4 in. FX series metal flexible hose, 1/4 in. female NPT inlet①
- **4** = 3 ft, 1/4 in. TH series PTFE-lined, stainless steel braided hose, 1/4 in. female NPT inlet①

For hose options and pressure ratings, see page 56.

① Not available for ASTM G93 Level E-cleaned and SC-11–cleaned regulators.

Select KCY series regulators are available that meet the testing requirements of ASTM G175, "Standard Test Method for Evaluating the Ignition Sensitivity and Fault Tolerance of Oxygen Regulators Used for Medical and Emergency Applications." Contact your authorized Swagelok representative.

High-Sensitivity Diaphragm-Sensing, Pressure-Reducing Regulators (KLF Series)

The KLF series provides high-sensitivity pressure control of gases or liquids with minimum droop in both low-flow and low-pressure applications.

Features

- Large-diameter convoluted, nonperforated diaphragm for increased pressure sensitivity
- Metal-to-metal diaphragm seal
- High-flow, dual-gauze type filter in inlet ports

Technical Data

Maximum Inlet Pressure

- 3600 psig (248 bar)

Pressure Control Ranges

- 0 to 2.0 psig (0.13 bar) through 0 to 250 psig (17.2 bar)

Flow Coefficient (C_v)

- 0.02 and 0.06

See page 43 for flow graphs.

- 0.20 and 0.50 also available

Supply-Pressure Effect

Flow Coefficient (C_v)	Pressure Control Range	
	Up to 10 psig (0.68 bar)	25 psig (1.7 bar) and Higher
	Supply Pressure Effect, %	
0.02	0.1	0.2
0.06	0.4	0.6
0.20	0.7	0.9
0.50	1.0	1.4

Maximum Operating Temperature

- 176°F (80°C) with PCTFE seat
- 392°F (200°C) with PEEK seat

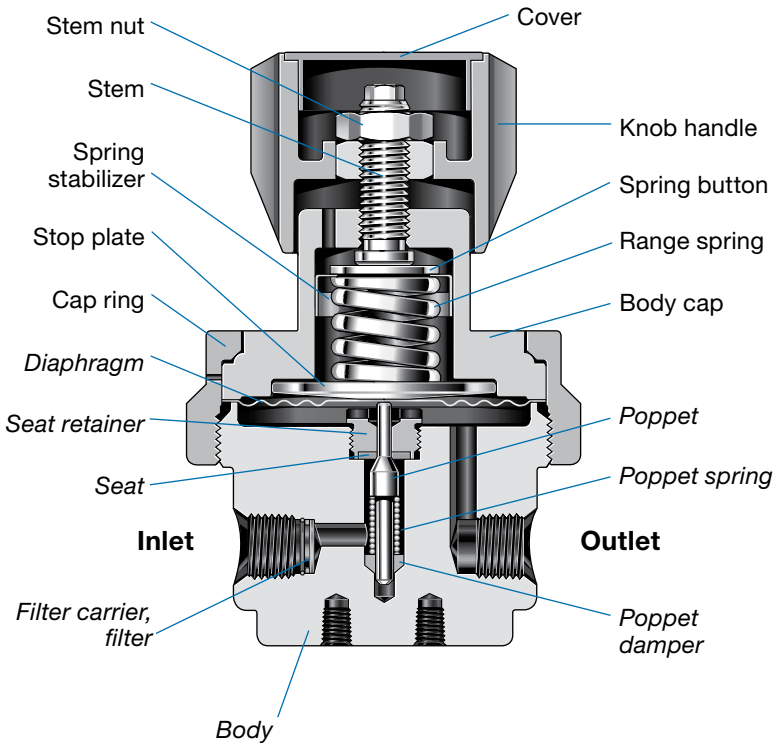
Weight

- 4.0 lb (1.8 kg)

Ports

- 1/4 in. female NPT inlet, outlet, and gauge ports

Materials of Construction



Component	Material
Knob handle, cover	Nylon with 316 SS insert
Spring button	Zinc-plated steel
Spring stabilizer①	301 SS
Range spring	316 SS or zinc-plated steel, depending on configuration
Stem, stem nut, cap ring, stop plate, body cap, panel nuts②	316 SS
Nonwetted lubricant	Hydrocarbon-based
Body, seat retainer, filter	*316 SS*
Seat	*PCTFE or PEEK*
Diaphragm,③ poppet spring	*Alloy X-750*
Poppet	*S17400 SS*
Poppet damper, filter carrier	*PTFE*
Wetted lubricant	*PTFE-based*

Wetted components listed in *italics*.

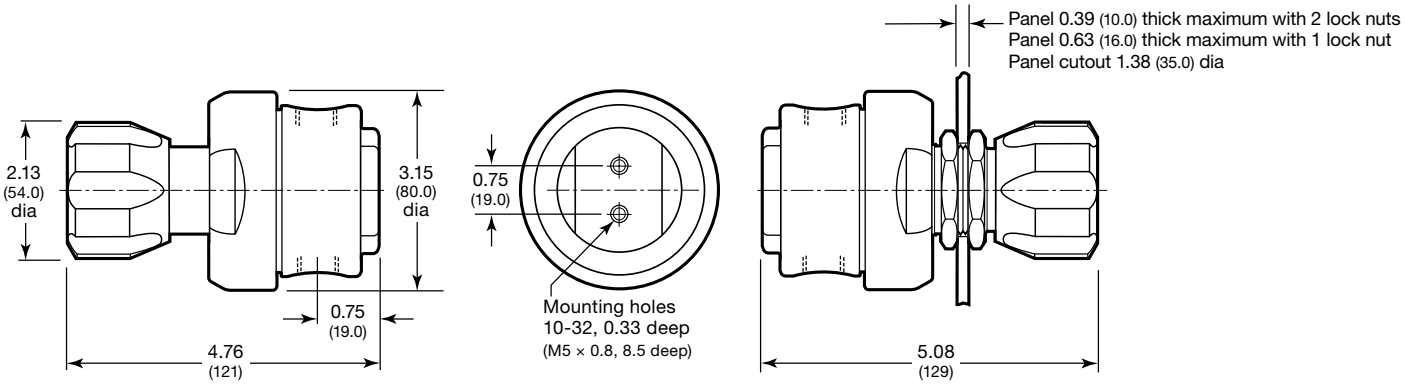
① Not required in all configurations.

② Not shown.

③ Regulators with control range 0 to 250 psig (0 to 17.2 bar) are assembled with two diaphragms.

Dimensions

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



Ordering Information

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

	4	5	6	7	8	9	10	11	12	13	14	15	16
KLF	**1**	**B**	**C**	**F**	4	**1**	**2**	**A**	**2**	**0**	**0**	**0**	**0**

4 Body Material

1 = 316 SS
A = 316 SS, ASTM G93 Level E-cleaned

5 Pressure Control Range

B = 0 to 2.0 psig (0 to 0.13 bar)①
C = 0 to 10 psig (0 to 0.68 bar)
D = 0 to 25 psig (0 to 1.7 bar)
E = 0 to 50 psig (0 to 3.4 bar)
F = 0 to 100 psig (0 to 6.8 bar)
G = 0 to 250 psig (0 to 17.2 bar)

① Available with 15 psig (1.0 bar) maximum inlet pressure only.

6 Maximum Inlet Pressure①③

C = 15 psig (1.0 bar)②
F = 100 psig (6.8 bar)
J = 500 psig (34.4 bar)
L = 1000 psig (68.9 bar)
P = 3000 psig (206 bar)
R = 3600 psig (248 bar)

① For better resolution and control, select a pressure that closely matches system pressure.
② Available with 0 to 2.0 psig (0 to 0.13 bar) pressure control range only.
③ Cylinder Connections and Hose accessories may limit inlet pressure ratings, see pages 53 and 56.

7 Port Configuration

A, B, C, E, F, H, K, L, M, N

*See **Port Configurations,** page 52.*

8 Ports

4 = 1/4 in. female NPT

9 Seat Material

1 = PCTFE
2 = PEEK

10 Flow Coefficient (C_v)

1 = 0.02
2 = 0.06
5 = 0.20
7 = 0.50

11 Sensing Mechanism, Vent

A = Alloy X-750 diaphragm, no vent
E = Alloy X-750 diaphragm, captured vent, no self vent

12 Handle, Mounting

2 = Knob
3 = 316 SS antitamper nut
6 = Knob, panel mount
7 = 316 SS antitamper nut, panel mount

For knob handle color options, see page 56.

13 Isolation and Relief Valves

0 = No valves

For isolation and relief valve options, see page 54.

14 Cylinder Connections

0 = No connection

For cylinder connection options and pressure ratings, see page 53.

15 Gauges

0 = No gauges

For inlet and outlet gauge options, see page 54.

16 Options

0 = No options
3 = 3 ft, 1/4 in. FX series metal flexible hose, 1/4 in. female NPT inlet①
4 = 3 ft, 1/4 in. TH series PTFE-lined, stainless steel braided hose, 1/4 in. female NPT inlet①

For hose options and pressure ratings, see page 56.

① Not available for ASTM G93 Level E-cleaned regulators.

High-Flow, High-Sensitivity Diaphragm-Sensing, Pressure-Reducing Regulators (KHF Series)

The KHF series combines the high-flow capabilities—1.0 C_v—of a bulk distribution regulator with the high sensitivity and accuracy of a point-of-use regulator.

Features

- Large-diameter convoluted, nonperforated diaphragm for increased pressure sensitivity
- Metal-to-metal diaphragm seal
- High-flow dual-gauze type filter in inlet ports

Technical Data

Maximum Inlet Pressure

- 3600 psig (248 bar)

Pressure Control Ranges

- 0 to 10 psig (0.68 bar) through 0 to 250 psig (17.2 bar)

Flow Coefficient (C_v)

- 1.0

See page 44 for flow graphs.

Supply-Pressure Effect

Flow Coefficient (C_v)	Pressure Control Range	
	Up to 50 psig (3.4 bar)	100 psig (6.8 bar) and Higher
	Supply Pressure Effect, %	
1.0	0.3	0.4

Maximum Operating Temperature

- 176°F (80°C) with PCTFE seat
- 392°F (200°C) with PEEK seat

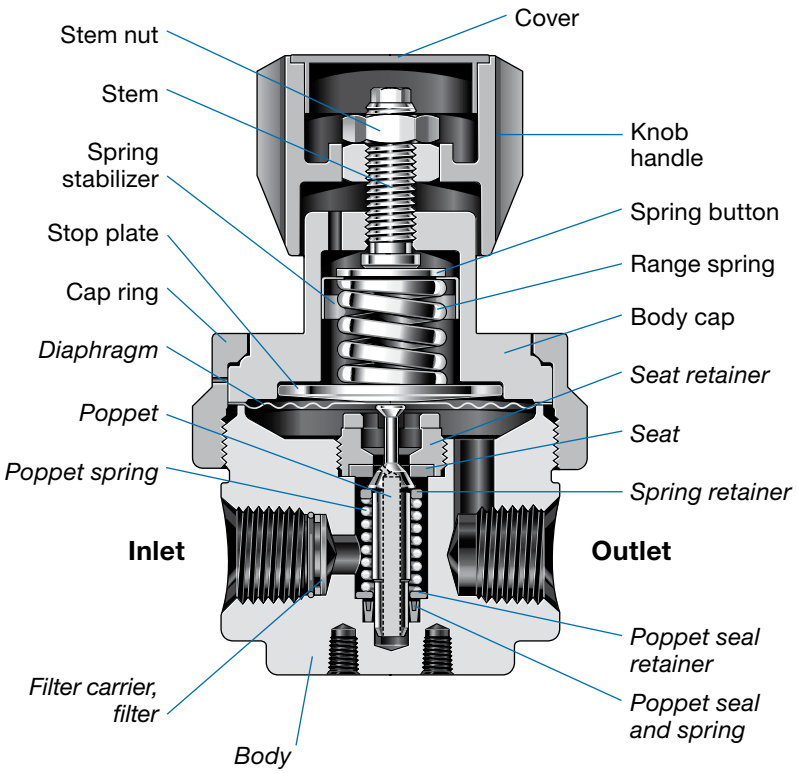
Weight

- 4.4 lb (2.0 kg)

Ports

- 1/2 in. female NPT inlet and outlet; 1/4 in. female NPT gauge port

Materials of Construction



Component	Material
Knob handle, cover	Nylon with 316 SS insert
Spring button	316 SS (0 to 250 psig range) Zinc-plated steel (all other ranges)
Spring stabilizer①	301 SS
Range spring	316 SS (0 to 10 and 0 to 25 psig control ranges) Zinc-plated steel (0 to 50 through 0 to 250 psig control ranges)
Stem, stem nut, cap ring, stop plate, body cap, panel nuts②	316 SS
Nonwetted lubricant	Hydrocarbon-based
Body, spring retainer, seat retainer, filter, poppet seal retainer	*316 SS*
Seat	*PCTFE or PEEK*
Diaphragm③	*Alloy X-750*
Poppet	*S17400 SS*
Poppet spring	*302 SS*
Poppet seal, filter carrier	*PTFE*
Poppet seal spring	*Elgiloy ®*
Wetted lubricant	*PTFE-based*

Wetted components listed in *italics*.

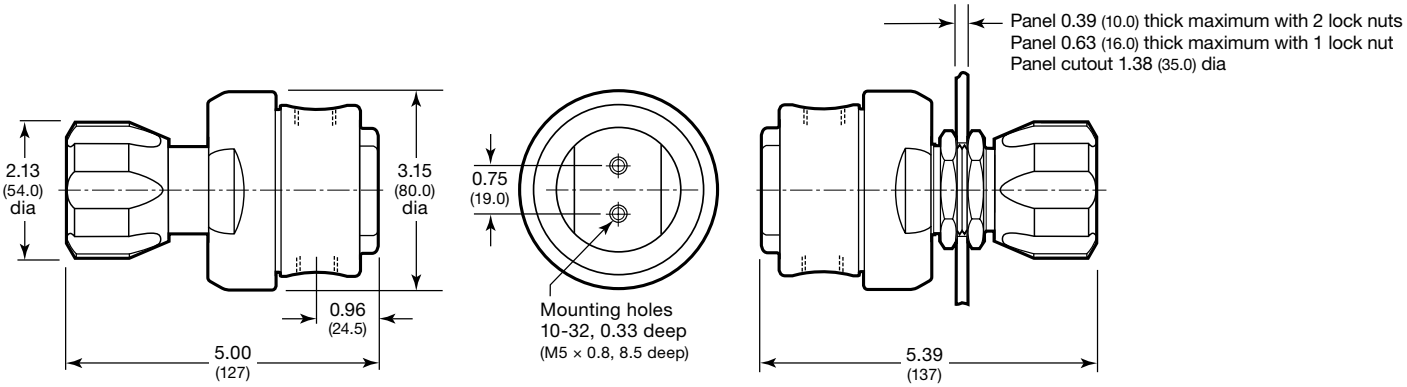
① Not included in regulators with 0 to 250 psig (0 to 17.2 bar) control range.

② Not shown.

③ Regulators with control range 0 to 250 psig (0 to 17.2 bar) are assembled with two diaphragms.

Dimensions

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



Ordering Information

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

	4	5	6	7	8	9	10	11	12	13	14	15	16
KHF	**1**	**F**	**R**	**F**	8	**1**	8	**A**	**2**	**0**	0	**0**	0

4 Body Material
1 = 316 SS
A = 316 SS, ASTM G93 Level E-cleaned

5 Pressure Control Range
C = 0 to 10 psig (0 to 0.68 bar)
D = 0 to 25 psig (0 to 1.7 bar)
E = 0 to 50 psig (0 to 3.4 bar)
F = 0 to 100 psig (0 to 6.8 bar)
G = 0 to 250 psig (0 to 17.2 bar)

6 Maximum Inlet Pressure①
F = 100 psig (6.8 bar)
J = 500 psig (34.4 bar)
L = 1000 psig (68.9 bar)
R = 3600 psig (248 bar)

① For better resolution and control, select a pressure that closely matches system pressure.

7 Port Configuration
A, B, C, E, F, H, K, L, M, N
*See **Port Configurations,** page 52.*

8 Ports
8 = 1/2 in. female NPT inlet and outlet; 1/4 in. female NPT gauge port

9 Seat Material
1 = PCTFE
2 = PEEK

10 Flow Coefficient (C_v)
8 = 1.0

11 Sensing Mechanism, Vent
A = Alloy X-750 diaphragm, no vent
E = Alloy X-750 diaphragm, captured vent, no self vent

12 Handle, Mounting
2 = Knob
3 = 316 SS antitamper nut
6 = Knob, panel mount
7 = 316 SS antitamper nut, panel mount
For knob handle color options, see page 56.

13 Isolation and Relief Valves
0 = No valves
For isolation and relief valve options, see page 54.

14 Cylinder Connections
0 = No connections

15 Gauges
0 = No gauges
For inlet and outlet gauge options, see page 54.

16 Options
0 = No options

Compact, Piston-Sensing, Pressure-Reducing Regulators (KCP Series)

The KCP series is a compact, piston-sensing pressure regulator with a short stroke to minimize wear in high-cycling applications.

Features

- Low internal volume
- Fully contained piston
- High-flow, dual-gauze type filter in inlet ports
- ANSI/ISA 76.00.02-compliant modular platform component (MPC) configuration available; MPC platform regulator does not contain a filter

Technical Data

Maximum Inlet Pressure

- 3600 psig (248 bar)

Pressure Control Ranges

- 0 to 10 psig (0.68 bar) through 0 to 1500 psig (103 bar)

Flow Coefficient (C_v)

- 0.06 and 0.20

  See page 45 for flow graphs.
- 0.02 and 0.50 also available

Supply-Pressure Effect

Flow Coefficient (C_v)	Pressure Control Range	
	Up to 250 psig (17.2 bar)	500 psig (34.4 bar) and Higher
	Supply Pressure Effect, %	
0.02	0.4	2.6
0.06	1.3	8.6
0.20	2.1	14.5
0.50	3.0	22.6

Maximum Operating Temperature

- 176°F (80°C) with PCTFE seat
- 392°F (200°C) with PEEK seat

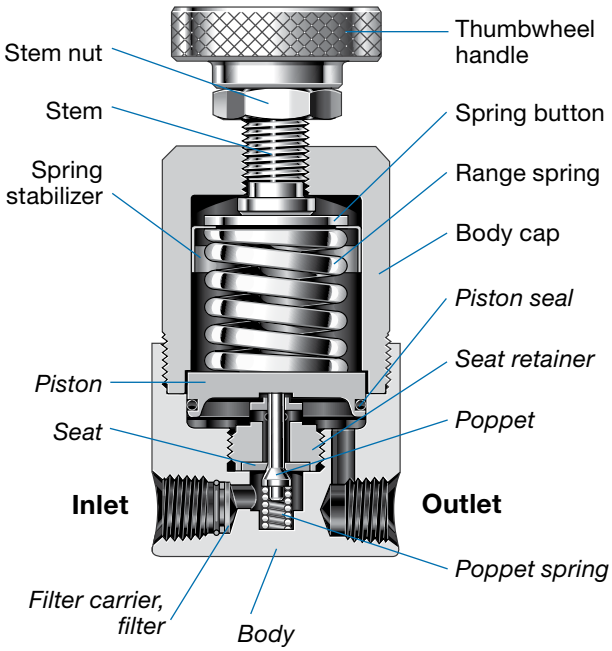
Weight

- 1.0 lb (0.45 kg)

Ports

- 1/8 in. female NPT inlet, outlet, and gauge ports
- MPC platform

Materials of Construction



Component	Material
Thumbwheel handle	Anodized aluminum
Knob handle,① cover①	Nylon with 316 SS insert
Spring button	Zinc-plated steel
Spring stabilizer	301 SS
Range spring	316 SS or zinc-plated steel, depending on configuration
Stem, stem nut, body cap, panel nuts①	316 SS
Nonwetted lubricant	Hydrocarbon-based
Body, seat retainer, piston, filter②	*316 SS*
Piston seal	*Fluorocarbon FKM or Kalrez®*
Seat	*PCTFE or PEEK*
Poppet	*S17400 SS*
Poppet spring	*302 SS*
Filter carrier②	*PTFE*
Wetted lubricant	*PTFE-based*

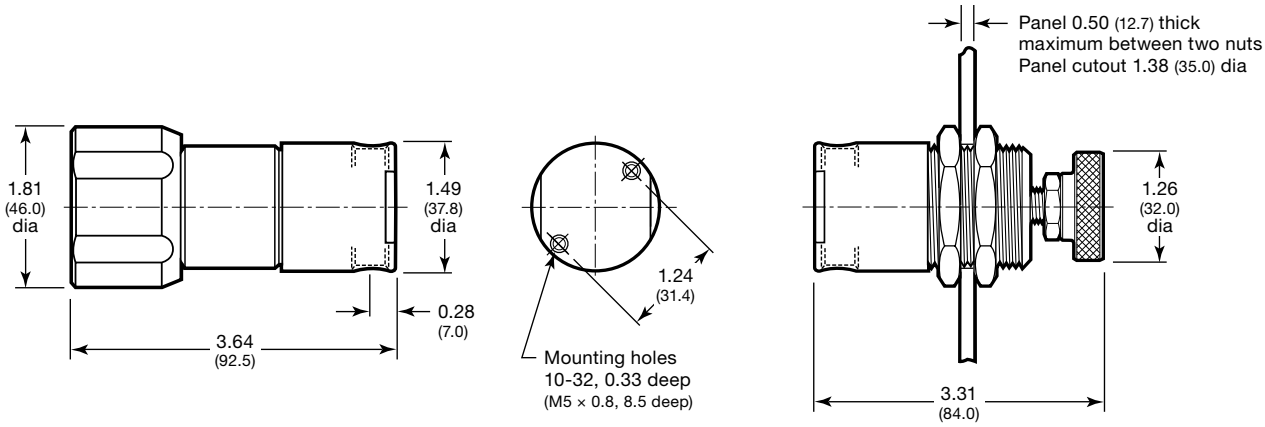
Wetted components listed in *italics*.

① Not shown.

② MPC platform regulator does not contain a filter.

Dimensions

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



Ordering Information

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

	4	5	6	7	8	9	10	11	12	13	14	15	16
KCP	**1**	**F**	**R**	**A**	**2**	**A**	**2**	P	**1**	**0**	0	**0**	0

4 Body Material
1 = 316 SS
A = 316 SS, ASTM G93 Level E-cleaned
C = 316 SS, SC-11–cleaned

5 Pressure Control Range
C = 0 to 10 psig (0 to 0.68 bar)
D = 0 to 25 psig (0 to 1.7 bar)
E = 0 to 50 psig (0 to 3.4 bar)
F = 0 to 100 psig (0 to 6.8 bar)
G = 0 to 250 psig (0 to 17.2 bar)
J = 0 to 500 psig (0 to 34.4 bar)
L = 0 to 1000 psig (0 to 68.9 bar)
M = 0 to 1500 psig (0 to 103 bar)

6 Maximum Inlet Pressure①
F = 100 psig (6.8 bar)
J = 500 psig (34.4 bar)
L = 1000 psig (68.9 bar)
R = 3600 psig (248 bar)

① For better resolution and control, select a pressure that closely matches system pressure.

7 Port Configuration
A, B, C, E, F, H, K, L, M, N, 5, 6
*See **Port Configurations,** page 52.*

8 Ports
2 = 1/8 in. female NPT
M = MPC platform

9 Seat, Seal Material
A = PCTFE, fluorocarbon FKM
B = PCTFE, Kalrez
C = PEEK, fluorocarbon FKM
D = PEEK, Kalrez

10 Flow Coefficient (C_v)
1 = 0.02
2 = 0.06
5 = 0.20①
7 = 0.50①

① Not available with MPC platform port configuration.

11 Sensing Mechanism
P = 316 SS piston

12 Handle, Mounting
1 = Thumbwheel
2 = Knob
3 = 316 SS antitamper nut
5 = Thumbwheel, panel mount
6 = Knob, panel mount
7 = 316 SS antitamper nut, panel mount
For knob handle color options, see page 56.

13 Isolation Valves
0 = No valves
For isolation valve options, see page 54.

14 Cylinder Connections
0 = No connections

15 Gauges
0 = No gauges
For inlet and outlet gauge options, see page 54.

16 Options
0 = No options

Medium- to High-Pressure Piston-Sensing, Pressure-Reducing Regulators (KPP Series)

The KPP series meets the demands of a wide range of gas or liquid applications in a lightweight, compact installation footprint. These features make the KPP pressure regulator an ideal pressure control solution within high-density OEM equipment.

Features

- Lightweight, compact design
- Live-loaded body seals
- Low internal volume
- High-flow, dual-gauze type filter in inlet ports

Technical Data

Maximum Inlet Pressure

- 6000 psig (413 bar)

Pressure Control Ranges

- 0 to 1000 psig (68.9 bar) through 0 to 3600 psig (248 bar)

Flow Coefficient (C_v)

- 0.02 and 0.06

See page 48 for flow graphs.

Supply-Pressure Effect

Flow Coefficient (C_v)	Supply Pressure Effect, %
0.02	2.2
0.06	7.2

Maximum Operating Temperature

- 392°F (200°C) with 2000 psig (137 bar) maximum inlet pressure
- 212°F (100°C) with maximum inlet pressure greater than 2000 psig (137 bar)

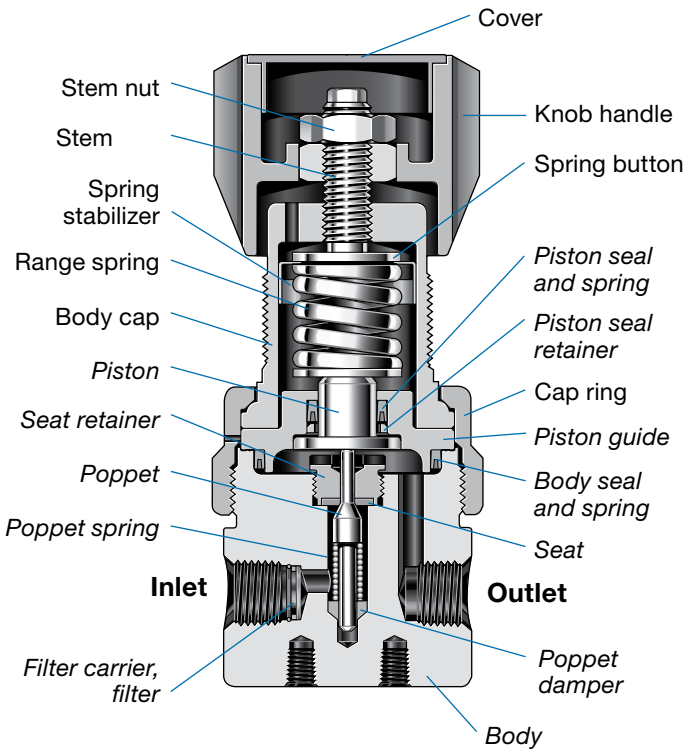
Weight

- 2.5 lb (1.2 kg)

Ports

- 1/4 in. female NPT inlet, outlet, and gauge ports

Materials of Construction



Component	Material
Knob handle, cover	Nylon with 316 SS insert
Spring button	316 SS (0 to 3000 and 0 to 3600 psig range) Zinc-plated steel (all other ranges)①
Spring stabilizer②	301 SS
Range spring	Zinc-plated steel
Stem, stem nut, cap ring, body cap, panel nuts③	316 SS
Nonwetted lubricant	Hydrocarbon-based
Body, seat retainer, filter, piston, piston guide	*316 SS*
Seat, piston seal retainer	*PEEK*
Poppet	*S17400 SS*
Poppet spring	*Alloy X-750*
Piston seal spring, body seal spring	*Elgiloy*
Poppet damper, filter carrier, piston seal, body seal	*PTFE*
Wetted lubricant	*PTFE-based*

Wetted components listed in *italics*.

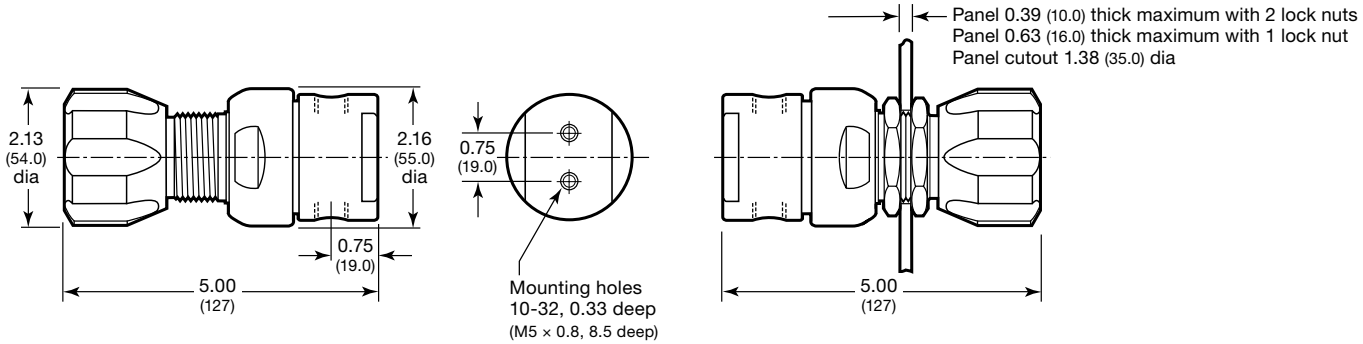
① 316 SS in regulators with 0 to 2000 psig (0 to 137 bar) control range with 6000 psig (413 bar) inlet pressure and regulators with 0 to 2000 psig (0 to 137 bar) control range, 4000 psig (275 bar) inlet pressure, and 0.06 C_v.

② Not included in regulators with 316 SS spring button.

③ Not shown.

Dimensions

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



Ordering Information

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

	4	5	6	7	8	9	10	11	12	13	14	15	16
KPP	**1**	**L**	**W**	**A**	4	2	**2**	**P**	**2**	**0**	0	**0**	0

4 Body Material
1 = 316 SS
A = 316 SS, ASTM G93 Level E-cleaned

5 Pressure Control Range
L = 0 to 1000 psig (0 to 68.9 bar)
M = 0 to 1500 psig (0 to 103 bar)
N = 0 to 2000 psig (0 to 137 bar)
P = 0 to 3000 psig (0 to 206 bar)①
R = 0 to 3600 psig (0 to 248 bar)①

① Not available with 2000 psig (137 bar) maximum inlet pressure.

6 Maximum Inlet Pressure①
N = 2000 psig (137 bar)
S = 4000 psig (275 bar)
W = 6000 psig (413 bar)

① For better resolution and control, select a pressure that closely matches system pressure.

7 Port Configuration
A, B, C, E, F, H, K, L, M, N
*See **Port Configurations,** page 52.*

8 Ports
4 = 1/4 in. female NPT

9 Seat, Seal Material
2 = PEEK, PTFE

10 Flow Coefficient (C_v)
1 = 0.02
2 = 0.06

11 Sensing Mechanism, Vent
P = 316 SS piston, no vent
V = 316 SS piston, captured vent, no self vent

12 Handle, Mounting
2 = Knob
3 = 316 SS antitamper nut
6 = Knob, panel mount
7 = 316 SS antitamper nut, panel mount
For knob handle color options, see page 56.

13 Isolation Valves
0 = No valves
For isolation valve options, see page 54.

14 Cylinder Connections
0 = No connections

15 Gauges
0 = No gauges
For inlet and outlet gauge options, see page 54.

16 Options
0 = No options

High-Flow Piston-Sensing, Pressure-Reducing Regulators (KPF Series)

The KPF series provides minimum droop across the flow range with high accuracy of outlet pressure.

Features

- High flow coefficient (C_v = 1.0)
- Balanced poppet for minimal supply-pressure effect
- High-flow, dual-gauze type filter in inlet ports

Technical Data

Maximum Inlet Pressure

- 6000 psig (413 bar)

Pressure Control Ranges

- 0 to 1000 psig (68.9 bar) through 0 to 4000 psig (275 bar)

Flow Coefficient (C_v)

- 1.0

See page 44 for flow graphs.

Supply-Pressure Effect

Flow Coefficient (C_v)	Supply Pressure Effect, %
1.0	5.3

Maximum Operating Temperature

- 176°F (80°C) with PCTFE seat
- 392°F (200°C) with PEEK seat

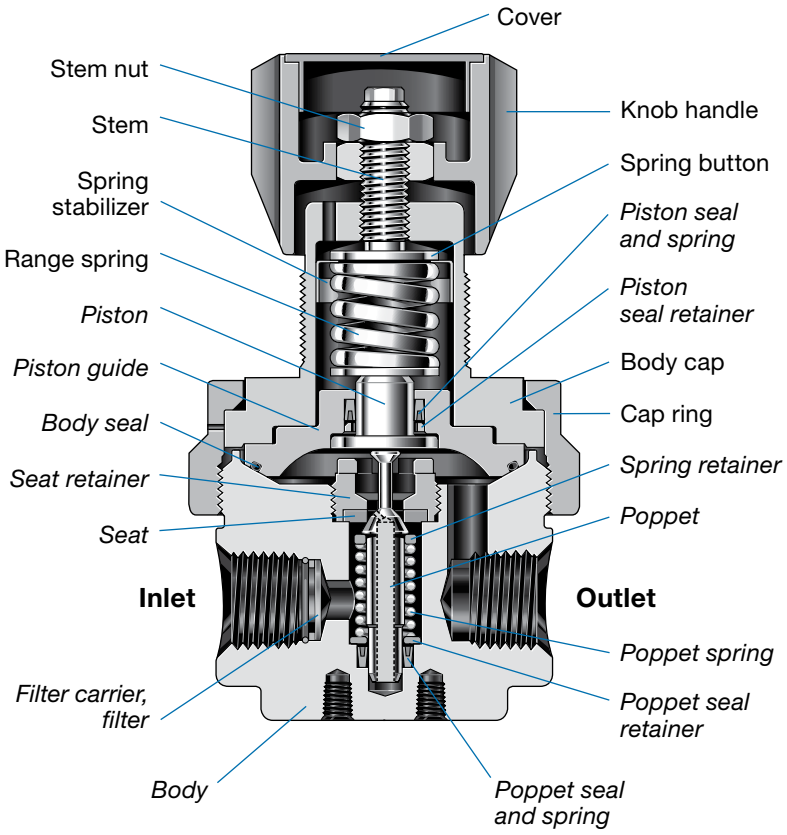
Weight

- 4.5 lb (2.1 kg)

Ports

- 1/2 in. female NPT inlet and outlet; 1/4 in. female NPT gauge ports

Materials of Construction

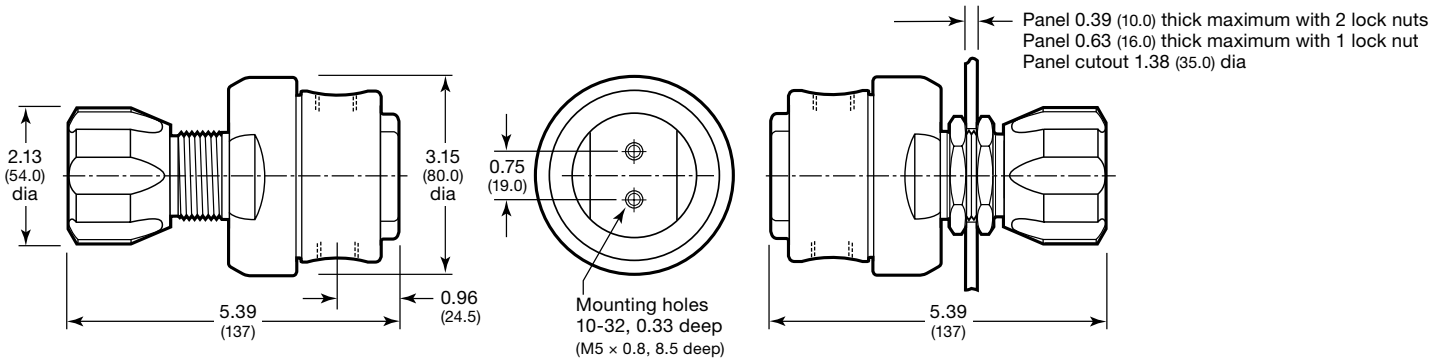


Component	Material
Knob handle, cover	Nylon with 316 SS insert
Spring button	316 SS (0 to 3000 and 0 to 4000 psig range) Zinc-plated steel (all other ranges)
Spring stabilizer①	301 SS
Range spring	Zinc-plated steel
Stem, stem nut, cap ring, body cap, panel nuts②	316 SS
Nonwetted lubricant	Hydrocarbon-based
Body, spring retainer, seat retainer, filter, piston, piston guide, poppet seal retainer	*316 SS*
Seat, piston seal retainer	*PCTFE or PEEK*
Poppet	*S17400 SS*
Poppet spring	*302 SS*
Filter carrier, piston seal, poppet seal	*PTFE*
Piston seal spring, poppet seal spring	*Elgiloy*
Body seal	*Fluorocarbon FKM*
Wetted lubricant	*PTFE-based*

Wetted components listed in *italics*.
① Not included in regulators with 316 SS spring button.
② Not shown.

Dimensions

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



Ordering Information

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

	4	5	6	7	8	9	10	11	12	13	14	15	16
KPF	**1**	**L**	W	**A**	8	**A**	8	**P**	**2**	**0**	0	**0**	0

4 Body Material
1 = 316 SS
A = 316 SS, ASTM G93 Level E-cleaned

5 Pressure Control Range
L = 0 to 1000 psig (0 to 68.9 bar)
N = 0 to 2000 psig (0 to 137 bar)
P = 0 to 3000 psig (0 to 206 bar)
S = 0 to 4000 psig (0 to 275 bar)

6 Maximum Inlet Pressure
W = 6000 psig (413 bar)

7 Port Configuration
A, B, C, E, F, H, K, L, M, N
*See **Port Configurations,** page 52.*

8 Ports
8 = 1/2 in. female NPT inlet and outlet; 1/4 in. female NPT gauge ports

9 Seat, Body Seal Material
A = PCTFE, fluorocarbon FKM
C = PEEK, fluorocarbon FKM

10 Flow Coefficient (C_v)
8 = 1.0

11 Sensing Mechanism, Vent
P = 316 SS piston, no vent
V = 316 SS piston, captured vent, no self vent

12 Handle, Mounting
2 = Knob
3 = 316 SS antitamper nut
6 = Knob, panel mount
7 = 316 SS antitamper nut, panel mount
For knob handle color options, see page 56.

13 Isolation Valves
0 = No valves
For isolation valve options, see page 54.

14 Cylinder Connections
0 = No connections

15 Gauges
0 = No gauges
For inlet and outlet gauge options, see page 54.

16 Options
0 = No options

High-Pressure Piston-Sensing, Pressure-Reducing Regulators (KHP Series)

The KHP series provides control of supply pressures up to 10 000 psig (689 bar). The self-venting capability enables downstream pressure reduction in closed-loop systems.

Features

- Thrust roller bearing eases operation
- Panel-mounting configuration available
- High-flow, dual-gauze type filter in inlet ports

Technical Data

Maximum Inlet Pressure

- 10 000 psig (689 bar)

Pressure Control Ranges

- 0 to 500 psig (34.4 bar) through 100 to 10 000 psig (6.8 to 689 bar)

Flow Coefficient (C_v)

- 0.06 and 0.25

See page 46 and 47 for flow graphs.

Supply-Pressure Effect

Flow Coefficient (C_v)	Pressure Control Range		
	Up to 2500 psig (172 bar)	3600 and 6000 psig (248 and 413 bar)	10 000 psig (689 bar)
	Supply Pressure Effect, %		
0.06	1.0	2.6	4.2
0.25	3.3	8.5	14.6

Maximum Operating Temperature

- 212°F (100°C)

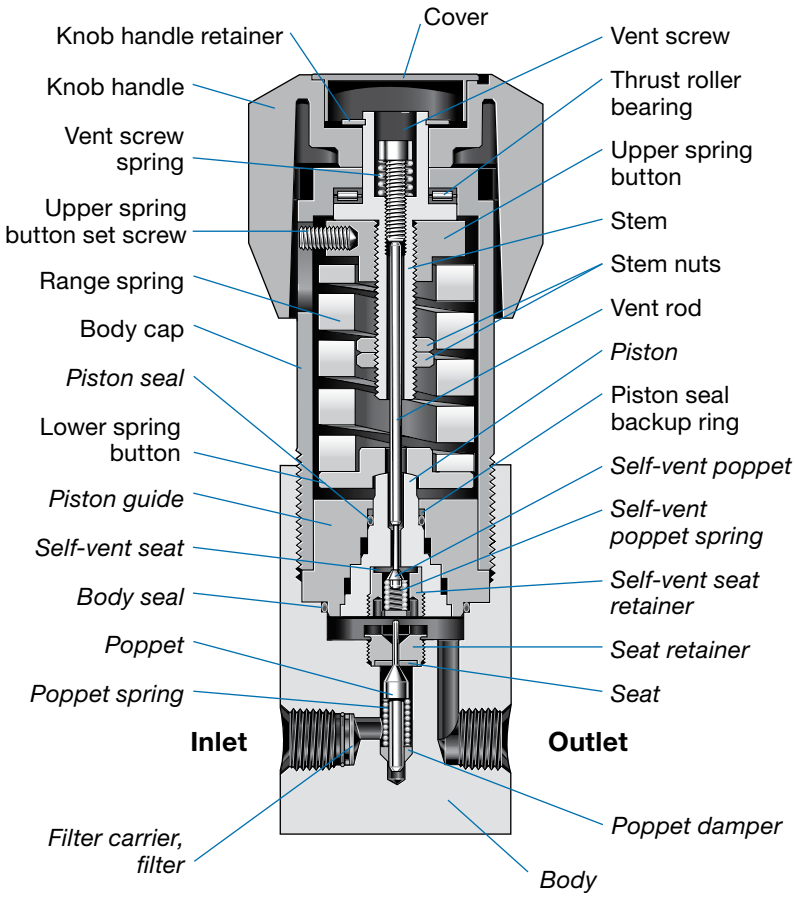
Weight

- 5.7 lb (2.6 kg)

Ports

- 1/4 in. female NPT inlet, outlet, and gauge ports

Materials of Construction

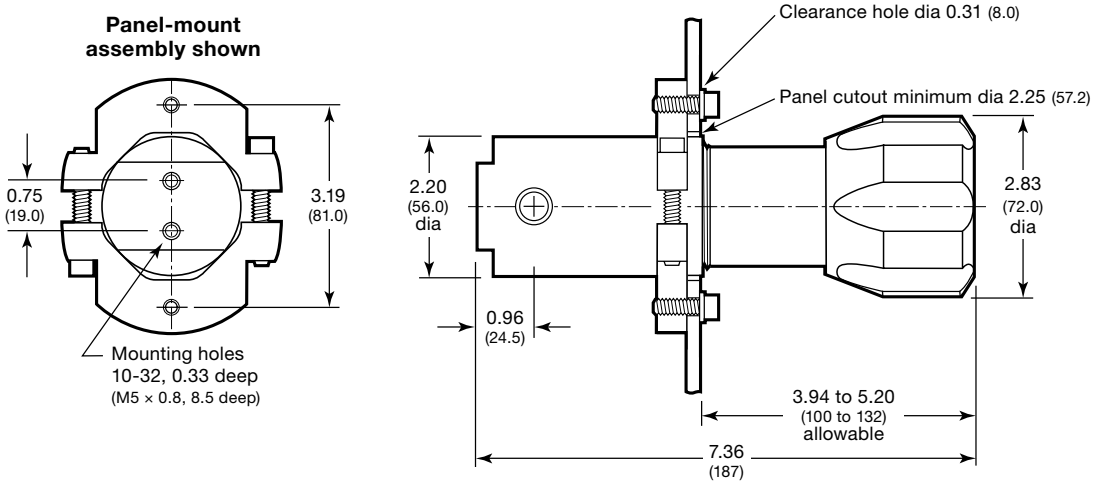


Component	Material
Knob handle, cover	Nylon with 316 SS insert
Spring buttons, upper spring button set screw, knob handle retainer, vent screw, stem nuts, body cap	316 SS
Vent screw spring	302 SS
Vent rod	431 SS
Stem	CZ114 bronze
Thrust roller bearing	Hardened carbon steel
Range spring	Chrome vanadium steel
Piston seal backup ring	PTFE
Nonwetted lubricant	Hydrocarbon-based
Body, seat retainer, filter, piston, piston guide, self-vent seat retainer	*316 SS*
Seat, self-vent seat	*PEEK*
Poppet, self-vent poppet	*S17400 SS*
Poppet spring	*Alloy X-750*
Poppet damper, filter carrier	*PTFE*
Self-vent poppet spring	*302 SS*
Body seal, piston seal	*Fluorocarbon FKM*
Wetted lubricant	*PTFE-based*

Wetted components listed in *italics*.

Dimensions

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



Ordering Information

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

	4	5	6	7	8	9	10	11	12	13	14	15	16
KHP	**1**	**T**	X	**A**	4	C	**2**	**S**	**2**	**0**	0	**0**	0

4 Body Material
1 = 316 SS
A = 316 SS, ASTM G93 Level E-cleaned

5 Pressure Control Range
J = 0 to 500 psig (0 to 34.4 bar)
K = 0 to 750 psig (0 to 51.6 bar)
T = 10 to 1500 psig (0.68 to 103 bar)
U = 15 to 2500 psig (1.0 to 172 bar)
V = 25 to 3600 psig (1.7 to 248 bar)
W = 50 to 6000 psig (3.4 to 413 bar)①
X = 100 to 10 000 psig (6.8 to 689 bar)①

① Not available for regulators assembled with isolation valves.

6 Maximum Inlet Pressure
X = 10 000 psig (689 bar)

7 Port Configuration
A, B, C, E, F, H, K, L, M, N
*See **Port Configurations,** page 52.*

8 Ports
4 = 1/4 in. female NPT

9 Seat, Seal Material
C = PEEK, fluorocarbon FKM

10 Flow Coefficient (C_v)
2 = 0.06
6 = 0.25

11 Sensing Mechanism, Vent
P = 316 SS piston, no vent
S = 316 SS piston, self vent

12 Handle, Mounting
2 = Knob
6 = Knob, panel mount
For knob handle color options, see page 56.

13 Isolation Valves
0 = No valves
For isolation valve options, see page 54.

14 Cylinder Connections
0 = No connections

15 Gauges
0 = No gauges
For inlet and outlet gauge options, see page 54.

16 Options
0 = No options

High-Pressure Piston-Sensing, Hydraulic Pressure-Reducing Regulators (KHR Series)

The KHR series provides control of pressures up to 10 000 psig (689 bar) for both liquid and gas applications. Metal or polymer seats are available.

Features

- Self-venting
- Captured vent port in bottom of body
- Panel-mounting configuration available
- Thrust roller bearing eases operation
- High-flow, dual-gauze type filter in inlet ports

Technical Data

Maximum Inlet Pressure

- 10 000 psig (689 bar)

Pressure Control Ranges

- 0 to 500 psig (34.4 bar) through 100 to 10 000 psig (6.8 to 689 bar)

Flow Coefficient (C_v)

- 0.06

See page 47 for flow graphs.

- 0.25 also available

Supply-Pressure Effect

Flow Coefficient (C_v)	Pressure Control Range		
	Up to 2500 psig (172 bar)	3600 and 6000 psig (248 and 413 bar)	10 000 psig (689 bar)
	Supply Pressure Effect, %		
0.06	1.0	2.6	4.2
0.25	3.3	8.5	14.6

Maximum Operating Temperature

- 212°F (100°C)

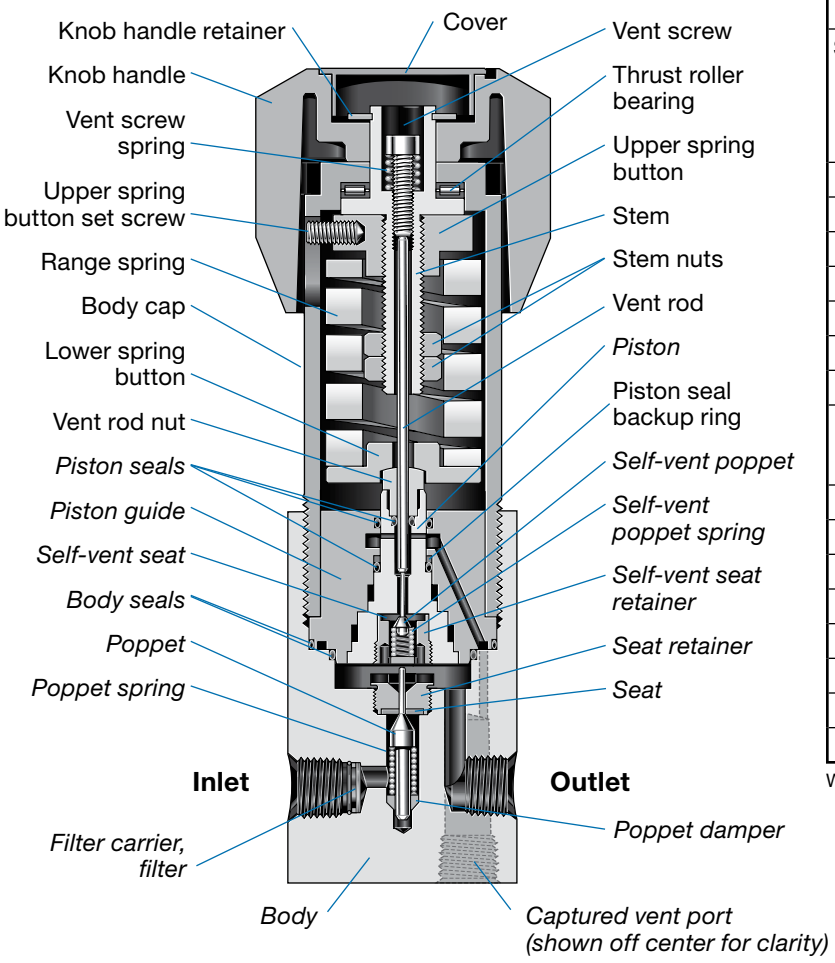
Weight

- 6.1 lb (2.75 kg)

Ports

- 1/4 in. female NPT inlet, outlet, vent, and gauge ports

Materials of Construction

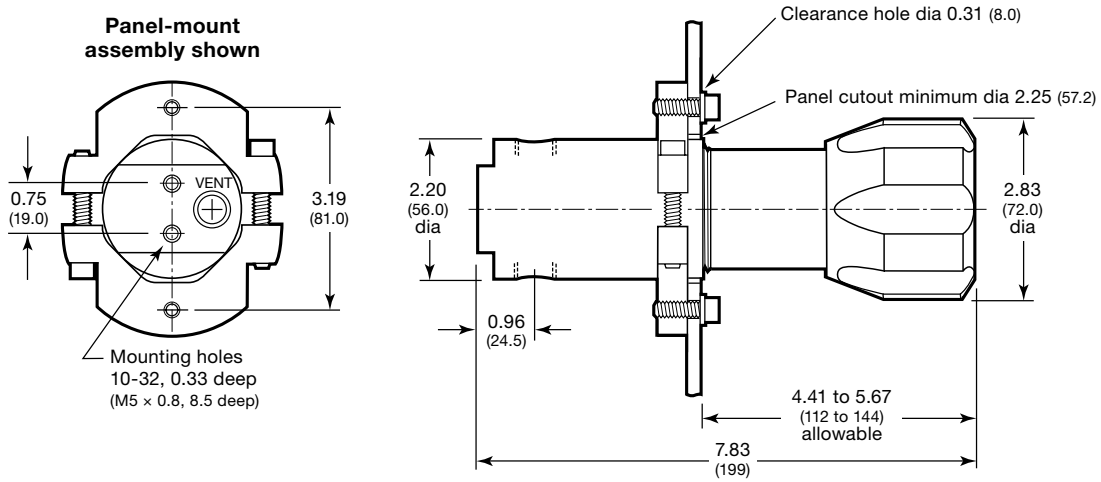


Component	Material
Knob handle, cover	Nylon with 316 SS insert
Spring buttons, upper spring button set screw, knob handle retainer, vent screw, stem nuts, vent rod nut, body cap	316 SS
Vent screw spring	302 SS
Vent rod	431 SS
Stem	CZ114 bronze
Thrust roller bearing	Hardened carbon steel
Range spring	Chrome vanadium steel
Piston seal backup ring	PEEK
Nonwetted lubricant	Hydrocarbon-based
Body, seat retainer, filter, piston, piston guide, self-vent seat retainer	*316 SS*
Self-vent seat	*PEEK*
Seat	*PEEK or 316 SS*
Poppet, self-vent poppet	*S17400 SS*
Poppet spring	*Alloy X-750*
Poppet damper, filter carrier	*PTFE*
Self-vent poppet spring	*302 SS*
Body seals, piston seals	*Fluorocarbon FKM*
Wetted lubricant	*PTFE-based*

Wetted components listed in *italics*.

Dimensions

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



Ordering Information

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

	4	5	6	7	8	9	10	11	12	13	14	15	16
KHR	**1**	**T**	X	**A**	4	**J**	**2**	U	**2**	**0**	0	**0**	0

4 Body Material
1 = 316 SS
A = 316 SS, ASTM G93 Level E-cleaned

5 Pressure Control Range
J = 0 to 500 psig (0 to 34.4 bar)
K = 0 to 750 psig (0 to 51.6 bar)
T = 10 to 1500 psig (0.68 to 103 bar)
U = 15 to 2500 psig (1.0 to 172 bar)
V = 25 to 3600 psig (1.7 to 248 bar)
W = 50 to 6000 psig (3.4 to 413 bar)①
X = 100 to 10 000 psig (6.8 to 689 bar)①

① Not available for regulators assembled with isolation valves.

6 Maximum Inlet Pressure
X = 10 000 psig (689 bar)

7 Port Configuration
A, B, C, F, M
*See **Port Configurations,** page 52.*

8 Ports
4 = 1/4 in. female NPT

9 Seat, Seal Material
C = PEEK, fluorocarbon FKM
J = 316 SS, fluorocarbon FKM①

① Not suitable for gas service.

10 Flow Coefficient (C_v)
2 = 0.06
6 = 0.25

11 Sensing Mechanism, Vent
U = 316 SS piston, self and captured vent

12 Handle, Mounting
2 = Knob
6 = Knob, panel mount
For knob handle color options, see page 56.

13 Isolation Valves
0 = No valves
For isolation valve options, see page 54.

14 Cylinder Connections
0 = No connections

15 Gauges
0 = No gauges
For inlet and outlet gauge options, see page 54.

16 Options
0 = No options

General-Purpose Diaphragm-Sensing Back-Pressure Regulators (KBP Series)

The KBP series is a high-sensitivity, general-purpose regulator designed to control back-pressure levels in analytical or process systems upstream of the regulator. The convoluted diaphragm provides excellent sensitivity and set-point repeatability. The metal-to-metal diaphragm seal minimizes the potential for leakage.

Features

- Convoluted, nonperforated diaphragm
- Metal-to-metal diaphragm seal
- Low internal volume
- Two-piece cap design provides linear load on the seal

Technical Data

Maximum Inlet Pressure

- Equal to pressure control range

Pressure Control Ranges

- 0 to 10 psig (0.68 bar) through 0 to 500 psig (34.4 bar)

Flow Coefficient (C_v)

- 0.20

See page 49 for flow graphs.

Maximum Operating Temperature

- 176°F (80°C) with PCTFE retainer seal
- 392°F (200°C) with PEEK retainer seal

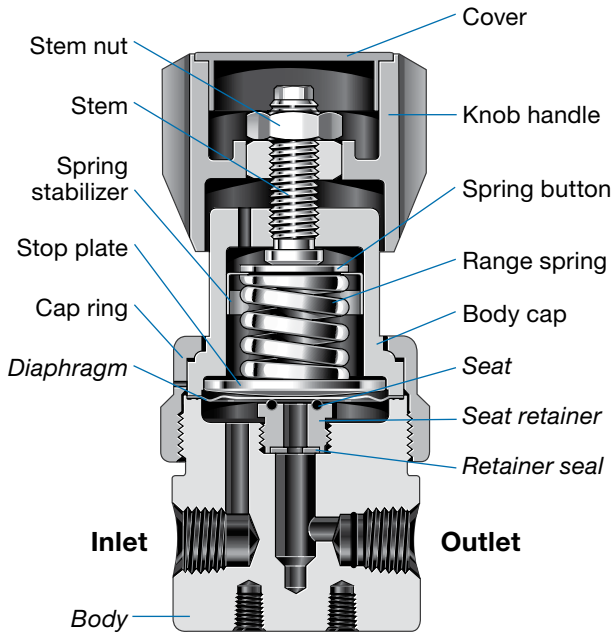
Weight

- 2.4 lb (1.1 kg)

Ports

- 1/4 in. female NPT inlet, outlet, and gauge ports (all body materials)
- 1/4 in. tube butt weld inlet, outlet, and gauge ports (316 SS body material only)
- 1/4 in. VCR inlet, outlet, and gauge ports (316 SS body material only)

Materials of Construction



Component	316 SS	Brass CW721R
	Material	
Knob handle, cover	Nylon with 316 SS insert	
Spring button	316 SS (0 to 500 psig range) Zinc-plated steel (all other ranges)	
Spring stabilizer①	301 SS	
Range spring	316 SS (0 to 10 through 0 to 50 psig control ranges) Zinc-plated steel (0 to 100 through 0 to 500 psig control ranges)	
Stem, stem nut, cap ring, stop plate, body cap, panel nuts②	316 SS	
VCR nuts②	316 SS	—
Nonwetted lubricant	Hydrocarbon-based	
Seat retainer	*316 SS*	
Retainer seal	*PCTFE or PEEK*	
Seat	*Fluorocarbon FKM or Kalrez*	
Diaphragm③	*Alloy X-750*	
Body	*316 SS*	*Brass CW721R*
Tube butt weld ports,② VCR gland ports②	*316L SS*	—
Wetted lubricant	*PTFE-based*	

Wetted components listed in *italics*.

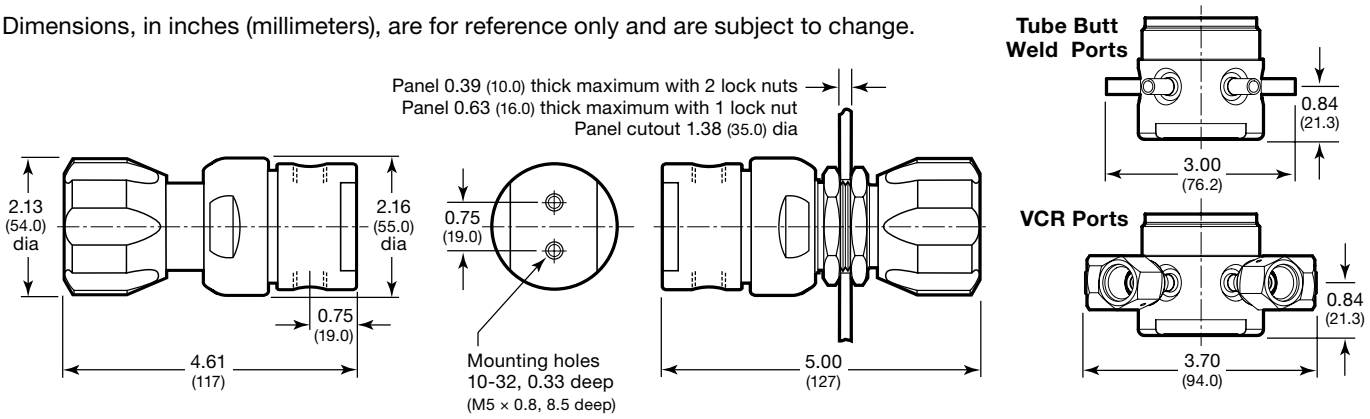
① Not included in regulators with 0 to 500 psig (0 to 34.4 bar) control range.

② Not shown.

③ Regulators with control ranges higher than 0 to 100 psig (0 to 6.8 bar) are assembled with two diaphragms.

Dimensions

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



Ordering Information

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

	4	5	6	7	8	9	10	11	12	13	14	15	16
KBP	**1**	**F**	0	**D**	**4**	**A**	5	**A**	**2**	0	0	**0**	0

4 Body Material

1 = 316 SS
2 = Brass CW721R
A = 316 SS, ASTM G93 Level E-cleaned
B = Brass, ASTM G93 Level E-cleaned
C = 316 SS, SC-11–cleaned
D = Brass, SC-11–cleaned

5 Pressure Control Range

C = 0 to 10 psig (0 to 0.68 bar)
D = 0 to 25 psig (0 to 1.7 bar)
E = 0 to 50 psig (0 to 3.4 bar)
F = 0 to 100 psig (0 to 6.8 bar)
G = 0 to 250 psig (0 to 17.2 bar)
J = 0 to 500 psig (0 to 34.4 bar)

6 Maximum Inlet Pressure

0 = Not applicable (equal to pressure control range)

7 Port Configuration

A, D, G, V

*See **Port Configurations,** page 52.*

8 Ports

4 = 1/4 in. female NPT
T = 1/4 in. × 0.035 in. tube butt weld①
V = 1/4 in. VCR gland, no nuts①②
X = 1/4 in. rotatable female VCR fitting①
Y = 1/4 in. rotatable male VCR fitting①

① Available only with 316 SS body material in **A** port configuration. Not available ASTM G93 Level E-cleaned.

② For use with VCR split-nuts, which can be ordered separately. Refer to Swagelok *VCR Metal Gasket Face Seal Fittings* catalog, MS-01-24.

9 Seat, Seal Material

A = Fluorocarbon FKM, PCTFE
B = Kalrez, PCTFE
C = Fluorocarbon FKM, PEEK
D = Kalrez, PEEK

10 Flow Coefficient (C_v)

5 = 0.20

11 Sensing Mechanism, Vent

A = Alloy X-750 diaphragm, no vent
E = Alloy X-750 diaphragm, captured vent, no self vent

12 Handle, Mounting

2 = Knob
3 = 316 SS antitamper nut
6 = Knob, panel mount
7 = 316 SS antitamper nut, panel mount

For knob handle color options, see page 56.

13 Valves

0 = No valves

14 Cylinder Connections

0 = No connections

15 Gauges

0 = No gauges

For inlet gauge options, see page 54.

16 Options

0 = No options

High-Flow, High-Sensitivity Diaphragm-Sensing Back-Pressure Regulators (KFB Series)

The KFB series regulator is designed to maintain back-pressure control in high-flow applications with a C_v of 1.0.

Features

- Large-diameter convoluted, nonperforated diaphragm for increased pressure sensitivity
- Metal-to-metal diaphragm seal

Technical Data

Maximum Inlet Pressure

- Equal to pressure control range

Pressure Control Ranges

- 0 to 10 psig (0.68 bar) through 0 to 250 psig (17.2 bar)

Flow Coefficient (C_v)

- 1.0

See page 49 for flow graphs.

Maximum Operating Temperature

- 176°F (80°C) with PCTFE retainer seal
- 392°F (200°C) with PEEK retainer seal

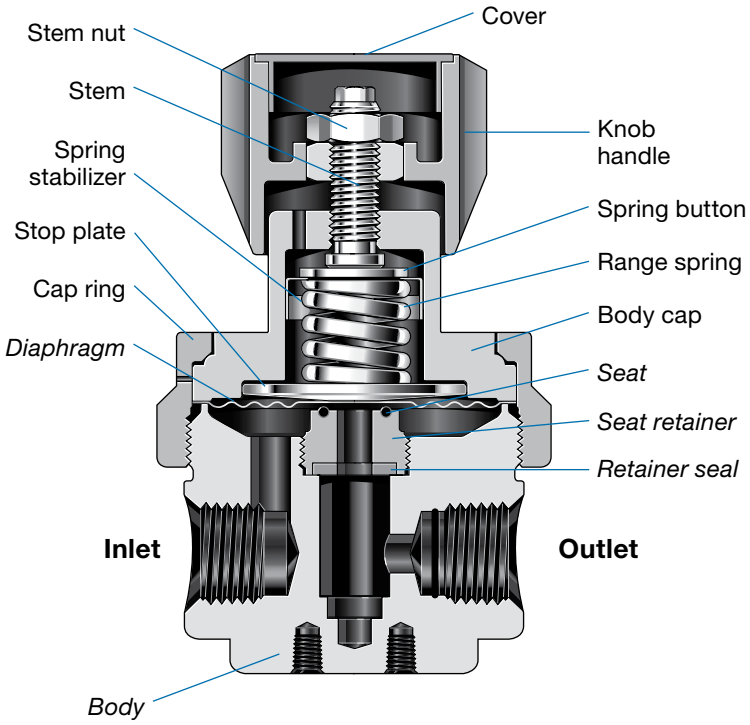
Weight

- 4.4 lb (2.0 kg)

Ports

- 1/2 in. female NPT inlet and outlet; 1/4 in. female NPT gauge port

Materials of Construction



Component	Material
Knob handle, cover	Nylon with 316 SS insert
Spring button	316 SS (0 to 250 psig range) Zinc-plated steel (all other ranges)
Spring stabilizer①	301 SS
Range spring	316 SS (0 to 10 and 0 to 25 psig control ranges) Zinc-plated steel (0 to 50 through 0 to 250 psig control ranges)
Stem, stem nut, cap ring, stop plate, body cap, panel nuts②	316 SS
Nonwetted lubricant	Hydrocarbon-based
Body, seat retainer	*316 SS*
Retainer seal	*PCTFE or PEEK*
Seat	*Fluorocarbon FKM*
Diaphragm③	*Alloy X-750*
Wetted lubricant	*PTFE-based*

Wetted components listed in *italics*.

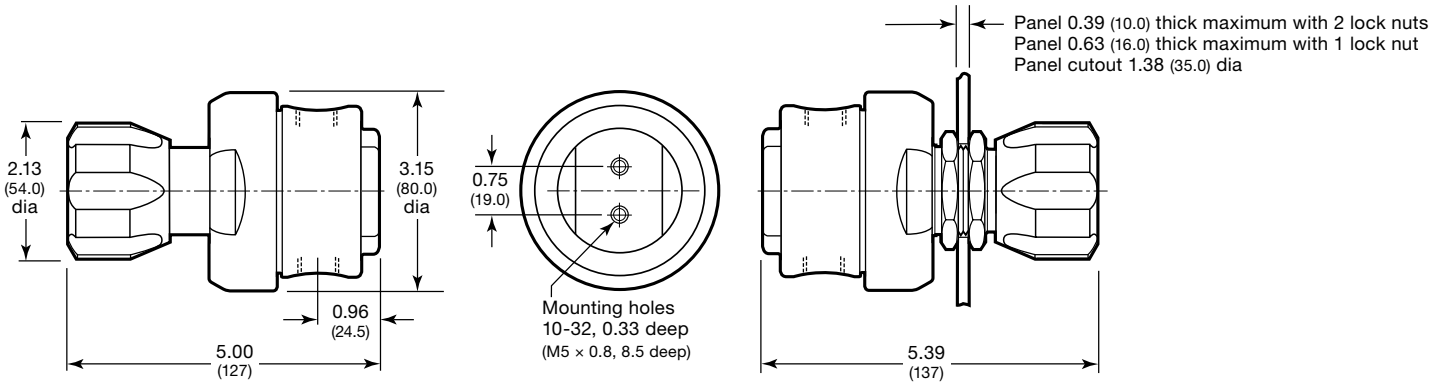
① Not included in regulators with 0 to 250 psig (0 to 17.2 bar) control range.

② Not shown.

③ Regulators with control range 0 to 250 psig (0 to 17.2 bar) are assembled with two diaphragms.

Dimensions

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



Ordering Information

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

	4	5	6	7	8	9	10	11	12	13	14	15	16
KFB	**1**	**F**	0	**D**	8	**A**	8	**A**	**1**	0	0	**0**	0

4 Body Material
1 = 316 SS
A = 316 SS, ASTM G93 Level E-cleaned

5 Pressure Control Range
C = 0 to 10 psig (0 to 0.68 bar)
D = 0 to 25 psig (0 to 1.7 bar)
E = 0 to 50 psig (0 to 3.4 bar)
F = 0 to 100 psig (0 to 6.8 bar)
G = 0 to 250 psig (0 to 17.2 bar)

6 Maximum Inlet Pressure
0 = Not applicable (equal to pressure control range)

7 Port Configuration
A, D, G, V
*See **Port Configurations,** page 52.*

8 Ports
8 = 1/2 in. female NPT inlet and outlet; 1/4 in. female NPT gauge port

9 Seat, Seal Material
A = Fluorocarbon FKM, PCTFE
C = Fluorocarbon FKM, PEEK

10 Flow Coefficient (C_v)
8 = 1.0

11 Sensing Mechanism, Vent
A = Alloy X-750 diaphragm, no vent
E = Alloy X-750 diaphragm, captured vent, no self vent

12 Handle, Mounting
2 = Knob
3 = 316 SS antitamper nut
6 = Knob, panel mount
7 = 316 SS antitamper nut, panel mount
For knob handle color options, see page 56.

13 Valves
0 = No valves

14 Cylinder Connections
0 = No connections

15 Gauges
0 = No gauges
For inlet gauge options, see page 54.

16 Options
0 = No options

Compact Piston-Sensing Back-Pressure Regulators (KCB Series)

The KCB series provides high sensitivity back-pressure control of sampling conditioning systems. It is ideally suited for use in portable or laboratory analytical systems as well as being embedded in the instrument bays of OEM equipment or sampling cabinets.

Features

- Low internal volume
- Fully contained piston
- Excellent flow characteristics with a C_v of 0.20
- ANSI/ISA 76.00.02-compliant modular platform component (MPC) configuration available

Technical Data

Maximum Inlet Pressure

- Equal to pressure control range

Pressure Control Ranges

- 0 to 10 psig (0.68 bar) through 0 to 375 psig (25.8 bar)

Flow Coefficient (C_v)

- 0.20

See page 49 for flow graphs.

- 0.10 also available with MPC platform

Maximum Operating Temperature

- 176°F (80°C) with PCTFE retainer seal
- 392°F (200°C) with PEEK retainer seal

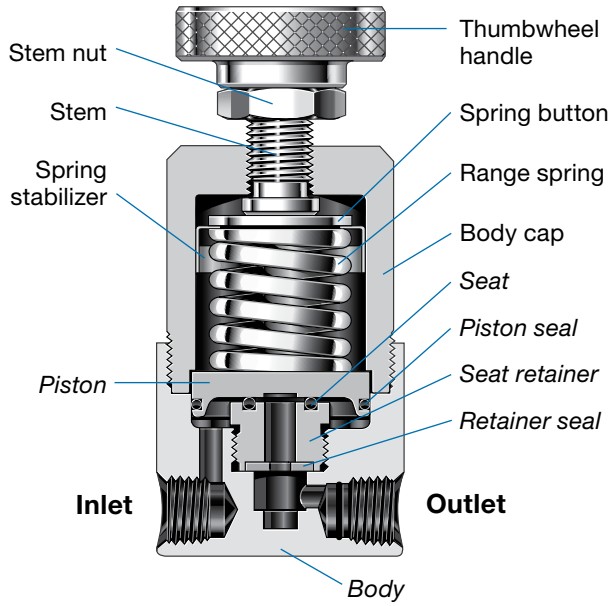
Weight

- 1.0 lb (0.5 kg)

Ports

- 1/8 in. female NPT inlet and outlet(s)
- MPC platform

Materials of Construction

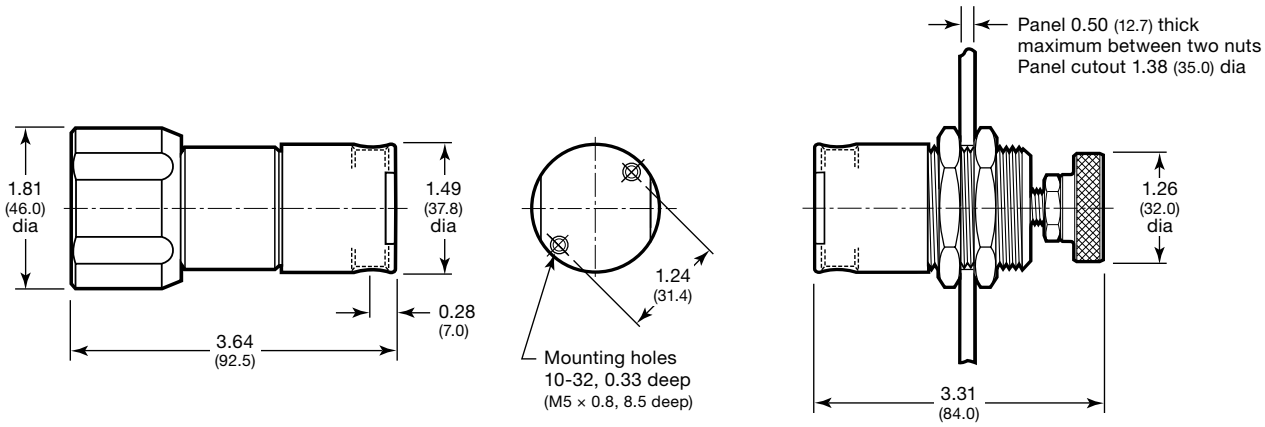


Component	Material
Thumbwheel handle	Anodized aluminum
Knob handle,① cover①	Nylon with 316 SS insert
Spring button	Zinc-plated steel
Spring stabilizer	301 SS
Range spring	316 SS (0 to 10 through 0 to 50 and 0 to 375 psig control ranges) Zinc-plated steel (all other control ranges)
Stem, stem nut, body cap, panel nuts①	316 SS
Nonwetted lubricant	Hydrocarbon-based
Body, seat retainer, piston	*316 SS*
Seat, piston seal	*Fluorocarbon FKM or Kalrez*
Retainer seal	*PCTFE or PEEK*
Wetted lubricant	*PTFE-based*

Wetted components listed in *italics*.
① Not shown.

Dimensions

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



Ordering Information

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

	4	5	6	7	8	9	10	11	12	13	14	15	16
KCB	**1**	**F**	0	**D**	**2**	**A**	**5**	P	**1**	0	0	**0**	0

4 Body Material
1 = 316 SS
A = 316 SS, ASTM G93 Level E-cleaned
C = 316 SS, SC-11–cleaned

5 Pressure Control Range
C = 0 to 10 psig (0 to 0.68 bar)
D = 0 to 25 psig (0 to 1.7 bar)
E = 0 to 50 psig (0 to 3.4 bar)
F = 0 to 100 psig (0 to 6.8 bar)
G = 0 to 250 psig (0 to 17.2 bar)
H = 0 to 375 psig (0 to 25.8 bar)

6 Maximum Inlet Pressure
0 = Not applicable (equal to pressure control range)

7 Port Configuration
A, D, G, V, 7, 8
*See **Port Configurations,** page 52.*

8 Ports
2 = 1/8 in. female NPT
M = MPC platform

9 Seat, Retainer Seal Material
A = Fluorocarbon FKM, PCTFE
B = Kalrez, PCTFE
C = Fluorocarbon FKM, PEEK
D = Kalrez, PEEK

10 Flow Coefficient (C_v)
4 = 0.10 (MPC platform only)
5 = 0.20 (1/8 in. female NPT ports only)

11 Sensing Mechanism
P = 316 SS piston

12 Handle, Mounting
1 = Thumbwheel①
2 = Knob
3 = 316 SS antitamper nut
5 = Thumbwheel, panel mount①
6 = Knob, panel mount
7 = 316 SS antitamper nut, panel mount
For knob handle color options, see page 56.

① Not available with 0 to 375 psig (0 to 25.8 bar) pressure control range.

13 Valves
0 = No valves

14 Cylinder Connections
0 = No connections

15 Gauges
0 = No gauges
For inlet gauge options, see page 54.

16 Options
0 = No options

Medium- to High-Pressure Piston-Sensing Back-Pressure Regulators (KPB Series)

The KPB series provides back-pressure control in gas or liquid applications. This compact and lightweight regulator provides an ideal pressure-control solution within high-density compact OEM equipment, as well as other applications.

Features

- Integral high-pressure overrange protection
- Lightweight, compact design

Technical Data

Maximum Inlet Pressure

- Equal to pressure control range

Pressure Control Ranges

- 0 to 1000 psig (68.9 bar) through 0 to 4000 psig (275 bar)

Flow Coefficient (C_v)

- 0.06 and 0.2

See page 50 for flow graphs.

Maximum Operating Temperature

- 176°F (80°C) with PCTFE seat
- 392°F (200°C) with PEEK seat

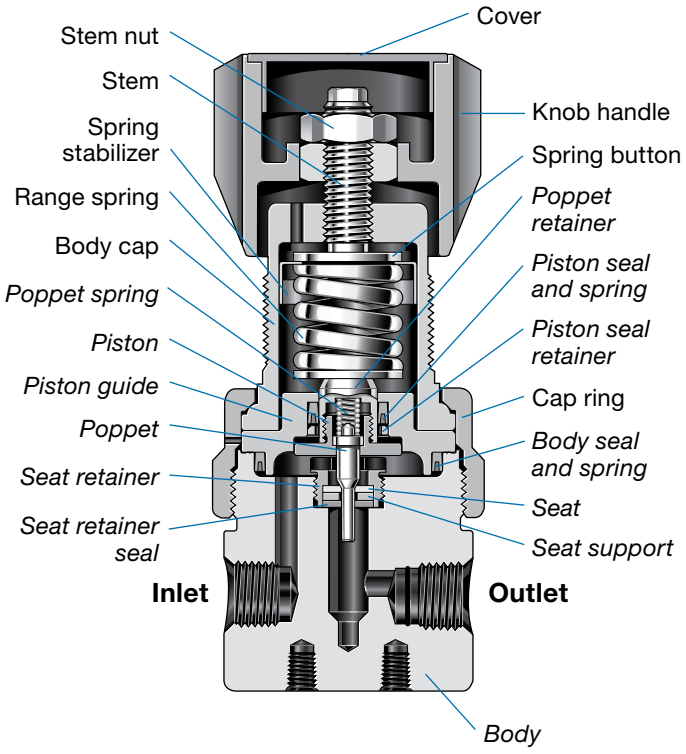
Weight

- 2.5 lb (1.2 kg)

Ports

- 1/4 in. female NPT inlet, outlet, and gauge ports

Materials of Construction



Component	Material
Knob handle, cover	Nylon with 316 SS insert
Spring button	316 SS (0 to 500 psig range) Zinc-plated steel (all other ranges)
Spring stabilizer①	301 SS
Range spring	316 SS (0 to 3000 and 0 to 4000 psig range) Zinc-plated steel (all other ranges)
Stem, stem nut, cap ring, body cap, panel nuts②	316 SS
Nonwetted lubricant	Hydrocarbon-based
Body, seat retainer, seat support, poppet retainer, piston, piston guide	*316 SS*
Seat, seat retainer seal	*PCTFE or PEEK*
Piston seal retainer	*PEEK*
Poppet	*S17400 SS*
Poppet spring	*302 SS*
Piston seal, body seal	*PTFE*
Piston seal spring, body seal spring	*Elgiloy*
Wetted lubricant	*PTFE-based*

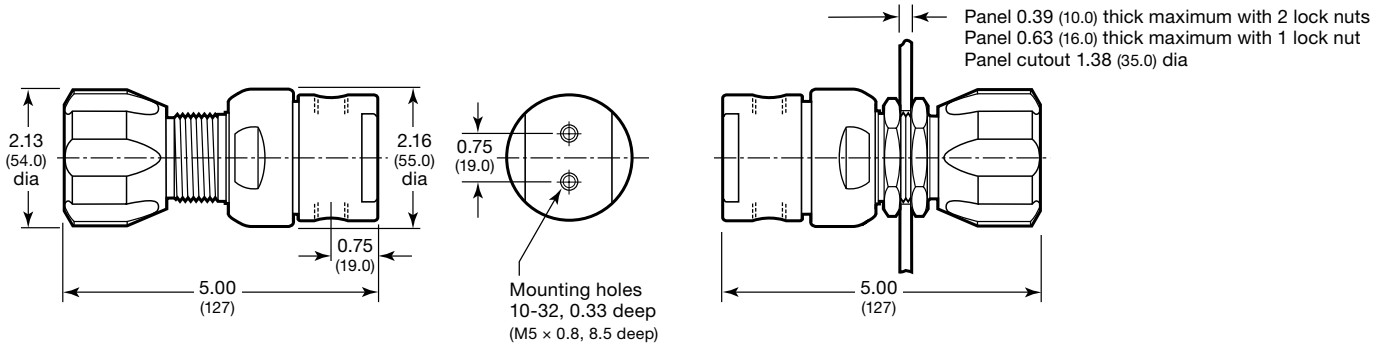
Wetted components listed in *italics*.

① Not included in regulators with 0 to 3000 psig (0 to 206 bar) and 0 to 4000 psig (0 to 275 bar) control ranges.

② Not shown.

Dimensions

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



Ordering Information

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

	4	5	6	7	8	9	10	11	12	13	14	15	16
KPB	**1**	**L**	0	**A**	4	**2**	**2**	P	**2**	0	0	**0**	0

4 Body Material
1 = 316 SS
A = 316 SS, ASTM G93 Level E-cleaned

5 Pressure Control Range
L = 0 to 1000 psig (0 to 68.9 bar)
N = 0 to 2000 psig (0 to 137 bar)
P = 0 to 3000 psig (0 to 206 bar)
S = 0 to 4000 psig (0 to 275 bar)

6 Maximum Inlet Pressure
0 = Not applicable (equal to pressure control range)

7 Port Configuration
A, D, G, V
*See **Port Configurations,** page 52.*

8 Ports
4 = 1/4 in. female NPT

9 Seat, Seal Material
1 = PCTFE
2 = PEEK

10 Flow Coefficient (C_v)
2 = 0.06
5 = 0.20

11 Sensing Mechanism
P = 316 SS piston

12 Handle, Mounting
2 = Knob
3 = 316 SS antitamper nut
6 = Knob, panel mount
7 = 316 SS antitamper nut, panel mount
For knob handle color options, see page 56.

13 Valves
0 = No valves

14 Cylinder Connections
0 = No connections

15 Gauges
0 = No gauges
For inlet gauge options, see page 54.

16 Options
0 = No options

High-Pressure Piston-Sensing Back-Pressure Regulators (KHB Series)

The KHB series provides control of back pressures up to 10 000 psig (689 bar) with high sensitivity across the control range.

Features

- Thrust roller bearing eases operation
- Panel-mounting configuration available

Technical Data

Maximum Inlet Pressure

- Equal to pressure control range

Pressure Control Ranges

- 0 to 500 psig (34.4 bar) through 100 to 10 000 psig (6.8 to 689 bar)

Flow Coefficient (C_v)

- 0.06 and 0.25

See page 51 for flow graphs.

Maximum Operating Temperature

- 212°F (100°C)

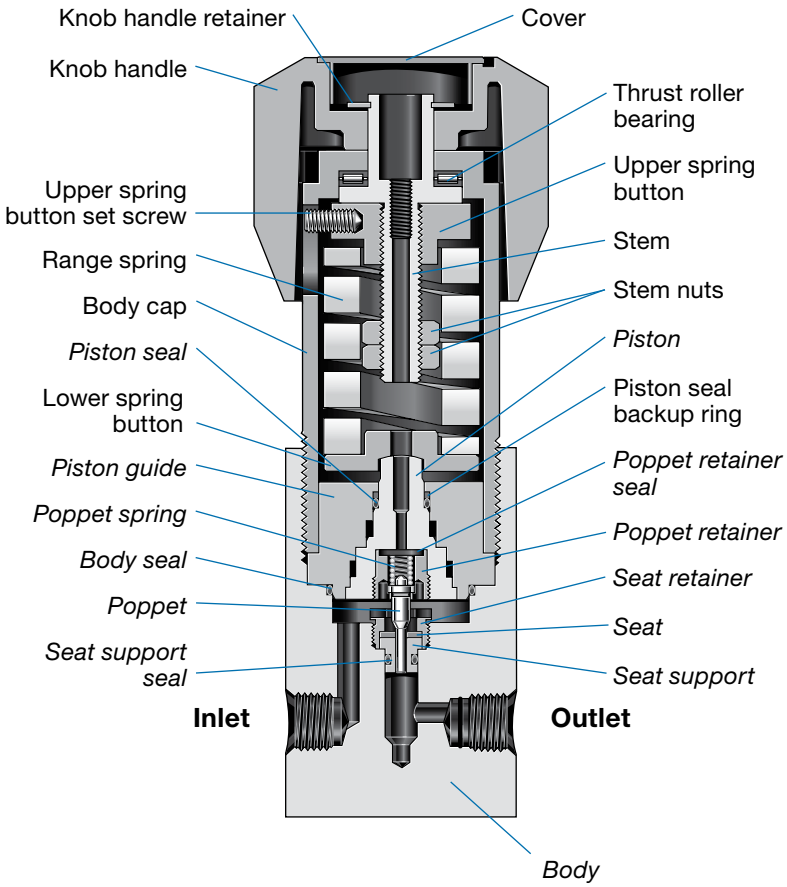
Weight

- 5.7 lb (2.6 kg)

Ports

- 1/4 in. female NPT inlet, outlet, and gauge ports

Materials of Construction

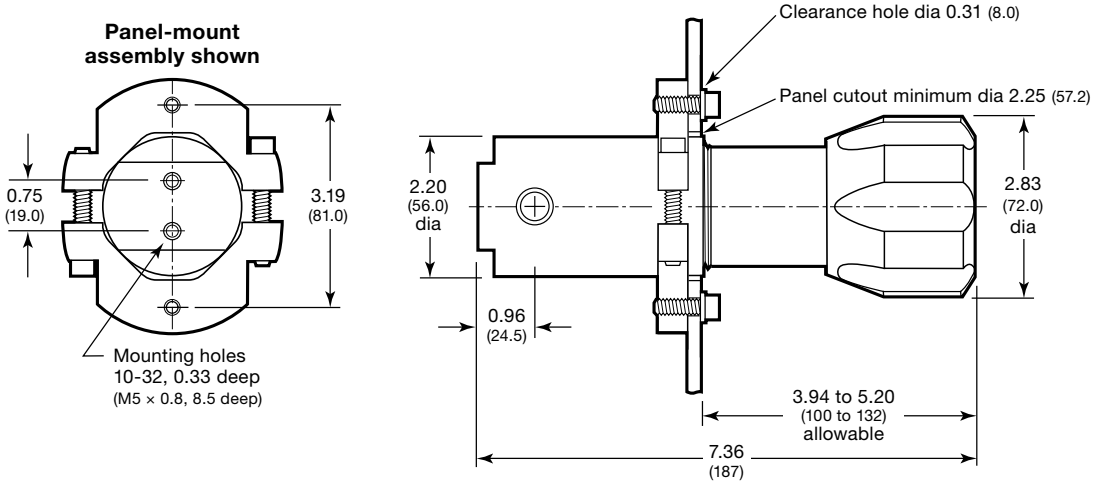


Component	Material
Knob handle, cover	Nylon with 316 SS insert
Spring buttons, upper spring button set screw, knob handle retainer, stem nuts, body cap	316 SS
Stem	CZ114 bronze
Thrust roller bearing	Hardened carbon steel
Range spring	Chrome vanadium steel
Piston seal backup ring	PEEK
Nonwetted lubricant	Hydrocarbon-based
Body, poppet retainer, seat retainer, seat support, piston, piston guide	*316 SS*
Seat	*PEEK or 316 SS*
Poppet retainer seal	*PEEK*
Poppet	*S17400 SS*
Poppet spring	*302 SS*
Piston seal, body seal, seat support seal	*Fluorocarbon FKM*
Wetted lubricant	*PTFE-based*

Wetted components listed in italics.

Dimensions

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



Ordering Information

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

	4	5	6	7	8	9	10	11	12	13	14	15	16
KHB	**1**	**T**	0	**D**	4	**C**	**2**	P	**2**	0	0	**0**	0

4 Body Material
1 = 316 SS
A = 316 SS, ASTM G93 Level E-cleaned

5 Pressure Control Range
J = 0 to 500 psig (0 to 34.4. bar)
K = 0 to 750 psig (0 to 51.6 bar)
T = 10 to 1500 psig (0.68 to 103 bar)
U = 15 to 2500 psig (1.0 to 172 bar)
V = 25 to 3600 psig (1.7 to 248 bar)
W = 50 to 6000 psig (3.4 to 413 bar)
X = 100 to 10 000 psig (6.8 to 689 bar)

6 Maximum Inlet Pressure
0 = Not applicable (equal to pressure control range)

7 Port Configuration
A, D, G, V
*See **Port Configurations,** page 52.*

8 Ports
4 = 1/4 in. female NPT

9 Seat, Piston/Body/Seat Support Seal Material
C = PEEK, fluorocarbon FKM
J = 316 SS, fluorocarbon FKM①
① Not suitable for gas service.

10 Flow Coefficient (C_v)
2 = 0.06
6 = 0.25

11 Sensing Mechanism
P = 316 SS piston

12 Handle, Mounting
2 = Knob
6 = Knob, panel mount
For knob handle color options, see page 56.

13 Valves
0 = No valves

14 Cylinder Connections
0 = No connections

15 Gauges
0 = No gauges
For inlet gauge options, see page 54.

16 Options
0 = No options

Gas Cylinder Changeover Regulator (KCM Series)

The KCM series is a two-stage gas delivery system that ensures continuous flow of gases in critical applications. When one supply drops below the changeover pressure, the selector regulator automatically switches the gas feed from the depleted supply to an alternate supply. The automatic operation of the KCM series eliminates costly system downtime and maintenance expense of continuously monitoring the gas supply.

Shown with Swagelok tube fittings, not included.

Features

- Convoluted, nonperforated diaphragm for strength and improved pressure response
- Metal-to-metal diaphragm seals on all stages
- Supply-pressure effect of approximately 0.01 %
- Bracket mount

Technical Data

Maximum Inlet Pressure①

- 4351 psig (300 bar) with PEEK seat
- 3600 psig (248 bar)

① Cylinder Connections and Hose accessories may limit inlet pressure ratings, see pages 53 and 56.

Pressure Control Ranges

- 0 to 10 psig (0.68 bar) through 0 to 500 psig (34.4 bar)

Nominal Changeover Pressures

- 100, 250, and 500 psig (6.8, 17.2, and 34.4 bar)

Flow Coefficient (C_v)

- 0.06

Supply-Pressure Effect

Flow Coefficient (C_v)	Pressure Control Range	
	Up to 100 psig (6.8 bar)	250 psig (17.2 bar) and Higher
	Supply Pressure Effect, %	
0.06	0.01	0.02

Maximum Operating Temperature

- 176°F (80°C) with PCTFE seat
- 392°F (200°C) with PEEK seat
- 212°F (100°C) with PEEK seat and maximum inlet pressure greater than 3600 psig (248 bar)

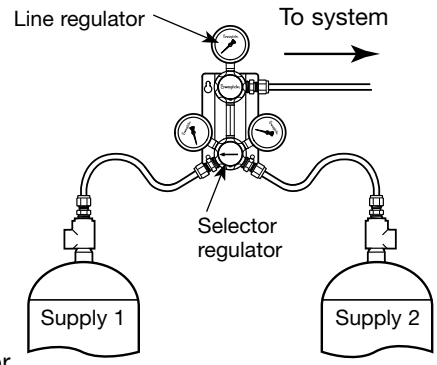
Weight

- 7.25 lb (3.3 kg)

Ports

- 1/4 in. female NPT inlet, outlet, and gauge ports

Operation



The KCM series can be ordered to switch from one supply to another at one of three different inlet pressures—100, 250, and 500 psig (6.8, 17.2, and 34.4 bar)—called changeover pressures.

The selector regulator (first stage) is factory-set to reduce the supply pressure to the nominal changeover pressure ordered. The line regulator (second stage) can be adjusted with the handle to achieve the required system pressure. This two-stage arrangement minimizes the supply-pressure effect caused by depleting gas supplies (cylinders, tank farm, etc.).

When one supply drops below the changeover pressure, the selector regulator automatically switches the gas feed from the depleted supply to an alternate supply. If both supplies drop below the changeover pressure, the assembly functions as a single-stage regulator, depleting both supplies at the same time. See the **Approximate Supply Depletion Pressures** table at right for pressures at which this occurs.

The Swagelok KCA series continuous gas delivery system is a panel-mounted gas changeover assembly that can be configured for many applications. For more information, see the *Swagelok KCA Series Continuous Gas Delivery System* catalog, MS-18-01.

Materials of Construction

The KCM series gas changeover uses Swagelok KPR series pressure-reducing regulators. For more information, see **General-Purpose Diaphragm Sensing, Pressure-Reducing Regulators (KPR Series),** page 6.

The table below lists additional components not shown in the KPR series section.

Component	Material
Interstage fitting	*316 SS with PTFE tape*
Line-regulator mounting block	Aluminum
Line-regulators mounting screws, mounting bracket	316 SS

Wetted components listed in *italics.*

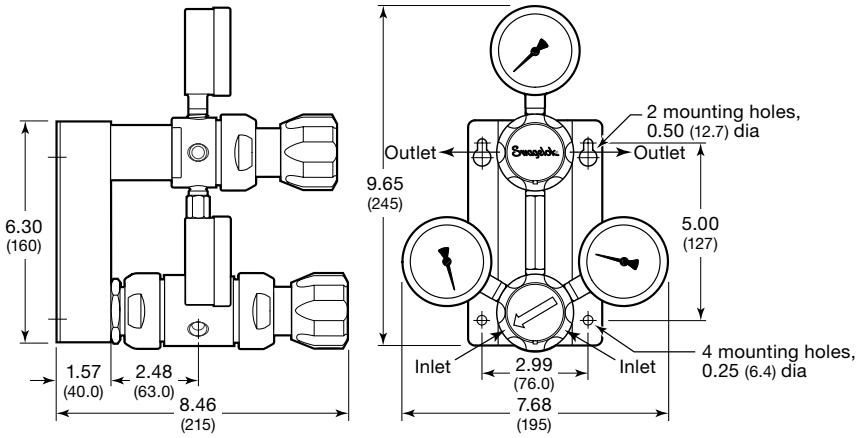
Approximate Supply Depletion Pressures

Nominal Changeover Pressure psig (bar)	Supply 1 Depletion Pressure psig (bar)	Supply 1 (300 bar) Depletion Pressure psig (bar)	Supply 2 Depletion Pressure psig (bar)
100 (6.8)	150 (10.3)	180 (12.4)	90 (6.2)
250 (17.2)	300 (20.6)	320 (22.1)	230 (15.8)
500 (34.4)	500 (34.4)	530 (36.6)	450 (31.0)

Supply 2 can deplete below some of the available pressure control range limits. Setting the line regulator near the nominal changeover pressure will cause flow to the system to decrease or stop as the supply nears depletion.

Dimensions

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



Ordering Information

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

	4	5	6	7	8	9	10	11	12	13	14	15	16
KCM	**1**	**F**	**F**	**B**	4	**1**	2	**A**	**D**	**0**	**0**	**1**	**0**

4 Body Material

1 = 316 SS
A = 316 SS, ASTM G93 Level E-cleaned

5 Pressure Control Range

C = 0 to 10 psig (0 to 0.68 bar)
D = 0 to 25 psig (0 to 1.7 bar)
E = 0 to 50 psig (0 to 3.4 bar)
F = 0 to 100 psig (0 to 6.8 bar)
G = 0 to 250 psig (0 to 17.2 bar)①
J = 0 to 500 psig (0 to 34.4 bar)②

① Not available with 100 psig (6.8 bar) changeover pressure.
② Only available with 500 psig (34.4 bar) changeover pressure.

6 Nominal Changeover Pressure①

F = 100 psig (6.8 bar)
G = 250 psig (17.2 bar)
J = 500 psig (34.4 bar)

For 4351 psig (300 bar) inlet②
5 = 100 psig (6.8 bar)
6 = 250 psig (17.2 bar)
7 = 500 psig (34.4 bar)

① Inlet pressure must exceed changeover pressure for automatic switching to occur.
② Only available with PEEK seat.

7 Port Configuration

B, C, L

*See **Port Configurations,** below.*

8 Ports

4 = 1/4 in. female NPT

9 Seat Material

1 = PCTFE
2 = PEEK

10 Flow Coefficient (C_v)

2 = 0.06

11 Sensing Mechanism, Vent

A = Alloy X-750 diaphragm, no vent
C = Alloy X-750 diaphragm, self vent①
E = Alloy X-750 diaphragm, captured vent, no self vent①
F = Alloy X-750 diaphragm, self and captured vent①

① Self and captured vent options on line regulator only.

12 Line Regulator Handle

D = Knob
E = 316 SS antitamper nut

Selector regulator has knob handle. For knob handle color options, see page 56.

13 Isolation and Relief Valves

0 = No valves

For isolation and relief valve options, see page 54.

14 Cylinder Connections

0 = No connections

Cylinder connections available only with hose option. For cylinder connection options and pressure ratings, see page 53.

15 Gauge Scale

1 = psig (bar) (North America only)
2 = bar (psig)
3 = psig (bar)
4 = MPa
5 = psig (kPa)

For more information, see page 54.

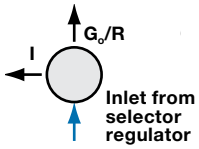
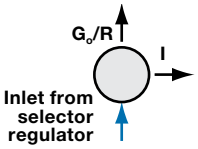
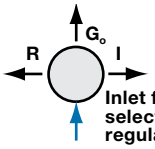
16 Options

0 = No options
3 = 3 ft, 1/4 in. FX series metal flexible hose, 1/4 in. female NPT inlet①
4 = 3 ft, 1/4 in. TH series PTFE-lined, stainless steel braided hose, 1/4 in. female NPT inlet①

For hose options and pressure ratings, see page 56.

① Not available for ASTM G93 Level E-cleaned regulators.

Port Configurations

Configuration	Designator	Configuration	Designator	Configuration	Designator
	B		C		L

G_o = Outlet gauge.
G_o/R = Outlet gauge or relief valve.
R = Relief valve.
I = Isolation valve.

Steam-Heated Vaporizing, Diaphragm-Sensing Pressure-Reducing Regulator (KSV Series)

The KSV series is a steam-heated vaporizing regulator with a low internal volume. It can be used to vaporize liquid samples or to preheat gas samples to prevent them from condensing.

Features

- Convoluted, nonperforated diaphragm
- Metal-to-metal diaphragm seal
- Low internal volume

Technical Data

Maximum Inlet Pressure

- 3600 psig (248 bar)

Outlet Pressure Ranges

- 0 to 10 psig (0.68 bar) through 0 to 500 psig (34.4 bar)

Flow Coefficient (C_v)

- 0.06 or 0.20

Supply-Pressure Effect

Flow Coefficient (C_v)	Pressure Control Range	
	Up to 100 psig (6.8 bar)	250 psig (17.2 bar) and Higher
	Supply Pressure Effect, %	
0.06	1.0	1.5
0.20	1.5	2.4

Maximum Steam Pressure and Temperature

- 650 psig (44.7 bar) and 500°F (260°C)

Maximum Regulator Operating Temperature

- 392°F (200°C)

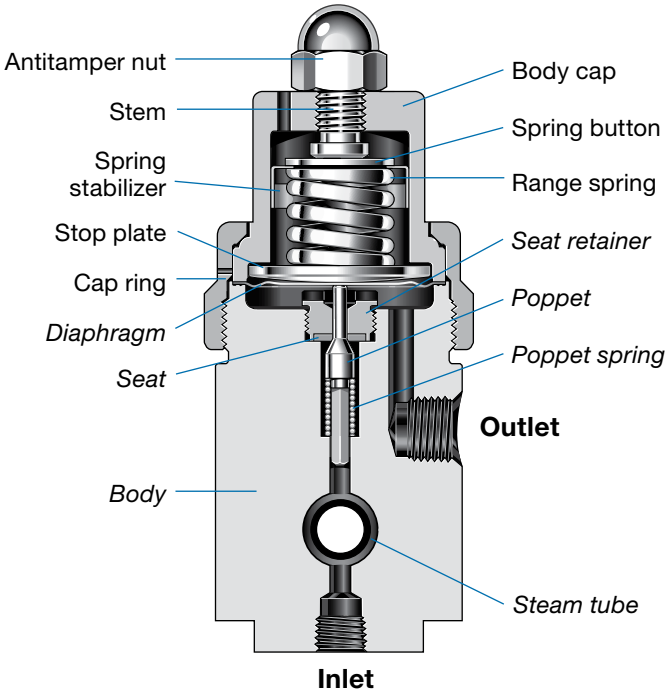
Weight

- 3.3 lb (1.5 kg)

Ports

- 1/8 in. female NPT inlet; 1/4 in. female NPT outlet(s)
- Steam tube 1/2 in. outside diameter, 0.065 in. wall

Materials of Construction



Component	Material
Antitamper nut, stem, cap ring, stop plate, body cap, panel nuts①	316 SS
Spring button	Zinc-plated steel
Spring stabilizer②	301 SS
Range spring	316 SS or zinc-plated steel, depending on configuration
Nonwetted lubricant	Hydrocarbon-based
Body, seat retainer, steam tube	*316 SS*
Seat	*PEEK*
Diaphragm,③ poppet spring	*Alloy X-750*
Poppet	*S17400 SS*
Wetted lubricant	*PTFE-based*

Wetted components listed in *italics*.

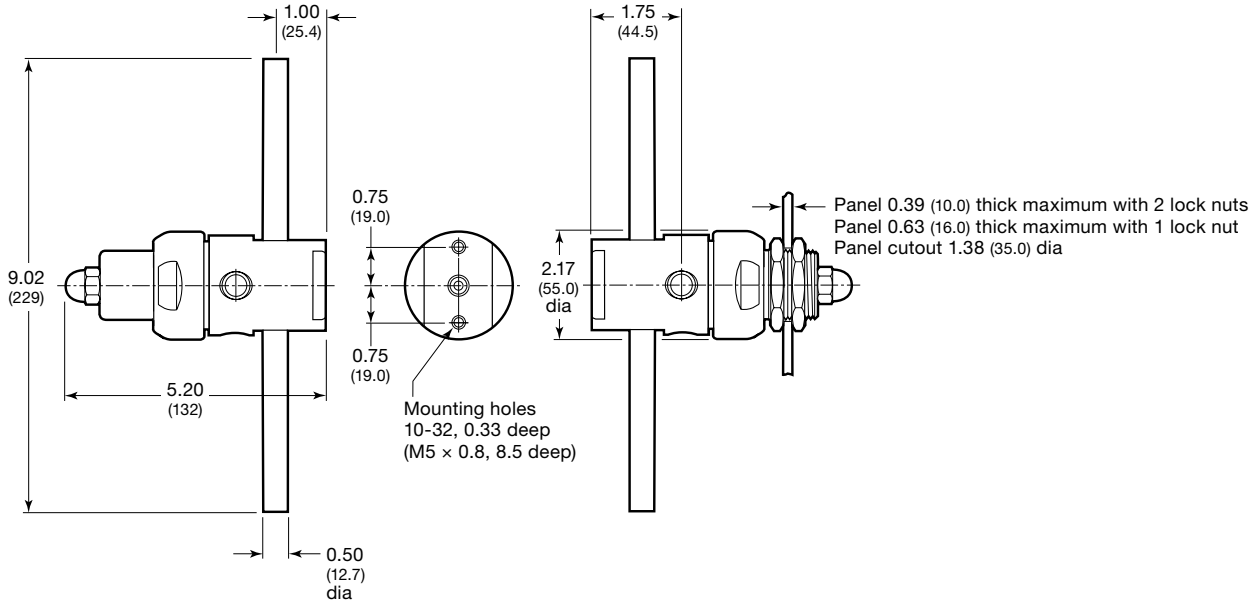
① Not shown.

② Not required in all configurations.

③ Regulators with control ranges higher than 0 to 100 psig (0 to 6.8 bar) are assembled with two diaphragms.

Dimensions

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



Ordering Information

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

	4	5	6	7	8	9	10	11	12	13	14	15	16
KSV	**1**	**F**	**R**	**1**	3	2	**2**	**A**	**3**	0	0	0	0

4 Body Material
1 = 316 SS
A = 316 SS, ASTM G93 Level E-cleaned

5 Pressure Control Range
C = 0 to 10 psig (0 to 0.68 bar)
D = 0 to 25 psig (0 to 1.7 bar)
E = 0 to 50 psig (0 to 3.4 bar)
F = 0 to 100 psig (0 to 6.8 bar)
G = 0 to 250 psig (0 to 17.2 bar)
J = 0 to 500 psig (0 to 34.4 bar)

6 Maximum Inlet Pressure①
F = 100 psig (6.8 bar)
J = 500 psig (34.4 bar)
L = 1000 psig (68.9 bar)
R = 3600 psig (248 bar)

① For better resolution and control, select a pressure that closely matches system pressure.

7 Port Configuration
1, 4

*See **Port Configurations,** right.*

8 Ports
3 = 1/8 in. female NPT inlet;
1/4 in. female NPT outlet(s)

9 Seat Material
2 = PEEK

10 Flow Coefficient (C_v)
2 = 0.06
5 = 0.20

11 Sensing Mechanism, Vent
A = Alloy X-750 diaphragm, no vent
E = Alloy X-750 diaphragm, captured vent, no self vent

12 Handle, Mounting
3 = Antitamper nut
7 = Antitamper nut, panel mount

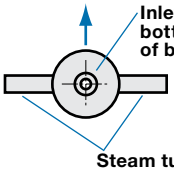
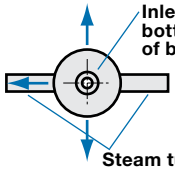
13 Valves
0 = No valves

14 Cylinder Connections
0 = No connections

15 Gauges
0 = No gauges

16 Options
0 = No options

Port Configurations

Configuration	Designator	Configuration	Designator
	1		4

Electrically Heated Vaporizing Pressure-Reducing Regulator (KEV Series)

The KEV series is an electrically heated vaporizing regulator with a low internal volume. It can be used to vaporize liquid samples or to preheat gas samples to prevent them from condensing. It features a heating element that is in direct contact with the process fluid for maximum thermal efficiency and is removable for easy cleaning. The KEV regulator has an integral temperature controller and is rated for use in hazardous areas, as identified below.

Features

- Convoluted, nonperforated diaphragm for control ranges up to 500 psig (34.4 bar)
- Stainless steel piston for control ranges from 1000 to 3600 psig (68.9 to 248 bar)
- ATEX, IECEx, and CSA certified for critical/hazardous environments
- T3 temperature classification for all heater ranges
- CE conformity: 89/336/EEC (EMC)
- Horizontally or vertically mounted
- One-piece body eliminates potential leak paths
- Low-volume vapor chamber for fast response
- Heater in direct contact with process media for maximum thermal efficiency
- Removable heater simplifies cleaning
- Side and base inlet options

Technical Data

Maximum Inlet Pressure

- 3600 psig (248 bar)

Pressure Control Ranges

- 0 to 10 psig (0.68 bar) through 0 to 3600 psig (248 bar)

Flow Coefficient (C_v)

- 0.02 or 0.06

Supply-Pressure Effect

Flow Coefficient (C_v)	Pressure Control Range		
	Up to 100 psig (6.8 bar)	250 and 500 psig (17.2 and 34.4 bar)	1000 psig (68.9 bar) and Higher
	Supply Pressure Effect, %		
0.02	0.3	0.5	2.2
0.06	1.0	1.5	7.2

Weight

- Side mounted—8.8 lb (4.0 kg)
- Base mounted—7.7 lb (3.5 kg)

Ports

- 1/8 in. female NPT inlet; 1/4 in. female NPT outlet

Electrical

- Supply—120 and 240 V (ac) (± 10 %), 50/60 Hz
- Heater ratings—50, 100, 150, and 200 W
- Control temperature range—75 to 380°F (23 to 193°C)
- Explosive atmosphere/hazardous location certification:
  - ATEX (Europe) and IECEx (international)—Group II, Category 2G, Ex db IIB+H_2 T3 Gb Ambient temperatures: –4 to 140°F (–20 to 60°C)
  - CSA (Canada and U.S.A.)—Class I, Div 1, Groups B, C, and D; T3; CSA Encl Type 4 Ambient temperatures: –58 to 122°F (–50 to 50°C)

⚠ WARNING

Certification and hazardous type protection may be impaired if the KEV regulator is used in a manner not specified by swagelok. Refer to *KEV Series Electrically Heated Vaporizing Pressure Reducing Regulators Instructions for Use*, MS-CRD-KEV1, for correct method of installation, operation, and use.

⚠ WARNING

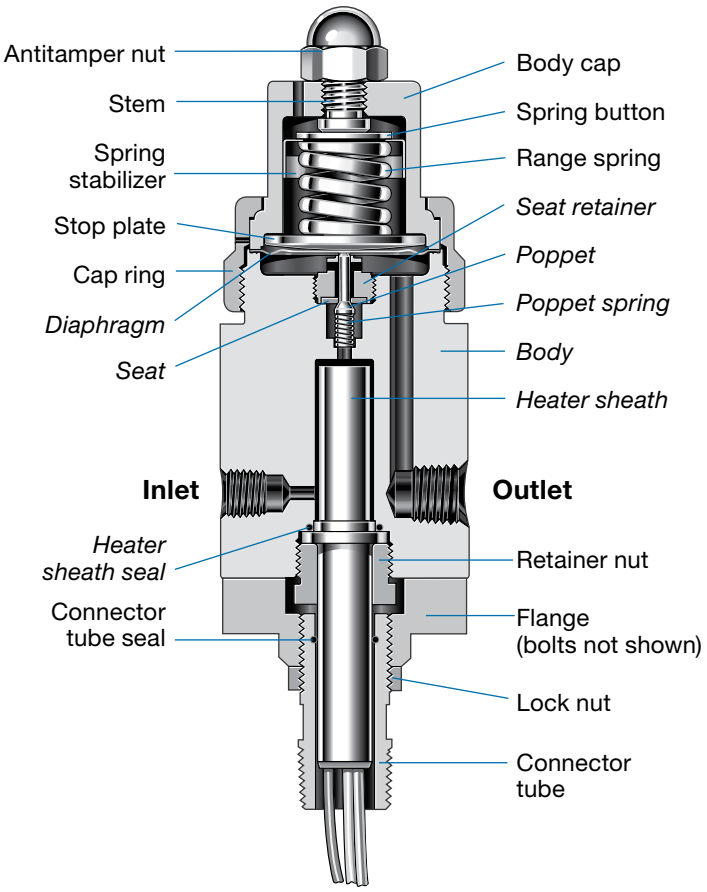
Do not alter or disassemble any of the flameproof joints within the KEV series regulator. Damage to the regulator resulting in affected performance and product safety is possible.

⚠ WARNING

There is a potential for air to become trapped within the piping system, creating the possibility of a combustible mixture. This could occur during system startup or shutdown. In order to allow the KEV heater tube to stabilize at ambient temperature, turn off the power to the regulator during system startup and shutdown. The amount of time needed for the system to reach ambient conditions depends on several system parameters including, but not limited to, set point, flow rate, ambient temperature, and the termal properties of the system and fluid.

Contact your authorized sales and service representative for any maintenance or repair beyond the maintenance of the heater sheath.

Materials of Construction



Component	Material
Antitamper nut, stem, cap ring, stop plate,① body cap, retainer nut, flange, flange bolts, lock nut, connector tube, panel nuts②	316 SS
Spring button	Zinc-plated steel
Spring stabilizer③	301 SS
Range spring	316 SS or zinc-plated steel, depending on configuration
Connector tube seal	Nitrile
Nonwetted lubricant	Hydrocarbon-based
Body, seat retainer, heater sheath	*316 SS*
Heater sheath seal	*Alloy 718*
Seat	*PEEK*
Diaphragm①④	*Alloy X-750*
Poppet	*S17400 SS*
Poppet spring	*302 SS*
Wetted lubricant	*PTFE-based*
Piston Sensing Components	
Piston seal, body seal	*PTFE*
Piston, piston guide	*316 SS*
Piston seal retainer	*PEEK*
Piston seal spring, body seal spring	*Elgiloy*

Wetted components listed in *italics*.

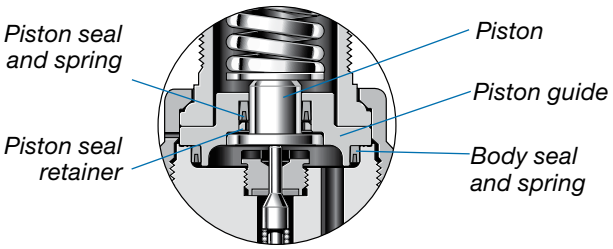
① Not included in regulators with piston sensing mechanism.

② Not shown.

③ Not required in all configurations.

④ Regulators with control ranges 0 to 250 psig (0 to 17.2 bar) and 0 to 500 psig (0 to 34.4 bar) are assembled with two diaphragms.

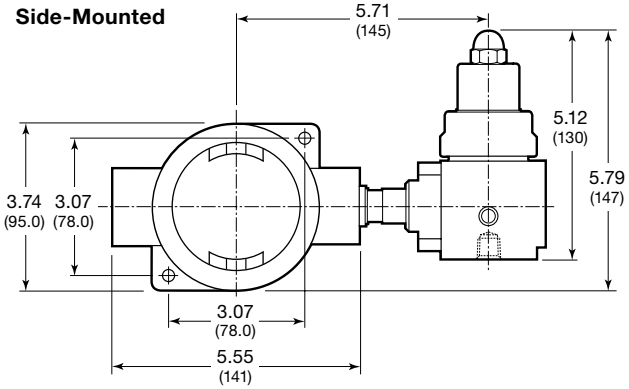
Piston Sensing Mechanism



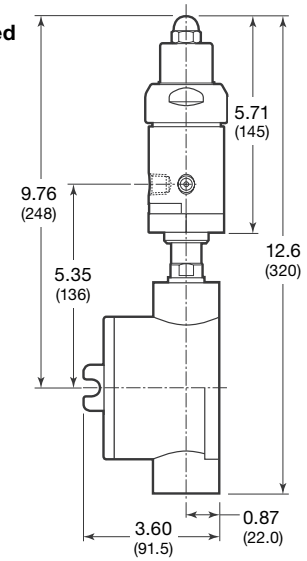
Dimensions

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

Side-Mounted



Base-Mounted



Ordering Information

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

	4	5	6	7	8	9	10	11	12	13	14	15	16
KEV	**1**	**F**	**R**	**A**	3	2	**2**	**A**	**X**	0	0	0	**G**

4 Body Material
1 = 316 SS
A = 316 SS, ASTM G93 Level E-cleaned

5 Pressure Control Range
Diaphragm Sensing
C = 0 to 10 psig (0 to 0.68 bar)
D = 0 to 25 psig (0 to 1.7 bar)
E = 0 to 50 psig (0 to 3.4 bar)
F = 0 to 100 psig (0 to 6.8 bar)
G = 0 to 250 psig (0 to 17.2 bar)
J = 0 to 500 psig (0 to 34.4 bar)
Piston Sensing
L = 0 to 1000 psig (0 to 68.9 bar)
M = 0 to 1500 psig (0 to 103 bar)
N = 0 to 2000 psig (0 to 137 bar)
P = 0 to 3000 psig (0 to 206 bar)
R = 0 to 3600 psig (0 to 248 bar)

6 Maximum Inlet Pressure①
F = 100 psig (6.8 bar)②
J = 500 psig (34.4 bar)②
L = 1000 psig (68.9 bar)②
R = 3600 psig (248 bar)

① For better resolution and control, select a pressure that closely matches system pressure.
② Available with diaphragm sensing mechanism only.

7 Port Configuration
Side Mount—A, X, 1, 2
Base Mount—A, B, X, Y, Z
See ***Port Configurations,*** below.

8 Ports
3 = 1/8 in. female NPT inlet;
1/4 in. female NPT outlet(s)

9 Seat Material
2 = PEEK

10 Flow Coefficient (C_v)
1 = 0.02
2 = 0.06

11 Sensing Mechanism
A = Alloy X-750 diaphragm (outlet pressures up to 500 psig [34.4 bar])
P = 316 SS piston (outlet pressures above 500 psig [34.4 bar])

12 Handle, Mounting
W = Antitamper nut, side mount
X = Antitamper nut, base mount

13 Valves
0 = No valves

14 Cylinder Connections
0 = No connections

15 Gauges
0 = No gauges

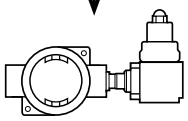
16 Heater, Controller

75 to 380°F (23 to 193°C), 120 V	*75 to 380°F (23 to 193°C), 240 V*
G = 50 W	**6** = 50 W
H = 100 W	**7** = 100 W
J = 150 W	**8** = 150 W
K = 200 W	**9** = 200 W

*Port Configurations*①

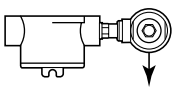
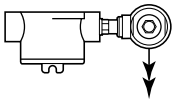
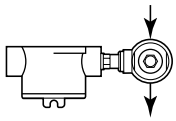
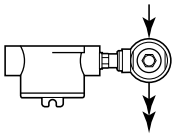
→→ **Outlet and auxiliary ports on the same face.**

Side-Mount View

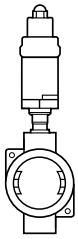


① Regulator is rotatable 360° in relation to terminal box.

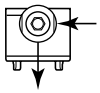
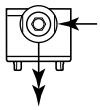
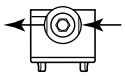
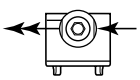
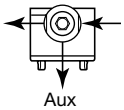
Side Mount

Designator	Configuration
1	
2	
A	
X	

Base-Mount View



Base Mount

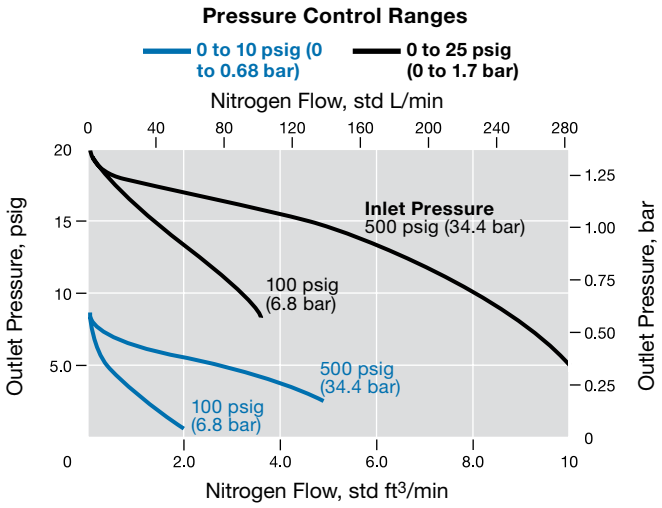
Designator	Configuration
Y	
Z	
A	
X	
B	

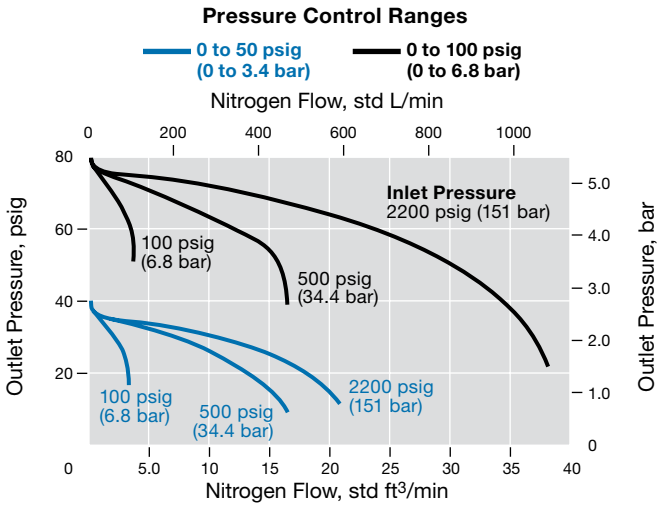
K Series Pressure-Reducing Regulator Flow Data

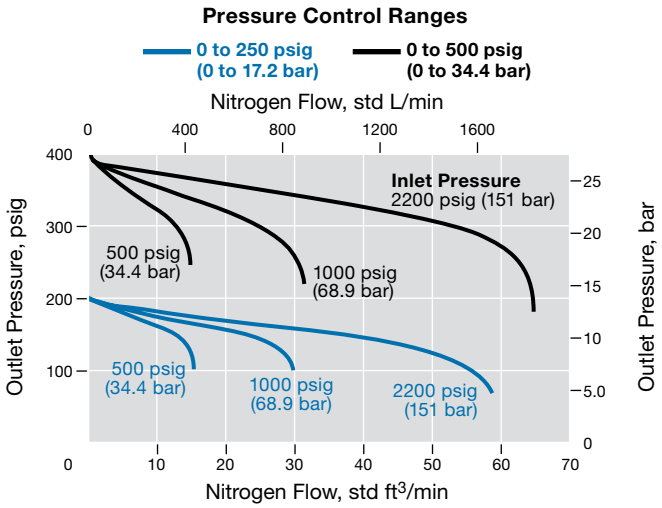
The graphs illustrate the change or "droop" in outlet pressures as the flow rate increases. Refer to Swagelok *Pressure-Reducing Regulator Flow Curves Technical Bulletin,* MS-06-114, for an overview of how to read regulator flow curves and for additional inlet pressures and flow coefficients

KPR Series

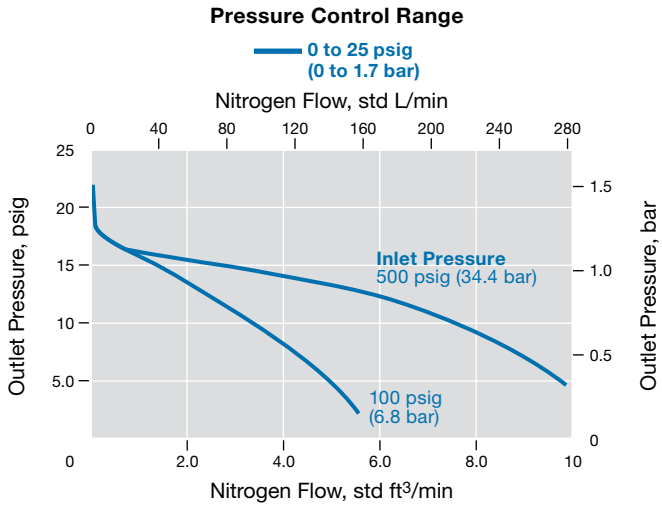
Flow Coefficient 0.06; Maximum Inlet Pressure 3600 psig (248 bar)

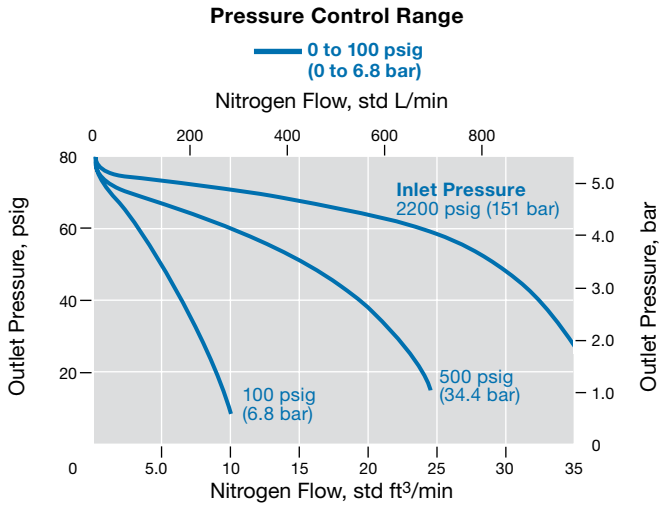


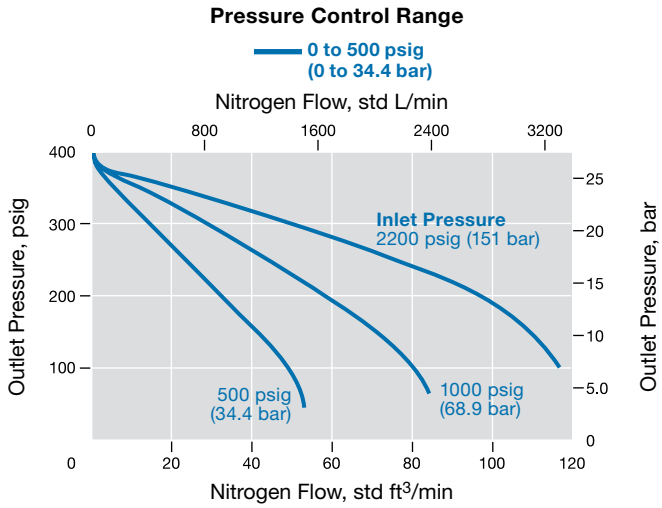




Flow Coefficient 0.20; Maximum Inlet Pressure 3600 psig (248 bar)





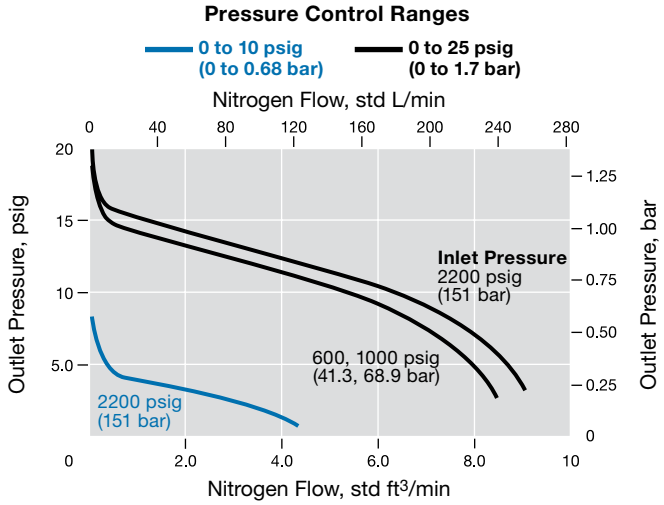


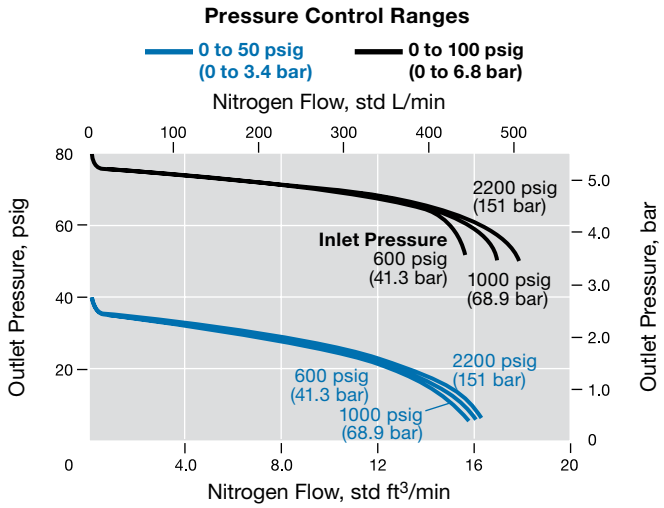
K Series Pressure-Reducing Regulator Flow Data

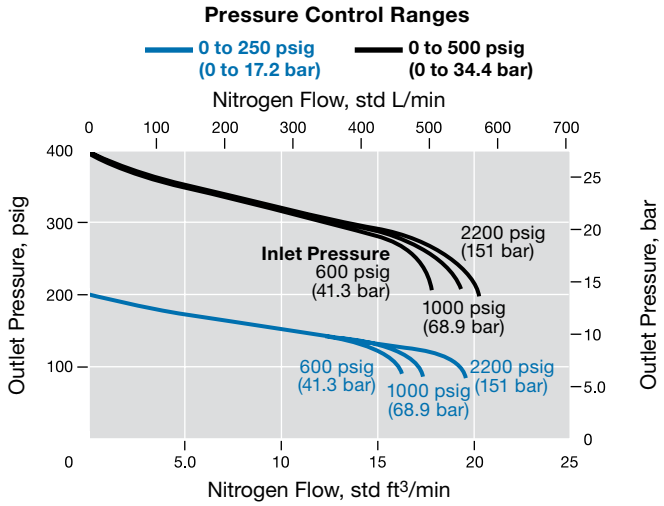
The graphs illustrate the change or "droop" in outlet pressures as the flow rate increases.

KCY Series

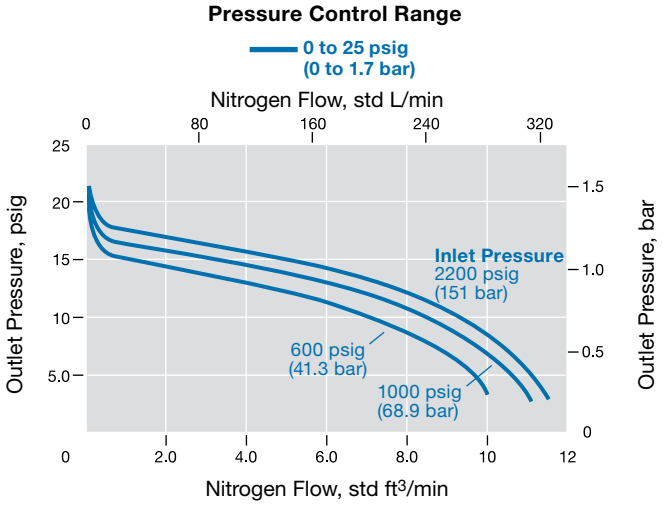
Flow Coefficient 0.06; Maximum Inlet Pressure 3600 psig (248 bar)

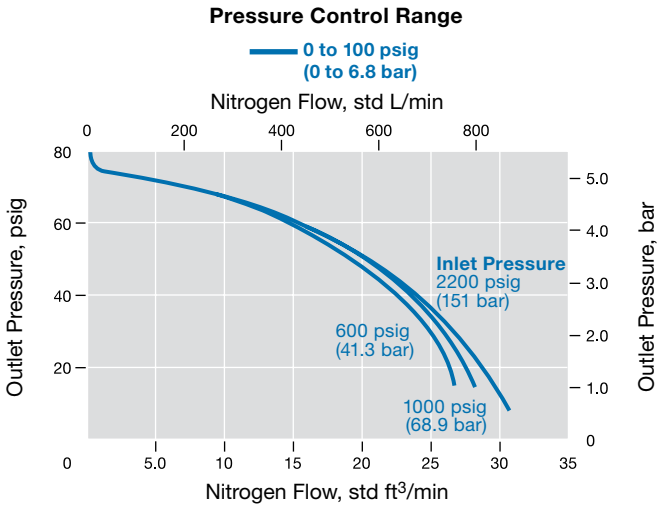


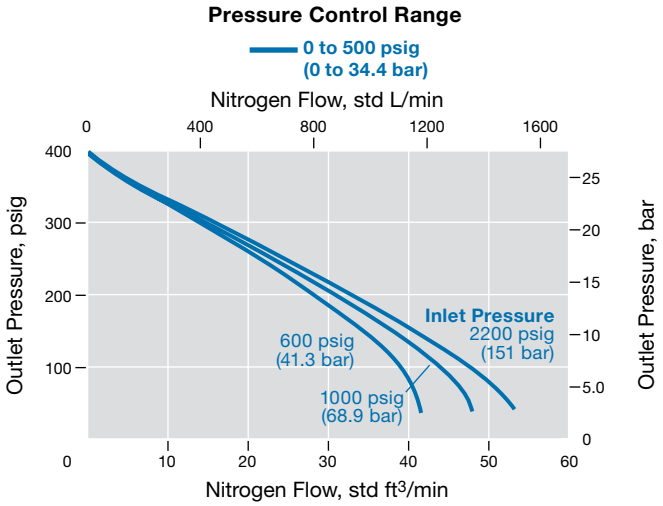




Flow Coefficient 0.20; Maximum Inlet Pressure 3600 psig (248 bar)





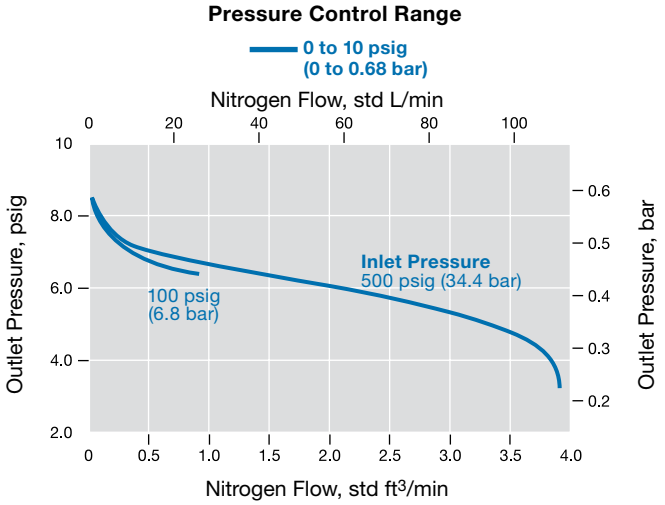


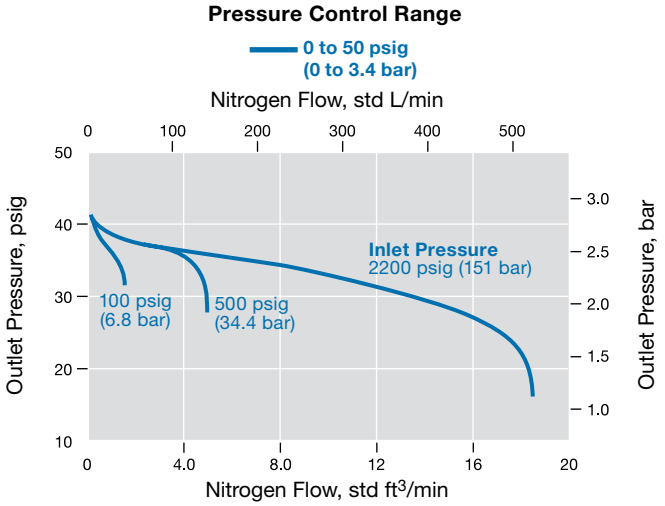
K Series Pressure-Reducing Regulator Flow Data

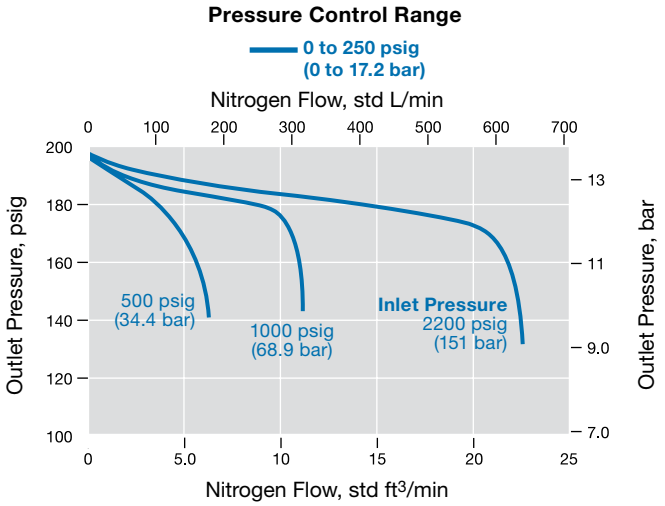
The graphs illustrate the change or "droop" in outlet pressures as the flow rate increases.

KLF Series

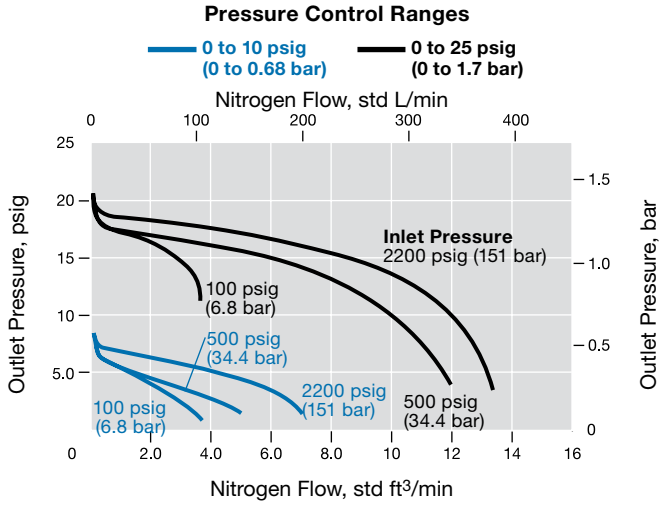
Flow Coefficient 0.02; Maximum Inlet Pressure 3600 psig (248 bar)

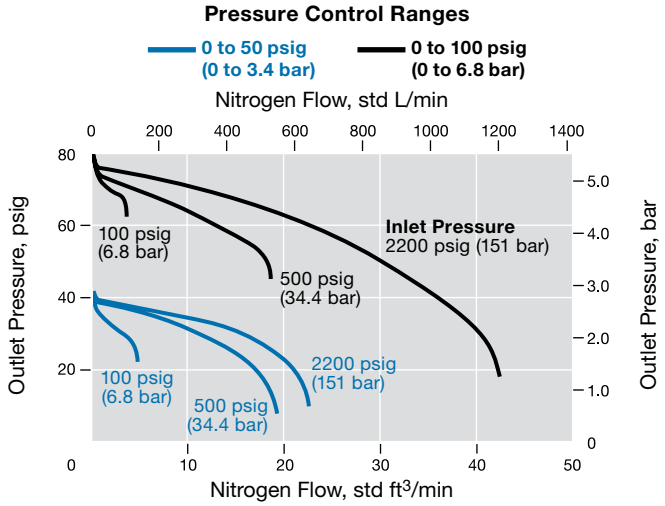


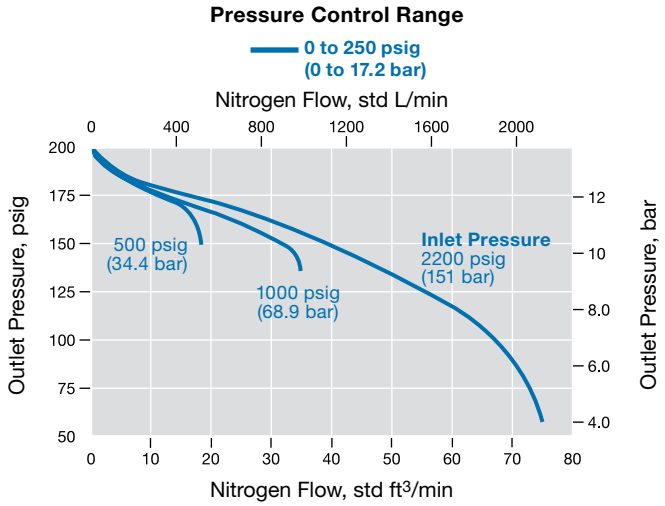




Flow Coefficient 0.06; Maximum Inlet Pressure 3600 psig (248 bar)





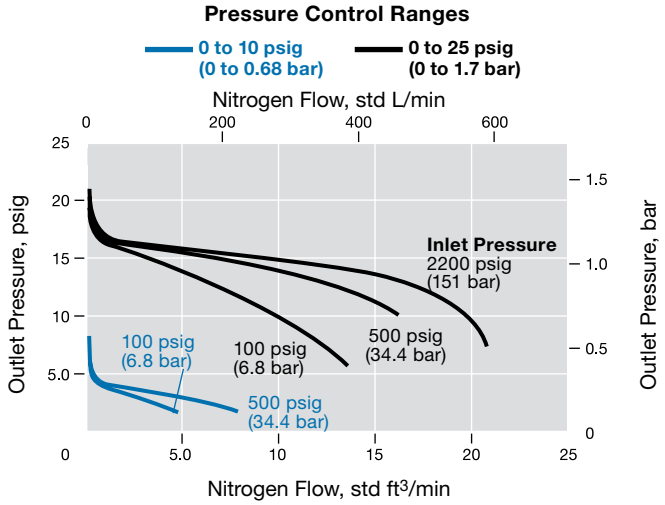


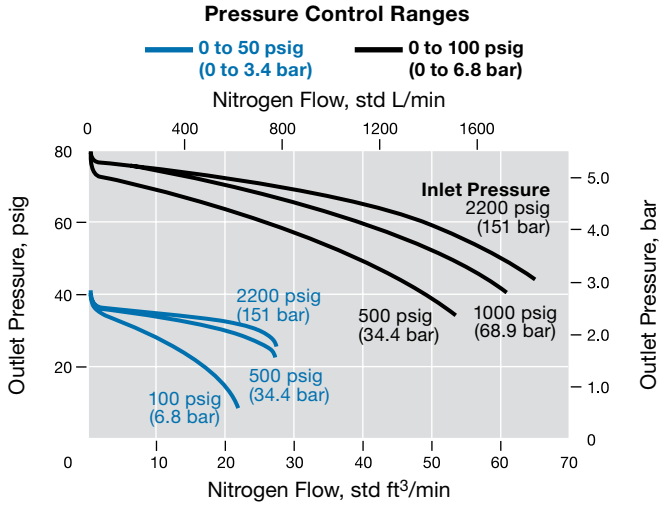
K Series Pressure-Reducing Regulator Flow Data

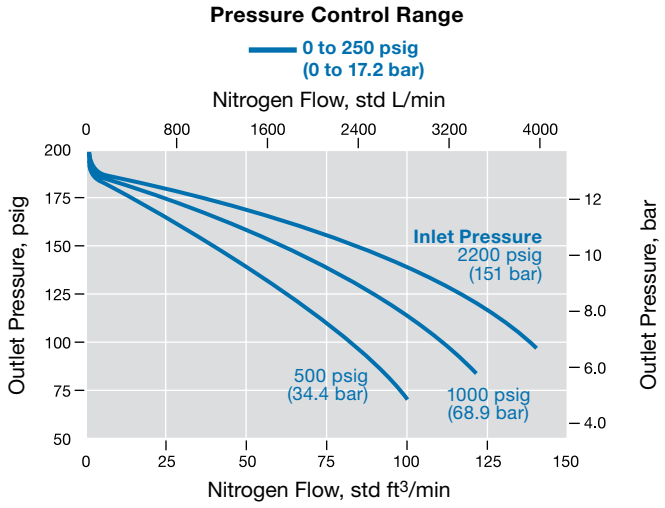
The graphs illustrate the change or "droop" in outlet pressures as the flow rate increases.

KHF Series

Flow Coefficient 1.0; Maximum Inlet Pressure 3600 psig (248 bar)

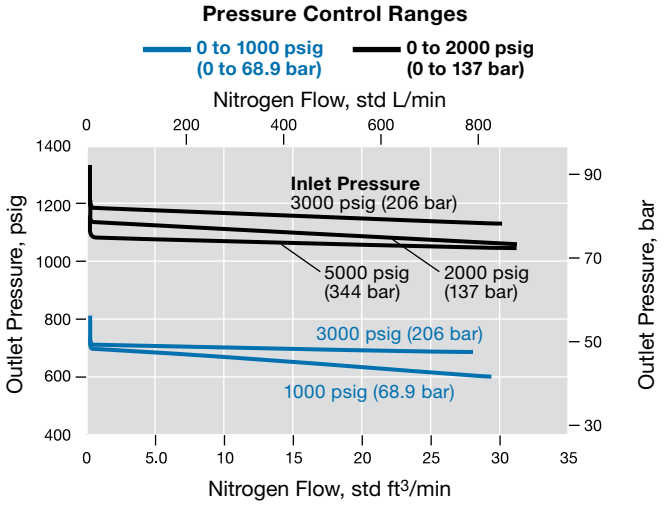


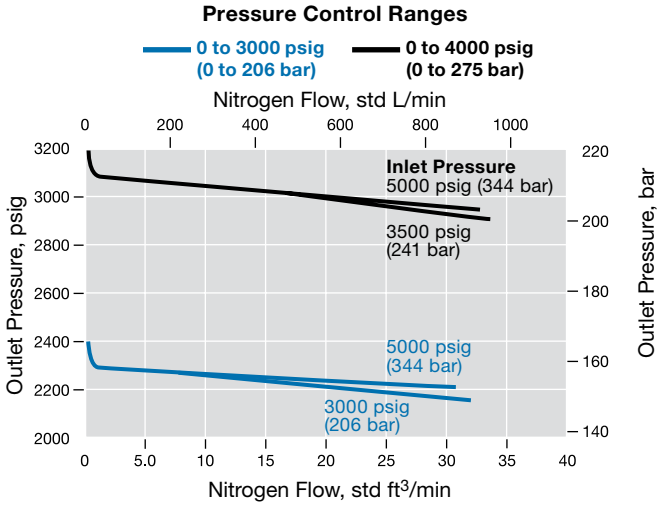




KPF Series

Flow Coefficient 1.0; Maximum Inlet Pressure 6000 psig (413 bar)



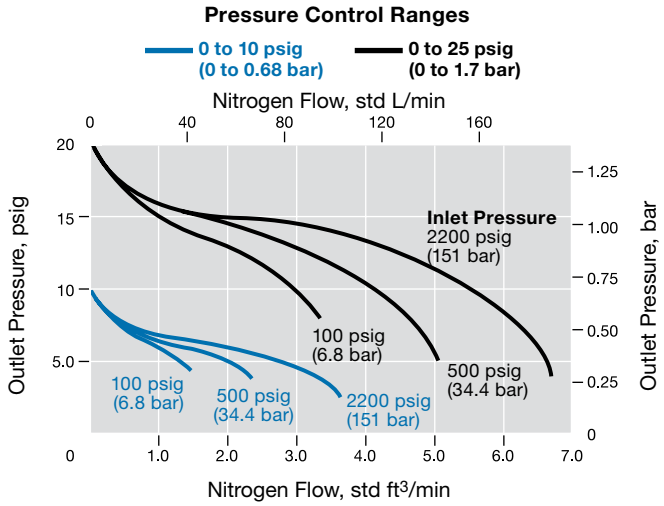


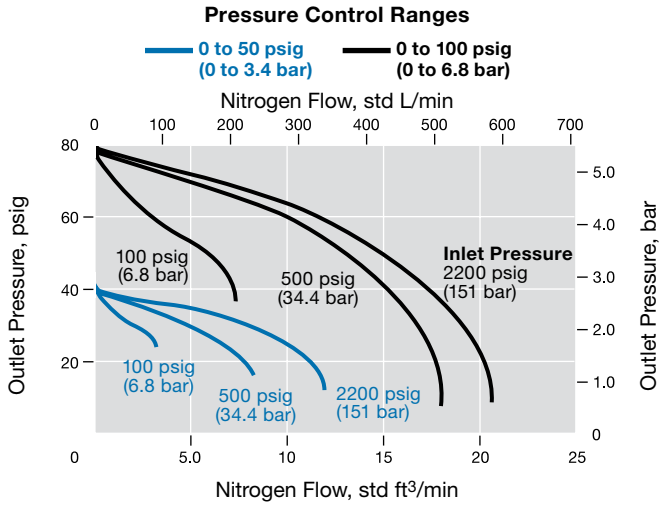
K Series Pressure-Reducing Regulator Flow Data

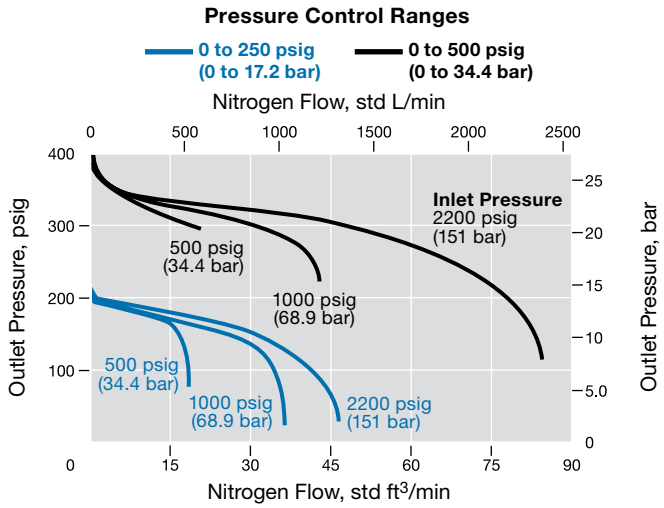
The graphs illustrate the change or "droop" in outlet pressures as the flow rate increases.

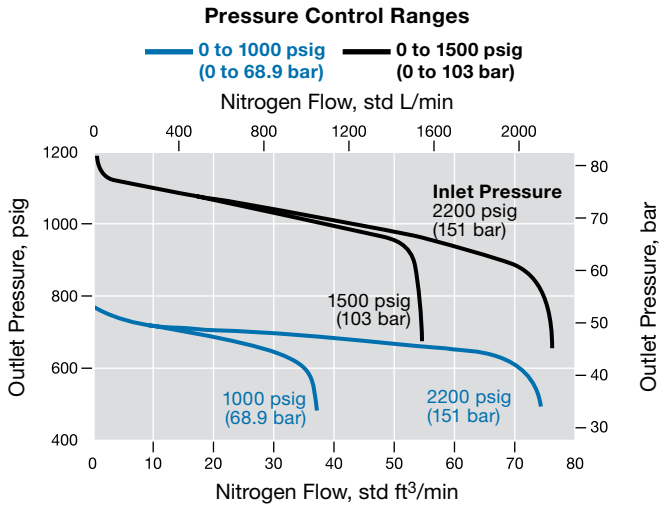
KCP Series

Flow Coefficient 0.06; Maximum Inlet Pressure 3600 psig (248 bar)

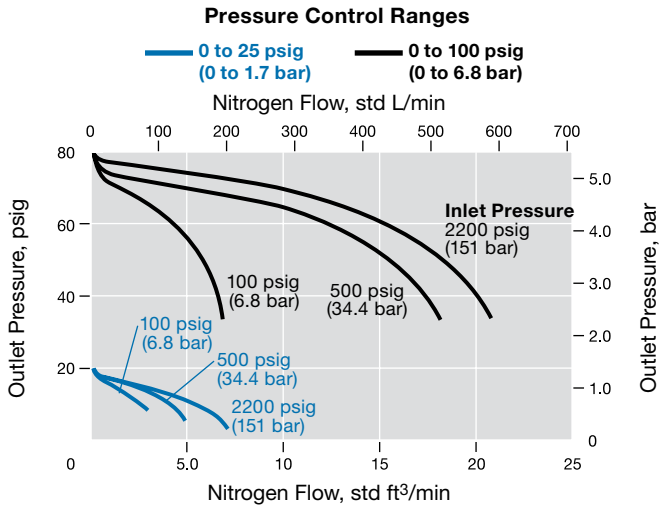


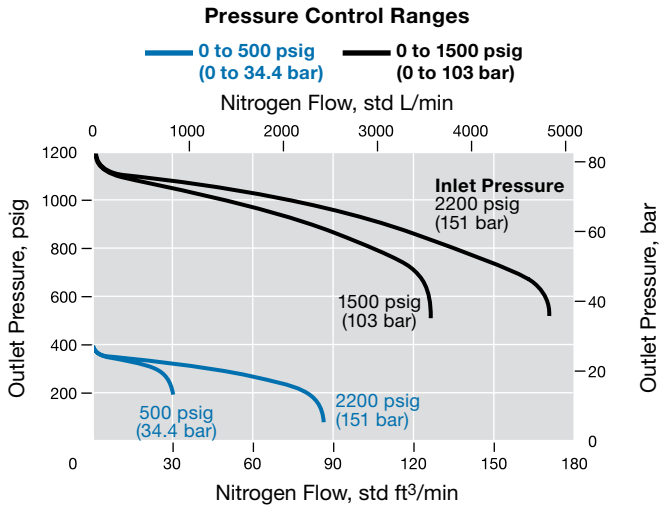






Flow Coefficient 0.20; Maximum Inlet Pressure 3600 psig (248 bar)



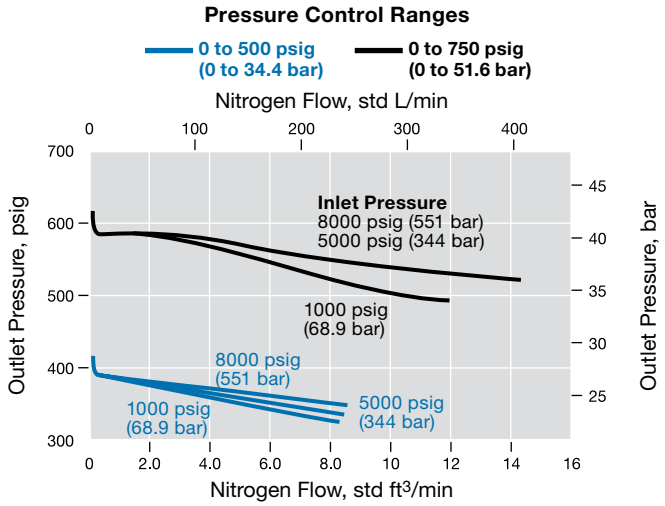


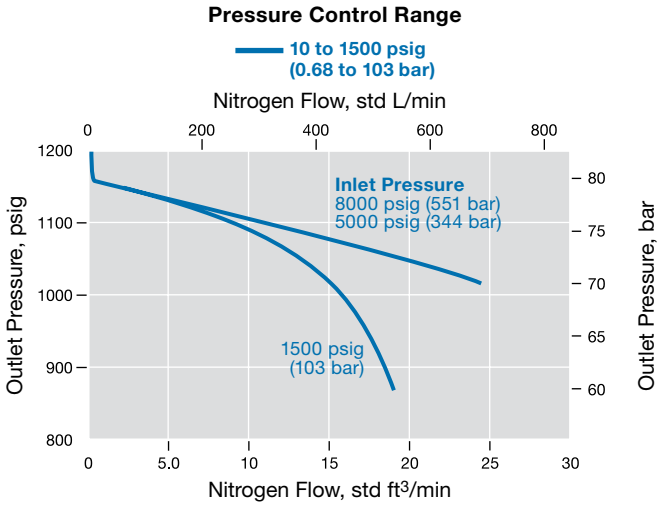
K Series Pressure-Reducing Regulator Flow Data

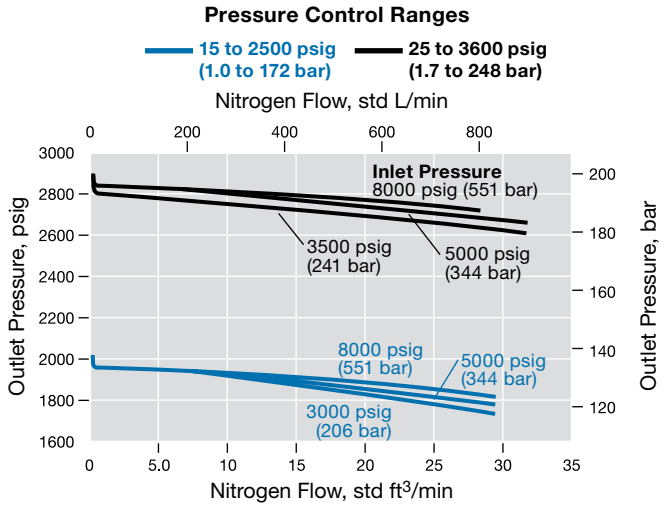
The graphs illustrate the change or “droop” in outlet pressures as the flow rate increases.

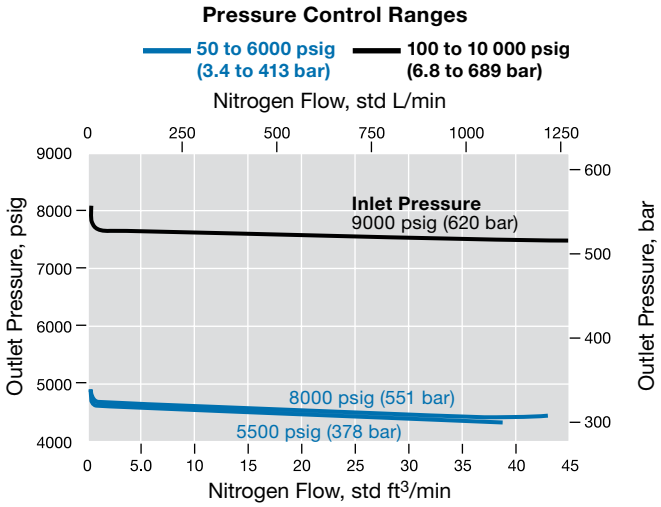
KHP Series

Flow Coefficient 0.06; Maximum Inlet Pressure 10 000 psig (689 bar)







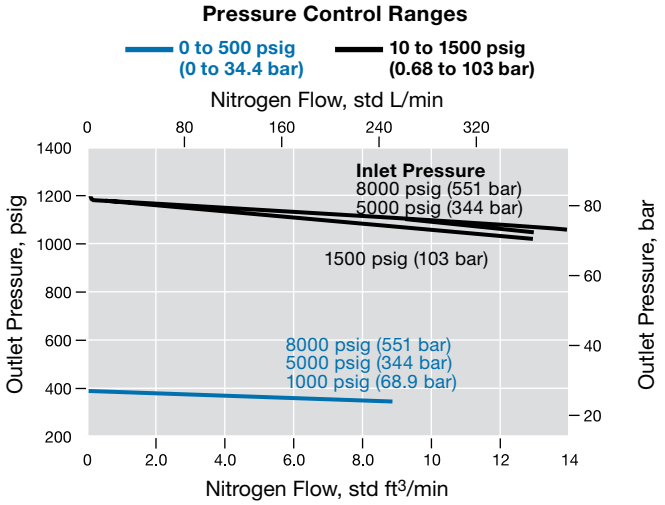


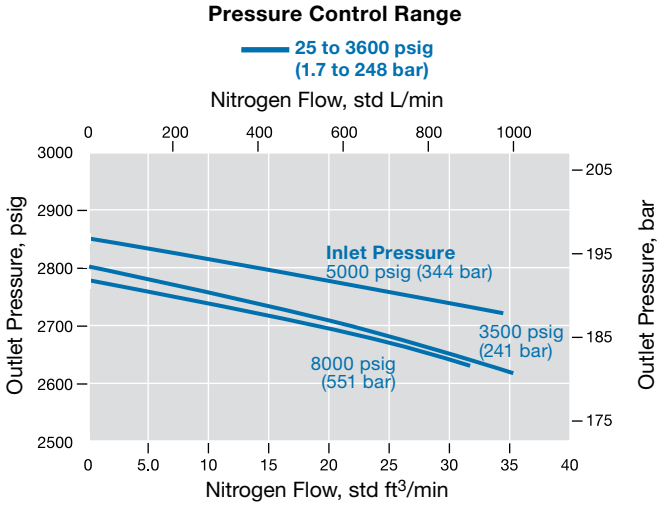
K Series Pressure-Reducing Regulator Flow Data

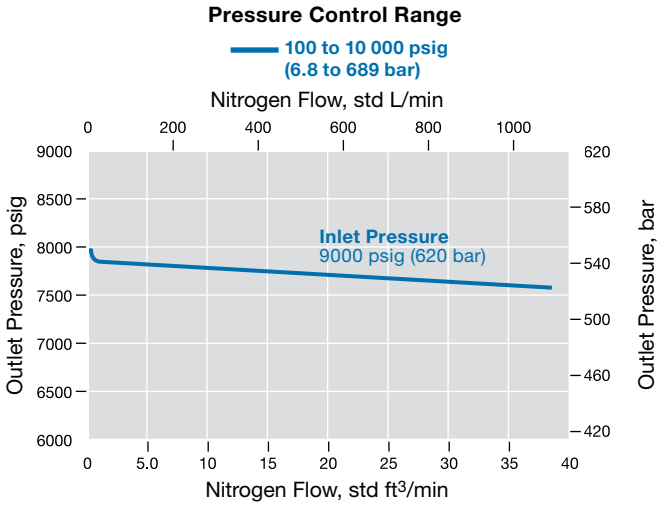
The graphs illustrate the change or "droop" in outlet pressures as the flow rate increases.

KHP Series

Flow Coefficient 0.25; Maximum Inlet Pressure 10 000 psig (689 bar)

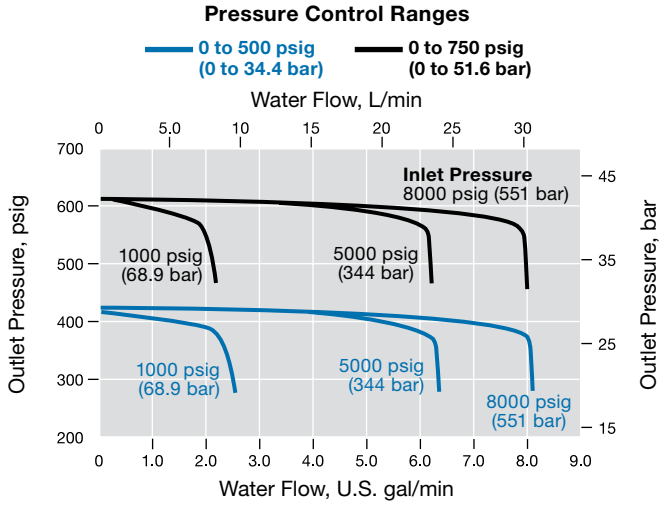


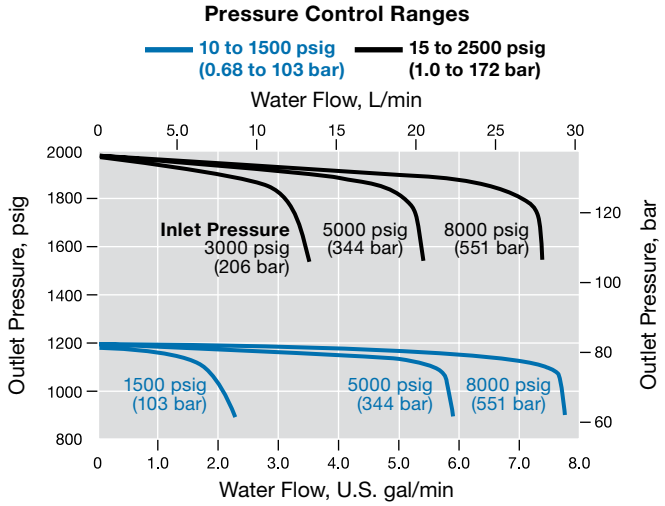


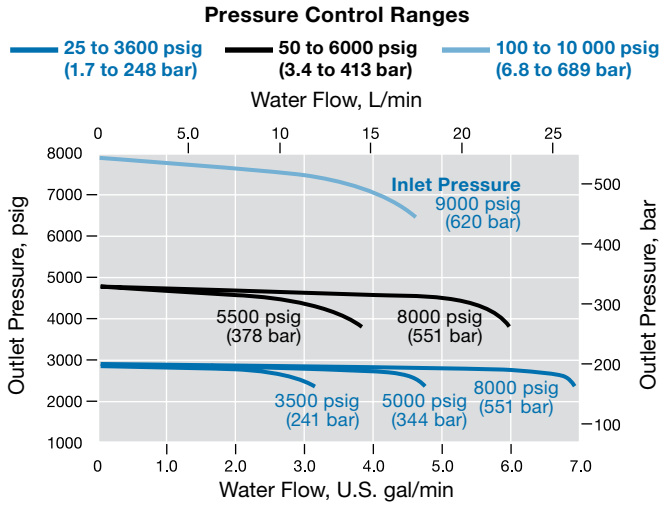


KHR Series

Flow Coefficient 0.06; Maximum Inlet Pressure 10 000 psig (689 bar)





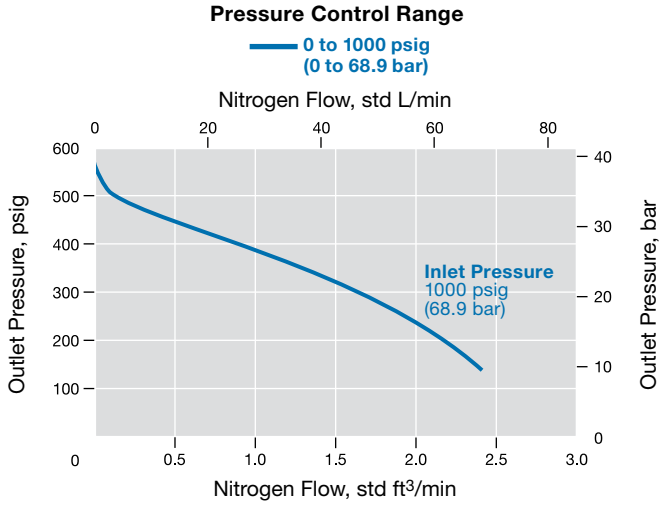


K Series Pressure-Reducing Regulator Flow Data

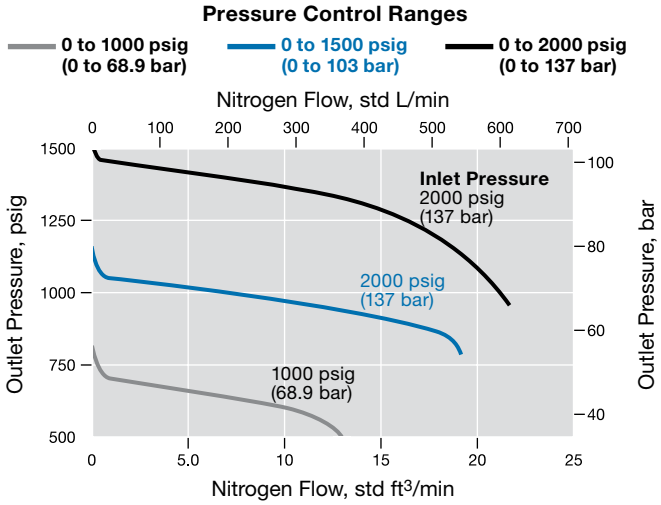
The graphs illustrate the change or “droop” in outlet pressures as the flow rate increases.

KPP Series

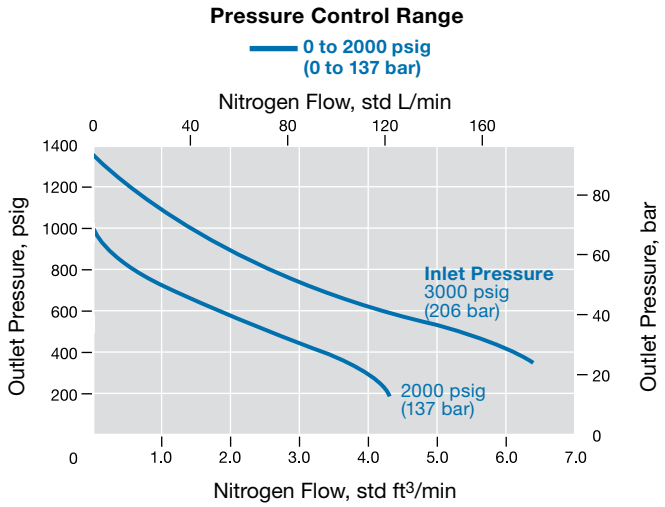
Flow Coefficient 0.02; Maximum Inlet Pressure 2000 psig (137 bar)



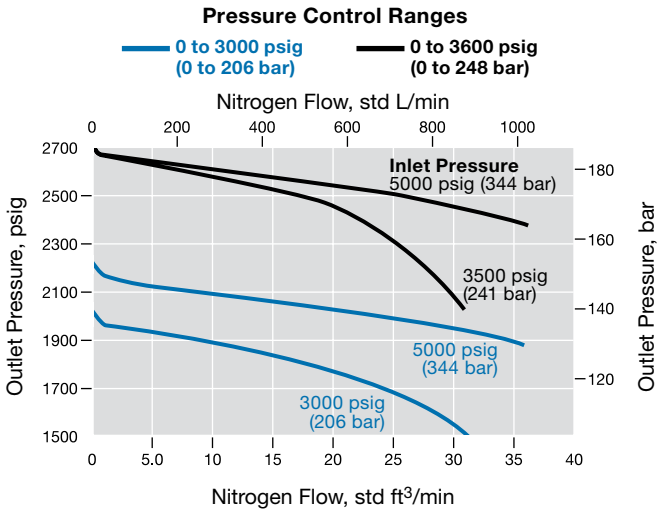
Flow Coefficient 0.06; Maximum Inlet Pressure 2000 psig (137 bar)



Flow Coefficient 0.02; Maximum Inlet Pressure 4000 psig (275 bar)



Flow Coefficient 0.06; Maximum Inlet Pressure 6000 psig (413 bar)

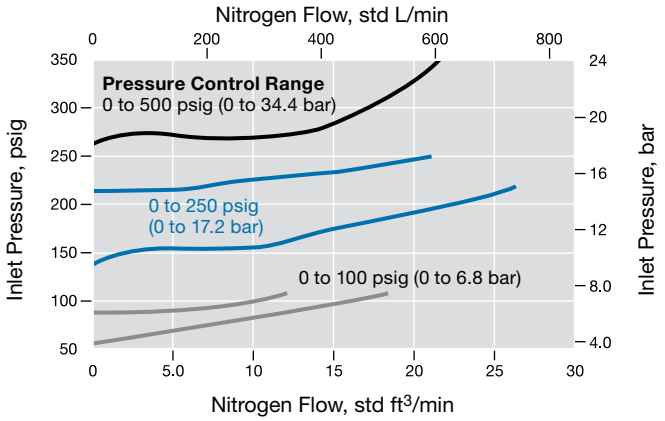


K Series Back-Pressure Regulator Flow Data

The graphs illustrate the change in inlet pressure as the flow rate increases.

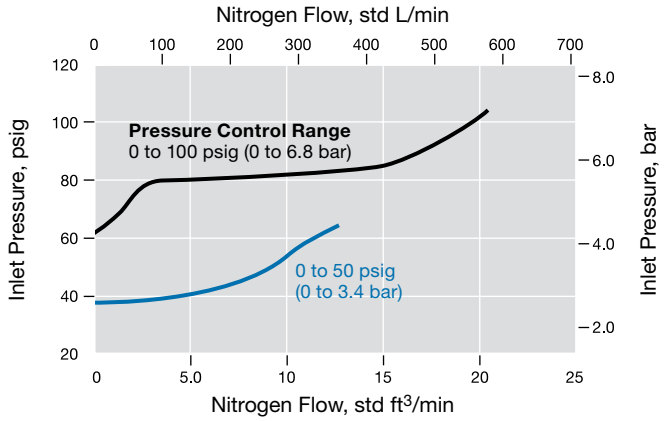
KBP Series

Flow Coefficient 0.20



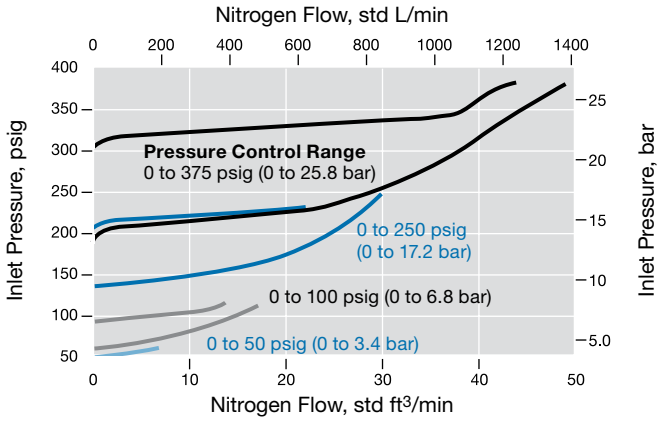
KFB Series

Flow Coefficient 1.0



KCB Series

Flow Coefficient 0.20

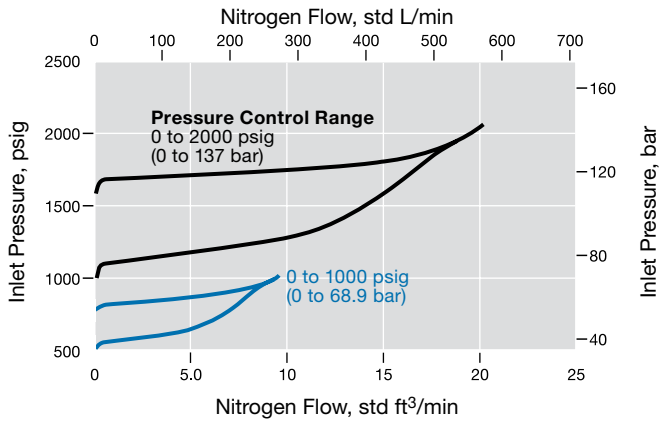


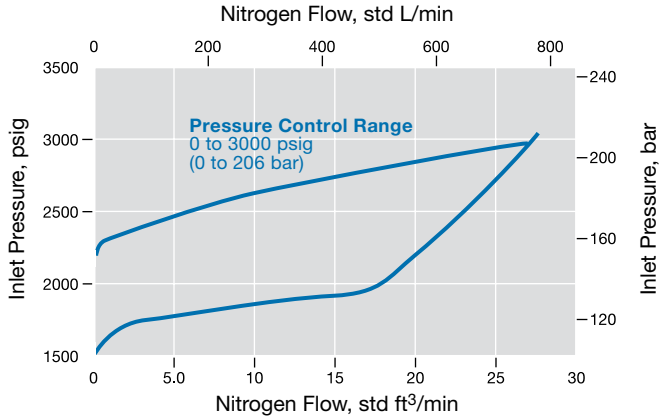
K Series Back-Pressure Regulator Flow Data

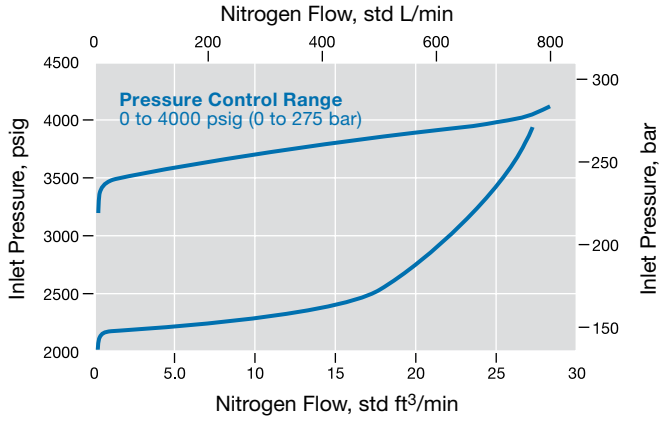
The graphs illustrate the change in inlet pressure as the flow rate increases.

KPB Series

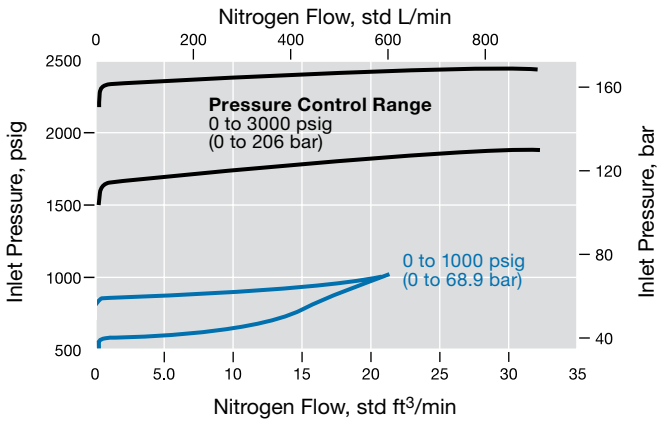
Flow Coefficient 0.06







Flow Coefficient 0.20

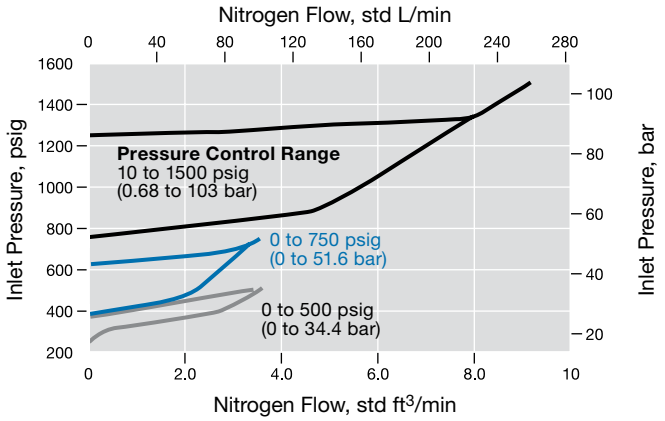


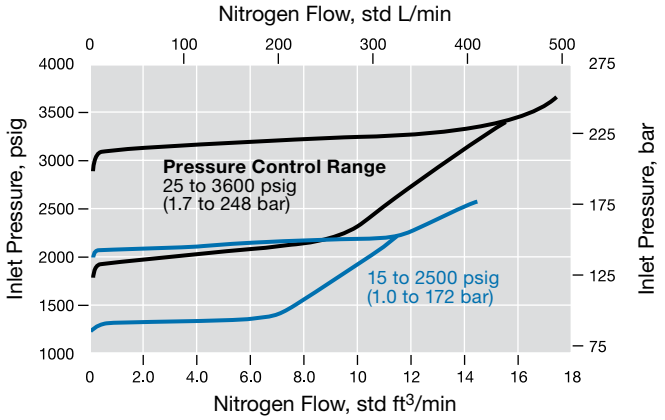
K Series Back-Pressure Regulator Flow Data

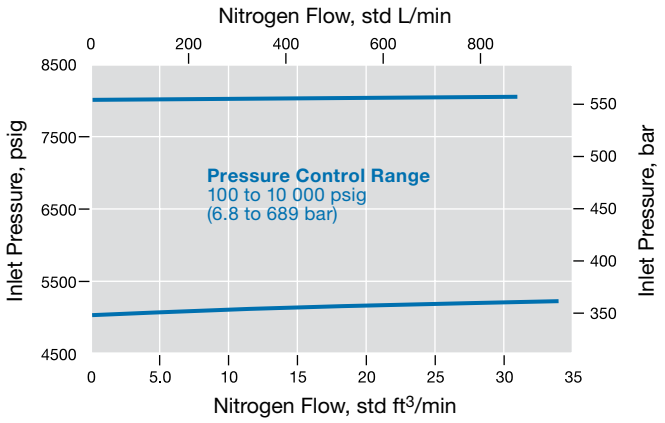
The graphs illustrate the change in inlet pressure as the flow rate increases.

KHB Series

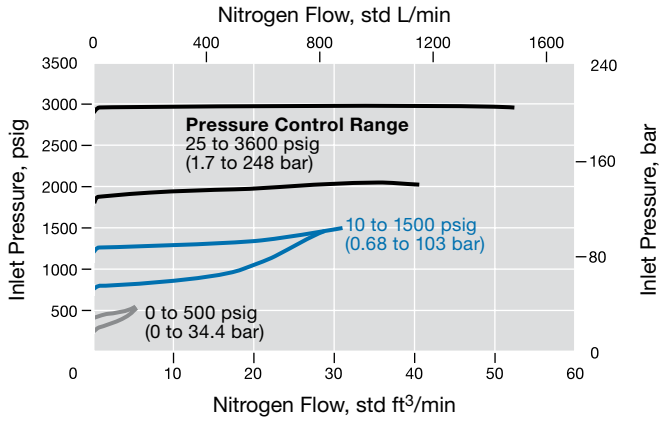
Flow Coefficient 0.06

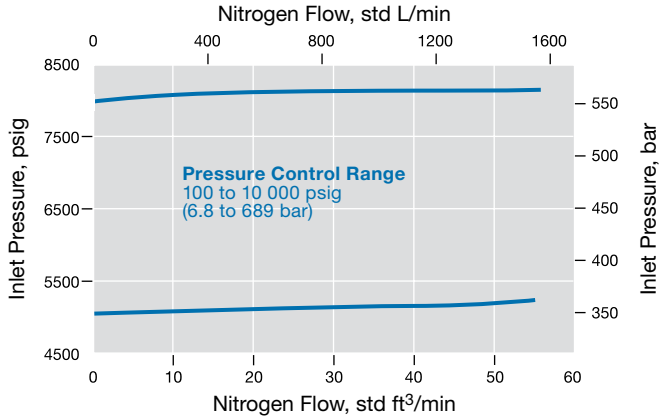






Flow Coefficient 0.25

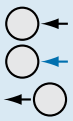




Port Configurations

Port configurations are available as shown in the regulator ordering information pages. The symbols indicate the port location of *factory-assembled* accessories. For alternative accessory locations, contact your authorized Swagelok representative.

Port Configuration Symbols



Filtered Accessory Inlet
Filtered main inlet
Outlet

G_i Inlet gauge
G_o Outlet gauge

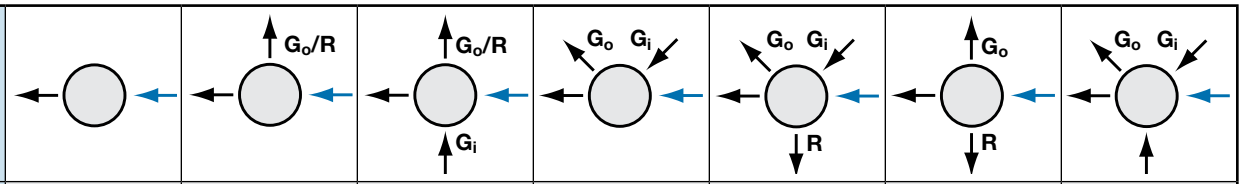
R Relief valve
G_o/R Outlet gauge or relief valve

Factory-assembled *cylinder connections* are placed on a filtered main inlet port; *isolation valves* are placed on an outlet port 180° from the cylinder connection.

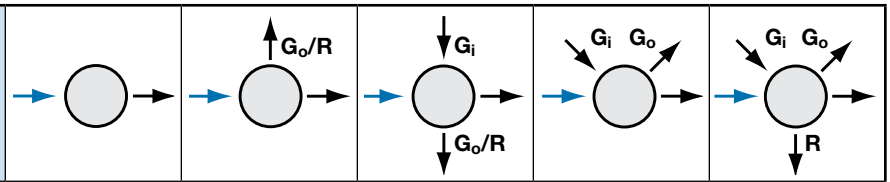
Select regulators are available on special order with additional port configurations. Contact your authorized Swagelok representative for more information.

Pressure-Reducing Regulators

Right-to-Left Flow

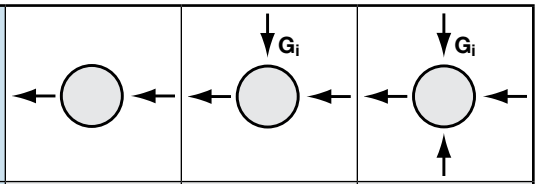
Configuration							
Designator	A	C	E	F	H	L	K

Left-to-Right Flow

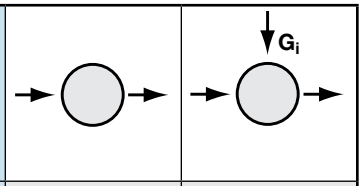
Configuration					
Designator	A	B	E	M	N

Back-Pressure Regulators

Right-to-Left Flow

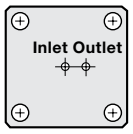
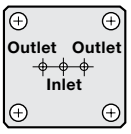
Configuration			
Designator	A	D	V

Left-to-Right Flow

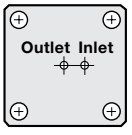
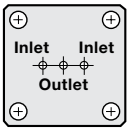
Configuration		
Designator	A	G

MPC Port Configurations

Pressure Reducing

Configuration	 2-Port	 3-Port
Designator	5	6

Back Pressure

Configuration	 2-Port	 3-Port
Designator	7	8

Options and Accessories

Regulator accessories are available separately or mounted on Swagelok regulators. Some accessories limit regulator pressure or temperature ratings. Additional materials, options, and accessories are available. Contact your authorized Swagelok representative for more information.

Cylinder Connections

- Available in a variety of 4 in (100 mm) long CGA, BS or DIN connections
- Stainless steel construction

Insert a designator into the ordering number as shown in the appropriate regulator ordering information pages.

Regulator inlet pressures and any optional accessories must be rated to the Cylinder connectors pressure. See the ordering information for each regulator for details.

Cylinder Gases and Connections

Cylinder Connection	Typical Gases (others may be applicable)	Rated Pressure psig (bar)	Connection Designator
CGA 320	Carbon Dioxide	3000 (206)	B
CGA 347	High pressure Air	5500 (379)	1
CGA 350	Hydrogen, Natural Gas	3000 (206)	D
CGA 540	Oxygen	3000 (206)	F①
CGA 580	Helium, Nitrogen	3000 (206)	G
CGA 590	Sulfur Hexafluoride	3000 (206)	H
CGA 660	Nitrogen Dioxide, Phosgene	3000 (206)	J
CGA 680	High pressure inert gas	5500 (379)	2
CGA 695	High pressure flammable gas	5500 (379)	3
BS 3	Argon, Helium	3600 (250)	R
BS 4	Hydrogen, Natural Gas	3600 (250)	S
BS 8	Carbon Dioxide	3600 (250)	V
BS/ISO 30	High pressure inert gas	4351 (300)	4
BS/ISO 31	High pressure Air	4351 (300)	5
BS/ISO 32	High pressure oxidising gas	4351 (300)	6
BS/ISO 38	High pressure flammable gas	4351 (300)	8
DIN 1	Ethane, Hydrogen	4351 (300)	K
DIN 5	Carbon monoxide, Hydrogen sulfide	4351 (300)	L
DIN 6	Ammonia, Xenon	4351 (300)	M
DIN 8	Chlorine, Hydrogen chloride	4351 (300)	N
DIN 10	Nitrogen	4351 (300)	P
DIN 13	Air	4351 (300)	Z

① Available only on select KPR and KCY series regulators. Contact your authorized Swagelok representative.

Other cylinder connections are also available. Contact your authorized Swagelok representative for more information.

Options and Accessories

Pressure Gauges

- Provides measure of inlet pressure, outlet pressure, or both
- 2 1/2 in. (63 mm) dial size with 1/4 in. male NPT connection
- 1 1/2 in. (40 mm) dial size with 1/8 in. male NPT connection
- Stainless steel cases and wetted components

Refer to Swagelok *Pressure Gauges, Industrial and Process* catalog, MS-02-170, for additional information.

Cleaning

Gauges assembled to ASTM G93 Level E or SC-11–cleaned regulators are cleaned in accordance with ASME B40.100 level IV.

Ordering Information

To order a regulator assembled with gauges, insert a designator from the table below into the ordering number as shown in the appropriate regulator ordering information pages. The maximum gauge pressures are appropriate for the maximum inlet pressure and/or control pressure ordered.

Gauge Scale primary unit (secondary unit)	Gauge Designator			Gauge Model①
	Inlet and Outlet	Inlet Only	Outlet Only	
psig (bar) (North America only)②	1	A	G	C
psig (bar)	3	C	J	B
psig (kPa)	5	E	L	C
bar (psig)	2	B	H	B
MPa	4	D	K	B

① KCP and KCB series regulators are assembled with M model gauges.
② Not available for KCP and KCB series regulators.

Isolation Valves

- Allow isolation from downstream equipment
- Working pressures up to 5000 psig (344 bar)
- 316 stainless steel construction
- Swagelok integral-bonnet needle valve (1 series)
- Used in conjunction with an adjustable regulator relief valve

Refer to Swagelok *Integral-Bonnet Needle Valves* catalog, MS-01-164, for additional information.

Isolation Valve and Relief Valve Ordering Information

Isolation valves are available factory assembled on KCP, KPP, KPF, KHP, KHR, and KHB series regulators. Isolation and adjustable regulator relief valves are available factory assembled on KPR, KCY, KCM, KLF, and KHF series regulators.

To order a regulator factory assembled with an isolation valve or isolation valve and adjustable regulator relief valve, insert a designator from the table below into the ordering number as shown in the appropriate regulator ordering information pages.

Description	Valve Designator		
	Relief Only	Isolation Only①	Isolation and Relief
Kenmac® KVV series adjustable regulator relief valve	1	—	—
1/4 in. male NPT inlet 1/4 in. Swagelok tube fitting outlet angle pattern isolation valve	—	A	2
1/4 in. male NPT inlet 6 mm Swagelok tube fitting outlet angle pattern isolation valve		B	3
1/4 in. male NPT inlet 1/4 in. female NPT outlet angle pattern isolation valve		C	4
1/4 in. Swagelok tube fitting inlet② and outlet straight pattern isolation valve		E	6
6 mm Swagelok tube fitting inlet② and outlet straight pattern isolation valve		F	7
3/8 in. Swagelok tube fitting inlet② 1/4 in. female NPT outlet straight pattern isolation valve		G	8

① Not available on KPR, KCY, KCM, KLF, and KHF series regulators, because a relief valve is needed to protect the diaphragm sensing mechanism.
② Includes male NPT to Swagelok tube adapter fitting (required for regulators with 1/8 and 1/2 in. female NPT ports).

Options and Accessories

Kenmac Adjustable Regulator Relief Valves (KVV Series)

- Provide nonsafety-related pressure protection for Swagelok regulators

Technical Data

Relief Pressure Ranges

- Based on the regulator control range

Regulator Control Range psig (bar)	Relief Pressure Range psig (bar)
0 to 10 (0 to 0.68) 0 to 25 (0 to 1.7) 0 to 50 (0 to 3.4)	0 to 100 (0 to 6.8)
0 to 100 (0 to 6.8)	50 to 200 (3.4 to 13.7)
0 to 250 (0 to 17.2) 0 to 500 (0 to 34.4)	150 to 500 (10.3 to 34.4)

Maximum Operating Temperature

- 392°F (200°C)

Weight

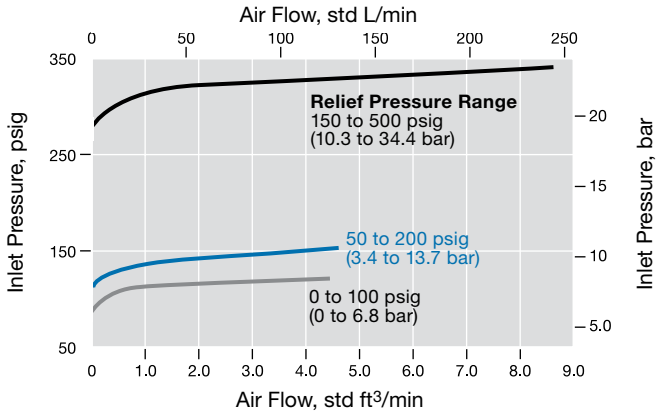
- 0.26 lb (0.12 kg)

Ports

- 1/4 in. NPT male inlet and female outlet

Flow Data

The graph illustrates the discharge characteristics of the Kenmac adjustable regulator relief valve.



Materials of Construction

Component	Material
Body, poppet, spring button, adjusting screw	*316 SS*
Seal	*Fluorocarbon FKM*
Range spring	*302 SS*

Wetted components listed in *italics*.

Testing

Every KVV series regulator relief valve is factory tested at its maximum rated pressure, then set to zero when assembled to the regulator.

⚠ **Reset relief pressure to the desired value before pressurizing the system.**

Ordering Information

To order a KVV adjustable regulator relief valve separately, select an ordering number from the table below.

Relief Pressure Range psig (bar)	Ordering Number
0 to 100 (0 to 6.8)	KVV11DE1
50 to 200 (3.4 to 13.7)	KVV11DG1
150 to 500 (10.3 to 34.4)	KVV11DI1

⚠ **For valves not actuated for a period of time, initial relief pressure may be higher than the set pressure.**

⚠ **Some system applications require relief valves to meet specific safety codes. The system designer and user must determine when such codes apply and whether these relief valves conform to them.**

⚠ **Kenmac adjustable regulator relief valves should never be used as ASME Boiler and Pressure Vessel Code safety relief devices.**

⚠ **Kenmac adjustable regulator relief valves are not "Safety Accessories" as defined in the Pressure Equipment Directive 2014/68/EU.**

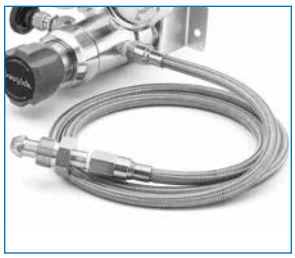
Options and Accessories

Hoses

Hoses are available assembled to the inlet of the regulator to allow connection to remote gas cylinders.

Hose options include:

- 3 ft long Swagelok 1/4 in. high-pressure, metal flexible hose (FX series), 1/4 in. female NPT inlet, 1/4 in. male NPT outlet connected to regulator: SS-FX4PM4PF4-36
  Rated to 6000 psig (413 bar) at 100°F (37°C)
- 3 ft long Swagelok 1/4 in. PTFE-lined, stainless steel braided hose (TH series), 1/4 in. female NPT inlet, 1/4 in. male NPT outlet connected to regulator: SS-TH4PM4PF4-36
  Rated to 3100 psig (213 bar) at 100°F (37°C)



Refer to Swagelok *Hose and Flexible Tubing* catalog, MS-01-180, for additional information.

Cleaning

Hoses are not available assembled to ASTM G93 Level E or SC-11 specially-cleaned regulators.

Handles

Knob, thumbwheel, and antitamper handles are available.

The green plastic knob handle is standard for most Swagelok regulators. Other colors are available; add a handle color designator to a regulator ordering number.

Color	Designator
Black	BK
Blue	BL
Orange	OG
Red	RD
Yellow	YW

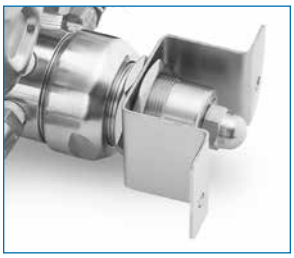
Example: KPR1FRF412A20000**BK**

The metal thumbwheel handle is available for the compact KCB and KCP series regulators.

The metal antitamper nut is available to prevent inadvertent pressure adjustment.

Wall Mounting Brackets

Stainless steel wall mounting brackets are available for many Swagelok regulators.



KCY Series Mounting Bracket

Requires 1st stage panel-mount option. See page 9.

KPR, KLF, KHF, KCP, KPP, KPF, KHP, KBP, KFB, KCB, KPB, and KHB Series Mounting Bracket

Wall Mounting Bracket Kits

Regulator Series	Ordering Number
KPR, KLF, KHF, KCP, KPP, KPF, KHP, KBP, KFB, KCB, KPB, KHB	9R0079
KCY	9R0149

Maintenance Kits

Filter Replacement Kits

Filter replacement kits are available for KPR, KCM, KCP, KCY, KPP, KHP, KLF, KHR, KHF, and KPF series regulators.

Filter replacement kits include:

- five sets of filters and carrier assemblies
- instructions.

Regulator Series	Inlet Size	Ordering Number
KCP	1/8 in. NPT	REG-FILTER-2-KIT5
KPR, KCM, KCY, KPP, KHP, KLF, KHR	1/4 in. NPT	REG-FILTER-4-KIT5
KHF, KPF	1/2 in. NPT	REG-FILTER-8-KIT5

Maintenance Kits

KPR, KCP, AND KBP Series Maintenance Kits

Maintenance kits include:

- all wetted components, except for the regulator body and piston, if applicable
- wetted lubricant with MSDS
- instructions.

Maintenance Kits for Other Regulator Series

Maintenance kits for KLF, KHF, KPP, KPF, KHP, KHR, KFB, KCB, KCY, KPB, KHB, KSV, and KEV series regulators are available.

To order, contact your authorized Swagelok representative; to ensure correct kit contents, please provide the original regulator ordering number.

Maintenance Instructions

Maintenance instructions for all Swagelok regulators are available from your Swagelok website.

Maintenance Tools

Specially designed tools and tool kits are available to assist in the service and repair of Swagelok regulators. Contact your authorized Swagelok representative for more information.

Ordering Information

Build a maintenance kit ordering number by combining the designators in the sequence shown below.

1 2 3	4	5	6	7	8	9	10	11	12	13 14 15 16
KPR	**1**	**D**	0	0	**4**	**1**	**2**	**A**	0	- K I T

1 2 3 Regulator Series
KPR = KPR
KCP = KCP
KBP = KBP

4 Body Material, Cleaning
1 = 316 SS and brass
C = 316 SS and brass, SC-11 cleaned

5 Pressure Control Range

KPR and KBP Series
D = 0 to 10 psig (0 to 0.68 bar) and 0 to 25 psig (0 to 1.7 bar)
F = 0 to 50 psig (0 to 3.4 bar) and 0 to 100 psig (0 to 6.8 bar)
J = 0 to 250 psig (0 to 17.2 bar) and 0 to 500 psig (0 to 34.4 bar)

KCP Series
G = 0 to 10 psig (0 to 0.68 bar), 0 to 25 psig (0 to 1.7 bar), 0 to 50 psig (0 to 3.4 bar), 0 to 100 psig (0 to 6.8 bar), and 0 to 250 psig (0 to 17.2 bar)
M = 0 to 500 psig (0 to 34.4 bar), 0 to 1000 psig (0 to 68.9 bar), and 0 to 1500 psig (0 to 103 bar)①

① Not available with MPC platform port configuration.

6 Maximum Inlet Pressure
0 = Not applicable

7 Port Configuration
0 = Not applicable

8 Ports (Filter Size)

KPR Series
4 = 1/4 in. female NPT
0 = All other end connections

KBP Series
0 = Not applicable

KCP Series
2 = 1/8 in. female NPT
M = MPC platform

9 Seat, Seal Material

KPR Series
1 = PCTFE
2 = PEEK

KBP and KCP Series
A = Fluorocarbon FKM, PCTFE
B = Kalrez, PCTFE
C = Fluorocarbon FKM, PEEK
D = Kalrez, PEEK

10 Flow Coefficient (C_v)
1 = 0.02
2 = 0.06
5 = 0.20①②
7 = 0.50①

① Not available for KCP series with MPC platform port configuration.
② Required for KBP series.

11 Sensing Mechanism, Vent

KPR Series
A = Alloy X-750 diaphragm, no-vent models and captured-vent models
C = Alloy X-750 diaphragm, self-vent models and self- and captured-vent models

KBP Series
A = Alloy X-750 diaphragm, all models

KCP Series
P = 316 SS piston

12 Handle, Mounting
0 = Not applicable

Additional Products

Filters

Swagelok offers a variety of filters, filter elements, and sizes.

- 316 SS and brass materials
- Sintered and strainer elements
- Tee type, inline, and all-welded models

Refer to Swagelok filters, see the *Filters—FW, F, and TF Series* catalog, MS-01-92, for additional information.

Transducers

Swagelok industrial pressure transducers electronically monitor fluid system pressure in a variety of analytical and process applications.

- Accurate and repeatable readings
- Swagelok tube adapter end connections available for ease of installation and maintenance
- CE compliant

Refer to Swagelok industrial pressure transducers, see the *Industrial Pressure Transducers* catalog, MS-02-225, for additional information.

⚠ **Swagelok 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.**

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

Swagelok

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 of the individual catalog. 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.

Warranty Information

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

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

Pressure Regulators
RHPS Series

- Pressure-reducing models
- Back-pressure models
- Spring-, dome-, and air-loaded
- 1/4 to 4 in. end connections
- Working pressures up to 10 150 psig (700 bar)
- Temperatures from –49 to 176°F (–45 to 80°C)

Contents

Pressure-Reducing Regulators

Spring-Loaded—RS Series, 8

Pressure-Reducing Regulators

Dome-Loaded—RD Series, 43

Pressure-Reducing Regulators

Dome-Loaded—RD Series

Integral Pilot-Operated
RD(H)30, 40 Series, 84

Integral Pilot-Operated, High-Sensitivity
LPRD20, 25, 30, 40 Series, 99

Air-Loaded
RA4, 6, 8 Series, 101

Back-Pressure Regulators

Spring-Loaded—BS Series, 107

BS Series Maintenance Kits, 128

Compact, General-Purpose
BS(H)2 Series, 109

General-Purpose
BS(H)4, 6, 8 Series, 113

General-Purpose
BS(H)10, 15 Series, 118

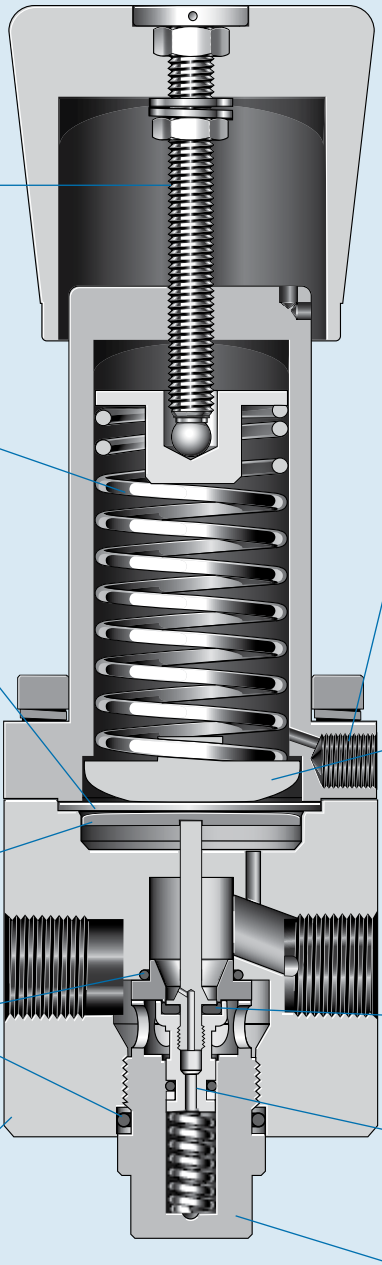
High-Sensitivity
LBS4 Series, 124

Back-Pressure Regulators

Dome-Loaded—BD Series

Contact your authorized Swagelok sales and service representative for information about dome-loaded, back-pressure regulators.

Features



Regulator Adjusting Screw

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

Set-Pressure Spring

- provides pressure control across a wide range of flow rates
- long spring improves droop performance.

Diaphragm Sensing Mechanism

- typically used in low outlet pressure applications
- provides greater accuracy in sensing changes in outlet pressure
- available in PTFE and a variety of elastomers
- designed with a short stroke to maximize cycle life.

Diaphragm Support Plate

promotes diaphragm life.

Seal Materials

available in a variety of materials for enhanced chemical compatibility in a wide range of applications.

Body Material

316L SS for improved corrosion resistance.

Threaded Vent

allows monitoring of the diaphragm or piston sensing mechanism.

WARNING: Threaded-vent regulators can release system fluid to atmosphere. Position the threaded vent connection away from operating personnel.

Bottom Spring Guide

- engages diaphragm to distribute forces evenly
- protects diaphragm from premature failure.

Seat Seal Materials

available in PCTFE, PEEK, and a variety of elastomers.

Balanced Poppet Design

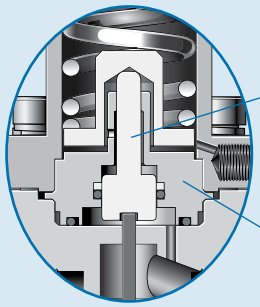
reduces supply-pressure effect and lockup.

Body Plug

allows for easy maintenance and more up-time.

Piston Sensing Mechanism

- typically used to regulate higher pressures than a diaphragm sensing mechanism
- more resistant to damage caused by pressure spikes
- designed with a short stroke to maximize cycle life.



Types of Regulators

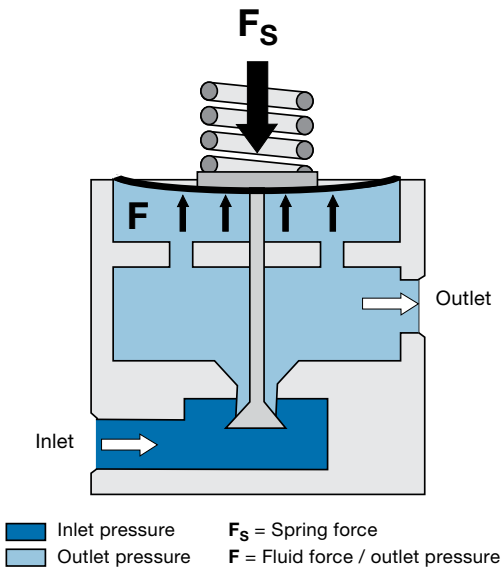
There are two types of RHPS series pressure regulators

- *Pressure-reducing* regulators with spring or dome loading
- *Back-pressure* regulators with spring or dome loading

How a Pressure Regulator Works

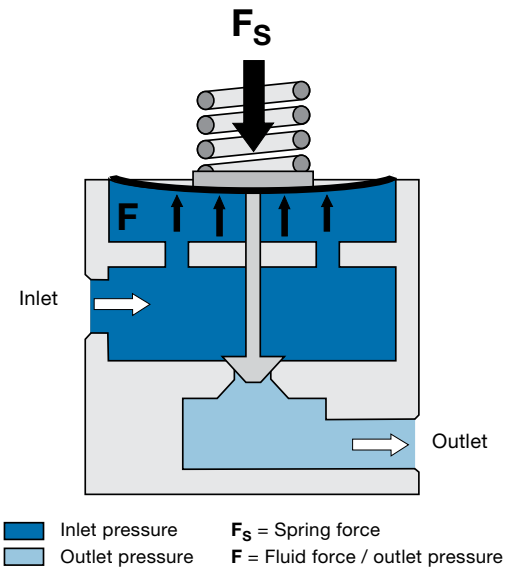
A pressure regulator has a sensing element (piston or diaphragm) which, on one side, is subjected to a load force (F_S) created by a spring (as shown below) or a gas pressure. On the other side, the sensing element is subject to the force (F) of the system fluid.

Pressure-Reducing Regulators



The function of a pressure-reducing regulator is to reduce a pressure and to keep this pressure as constant as possible while the inlet pressure and the flow may vary. This is accomplished by the fluid force (F) being equal to or slightly lower than load force (F_S) causing the poppet to open.

Back-Pressure Regulators



The function of a back-pressure regulator is to keep inlet pressure below a set pressure. This means the regulator can either **open** in case of excess pressure or **close** when the pressure drops below a desired pressure. This is accomplished by the fluid force (F) being equal to or slightly lower than load force (F_S) causing the poppet to close.

Terminology

Accumulation—an increase in inlet pressure caused by an increase in flow rate to a back-pressure regulator.

Creep—an increase in outlet pressure typically caused by regulator seat leakage.

Dependency—see supply pressure effect (SPE).

Droop—a decrease in outlet pressure caused by an increase in flow rate to a pressure-reducing regulator.

Lockup—an increase in outlet pressure that occurs as the flow rate is decreased to zero.

Self-venting—a feature that reduces outlet pressure in a pressure-reducing regulator when the regulator set point is decreased and there is no flow through the regulator.

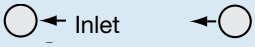
Sensitivity—the degree to which the regulator responds to force balance changes.

Set pressure—the desired outlet pressure of a pressure-reducing regulator, normally stated at a no-flow condition.

Supply pressure effect (SPE)—the effect on the set pressure of a pressure-reducing regulator as a result of a change in inlet pressure, normally experienced as an increase in outlet pressure due to a decrease in inlet pressure. Also known as Dependency.

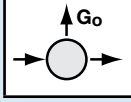
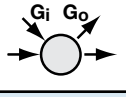
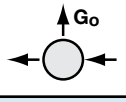
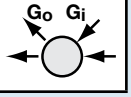
Threaded vent—a connection that allows monitoring of the diaphragm or piston sensing mechanism.

Gauge Connection Configuration Symbols



G_i = Inlet gauge G_o = Outlet gauge

Gauge Connection Configurations—Pressure-Reducing Regulators

Standard	GN2	GN4	GN5
			

Components

Every RHPS series pressure regulator has three common design components:

- Loading mechanism (spring, dome, or combination spring and dome)
- Sensing mechanism (diaphragm or piston)
- Controlling mechanism (poppet)

Loading Mechanism

The loading mechanism is the component of the regulator that balances the force or pressure.

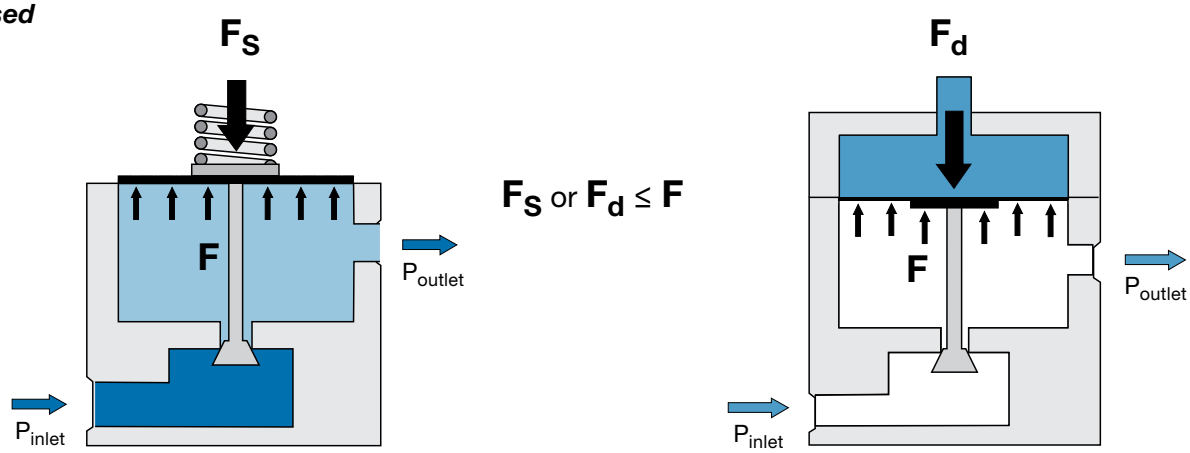
Spring-Loaded

In a spring-loaded regulator, a coil spring is used to generate a load (F_S) against the sensing mechanism. The amount of spring force or load can be adjusted by turning the handle or adjusting screw of the regulator.

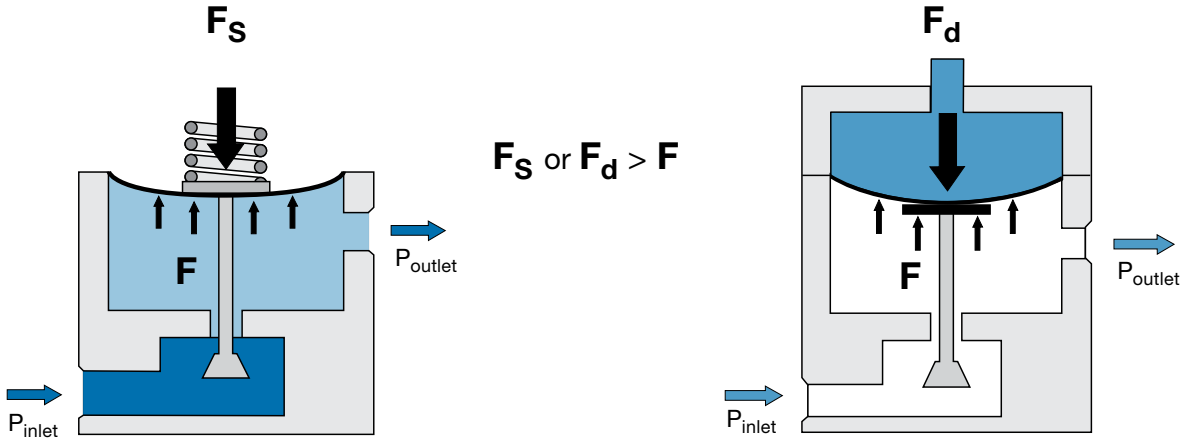
Dome-Loaded

In a dome-loaded regulator, a gas is fed into the dome chamber above the sensing mechanism at a pressure equal to or slightly above the required outlet pressure. This volume of gas is used like a spring. The dome pressure (F_d) is typically supplied by a second regulator called a pilot regulator.

Closed



Open



Combination Spring- and Dome-Loaded

The spring- and dome-loaded mechanisms can be used in combination with one another. The resulting effect provides the function of a differential pressure regulator. This regulator is designed to control pressure which is the sum of a reference pressure (provided by the dome) and a bias pressure (provided by the spring). See RD(H)6DP series on page 55 for details.

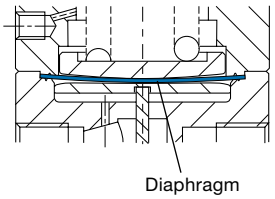
Components

Sensing Mechanisms

The sensing mechanism is the component separating the spring/dome force and the fluid force. It senses changes in pressure and allows the regulator to react and to try to restore the original set pressure.

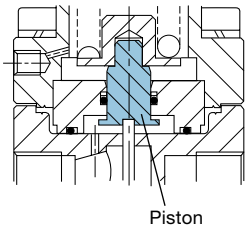
Diaphragm Sensing

The diaphragm is a large, flat piece of material usually made of an elastomer, PTFE, or metal depending on the application. A diaphragm is normally used for low control-pressure applications in spring-loaded regulators and in all dome-loaded regulators.



Piston Sensing

A piston is a cylindrical metal component which is generally used to regulate higher control pressures than a spring-loaded regulator with a diaphragm. They are also more resistant to damage caused by pressure spikes.

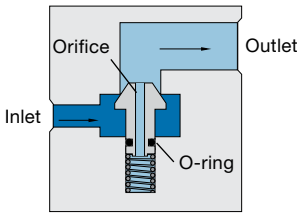


Controlling Mechanisms

The controlling mechanism, also known as a poppet, acts to reduce a high inlet pressure to a lower outlet pressure. There are two designs used in RHPS regulators.

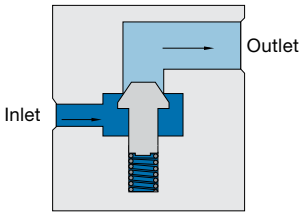
Balanced Poppet

In a balanced poppet design, the area on which the inlet pressure acts is reduced due to the orifice through the poppet and balancing O-ring. The advantages of this design are a reduced seat load, less sensitivity to SPE, and the ability to have a larger seat for more flow.



Unbalanced Poppet

In an unbalanced poppet design, the inlet pressure provides the majority of the shutoff force. Unbalanced poppets are generally used in small regulators or larger regulators in low-pressure applications.

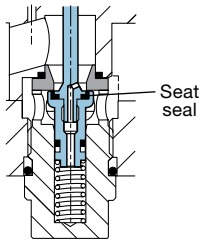


Seat Design

The poppet within the RHPS series regulator can have a *hard* or *soft* seat seal depending on the pressure requirements of the application.

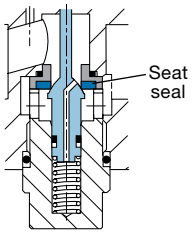
Soft Seat Seal

A soft seat seal is designed to regulate pressures up to 1015 psig (70.0 bar). The seat seal materials are generally elastomeric, and include fluorocarbon FKM, perfluorocarbon FFKM, nitrile, and EPDM.



Hard Seat Seal

A hard seat seal is designed to regulate pressures up to 10 150 psig (700 bar). The seat seal materials are PCTFE for pressures up to 5800 psig (400 bar) and PEEK for pressures up to 10 150 psig (700 bar).



Testing

Every RHPS series regulator is factory tested with nitrogen or air. Shell testing is performed to a requirement of no detectable leakage with a liquid leak detector.

Cleaning and Packaging

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

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

Oxygen Service Hazards

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

⚠ **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.**

⚠ **WARNING: Self-venting and threaded-vent regulators can release system fluid to atmosphere. Position the self-vent hole or the threaded vent connection away from operating personnel.**

Pressure-Reducing, Spring-Loaded Regulators—RS Series

The RS series pressure-reducing regulators are suitable for most gases and liquids. The RS series regulators feature various poppet designs, a choice of sensing types (diaphragm or piston), and seat and seal materials to accommodate a variety of pressure, temperature, and flow conditions.

The RS series regulators are available in sizes from 1/4 to 2 in. with a choice of threaded or flange end connections.

The RSH series regulators are a high-pressure version of the RS series regulators, and the LRS and LPRS series are low-pressure, high-accuracy versions of the RS series regulators.

The RS series regulators are available with many options, including a variety of gauge connection configurations, self venting, internal filter, external feedback, antitamper, special cleaning to ASTM G93 Level C, and NACE MR0175/ISO 15156-compliant models.

Features

- Spring-loaded pressure control
- Diaphragm or piston sensing mechanisms
- Red knob handle or screw adjustment
- 316L stainless steel materials of construction for corrosion resistance
- Maximum inlet pressure ratings: 232 to 10 150 psig (16.0 to 700 bar)
- Pressure control ranges: Up to 0 to 10 150 psig (0 to 700 bar)

RS(H)2

RS(H)4, 6, 8

RS(H)10, 15, 20

LRS(H)4

LPRS4, 6, 8

LPRS10, 15

Pressure-Temperature Ratings

Seal Material	Temperature Range °F (°C)	Material Designator
Fluorocarbon FKM	5 to 176 (–15 to 80)	V
Standard Nitrile	-4 to 176 (–20 to 80)	N
Low-Temp Nitrile	-49 to 176 (–45 to 80)	L
EPDM	-4 to 176 (–20 to 80)	E
FFKM	14 to 176 (–10 to 80)	F

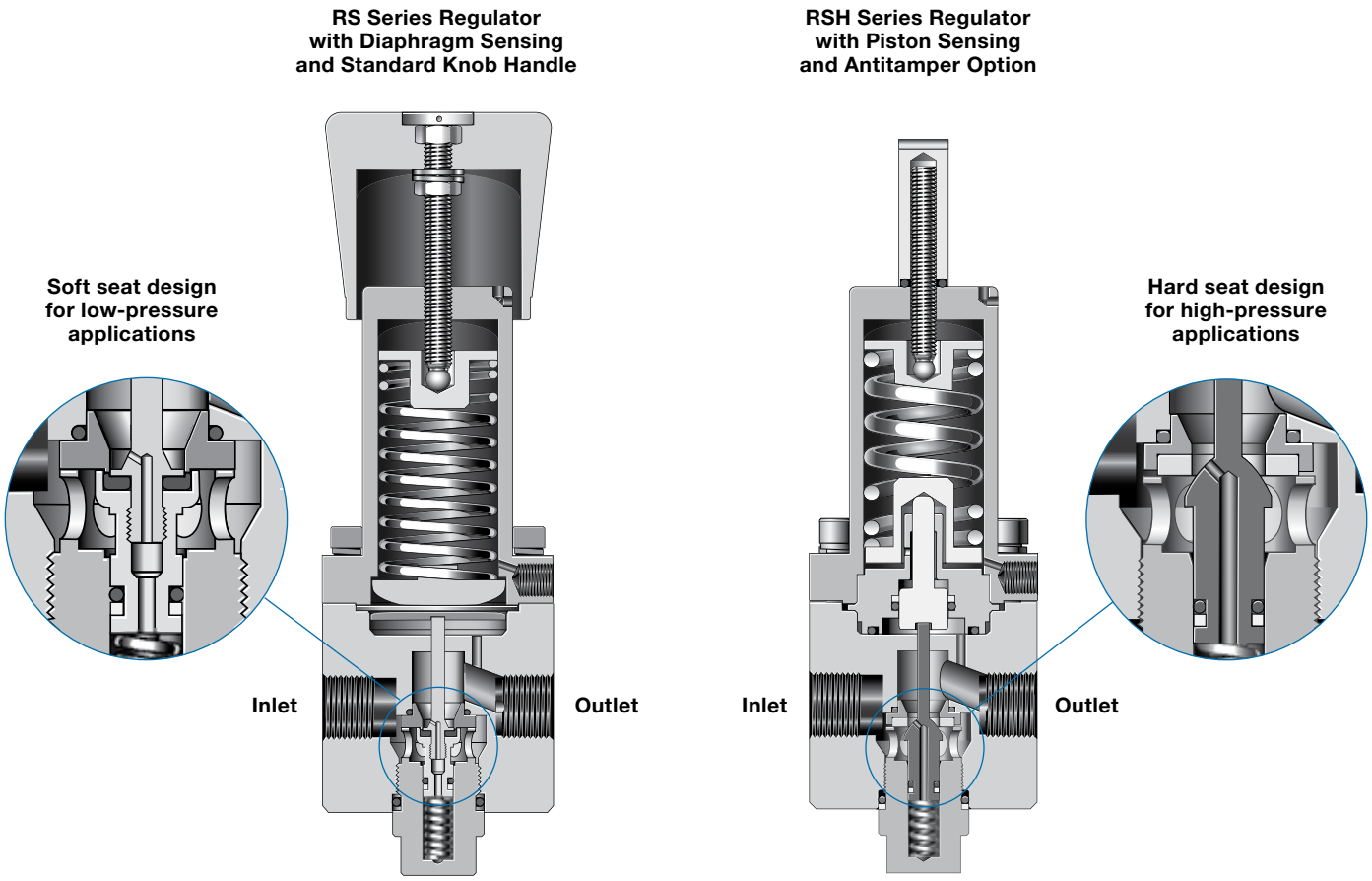
Seat Material	PCTFE	PEEK	Fluorocarbon FKM, Nitrile, EPDM, FFKM
Temperature °F (°C)	Maximum Inlet Pressure / Working Pressure psig (bar)		
-49 to -40 (–45 to -40)	–	–	1015 (70.0)
-40 to -4 (–40 to -20)	5800 (400)	5800 (400)	
95 (35)		10 150 (700)	
149 (65)	3987 (275)		
176 (80)	1812 (125)		

Technical Data—Performance

Series	Maximum Inlet Pressure① psig (bar)	Maximum Outlet Control Pressure① psig (bar)	Flow Coefficient (C_v)	Sensing Type	Flow Data on Page
RS2	5 800 (400)	5 075 (350)	0.05	Piston	11
RSH2	10 150 (700)	10 150 (700)			
RS4	1 015 (70.0)	406 (28.0) diaphragm 5 800 (400) piston	1.84	Diaphragm or piston	15
RSH4	5 800 (400)				
RS6	1 015 (70.0)	203 (14.0) diaphragm 5 800 (400) piston	1.95	Diaphragm or piston	17
RSH6	5 800 (400)				
RS8	1 015 (70.0)	203 (14.0) diaphragm 5 800 (400) piston	2.07	Diaphragm or piston	20
RSH8	5 800 (400)				
RS10	1 015 (70.0)	290 (20.0) diaphragm 3 625 (250) piston	3.79	Diaphragm or piston	23
RSH10	5 800 (400)				
RS15	1 015 (70.0)	290 (20.0) diaphragm 3 625 (250) piston	7.30	Diaphragm or piston	—
RSH15	5 800 (400)				
RS20	1 015 (70.0)	290 (20.0)	13	Diaphragm	—
RSH20	5 800 (400)				
LRS4	507 (35.0)	290 (20.0)	0.73	Diaphragm	30
LRSH4	5 800 (400)		0.10		31
LPRS4	232 (16.0)	43 (3.0)	1.84	Diaphragm	—
LPRS6			1.95		
LPRS8			2.07		
LPRS10	232 (16.0)	43 (3.0)	3.79	Diaphragm	39
LPRS15			7.30		39

① Regulator pressure rating may be limited by end connection type.

Pressure-Reducing, Spring-Loaded Regulators—RS Series



Technical Data—Design

Series	Seat Diameter in. (mm)	Inlet and Outlet Connections	Gauge Connection	Weight (Without Flanges) lb (kg)	More Information on Page
RS2	0.087 (2.2)	1/4 in. NPT	1/4 in. NPT	3.3 (1.5)	10
RSH2					
RS4	0.39 (10.0)	1/2 in. NPT, ISO/BSP parallel thread, EN or ASME flanges	1/4 in. NPT	7.7 (3.5)	14
RSH4					
RS6	0.39 (10.0)	3/4 in. NPT, ISO/BSP parallel thread, EN or ASME flanges	1/4 in. NPT	9.9 (4.5)	14
RSH6					
RS8	0.39 (10.0)	1 in. NPT, ISO/BSP parallel thread, EN or ASME flanges	1/4 in. NPT	9.9 (4.5)	14
RSH8					
RS10	0.55 (14.0)	1 in. NPT, ISO/BSP parallel thread, EN or ASME flanges	1/4 in. NPT or ISO/BSP parallel thread	16.5 (7.5)	22
RSH10	0.53 (13.5)				
RS15	0.75 (19.0)	1 1/2 in. NPT, ISO/BSP parallel thread, EN or ASME flanges	1/4 in. NPT or ISO/BSP parallel thread	22.0 (10.0)	22
RSH15					
RS20	0.98 (25.0)	2 in. NPT, ISO/BSP parallel thread, EN or ASME flanges	ISO/BSP parallel thread	39.6 (18.0)	22
RSH20					
LRS4	0.23 (6.0)	1/2 in. NPT	1/4 in. NPT	5.7 (2.6)	29
LRSH4	0.087 (2.2)				
LPRS4	0.39 (10.0)	1/2 in. NPT, ISO/BSP parallel thread, EN or ASME flanges	1/4 in. NPT	11.0 (5.0)	33
LPRS6		3/4 in. NPT, ISO/BSP parallel thread, EN or ASME flanges		12.1 (5.5)	
LPRS8		1 in. NPT, ISO/BSP parallel thread, EN or ASME flanges		12.1 (5.5)	
LPRS10	0.55 (14.0)	1 in. NPT, ISO/BSP parallel thread, EN or ASME flange	1/4 in. NPT or ISO/BSP parallel thread	17.6 (8.0)	38
LPRS15	0.75 (19.0)	1 1/2 in. NPT, ISO/BSP parallel thread, EN or ASME flanges		22.0 (10.0)	

Compact, General-Purpose, Spring-Loaded Pressure-Reducing Regulators—RS(H)2 Series

Features

- Bottom mounting
- Sealed spring housing
- Low-friction piston for better control
- Cartridge poppet assembly with 25 µm filter for ease of service
- Self-venting
- Threaded vent below panel for safety

Options

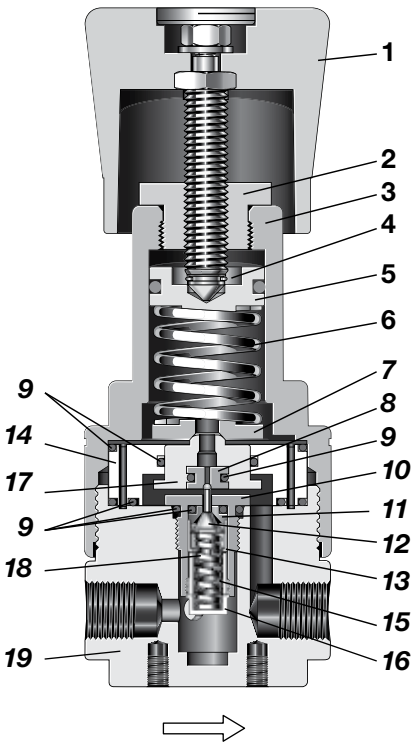
- No filter—for liquid applications
- NACE MR0175/ISO 15156-compliant models (nonventing and no-filter models only)
- Nonventing
- Special cleaning to ASTM G93 Level C
- Panel mounting kit sold separately—no disassembly required

Technical Data

Series	Maximum Inlet Pressure psig (bar)	Maximum Outlet Control Pressure psig (bar)	Sensing Type	Temperature Range °F (°C)	Flow Coefficient (C_v)	Seat Diameter in. (mm)	Inlet and Outlet Connections	Gauge / Vent Connections	Weight lb (kg)
RS2	5 800 (400)	5 075 (350)	Piston	–40 to 176 (–40 to 80)	0.05	0.087 (2.2)	1/4 in. NPT	Gauge: 1/4 in. NPT Vent: 1/8 in. NPT	3.3 (1.5)
RSH2	10 150 (700)	10 150 (700)		–4 to 176 (–20 to 80)					

See **Pressure-Temperature Ratings,** page 8, for ratings.
See **Flow Data**, pages 11 to 12.

RS2 Series Regulator with Cartridge Poppet Design



Materials of Construction

Component	Material / Specification
1 Knob assembly with adjusting screw, nuts, washer	Red ABS with 431 SS
2 Spring housing cover	431 SS / A276
3 Spring housing	316L SS / A479
4 C-ring	A2
5 Spring guide	316L SS / A479
6 Set spring	50CRV4
7 Bottom spring guide	316L SS / A479
***8** Relief seat*	*PEEK or PCTFE*
***9** O-rings*	*EPDM, FKM, FFKM, or nitrile*
***10** Poppet housing*	*316L SS / A479*
***11** Seat*	*PEEK or PCTFE*
***12** Poppet*	*S17400 SS or 431 SS*
***13** Seat retainer*	*316L SS / A479*
***14** Piston plate*	
***15** Filter*	*316L SS*
***16** Plug*	*316L SS / A479*
***17** Piston*	
***18** Poppet spring*	*302 SS / A313*
***19** Body*	*316L SS / A479*
Wetted lubricants: Silicone-based and synthetic hydrocarbon-based	

Wetted components listed in *italics.*
Gauge plugs (not shown): 431 SS / A276.

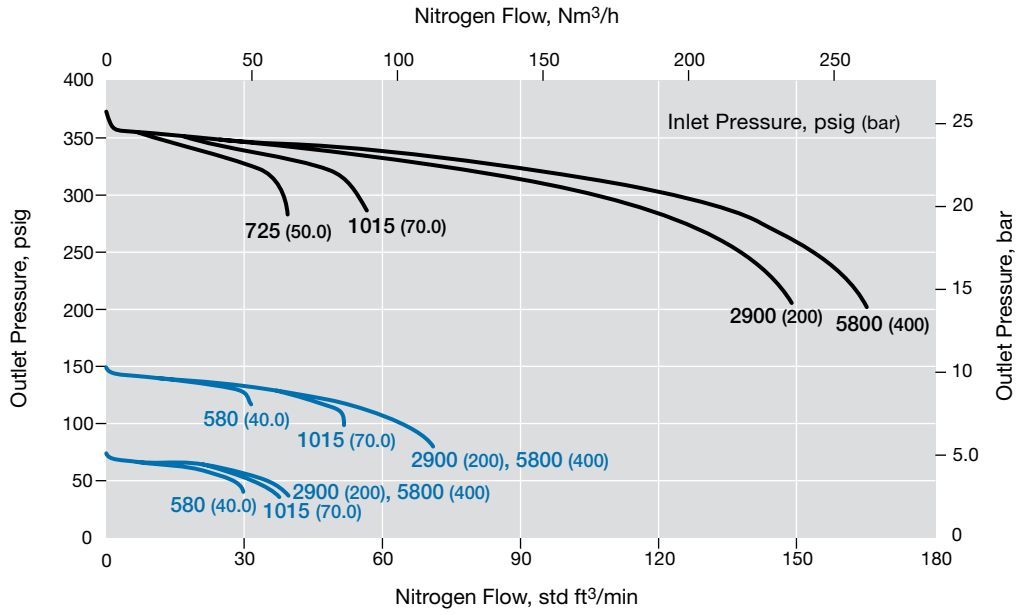
Flow Data

The graphs illustrate the change or “droop” in outlet pressures as the flow rate increases.
For more flow curve information, contact your authorized Swagelok representative.

RS2 Series

Flow Coefficient: 0.05
Maximum Inlet Pressure: 5800 psig (400 bar)
Outlet Pressure Control Range: 0 to 362 psig (0 to 25.0 bar)

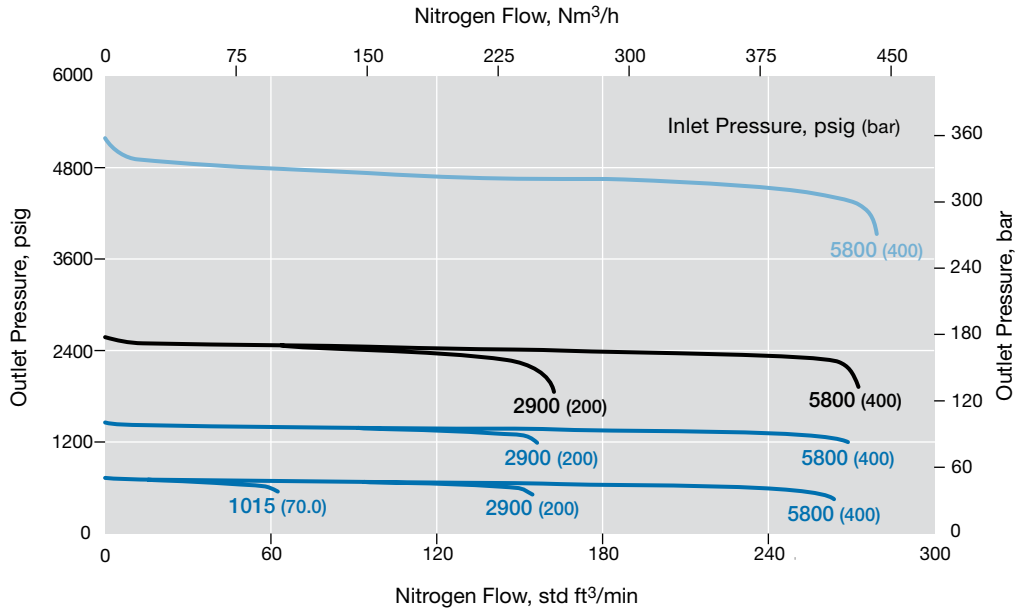
Pressure Control Range
- 0 to 362 psig (0 to 25.0 bar)
- 0 to 145 psig (0 to 10.0 bar)



RS2 Series

Flow Coefficient: 0.05
Maximum Inlet Pressure: 5800 psig (400 bar)
Outlet Pressure Control Range: 0 to 5075 psig (0 to 350 bar)

Pressure Control Range
- 0 to 5075 psig (0 to 350 bar)
- 0 to 2537 psig (0 to 175 bar)
- 0 to 1450 psig (0 to 100 bar)



Flow Data

The graphs illustrate the change or “droop” in outlet pressures as the flow rate increases.

For more flow curve information, contact your authorized Swagelok representative.

RSH2 Series

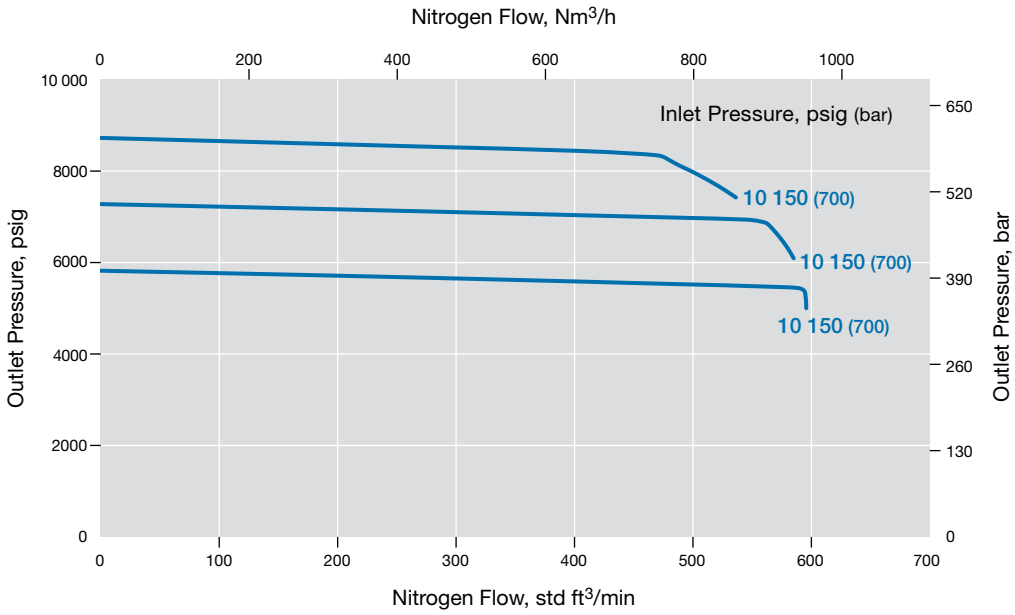
Flow Coefficient: 0.05

Maximum Inlet Pressure: 10 150 psig (700 bar)

Outlet Pressure Control Range: 0 to 10 150 psig (0 to 700 bar)

Pressure Control Range

0 to 10 150 psig (0 to 700 bar)

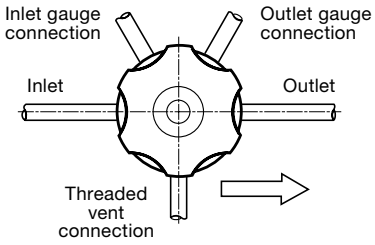


Dimensions

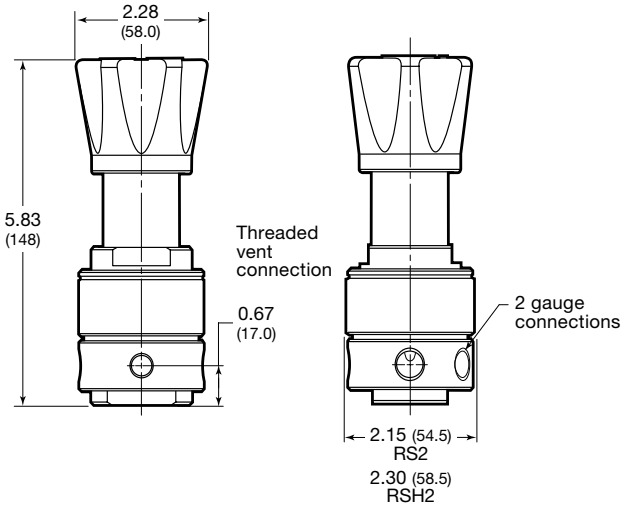
Dimensions, in inches (millimeters), are for reference only and are subject to change.

Configuration

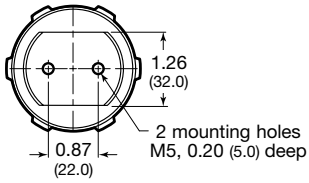
Top



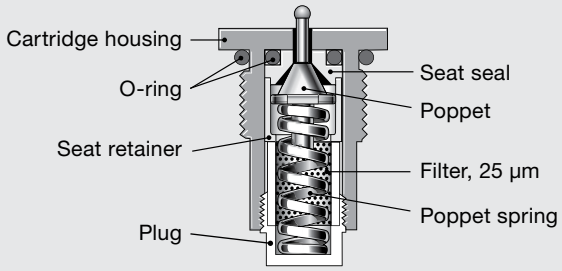
Shown with tubing for clarity; tubing not included.



Bottom Mounting

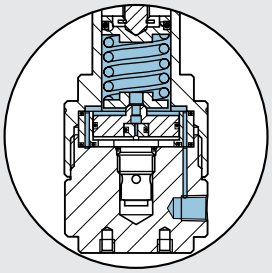


Cartridge Poppet Assembly Detail



Venting

- Self-venting is standard.
- Threaded vent connection is below panel for safety
- A nonventing option is available.



⚠ **WARNING: Self-venting regulators can release system fluid to atmosphere. Position the self-vent hole away from operating personnel.**

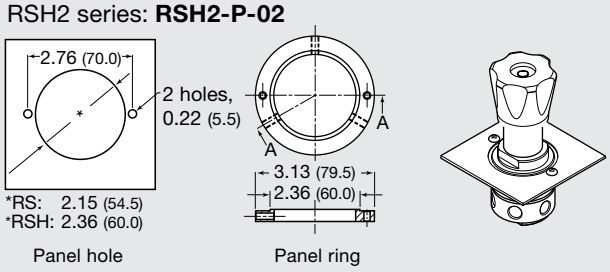
Panel Mounting Kit

No disassembly required when using panel mount kit.

Panel mounting kit ordering numbers:

RS2 series: **RS2-P-02**

RSH2 series: **RSH2-P-02**



Ordering Information

Build an RS2 or RSH2 series regulator ordering number by combining the designators in the sequence shown below.

1	2	3	4	5	6	7	8
RS	N2 -	02	- 1	- V	V	K -	LNV

1 Series

RS = 5800 psig (400 bar) maximum inlet pressure
RSH = 10 150 psig (700 bar) maximum inlet pressure

2 Inlet / Outlet

N2 = 1/4 in. female NPT

3 Body Material

02 = 316L SS

4 Pressure Control Range

RS and RSH series
1 = 0 to 145 psig (0 to 10.0 bar)
2 = 0 to 362 psig (0 to 25.0 bar)
3 = 0 to 1450 psig (0 to 100 bar)
4 = 0 to 2537 psig (0 to 175 bar)
5 = 0 to 5075 psig (0 to 350 bar)
RSH series only
6 = 0 to 10 150 psig (0 to 700 bar)

5 Seal Material

RS and RSH series
V = Fluorocarbon FKM
N = Nitrile
E = EPDM
F = FFKM
RS series only
L = Low temperature Nitrile

6 Piston Seal Material

RS and RSH series
V = Fluorocarbon FKM
N = Nitrile
E = EPDM
F = FFKM
RS series only
L = Low temperature Nitrile

7 Seat Seal Material

RS series
K = PCTFE
P = PEEK
RSH series
P = PEEK

8 Options

L = No filter
N = NACE MR0175/ISO 15156
NV = Nonventing
G93 = ASTM G93 Level C-cleaned

General-Purpose, Spring-Loaded Pressure-Reducing Regulators—RS(H)4, RS(H)6, and RS(H)8 Series

Features

- Balanced poppet design
- Diaphragm or piston sensing
- Threaded vent to monitor sensing seal integrity

Options

- Antitamper
- Gauge connections—choice of 4 configurations
- NACE MR0175/ISO 15156-compliant models
- Self-venting
- Special cleaning to ASTM G93 Level C

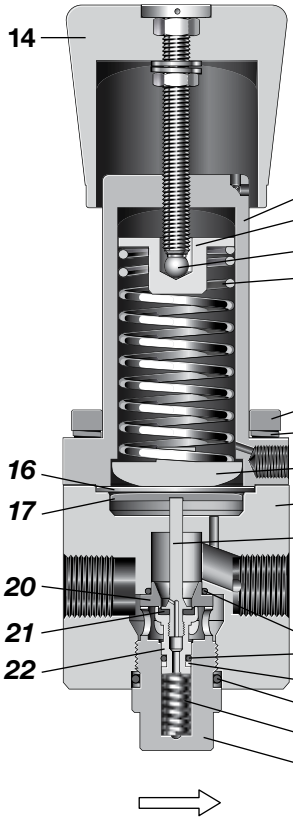
Technical Data

Series	Maximum Inlet Pressure psig (bar)	Maximum Outlet Control Pressure psig (bar)	Sensing Type	Temperature Range °F (°C)	Flow Coefficient (C_v)	Seat Diameter in. (mm)	Connections			Weight (Without Flanges) lb (kg)
							Inlet and Outlet		Gauge and Vent	
							Size	Type		
RS(H)4	RS: 1015 (70.0) RSH: 5800 (400)	RS: 406 (28.0) RSH: 5800 (400)	Diaphragm: RS4: 0 to 406 psig (28.0 bar) RS6, 8: 0 to 203 psig (14.0 bar) Piston: 0 to 5800 psig (400 bar)	–49 to 176 (–45 to 80) See **Pressure-Temperature Ratings,** page 8.	1.84	0.39 (10.0)	1/2 in. DN15	NPT ISO/BSP parallel thread ASME or EN flange	Gauge: 1/4 in. NPT Vent: 1/8 in. ISO/BSP parallel thread	7.7 (3.5)
RS(H)6					1.95		3/4 in. DN20			9.9 (4.5)
RS(H)8					2.07		1 in. DN25			

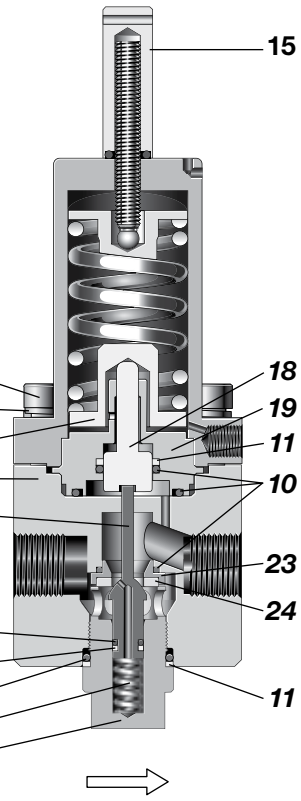
See pages 15 to 20 for flow data.

Materials of Construction

RS Series Regulator with Diaphragm Sensing and Standard Knob



RSH Series Regulator with Piston Sensing and Antitamper Option



Component			Material / Specification
Common Components	**1** Spring housing		316L SS / A479
	2 Spring guide		
	3 Ball		420 SS (Hardened)
	4 Set spring		302 SS / A313
	5 Cap screw		A4-80
	6 Washer		A4
	7 Bottom spring guide		*316L SS / A479*
	8 Body		
	9 Poppet	*RS*	*316L SS / A479*
		RSH	*S17400 SS / A276 or 431 SS*
	10 O-rings		*EPDM, FKM, or nitrile*
	11 Backup ring		*PTFE*
	12 Poppet spring		*302 SS / A313*
	13 Body plug		*316L SS / A479*
Actuation	**14** Knob assembly with adjusting screw, nuts, washers		Red ABS with A2-70
	15 Antitamper option with O-ring, set screw		316L SS and A2-70 (O-ring same as item **10**)
Sensing Mechanism	***Diaphragm Only***		
	16 Diaphragm		*EPDM, FKM, or nitrile*
	17 Diaphragm plate		*316L SS / A479*
	Piston Only		
	18 Piston		*316L SS / A479*
	19 Piston plate		
RS Only	*20 Seat*		
	21 Seat seal		*EPDM, FKM, or nitrile*
	22 Poppet housing		*316L SS / A479*
RSH Only	*23 Seat*		
	24 Seat seal		*PEEK or PCTFE*
Wetted lubricant: Silicone-based, synthetic hydrocarbon-based			

Wetted components listed in *italics*.
Gauge plugs (not shown): 431 SS / A276.

Flow Data

The graphs illustrate the change or “droop” in outlet pressures as the flow rate increases.

For more flow curve information, contact your authorized Swagelok representative.

RS4 Series

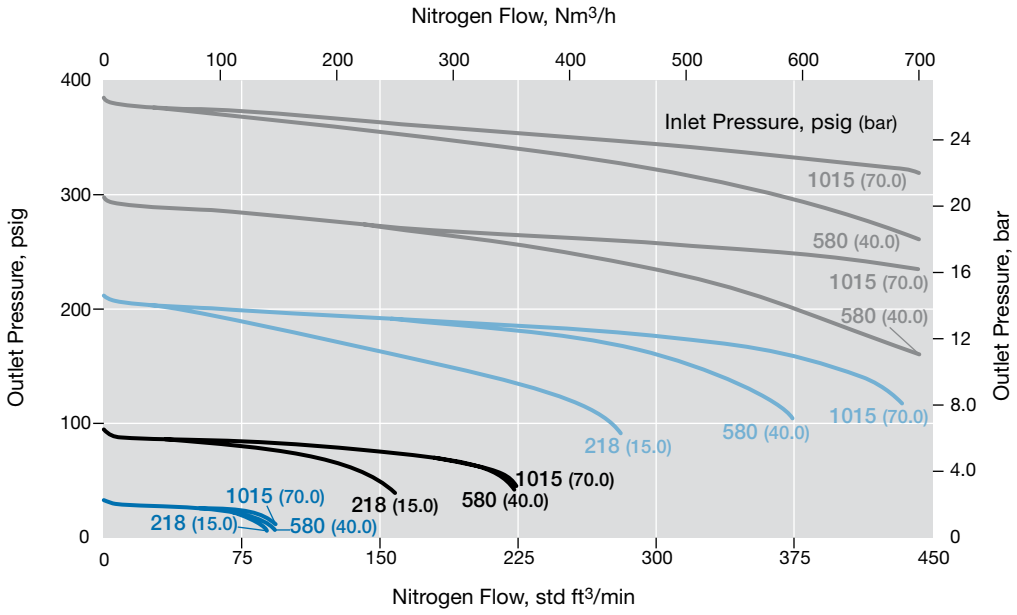
Flow Coefficient: 1.84

Maximum Inlet Pressure: 1015 psig (70.0 bar)

Outlet Pressure Control Range: 0 to 406 psig (0 to 28.0 bar)

Pressure Control Range

- 0 to 406 psig (0 to 28.0 bar)
- 0 to 203 psig (0 to 14.0 bar)
- 0 to 101 psig (0 to 7.0 bar)
- 0 to 43 psig (0 to 3.0 bar)



RS(H)4 Series

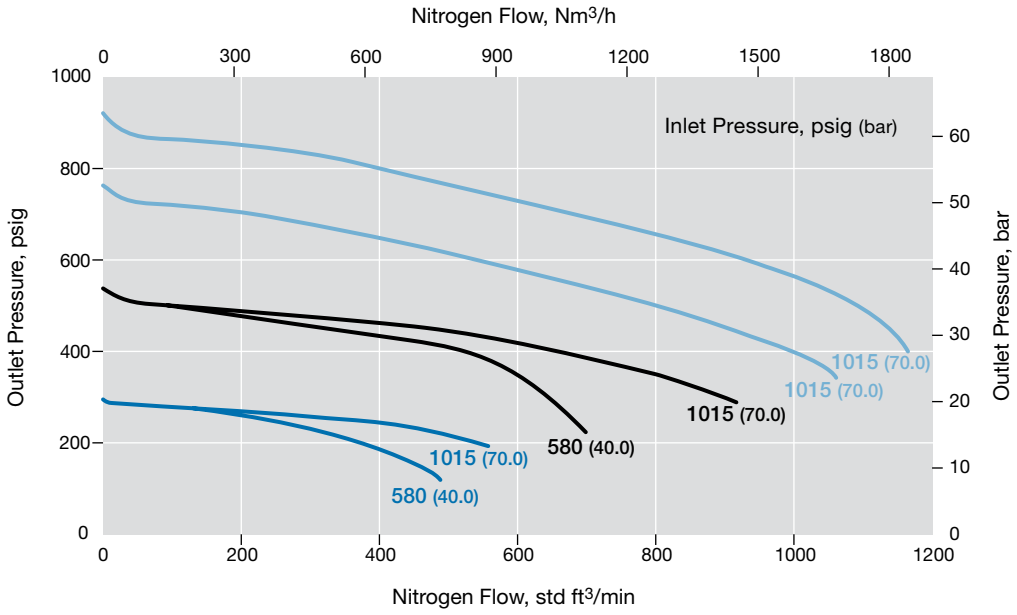
Flow Coefficient: 1.84

Maximum Inlet Pressure: RS4—1015 psig (70.0 bar); RSH4—5800 psig (400 bar)

Outlet Pressure Control Range: 0 to 1160 psig (0 to 80.0 bar)

Pressure Control Range

- 0 to 1160 psig (0 to 80.0 bar)
- 0 to 580 psig (0 to 40.0 bar)
- 0 to 406 psig (0 to 28.0 bar)



Flow Data

The graphs illustrate the change or “droop” in outlet pressures as the flow rate increases.

For more flow curve information, contact your authorized Swagelok representative.

RSH4 Series

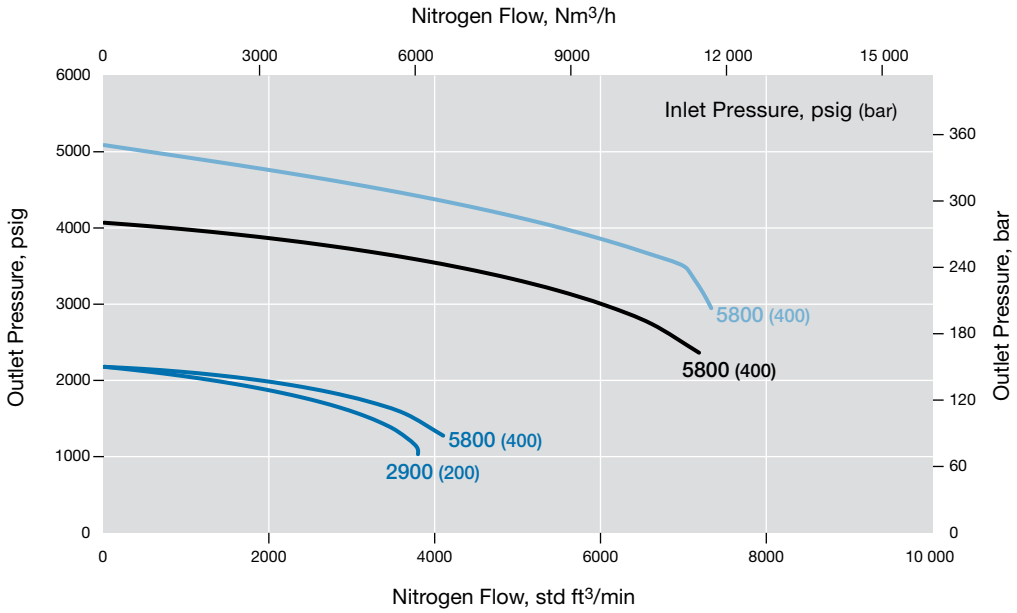
Flow Coefficient: 1.84

Maximum Inlet Pressure: 5800 psig (400 bar)

Outlet Pressure Control Range: 0 to 5800 psig (0 to 400 bar)

Pressure Control Range

- 0 to 5800 psig (0 to 400 bar)
- 0 to 4060 psig (0 to 280 bar)
- 0 to 2175 psig (0 to 150 bar)



Flow Data

The graphs illustrate the change or “droop” in outlet pressures as the flow rate increases.

For more flow curve information, contact your authorized Swagelok representative.

RS6 Series

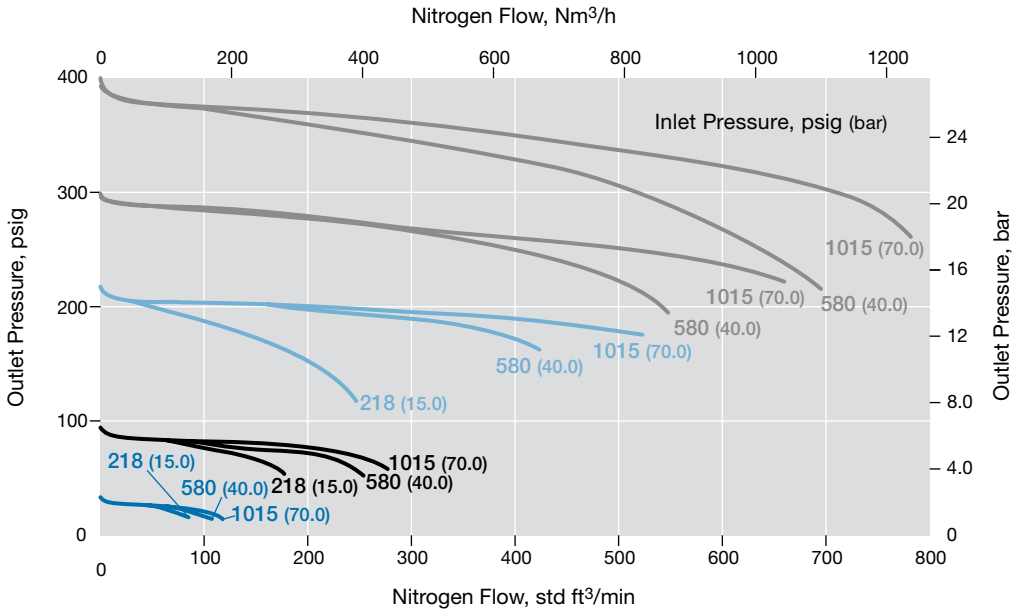
Flow Coefficient: 1.95

Maximum Inlet Pressure: 1015 psig (70.0 bar)

Outlet Pressure Control Range: 0 to 406 psig (0 to 28.0 bar)

Pressure Control Range

- 0 to 406 psig (0 to 28.0 bar)
- 0 to 203 psig (0 to 14.0 bar)
- 0 to 101 psig (0 to 7.0 bar)
- 0 to 43 psig (0 to 3.0 bar)



RS(H)6 Series

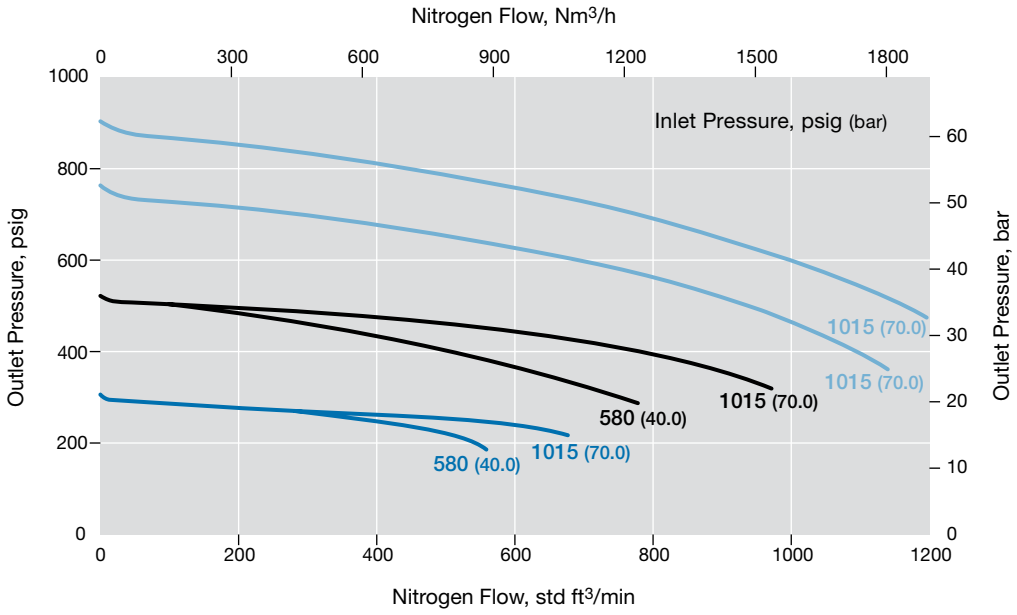
Flow Coefficient: 1.95

Maximum Inlet Pressure: RS6—1015 psig (70.0 bar); RSH6—5800 psig (400 bar)

Outlet Pressure Control Range: 0 to 1160 psig (0 to 80.0 bar)

Pressure Control Range

- 0 to 1160 psig (0 to 80.0 bar)
- 0 to 580 psig (0 to 40.0 bar)
- 0 to 406 psig (0 to 28.0 bar)



Flow Data

The graphs illustrate the change or “droop” in outlet pressures as the flow rate increases.

For more flow curve information, contact your authorized Swagelok representative.

RSH6 Series

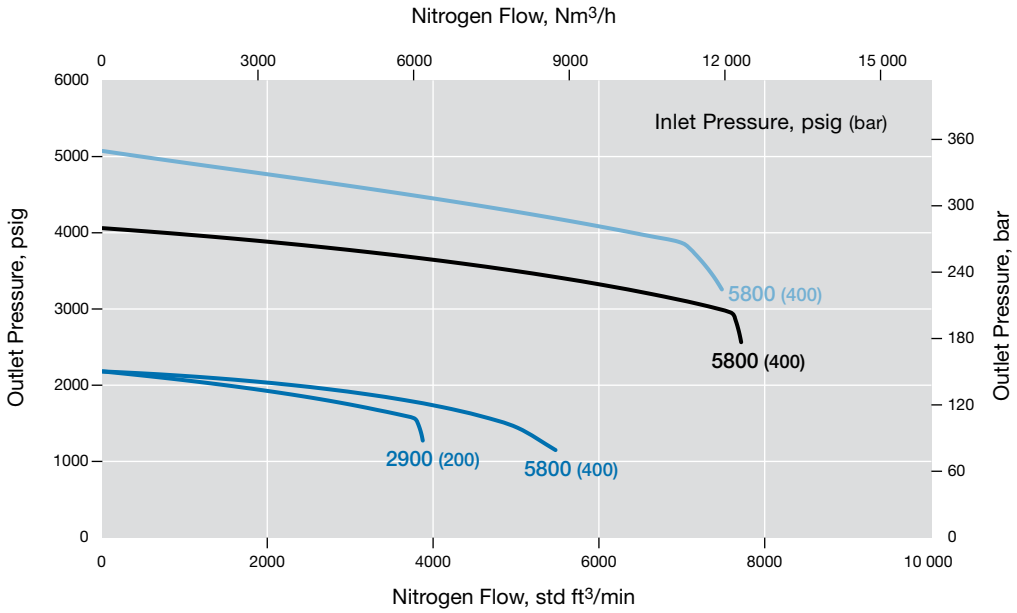
Flow Coefficient: 1.95

Maximum Inlet Pressure: 5800 psig (400 bar)

Outlet Pressure Control Range: 0 to 5800 psig (0 to 400 bar)

Pressure Control Range

- 0 to 5800 psig (0 to 400 bar)
- 0 to 4060 psig (0 to 280 bar)
- 0 to 2175 psig (0 to 150 bar)



Flow Data

The graphs illustrate the change or “droop” in outlet pressures as the flow rate increases.

For more flow curve information, contact your authorized Swagelok representative.

RS8 Series

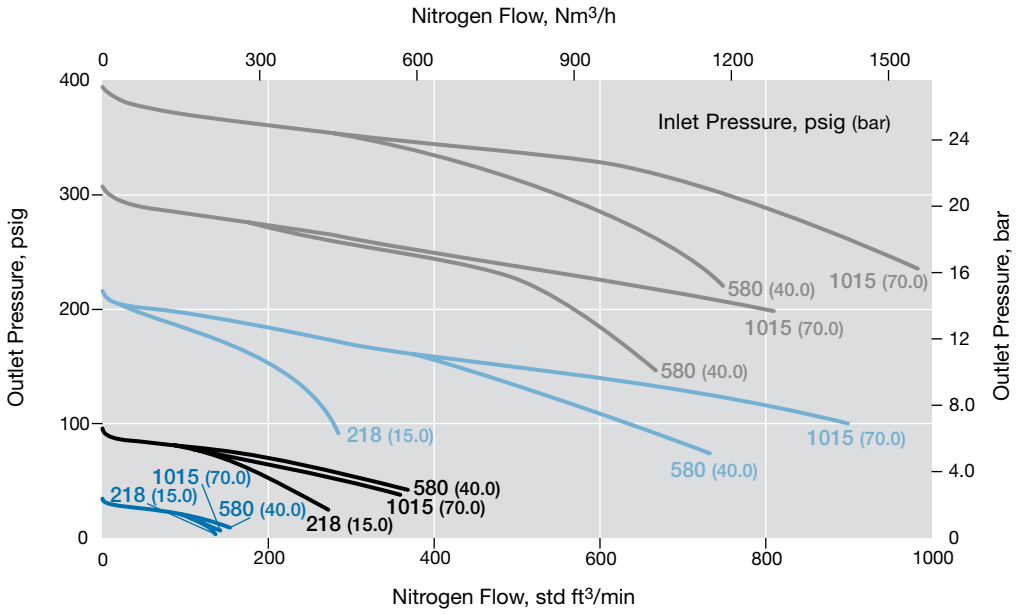
Flow Coefficient: 2.07

Maximum Inlet Pressure: 1015 psig (70.0 bar)

Outlet Pressure Control Range: 0 to 406 psig (0 to 28.0 bar)

Pressure Control Range

- 0 to 406 psig (0 to 28.0 bar)
- 0 to 203 psig (0 to 14.0 bar)
- 0 to 101 psig (0 to 7.0 bar)
- 0 to 43 psig (0 to 3.0 bar)



RS(H)8 Series

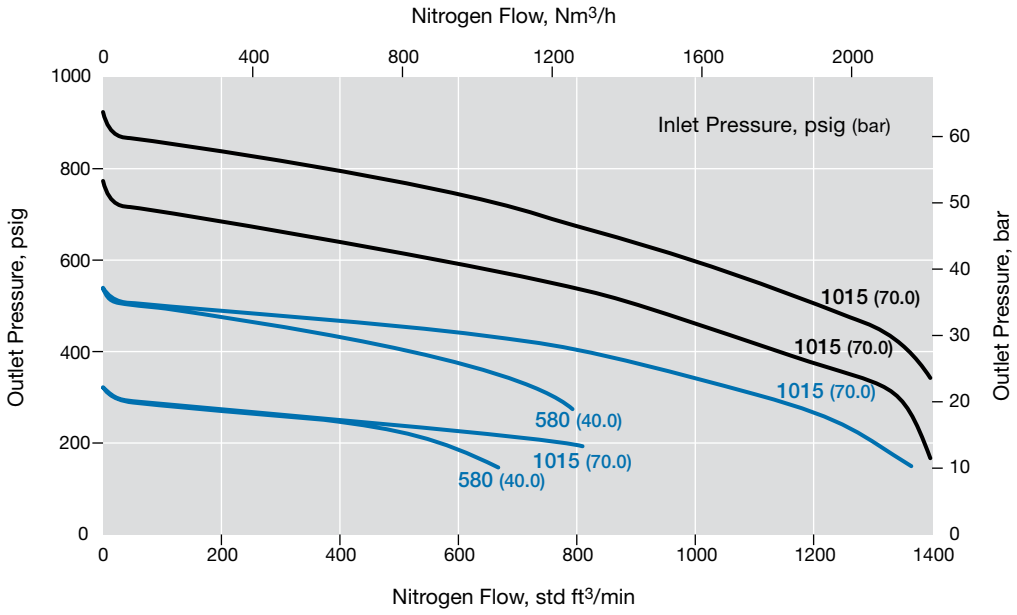
Flow Coefficient: 2.07

Maximum Inlet Pressure: RS8—1015 psig (70.0 bar); RSH8—5800 psig (400 bar)

Outlet Pressure Control Range: 0 to 1160 psig (0 to 80.0 bar)

Pressure Control Range

- 0 to 1160 psig (0 to 80.0 bar)
- 0 to 580 psig (0 to 40.0 bar)



Flow Data

The graphs illustrate the change or “droop” in outlet pressures as the flow rate increases.

For more flow curve information, contact your authorized Swagelok representative.

RSH8 Series

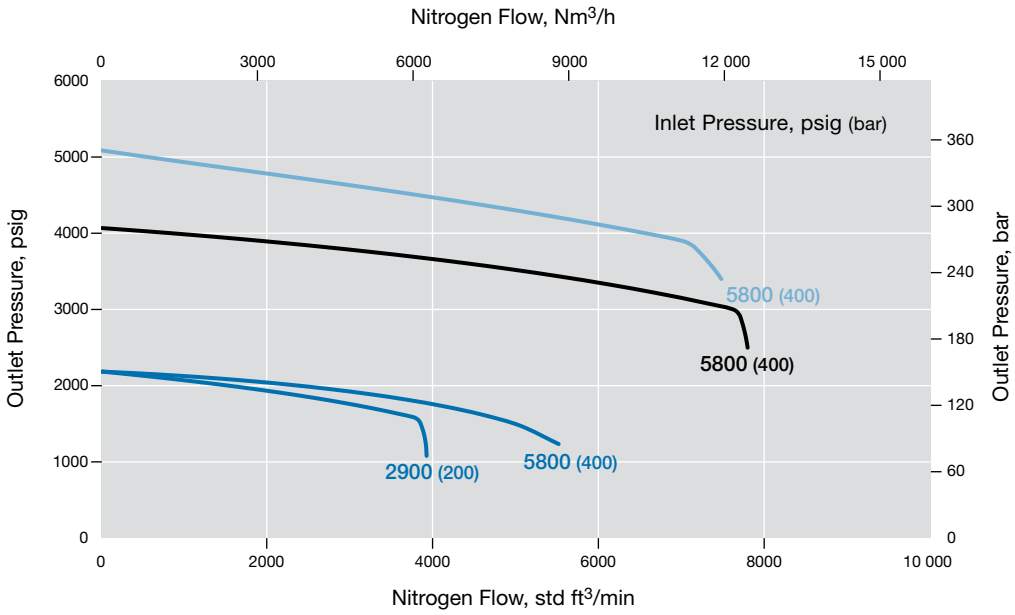
Flow Coefficient: 2.07

Maximum Inlet Pressure: 5800 psig (400 bar)

Outlet Pressure Control Range: 0 to 5800 psig (0 to 400 bar)

Pressure Control Range

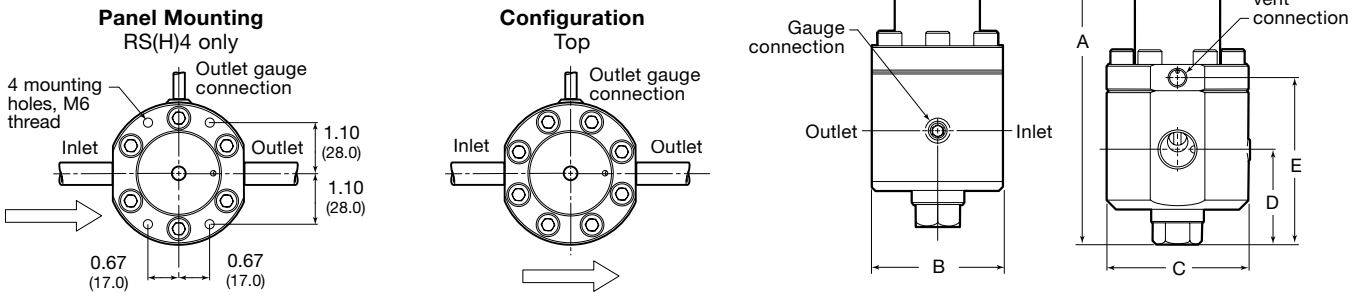
- 0 to 5800 psig (0 to 400 bar)
- 0 to 4060 psig (0 to 280 bar)
- 0 to 2175 psig (0 to 150 bar)



Dimensions

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

Series	End Connection Size	Dimensions, in. (mm)				
		A	B	C	D	E
RS(H)4	1/2 in.	9.06 (230)	2.83 (72.0)	3.07 (78.0)	2.09 (53.0)	3.62 (92.0)
RS(H)6	3/4 in.	9.25 (235)	3.23 (82.0)	3.50 (89.0)	2.20 (56.0)	3.94 (100)
RS(H)8	1 in.	9.25 (235)	3.07 (78.0)	3.50 (89.0)	2.20 (56.0)	3.94 (100)



Shown with tubing for clarity; tubing not included.

Ordering Information

Build an RS(H)4, RS(H)6, and RS(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
RS	FA	4	A	1	-	02	- 1	- V	V	V	- GN2

1 Series
- **RS** = 1015 psig (70.0 bar) maximum inlet pressure
- **RSH** = 5800 psig (400 bar) maximum inlet pressure

2 Inlet / Outlet
- **B** = Female ISO/BSP parallel thread
- **N** = Female NPT
- **FA** = ASME B16.5 flange
- **FD** = EN 1092 (DIN) flange

3 Size
- **4** = 1/2 in. / DN15
- **6** = 3/4 in. / DN20
- **8** = 1 in. / DN25

4 Pressure Class

Omit designator if flanges are not ordered.
- **A** = ASME class 150
- **B** = ASME class 300
- **C** = ASME class 600
- **E** = ASME class 1500
- **F** = ASME class 2500
- **M** = EN class PN16
- **N** = EN class PN40

5 Flange Facing

Omit designator if flanges are not ordered.
- **1** = Raised face smooth
- **3** = RTJ

6 Body Material
- **02** = 316L SS

7 Pressure Control Range

Diaphragm sensing
- **1** = 0 to 43 psig (0 to 3.0 bar)
- **2** = 0 to 101 psig (0 to 7.0 bar)
- **3** = 0 to 203 psig (0 to 14.0 bar)
- **4** = 0 to 406 psig (0 to 28.0 bar)①

Piston sensing
- **4** = 0 to 406 psig (0 to 28.0 bar)②
- **5** = 0 to 580 psig (0 to 40.0 bar)
- **6** = 0 to 1160 psig (0 to 80.0 bar)
- **7** = 0 to 2175 psig (0 to 150 bar)
- **9** = 0 to 4060 psig (0 to 280 bar)
- **11** = 0 to 5800 psig (0 to 400 bar)

① RS(H)4 series only.
② RS(H)6 and RS(H)8 series only.

8 Seal Material
- **V** = Fluorocarbon FKM
- **N** = Nitrile
- **E** = EPDM
- **L** = Low temperature Nitrile

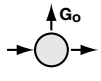
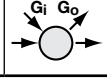
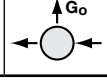
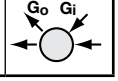
9 Diaphragm / Piston O-Rings
- **V** = Fluorocarbon FKM
- **N** = Nitrile
- **E** = EPDM
- **L** = Low temperature Nitrile

10 Seat Seal Material

RS series
- **V** = Fluorocarbon FKM
- **N** = Nitrile
- **E** = EPDM
- **L** = Low temperature Nitrile

RSH series
- **K** = PCTFE
- **P** = PEEK

11 Options
- **A** = Antitamper
- **GN2** = Gauge connection, see below
- **GN4** = Gauge connection, see below
- **GN5** = Gauge connection, see below
- None = Standard connection, see below

Gauge Connection Configuration			
Standard	GN2	GN4	GN5
			

- **N** = NACE MR0175/ISO 15156
- **S** = Self-venting (with 1/8 in. NPT)
- **G93** = ASTM G93 Level C-cleaned

General-Purpose, Spring-Loaded Pressure-Reducing Regulators—RS(H)10, RS(H)15, and RS(H)20 Series

Features

- Balanced poppet design
- RS(H)10 and RS(H)15—diaphragm or piston sensing
  RS(H)20—diaphragm sensing only

Options

- NACE MR0175/ISO 15156-compliant models
- Special cleaning to ASTM G93 Level C

Technical Data

Series	Maximum Inlet Pressure psig (bar)	Maximum Outlet Control Pressure psig (bar)	Sensing Type	Temperature Range °F (°C)	Flow Coefficient (C_v)	Seat Diameter in. (mm)	Connections			Weight (Without Flanges) lb (kg)
							Inlet and Outlet			
							Size	Type	Gauge①②	
RS(H)10	RS: 1015 (70.0) RSH: 5800 (400)	RS: 290 (20.0) RSH: 3625 (250)	Diaphragm: 0 to 290 psig (20.0 bar) Piston: 0 to 3625 psig (0 to 250 bar)	–49 to 176 (–45 to 80) See **Pressure-Temperature Ratings,** page 8.	3.79	RS: 0.55 (14.0) RSH: 0.53 (13.5)	1 in. DN25	NPT ISO/BSP parallel thread ASME or EN flange	1/4 in. NPT or ISO/BSP parallel thread	16.5 (7.5)
RS(H)15					7.30	0.75 (19.0)	1 1/2 in. DN40			22.0 (10.0)
RS(H)20		290 (20.0)	Diaphragm		13	0.98 (25.0)	2 in. DN50			39.6 (18.0)

See pages 23 to page 27 for flow data.

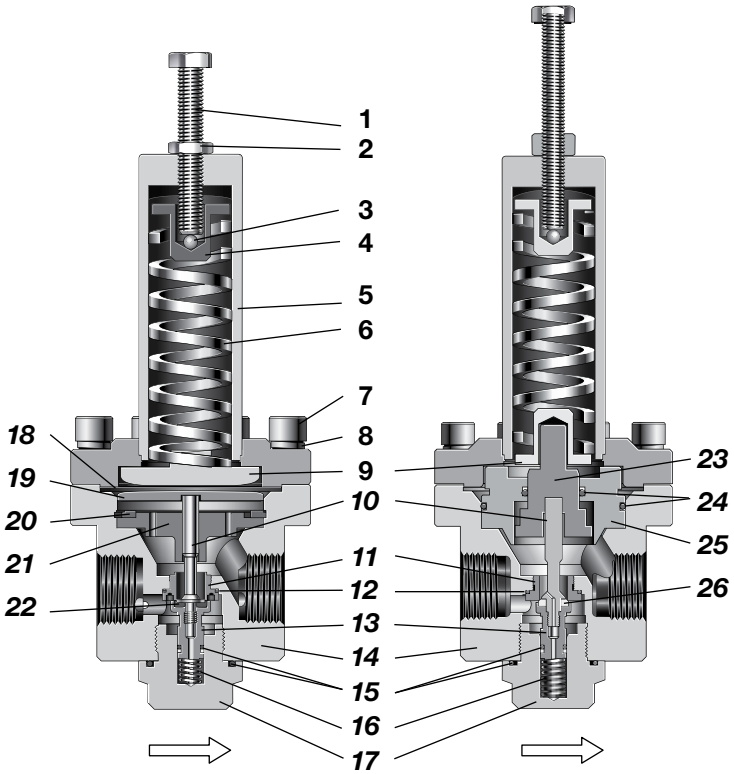
① Regulators with NPT inlet / outlet connections have 1/4 in. NPT gauge connections.

② All RS(H)20 regulators will have 1/4 in. ISO/BSP gauge ports.

Materials of Construction

RS Series Regulator with Diaphragm Sensing and Soft Seat Seal

RSH Series Regulator with Piston Sensing and Hard Seat Seal



	Component	Material / Specification
Common Components	**1** Adjusting screw	A2-70
	2 Nut	A2
	3 Ball	420 SS (Hardened)
	4 Upper spring guide	316L SS / A479
	5 Spring housing assembly	316L SS / A479
	6 Set spring	50CRV4
	7 Cap screw	A4-80
	8 Washer	A4
	9 Bottom spring guide	316L SS / A479
	***10** Poppet*	*S17400 SS or 316L SS*
	***11** Seat*	*316L SS / A479*
	***12** Seat O-ring*	*EPDM, FKM, or nitrile*
	***13** Poppet housing*	*316L SS / A479*
	***14** Body*	*316L SS / A479*
	***15** O-rings*	*EPDM, FKM, or nitrile*
	***16** Poppet spring*	*302 SS / A313*
	***17** Body plug*	*316L SS / A479*
Diaphragm	***18** Diaphragm*	*EPDM, FKM, or nitrile*
	***19** Diaphragm plate*	*316L SS / A479*
	***20** Retaining ring*	*Commercial stainless steel*
	***21** Body plate*	*316L SS / A479*
	***22** Seat seal*	*EPDM, FKM, or nitrile*
Piston	***23** Piston*	*316L SS / A479*
	***24** Piston O-rings*	*EPDM, FKM, or nitrile*
	***25** Piston plate*	*316L SS / A479*
	***26** Seat seal*	*PEEK or PCTFE*
Wetted lubricant: Silicone-based, synthetic hydrocarbon-based		

Wetted components listed in *italics*.
Gauge plugs (not shown): 431 SS / A276.

Flow Data

The graphs illustrate the change or “droop” in outlet pressures as the flow rate increases.

For more flow curve information, contact your authorized Swagelok representative.

RS10 Series

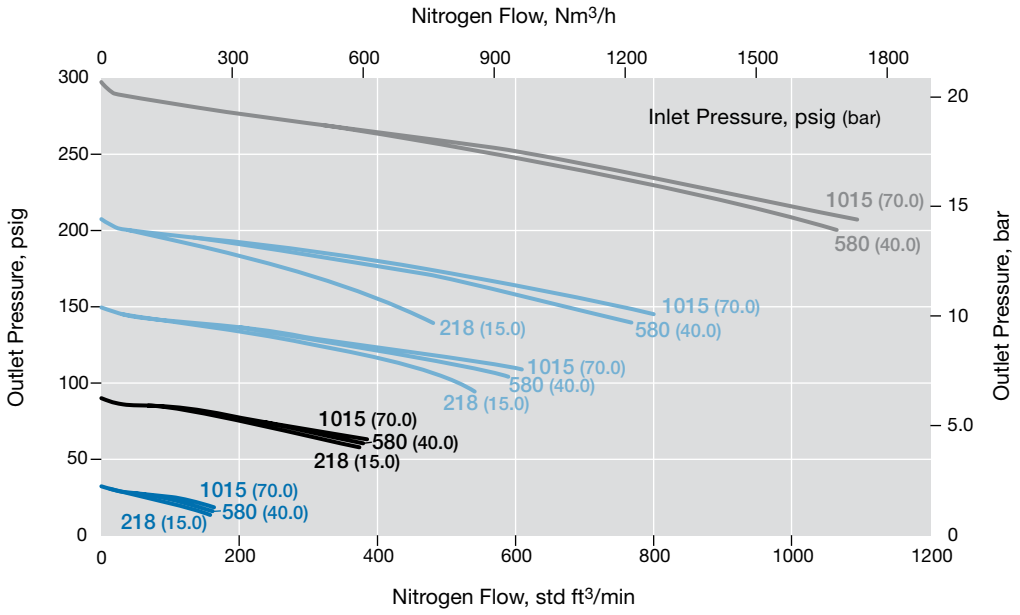
Flow Coefficient: 3.79

Maximum Inlet Pressure: 1015 psig (70.0 bar)

Outlet Pressure Control Range: 0 to 406 psig (0 to 28.0 bar)

Pressure Control Range

- 0 to 580 psig (0 to 40.0 bar)
- 0 to 290 psig (0 to 20.0 bar)
- 0 to 145 psig (0 to 10.0 bar)
- 0 to 43 psig (0 to 3.0 bar)



RSH10 Series

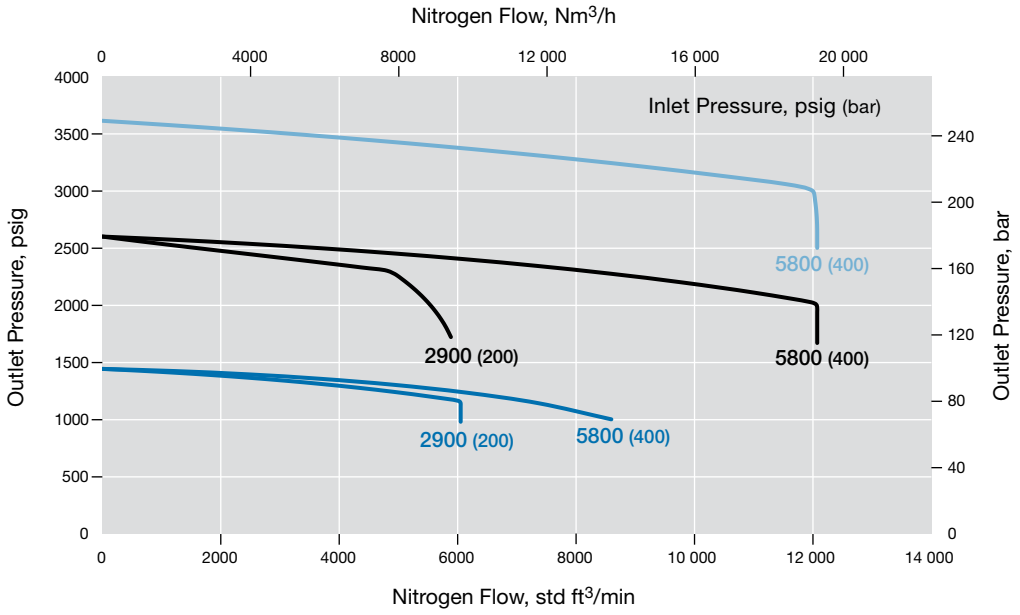
Flow Coefficient: 3.79

Maximum Inlet Pressure: 5800 psig (400 bar)

Outlet Pressure Control Range: 0 to 3625 psig (0 to 250 bar)

Pressure Control Range

- 0 to 3625 psig (0 to 250 bar)
- 0 to 2610 psig (0 to 180 bar)
- 0 to 1450 psig (0 to 100 bar)



Flow Data

The graphs illustrate the change or “droop” in outlet pressures as the flow rate increases.

For more flow curve information, contact your authorized Swagelok representative.

RS15 Series

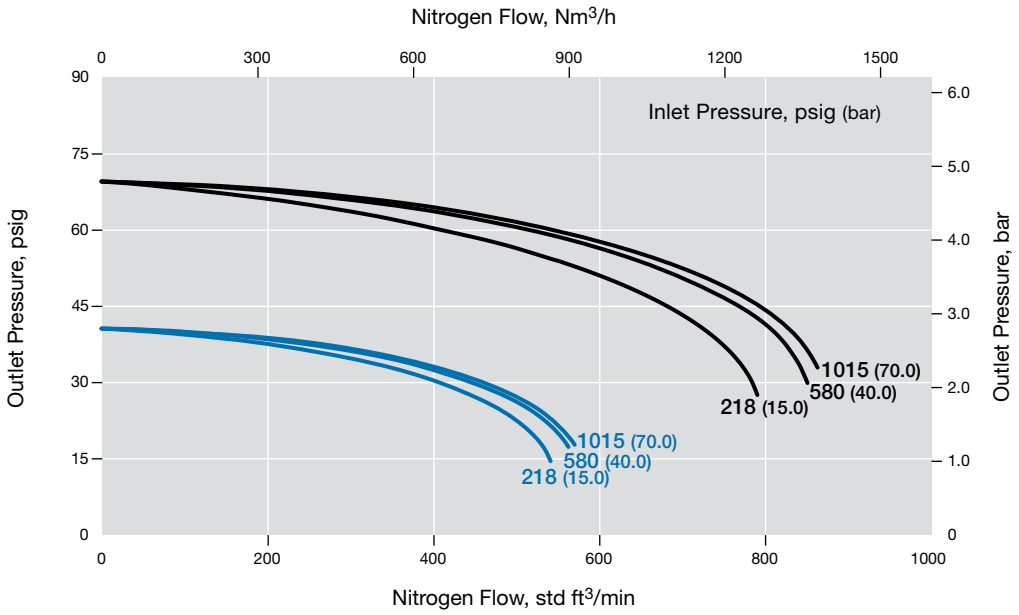
Flow Coefficient: 7.30

Maximum Inlet Pressure: 1015 psig (70.0 bar)

Outlet Pressure Control Range: 0 to 72 psig (0 to 5.0 bar)

Pressure Control Range

- 0 to 72 psig (0 to 5.0 bar)
- 0 to 43 psig (0 to 3.0 bar)



RS15 Series

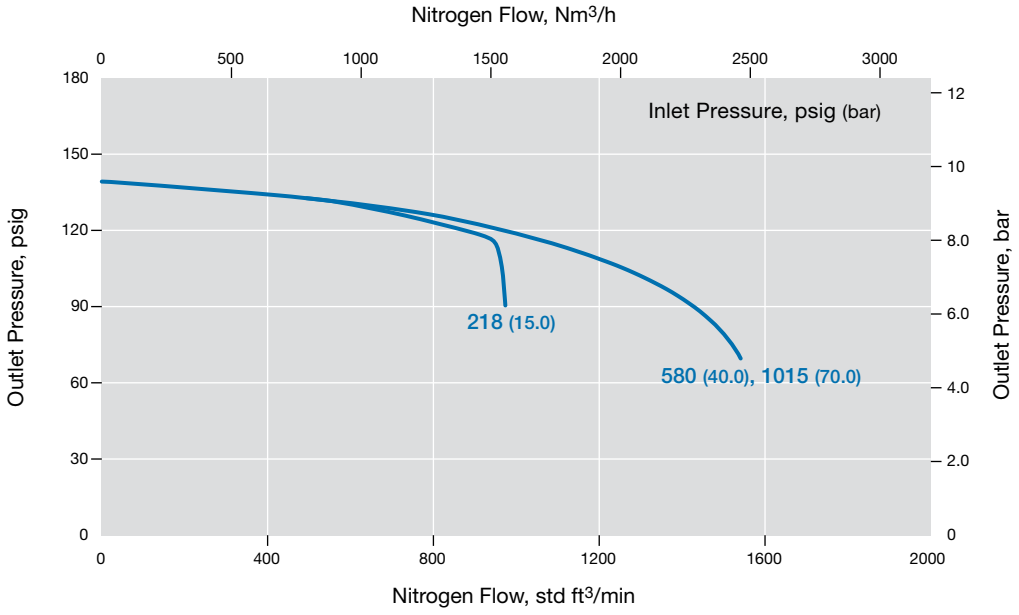
Flow Coefficient: 7.30

Maximum Inlet Pressure: 1015 psig (70.0 bar)

Outlet Pressure Control Range: 0 to 145 psig (0 to 10.0 bar)

Pressure Control Range

- 0 to 145 psig (0 to 10.0 bar)



Flow Data

The graphs illustrate the change or “droop” in outlet pressures as the flow rate increases.

For more flow curve information, contact your authorized Swagelok representative.

RS15 Series

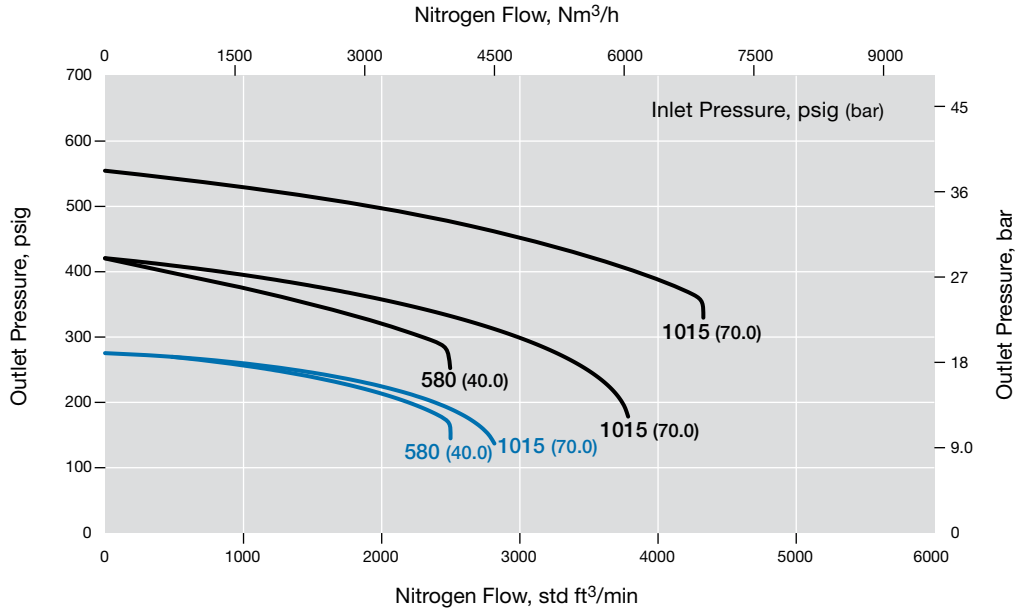
Flow Coefficient: 7.30

Maximum Inlet Pressure: 1015 psig (70.0 bar)

Outlet Pressure Control Range: 0 to 580 psig (0 to 40.0 bar)

Pressure Control Range

- 0 to 580 psig (0 to 40.0 bar)
- 0 to 290 psig (0 to 20.0 bar)



Flow Data

The graphs illustrate the change or “droop” in outlet pressures as the flow rate increases.

For more flow curve information, contact your authorized Swagelok representative.

RSH15 Series

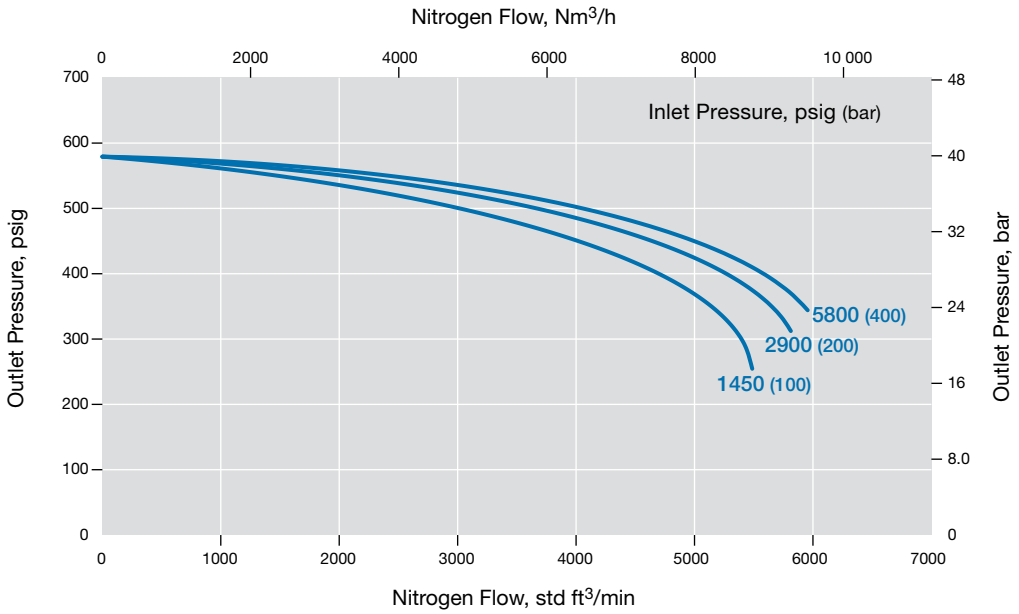
Flow Coefficient: 7.30

Maximum Inlet Pressure: 5800 psig (400 bar)

Outlet Pressure Control Range: 0 to 580 psig (0 to 40.0 bar)

Pressure Control Range

0 to 580 psig (0 to 40.0 bar)



RSH15 Series

Flow Coefficient: 7.30

Maximum Inlet Pressure: 5800 psig (400 bar)

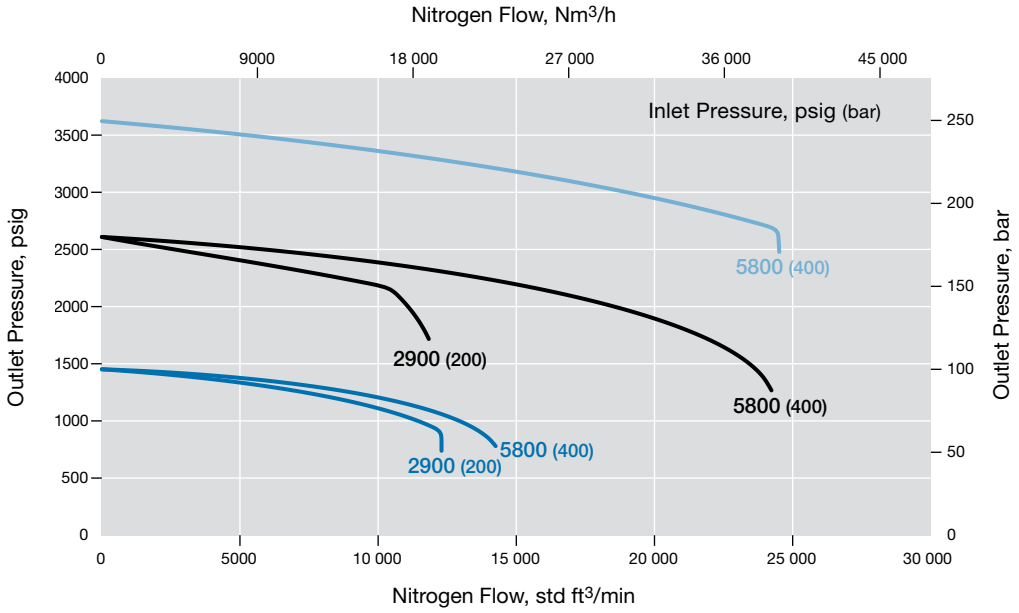
Outlet Pressure Control Range: 0 to 3625 psig (0 to 250 bar)

Pressure Control Range

0 to 3625 psig (0 to 250 bar)

0 to 2610 psig (0 to 180 bar)

0 to 1450 psig (0 to 100 bar)



Flow Data

The graphs illustrate the change or “droop” in outlet pressures as the flow rate increases.

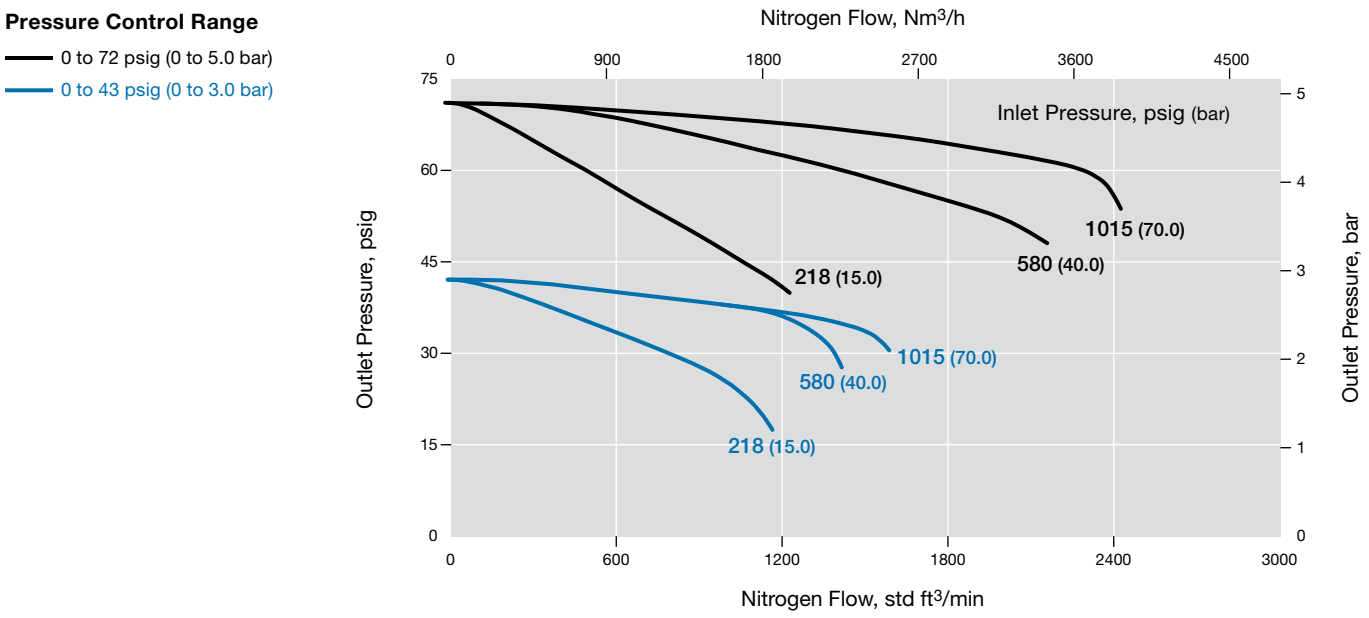
For more flow curve information, contact your authorized Swagelok representative.

RS20 Series

Flow Coefficient: 13

Maximum Inlet Pressure: 1015 psig (70.0 bar)

Outlet Pressure Control Range: 0 to 72 psig (0 to 5.0 bar)

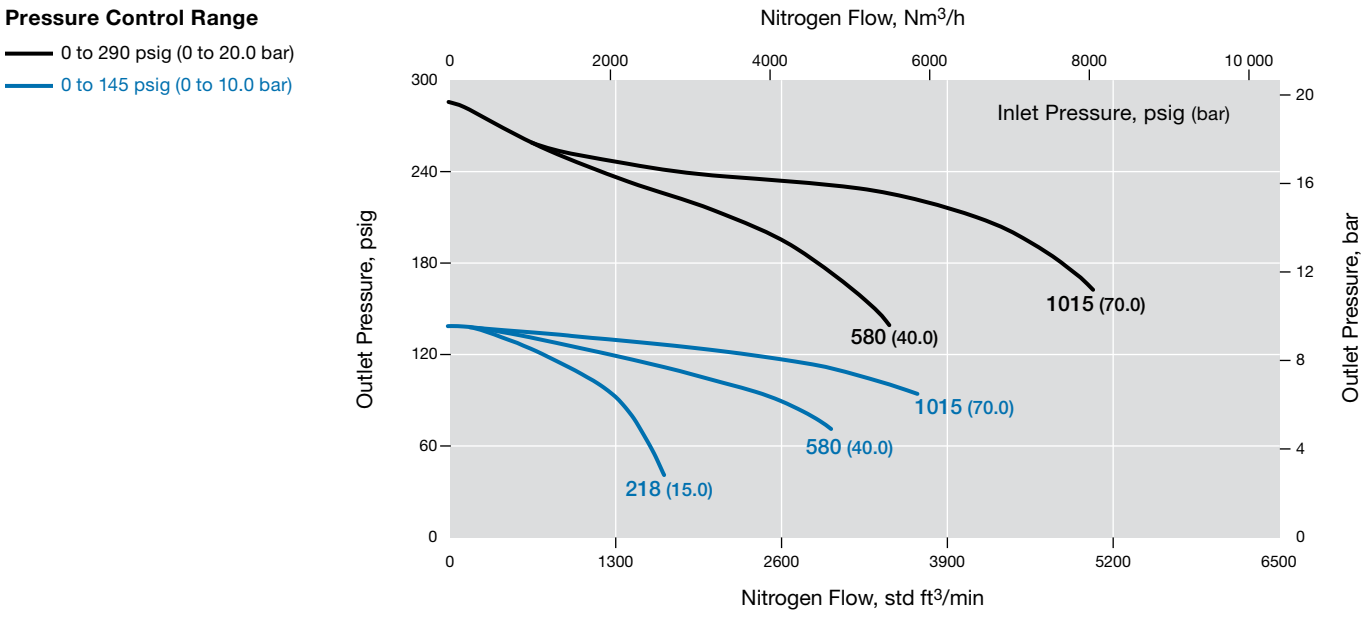


RS20 Series

Flow Coefficient: 13

Maximum Inlet Pressure: 1015 psig (70.0 bar)

Outlet Pressure Control Range: 0 to 290 psig (0 to 20.0 bar)

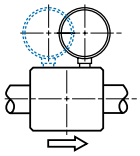


Dimensions

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

Series	End Connection Size	Dimensions, in. (mm)						
		A	B	C	D	E	F	G
RS(H)10	1 in.	10.5 (266)	3.54 (90.0)	3.07 (78.0)	2.28 (58.0)	1.97 (50.0)	1.77 (45.0)	4.53 (115)
RS(H)15	1 1/2 in.	10.8 (275)	4.53 (115)	3.78 (96.0)	2.44 (62.0)	2.01 (51.0)	1.77 (45.0)	4.53 (115)
RS(H)20	2 in.	11.3 (288)	5.51 (140)	3.93 (100)	2.44 (62.0)	1.85 (47.0)	2.56 (65.0)	6.30 (160)

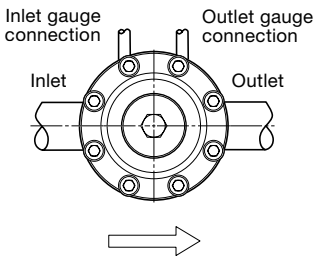
Gauge Connection

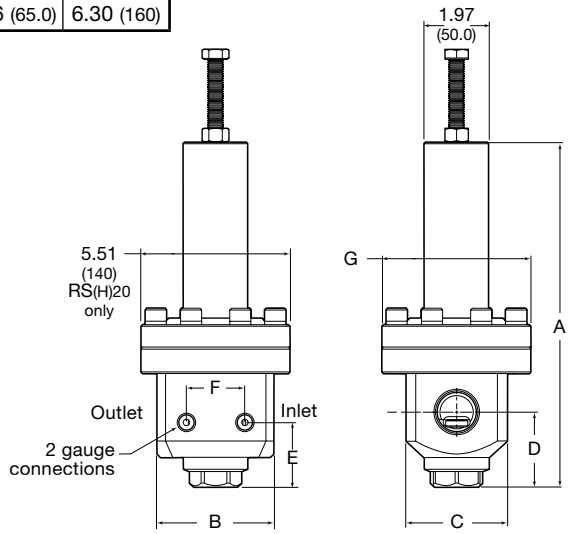


Only one gauge with a 50 mm (2 in.) or larger dial size fits directly into the body.

Configuration

Top





Shown with tubing for clarity; tubing not included.

Ordering Information

Build an RS(H)10, RS(H)15, and RS(H)20 series regulator ordering number by combining the designators in the sequence shown below.

1	2	3	4	5	6	7	8	9	10	11
RS	FA	10	A	1	- 02	- 1	- V	V	V	- G93

1 Series
- **RS** = 1015 psig (70.0 bar) maximum inlet pressure
- **RSH** = 5800 psig (400 bar) maximum inlet pressure

2 Inlet / Outlet
- **B** = Female ISO/BSP parallel thread
- **N** = Female NPT
- **FA** = ASME B16.5 flange
- **FD** = EN 1092 (DIN) flange

3 Size
- **10** = 1 in. / DN25
- **15** = 1 1/2 in. / DN40
- **20** = 2 in. / DN50

4 Pressure Class

Omit designator if flanges are not ordered.
- **A** = ASME class 150
- **B** = ASME class 300
- **C** = ASME class 600
- **E** = ASME class 1500
- **F** = ASME class 2500
- **M** = EN class PN16
- **N** = EN class PN40

5 Flange Facing

Omit designator if flanges are not ordered.
- **1** = Raised face smooth
- **3** = RTJ

6 Body Material
- **02** = 316L SS

7 Pressure Control Range

Diaphragm sensing
- **1** = 0 to 43 psig (0 to 3.0 bar)
- **2** = 0 to 72 psig (0 to 5.0 bar)
- **3** = 0 to 145 psig (0 to 10.0 bar)
- **4** = 0 to 290 psig (0 to 20.0 bar)

Piston sensing
- **5** = 0 to 580 psig (0 to 40.0 bar)①
- **6** = 0 to 1450 psig (0 to 100 bar)①
- **7** = 0 to 2610 psig (0 to 180 bar)①
- **8** = 0 to 3625 psig (0 to 250 bar)①

① RS(H)10 and RS(H)15 series only.

8 Seal Material
- **V** = Fluorocarbon FKM
- **N** = Nitrile
- **E** = EPDM
- **L** = Low temperature Nitrile

9 Diaphragm / Piston O-Rings
- **V** = Fluorocarbon FKM
- **N** = Nitrile
- **E** = EPDM
- **L** = Low temperature Nitrile

10 Seat Seal Material

RS series
- **V** = Fluorocarbon FKM
- **N** = Nitrile
- **E** = EPDM
- **L** = Low temperature Nitrile

RSH series
- **K** = PCTFE
- **P** = PEEK

11 Options
- **N** = NACE MR0175/ISO 15156
- **G93** = ASTM G93 Level C-cleaned

High-Sensitivity, Spring-Loaded Pressure-Reducing Regulators—LRS(H)4 Series

Features

- Diaphragm sensing
- Large diaphragm for higher accuracy
- Diaphragm materials: PTFE or 316L SS for most pressure control ranges
- Bottom mounting
- Low torque minimizes stem wear
- Nonventing
- Cartridge poppet assembly in LRSH4 for ease of service
- Panel mounting—no disassembly required

Options

- External feedback
- Filter, 25 µm
- NACE MR0175/ISO 15156-compliant models
- Self-venting
- Special cleaning to ASTM G93 Level C

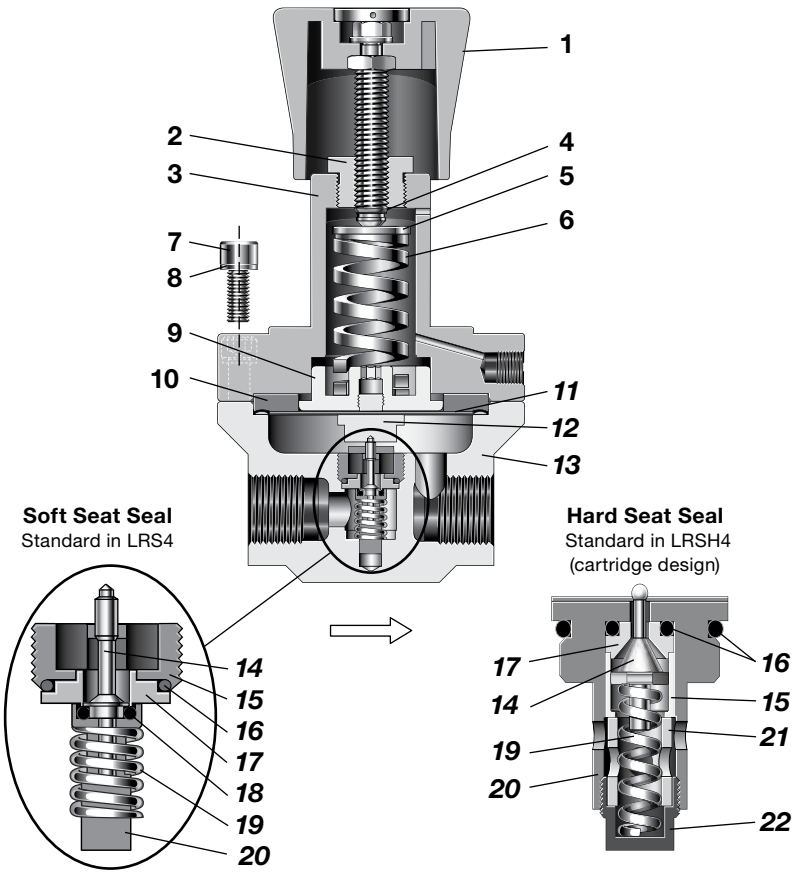
Technical Data

Series	Maximum Inlet Pressure psig (bar)	Maximum Outlet Control Pressure psig (bar)	Sensing Type	Temperature Range °F (°C)	Flow Coefficient (C_v)	Seat Diameter in. (mm)	Inlet and Outlet Connections	Gauge / Vent Connections	Weight lb (kg)
LRS4	507 (35.0)	290 (20.0)	Diaphragm	–49 to 176 (–45 to 80) See **Pressure-Temperature Ratings,** page 8.	0.73	0.23 (6.0)	1/2 in. NPT	Gauge: 1/4 in. NPT Vent: 1/8 in. NPT	5.7 (2.6)
LRSH4	5800 (400)				0.10	0.087 (2.2)			

See pages 30 to 31 for flow data.

Materials of Construction

LRS Series Regulator with Soft Seat Seal



Component		Material / Specification
1 Knob assembly with adjusting screw, nuts		Red ABS with 431 SS
2 Spring housing cover		431 SS / A276
3 Spring housing		316L SS / A479
4 C-ring		A2
5 Spring guide		316L SS / A479
6 Set spring		50CRV4
7 Cap screw		A4-80
8 Washer		A2
9 Bottom spring guide		316L SS / A479
10 Clamp ring		
***11** Diaphragm*		*PTFE or 316L SS*
***12** Diaphragm screw*		*316L SS / A479*
***13** Body*		
***14** Poppet*		*S17400 or 431 SS*
***15** Seat retainer*		*316L SS / A479*
***16** O-ring*		*EPDM, FKM, or FFKM*
***17** Seat*	*LRS*	*316L SS / A479*
	LRSH	*PCTFE or PEEK*
***18** Seat seal (LRS only)*		*EPDM, FKM, or FFKM*
***19** Poppet spring*		*302 SS / A313*
***20** Poppet housing*		*316L SS / A479*
***21** Fluid case*		
***22** Cartridge plug*		
Wetted lubricants: Silicone-based, synthetic hydrocarbon-based		

Wetted components listed in *italics*.
Gauge plugs (not shown): 431 SS / A276.

Flow Data

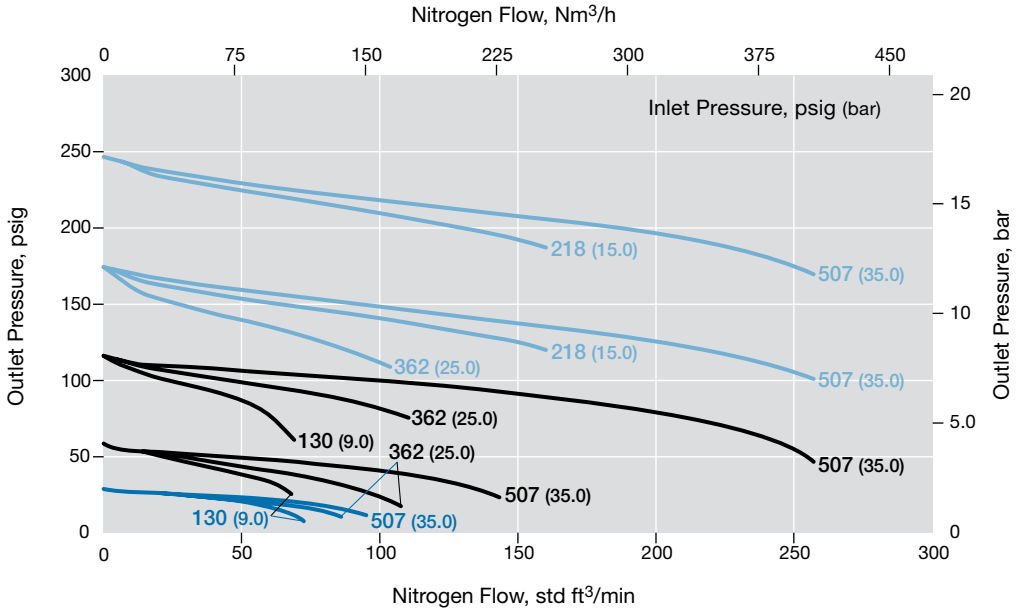
The graphs illustrate the change or “droop” in outlet pressures as the flow rate increases.
For more flow curve information, contact your authorized Swagelok representative.

LRS4 Series

Flow Coefficient: 0.73
Maximum Inlet Pressure: 507 psig (35.0 bar)
Outlet Pressure Control Range: 0 to 290 psig (0 to 20.0 bar)

Pressure Control Range

- 0 to 290 psig (0 to 20.0 bar)
- 0 to 145 psig (0 to 10.0 bar)
- 0 to 43 psig (0 to 3.0 bar)

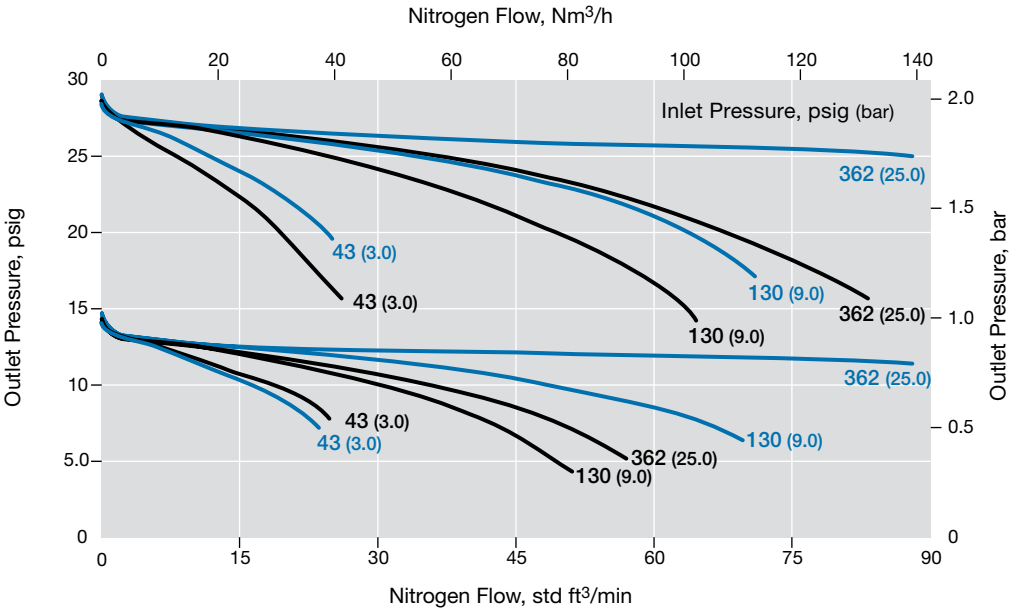


LRS4 Series with Optional External Feedback

Flow Coefficient: 0.73
Maximum Inlet Pressure: 507 psig (35.0 bar)
Outlet Pressure Control Range: 0 to 290 psig (0 to 20.0 bar)

Comparative Flow

- Standard
- External Feedback



Flow Data

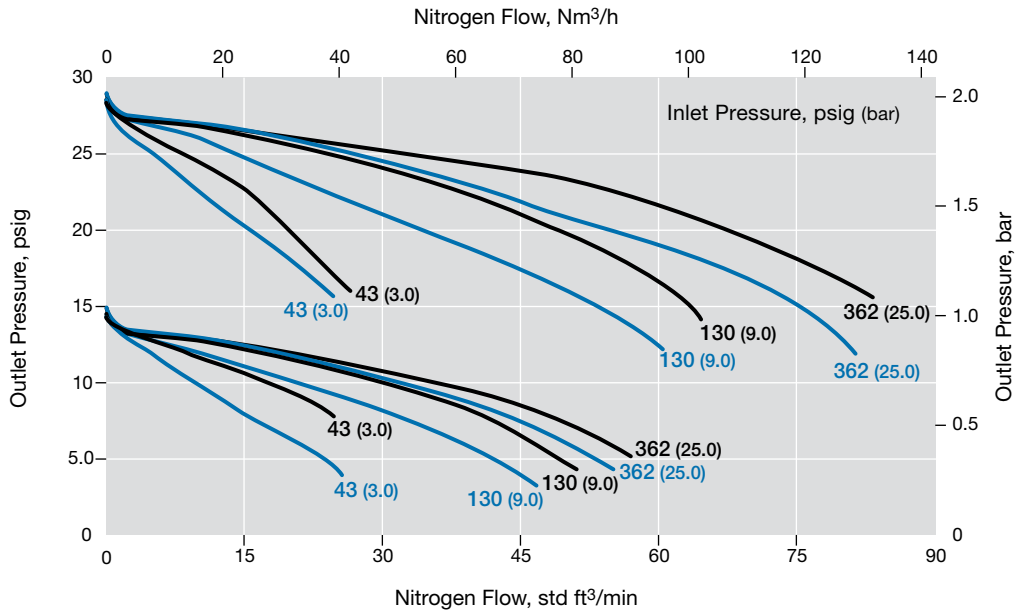
The graphs illustrate the change or “droop” in outlet pressures as the flow rate increases.
For more flow curve information, contact your authorized Swagelok representative.

LRS4 Series with Optional 316L SS Diaphragm

Flow Coefficient: 0.73
Maximum Inlet Pressure: 507 psig (35.0 bar)
Outlet Pressure Control Range: 0 to 290 psig (0 to 20.0 bar)

Comparative Flow

- Standard
- 316L SS Diaphragm

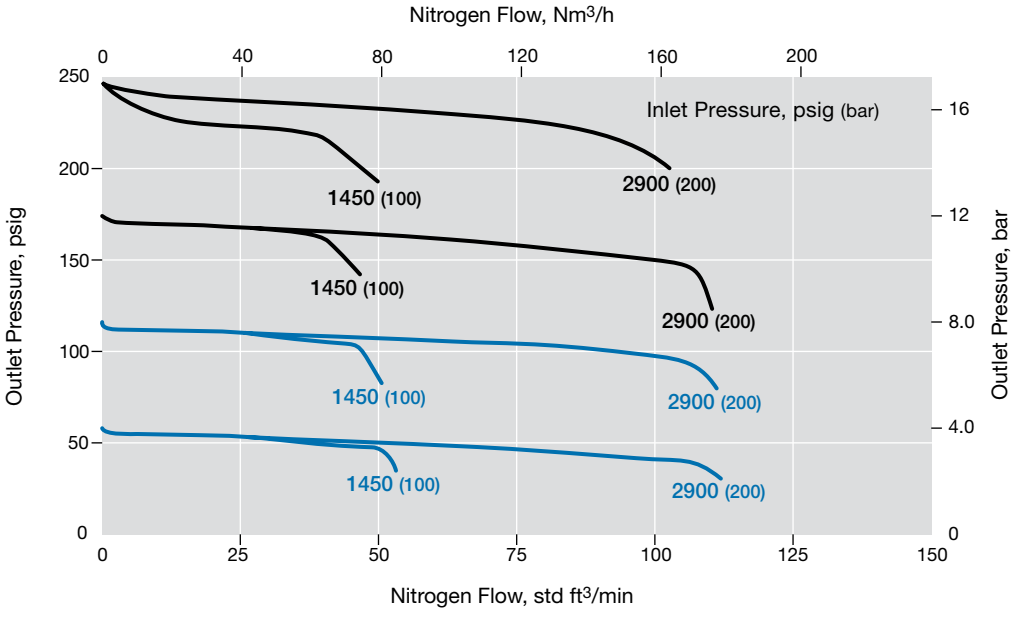


LRSH4 Series

Flow Coefficient: 0.10
Maximum Inlet Pressure: 5800 psig (400 bar)
Outlet Pressure Control Range: 0 to 290 psig (0 to 20.0 bar)

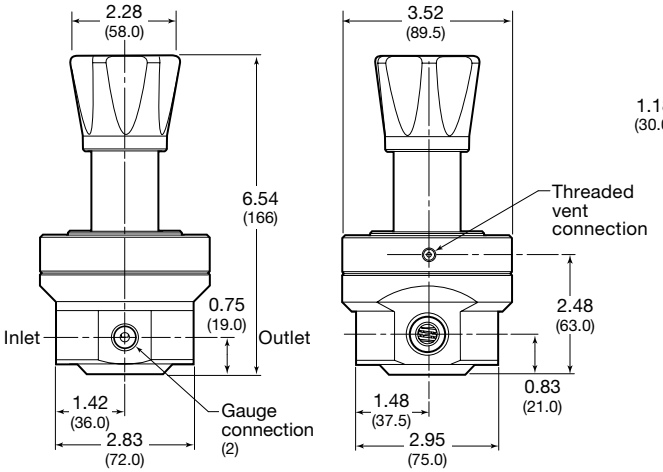
Pressure Control Range

- 0 to 290 psig (0 to 20.0 bar)
- 0 to 130 psig (0 to 9.0 bar)

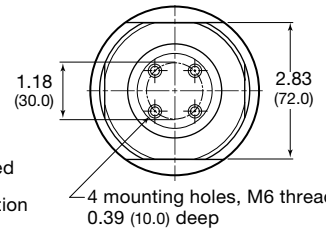


Dimensions

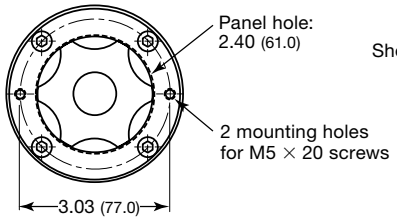
Dimensions, in inches (millimeters), are for reference only and are subject to change.



Bottom Mounting

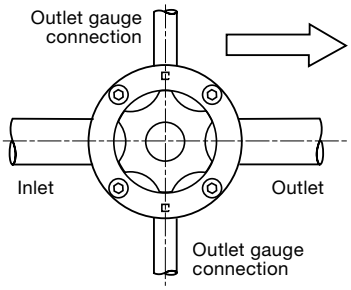


Panel Mounting



Configuration

Top

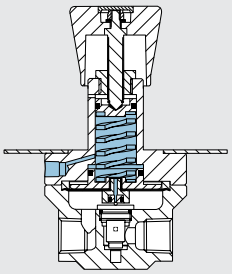


Shown with tubing for clarity; tubing not included.

Options

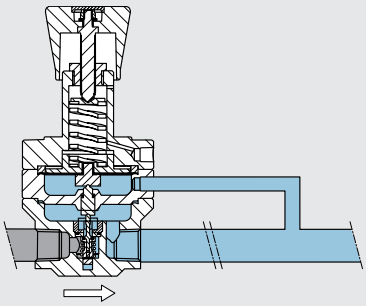
Self Venting

Threaded vent connection is below the panel in self-venting version.



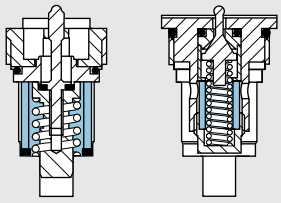
External Feedback

Compensates for pressure loss (droop).



25 µm Filter

Reduces potential seat damage; will reduce flow.



LRS4 series cartridge

LRSH4 series cartridge

Ordering Information

Build an LRS4 or LRSH4 series regulator ordering number by combining the designators in the sequence shown below.

1	2	3	4	5	6	7	8
LRS	N4	- 02	- 1	- V	T	V	- S

1 Series

LRS = 507 psig (35 bar) maximum inlet pressure

LRSH = 5800 psig (400 bar) maximum inlet pressure

2 Inlet / Outlet

N4 = 1/2 in. female NPT

3 Body Material

02 = 316L SS

4 Pressure Control Range

1 = 0 to 43 psig (0 to 3.0 bar)

2 = 0 to 130 psig (0 to 9.0 bar)

3 = 0 to 290 psig (0 to 20.0 bar)

5 Seal Material

V = Fluorocarbon FKM

N = Nitrile

E = EPDM

F = FFKM

L = Low temperature Nitrile

6 Diaphragm

T = PTFE①

M = 316L SS: only for 0 to 43 psig (0 to 3.0 bar) and 0 to 130 psig (0 to 9.0 bar) pressure control ranges

L = Low temperature Nitrile

① Not available with Low temperature Nitrile seals.

7 Seat Seal Material

LRS series (seat seal)

V = Fluorocarbon FKM

N = Nitrile

E = EPDM

F = FFKM

L = Low temperature Nitrile

LRSH series (seat)

K = PCTFE

P = PEEK

8 Options

EF = External feedback

F = Filter, 25 µm

N = NACE MR0175/ISO 15156

S = Self venting

G93 = ASTM G93 Level C-cleaned

High Sensitivity, Spring-Loaded Pressure-Reducing Regulators—LPRS4, LPRS6, and LPRS8 Series

Features

- Balanced poppet design
- Diaphragm sensing
- Large diaphragm for higher accuracy
- Suction tube for reduced droop
- Ideal as second-stage regulator

Options

- Antitamper
- Gauge connections—choice of 4 configurations
- NACE MR0175/ISO 15156-compliant models
- Special cleaning to ASTM G93 Level C

Technical Data

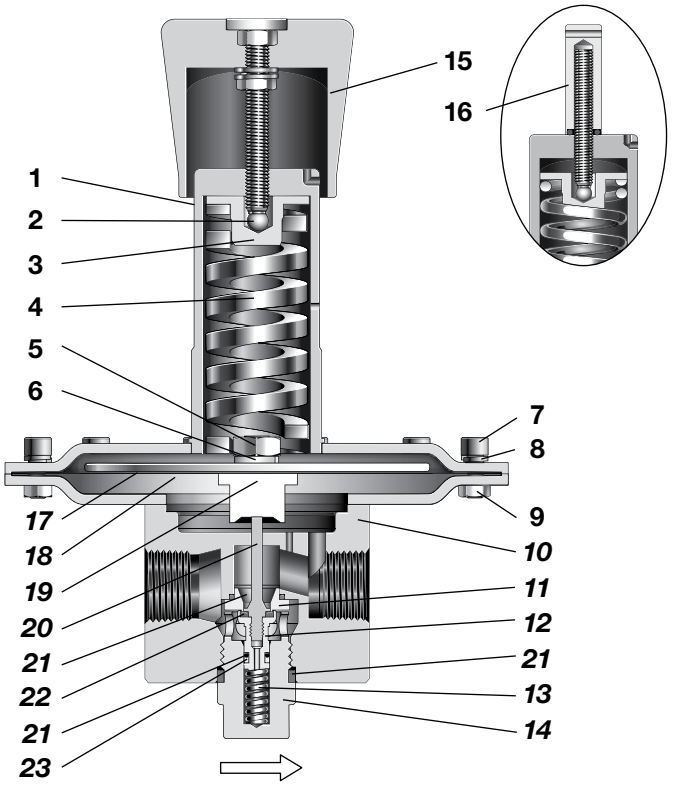
Series	Maximum Inlet Pressure psig (bar)	Maximum Outlet Control Pressure psig (bar)	Sensing Type	Temperature Range °F (°C)	Flow Coefficient (C_v)	Seat Diameter in. (mm)	Connections			Weight
							Inlet and Outlet			
							Size	Type	Gauge	
LPRS4	232 (16.0)	43.0 (3.0)	Diaphragm	–49 to 176 (–45 to 80) See **Pressure-Temperature Ratings,** page 887.	1.84	0.39 (10.0)	1/2 in. DN15	NPT ISO/BSP parallel thread ASME or EN flange	1/4 in. NPT	See **Dimensions,** page 36.
LPRS6					1.95		3/4 in. DN20			
LPRS8					2.07		1 in. DN25			

See pages 34 to 35 for flow data.

Materials of Construction

LPRS Series Regulator with Standard Knob

Antitamper Option



Component	Material / Specification
1 Spring housing assembly	316L SS / A479
2 Ball	Commercial stainless steel
3 Spring guide	316L SS / A479
4 Set spring	50CRV4
5 Nut	A2
6 Washer	A4
7 Cap screw	A4-80
8 Washer	A4
9 Nut	A4-80
***10** Body*	*316L SS / A479*
***11** Seat*	
***12** Poppet housing*	
***13** Poppet spring*	*302 SS / A313*
***14** Body plug*	*316L SS / A479*
15 Knob assembly with adjusting screw, nuts	Red ABS with A2-70
16 Antitamper assembly with O-ring, adjusting screw	316L SS, nitrile, A2-70
***17** Diaphragm plate*	*316L SS / A479*
***18** Diaphragm*	*PTFE, EPDM, FKM, or nitrile*
***19** Diaphragm screw*	*316L SS / A479*
***20** Poppet*	
***21** O-rings*	*EPDM, FKM, or nitrile*
***22** Seat seal*	
***23** Backup ring*	*PTFE*
Wetted lubricants: Silicone-based, synthetic hydrocarbon-based	

Wetted components listed in *italics*.
Gauge plugs (not shown): 431 SS / A276.

Flow Data

The graphs illustrate the change or “droop” in outlet pressures as the flow rate increases.

For more flow curve information, contact your authorized Swagelok representative.

LPRS4 Series

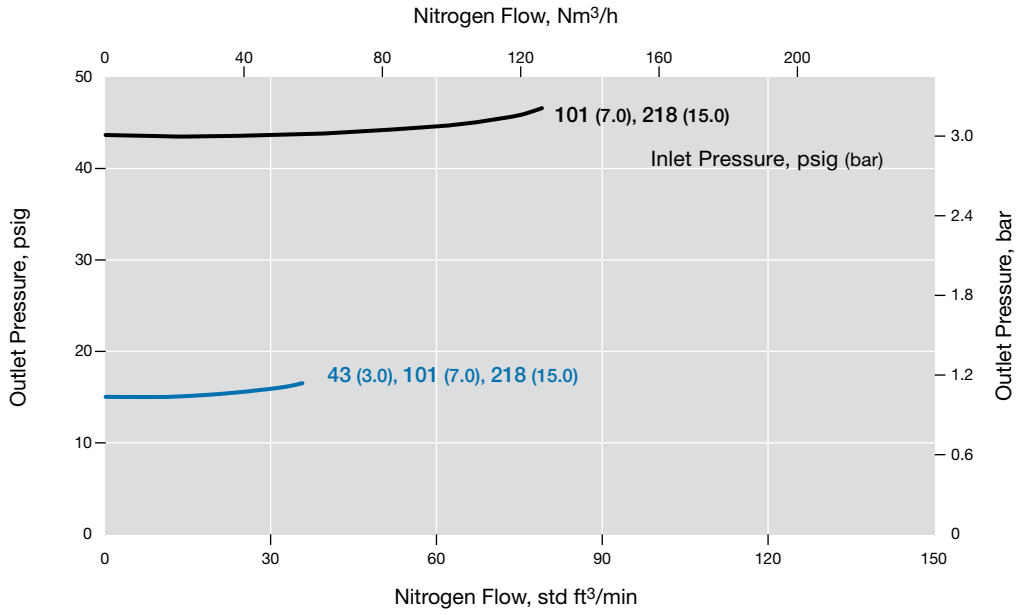
Flow Coefficient: 1.84

Maximum Inlet Pressure: 218 psig (15.0 bar)

Outlet Pressure Control Range: 1.4 to 43 psig (0.10 to 3.0 bar)

Pressure Control Range

- 4.3 to 43 psig (0.30 to 3.0 bar)
- 1.4 to 14.5 psig (0.10 to 1.0 bar)



Flow Data

The graphs illustrate the change or “droop” in outlet pressures as the flow rate increases.

For more flow curve information, contact your authorized Swagelok representative.

LPRS8 Series

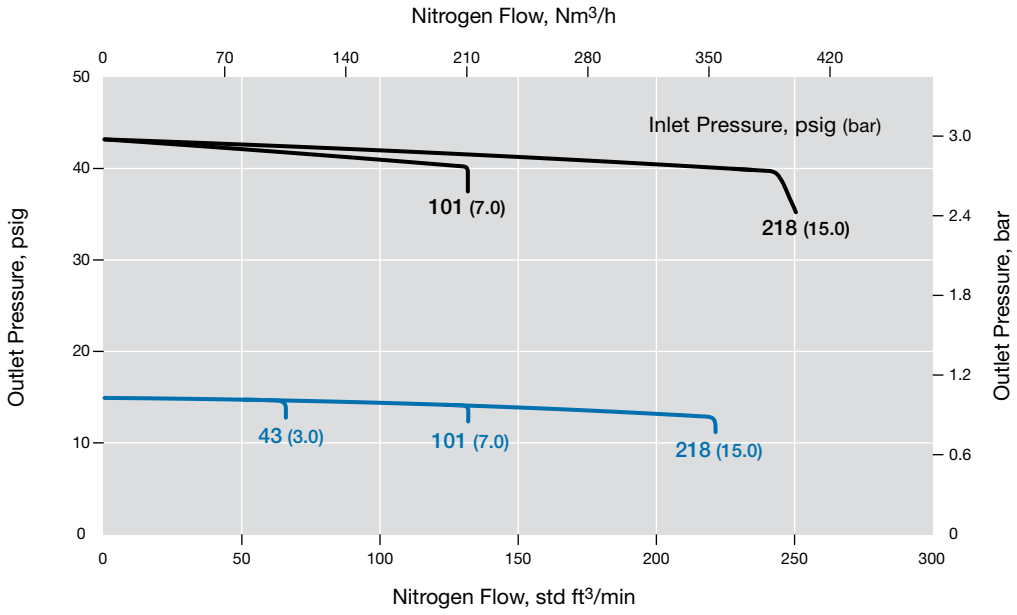
Flow Coefficient: 2.07

Maximum Inlet Pressure: 218 psig (15.0 bar)

Outlet Pressure Control Range: 1.4 to 43 psig (0.10 to 3.0 bar)

Pressure Control Range

- 4.3 to 43 psig (0.30 to 3.0 bar)
- 1.4 to 14.5 psig (0.10 to 1.0 bar)

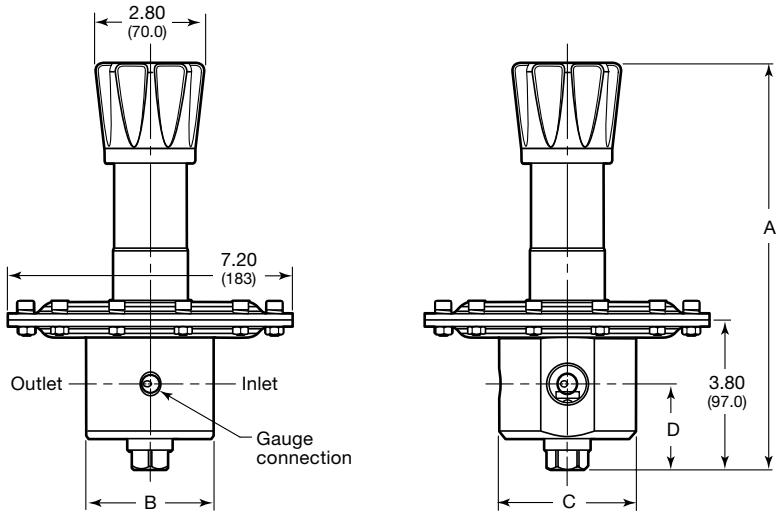


Dimensions

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

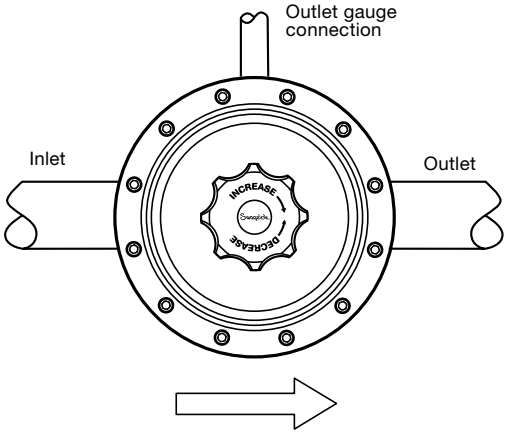
Series	End Connection Size and Type	Dimensions, in. (mm)				Weight lb (kg)
		A	B	C	D	
LPRS4	1/2 in. NPT or ISO/BSP parallel thread	10.2 (258)	2.83 (72.0)	3.07 (78.0)	2.09 (53.0)	11.0 (5.0)
	DN15 PN40—EN 1092		10.2 (260)			14.3 (6.5)
	1/2 in. ASME class 150—B16.5		11.0 (280)			
LPRS6	3/4 in. NPT or ISO/BSP parallel thread		3.23 (82.0)	3.50 (89.0)	2.20 (56.0)	12.1 (5.5)
	DN20 PN40—EN 1092		10.2 (260)			17.6 (7.8)
	3/4 in. ASME class 150—B16.5		11.2 (285)			
LPRS8	1 in. NPT or ISO/BSP parallel thread		3.07 (78.0)	3.50 (89.0)	2.20 (56.0)	12.1 (5.5)
	DN25 PN40—EN 1092		10.2 (260)			18.3 (8.3)
	1 in. ASME class 150—B16.5		11.5 (291)			

Regulators with Pipe Connections



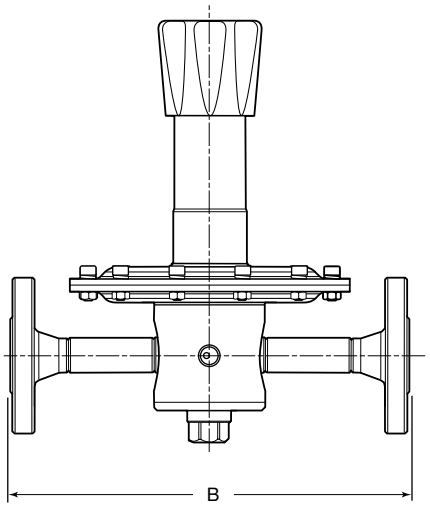
Standard Configuration

Top



Shown with tubing for clarity; tubing not included.

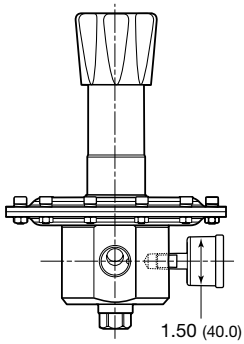
Regulators with Flange Connections



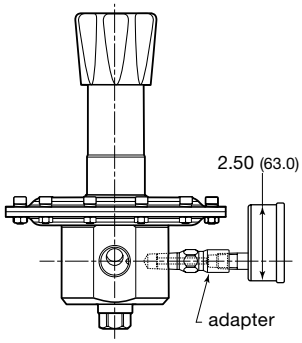
Gauges

Due to the size of the diaphragm enclosure it is not possible to fit a gauge without an adapter, unless a gauge with 40 mm (1 1/2 in.) dial and center-back mount is used.

RHPS Gauge Adapter



40 mm (1 1/2 in.) gauge dial size with center-back mount



63 mm (2 1/2 in.) or larger gauge dial size requires the use of an adapter.

Flow Table

1/2 in. DN15, 3/4 in. DN20, 1 in. DN25 Connections

Inlet Pressure P1 psig (bar)	Set Pressure P2 psig (bar)	Pressure Control Range psig (bar)	Flow std ft³/min (Nm³/h)
14.5 (1.0)	1.4 (0.10)	1.4 to 14.5 (0.10 to 1.0)	12.9 (22)
	4.3 (0.30)		17.6 (30)
43 (3.0)	1.4 (0.10)	1.4 to 14.5 (0.10 to 1.0)	12.9 (22)
	4.3 (0.30)		23.5 (40)
	11 (0.80)		35.3 (60)
	29 (2.0)	4.3 to 43 (0.30 to 3.0)	47.0 (80)①
72 (5.0)	1.4 (0.10)	1.4 to 14.5 (0.10 to 1.0)	12.9 (22)
	4.3 (0.30)		23.5 (40)
	11 (0.80)		35.3 (60)
	29 (2.0)	4.3 to 43 (0.30 to 3.0)	76.5 (130)①
145 (10.0)	4.3 (0.30)	1.4 to 14.5 (0.10 to 1.0)	23.5 (40)
	11 (0.80)		35.3 (60)
	29 (2.0)	4.3 to 43 (0.30 to 3.0)	76.5 (130)①
232 (16.0)	4.3 (0.30)	1.4 to 14.5 (0.10 to 1.0)	23.5 (40)
	11 (0.80)		35.3 (60)
	29 (2.0)	4.3 to 43 (0.30 to 3.0)	76.5 (130)①

① Droop is approximately 15 %.

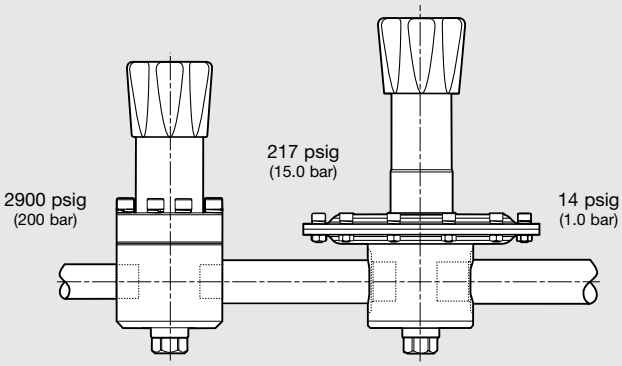
Droop

Due to the working of the suction tube, LPRS series regulators show little or no droop.

Flow

If the flows given in the table are exceeded, the set pressure P2 may rise above the original setting.

Typical 2-Stage Reduction
for improved set-pressure control



Ordering Information

Build an LPRS4, LPRS6, and LPRS8 series regulator ordering number by combining the designators in the sequence shown below.

1	2	3	4	5	6	7	8	9	10	11
LPRS	FA	4	A	1	- 02	- 2	- V	V	V	- GN2

1 Series
LPRS = 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 = EN 1092 (DIN) flange

3 Size
4 = 1/2 in. / DN15
6 = 3/4 in. / DN20
8 = 1 in. / DN25

4 Pressure Class
Omit designator if flanges are not ordered.
A = ASME class 150
N = EN class PN40

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

6 Body Material
02 = 316L SS

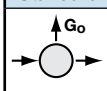
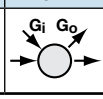
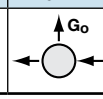
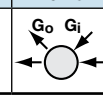
7 Pressure Control Range
2 = 1.4 to 14.5 psig (0.10 to 1.0 bar)
3 = 4.3 to 43 psig (0.30 to 3.0 bar)

8 Seal Material
V = Fluorocarbon FKM
N = Nitrile
E = EPDM
L = Low temperature Nitrile

9 Diaphragm
V = Fluorocarbon FKM
N = Nitrile
E = EPDM
L = Low temperature Nitrile

10 Seat Seal Material
V = Fluorocarbon FKM
N = Nitrile
E = EPDM
L = Low temperature Nitrile

11 Options
A = Antitamper
GN2 = Gauge connection, see below
GN4 = Gauge connection, see below
GN5 = Gauge connection, see below
None = Standard connection, see below

Gauge Connection Configuration			
Standard	GN2	GN4	GN5
			

N = NACE MR0175/ISO 15156
G93 = ASTM G93 Level C-cleaned

High-Sensitivity, Spring-Loaded Pressure-Reducing Regulators—LPRS10 and LPRS15 Series

Features

- Balanced poppet design
- Diaphragm sensing
- High flow and high accuracy
- Suction tube for reduced droop
- Ideal as second-stage regulator

Options

- Antitamper
- NACE MR0175/ISO 15156-compliant models
- Special cleaning to ASTM G93 Level C

Technical Data

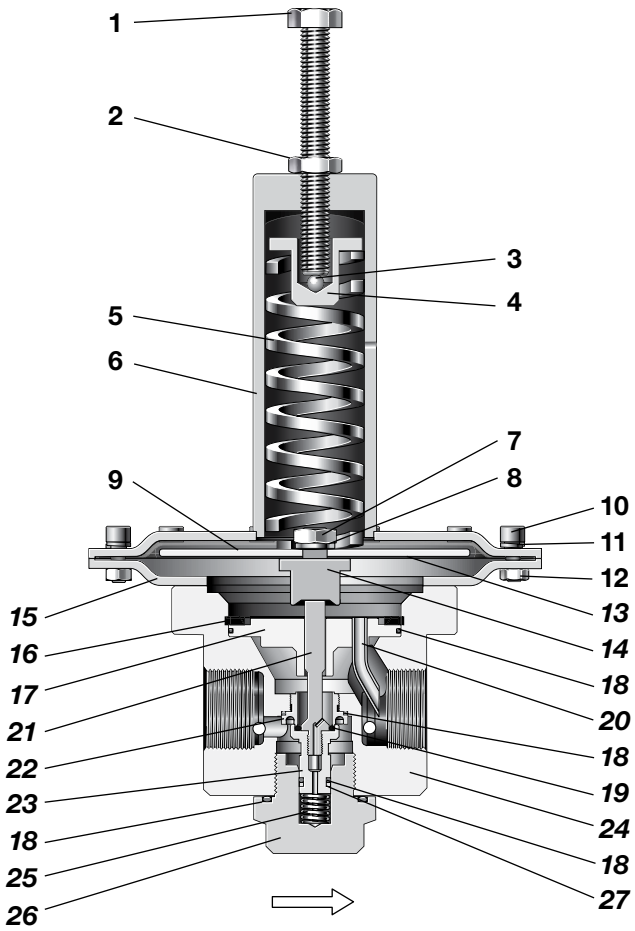
Series	Maximum Inlet Pressure psig (bar)	Maximum Outlet Control Pressure psig (bar)	Sensing Type	Temperature Range °C (°F)	Flow Coefficient (C_v)	Seat Diameter in. (mm)	Connections			Weight (Without Flanges) lb (kg)
							Inlet and Outlet			
							Size	Type	Gauge	
LPRS10	232 (16.0)	43.0 (3.0)	Diaphragm	–49 to 176 (–45 to 80) See **Pressure-Temperature Ratings,** page 887.	3.79	0.55 (14.0)	1 in. DN25	NPT ISO/BSP parallel thread ASME or EN flange	1/4 in. NPT or ISO/BSP parallel thread①	17.6 (8.0)
LPRS15					7.30	0.75 (19.0)	1 1/2 in. DN40			22.0 (10.0)

See page 39 for flow data.

① Regulators with NPT inlet / outlet connections have 1/4 in. NPT gauge connections.

Materials of Construction

LPRS10 Series Regulator



Component	Material / Specification
1 Adjusting screw	A2-70
2 Nut	A2
3 Ball	Commercial stainless steel
4 Spring guide	316L SS / A479
5 Set spring	50CRV4
6 Spring housing assembly	316L SS / A479
7 Nut	A2
8 Washer	A4
9 Diaphragm plate	316L SS / A479
10 Cap screw	A4-80
11 Washer	A2
12 Nut	A2
***13** Diaphragm*	*PTFE, FKM, EPDM, or nitrile*
***14** Diaphragm screw*	*316L SS / A479*
***15** Bottom cover*	
***16** Retaining ring*	*Commercial stainless steel*
***17** Body plate*	*316L SS / A479*
***18** O-rings*	*EPDM, FKM, or nitrile*
***19** Seat seal*	
***20** Suction tube*	*316L SS / A479*
***21** Poppet*	
***22** Seat*	
***23** Poppet housing*	
***24** Body*	
***25** Poppet spring*	*302 SS / A313*
***26** Body plug*	*316L SS / A479*
***27** Backup ring*	*PTFE*
Wetted lubricant: Silicone-based, synthetic hydrocarbon-based	

Wetted components listed in *italics*.
Gauge plugs (not shown): 431 SS / A276.

Flow Data

The graphs illustrate the change or “droop” in outlet pressures as the flow rate increases.

For more flow curve information, contact your authorized Swagelok representative.

LPRS10 Series

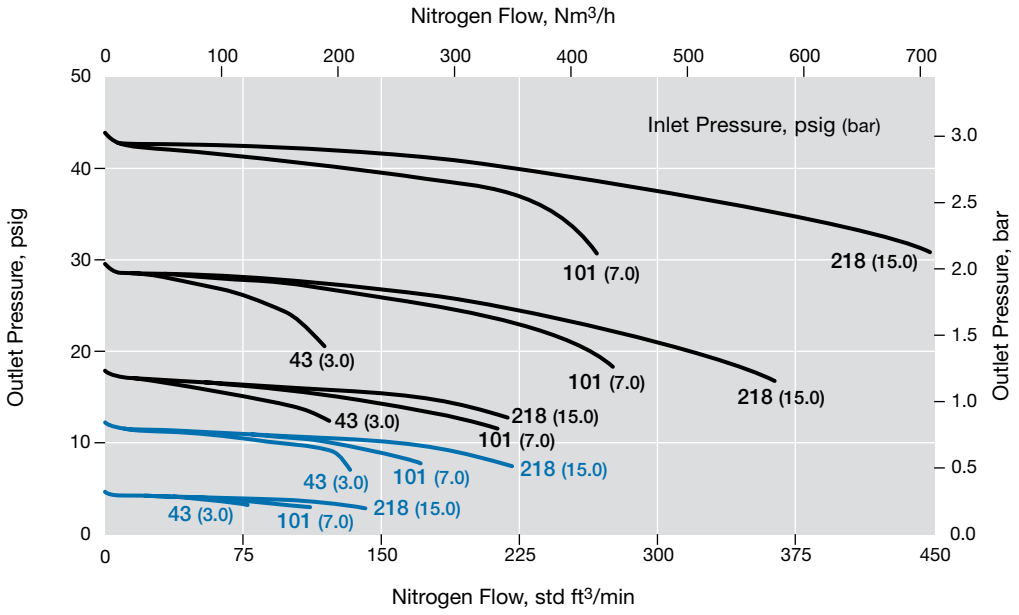
Flow Coefficient: 3.79

Maximum Inlet Pressure: 232 psig (16.0 bar)

Outlet Pressure Control Range: 1.4 to 43 psig (0.10 to 3.0 bar)

Pressure Control Range

- 4.3 to 43 psig (0.30 to 3.0 bar)
- 1.4 to 14.0 psig (0.10 to 1.0 bar)



LPRS15 Series

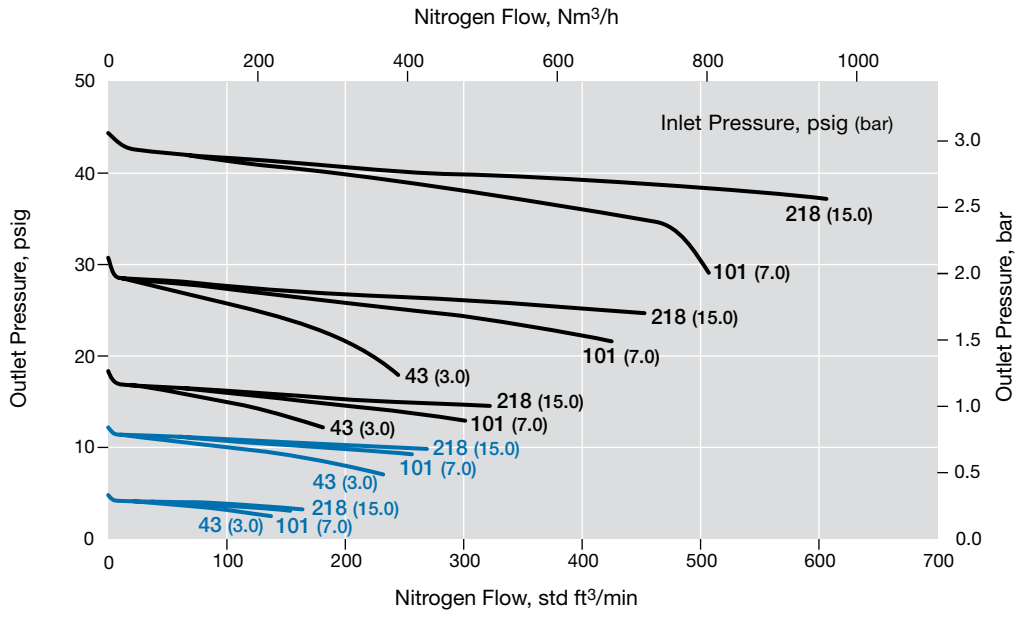
Flow Coefficient: 7.3

Maximum Inlet Pressure: 232 psig (16.0 bar)

Outlet Pressure Control Range: 1.4 to 43 psig (0.10 to 3.0 bar)

Pressure Control Range

- 4.3 to 43 psig (0.30 to 3.0 bar)
- 1.4 to 14.0 psig (0.10 to 1.0 bar)

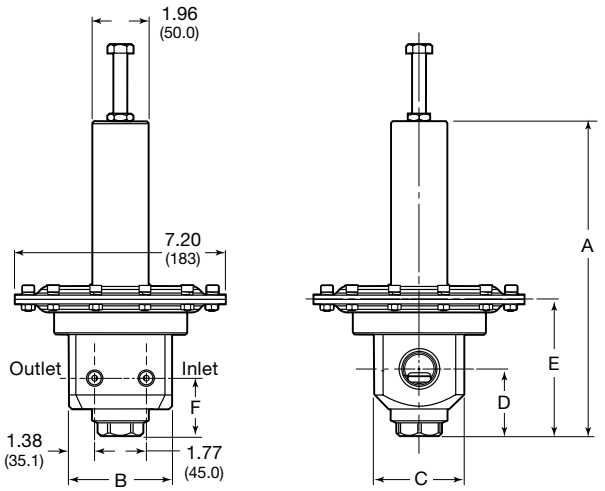


Dimensions

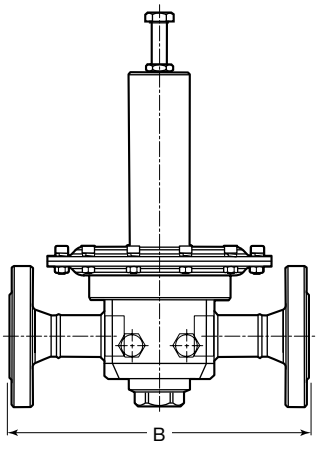
Dimensions, in inches (millimeters), are for reference only and are subject to change.

Series	End Connection Size and Type	Dimensions, in. (mm)					
		A	B	C	D	E	F
LPRS10	1 in. NPT or ISO/BSP parallel thread	10.8 (275)	3.54 (90.0)	3.07 (78.0)	2.28 (58.0)	4.69 (119)	2.00 (50.8)
	DN25 PN40—EN 1092		9.69 (246)				
	1 in. ASME class 150—B16.5		9.65 (245)				
LPRS15	1 1/2 in. NPT or ISO/BSP parallel thread	11.3 (286)	4.53 (115)	3.78 (96.0)	2.44 (62.0)	5.12 (130)	2.03 (51.6)
	DN40 PN40—EN 1092		11.0 (280)				
	1 1/2 in. ASME class 150—B16.5		12.4 (314)				

Regulators with Pipe Connections

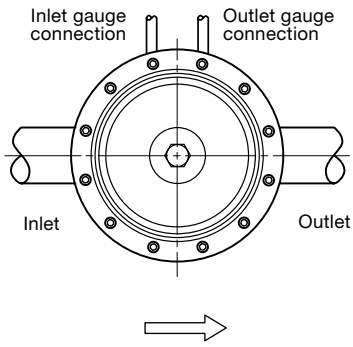


Regulators with Flange Connections



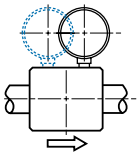
Configuration

Top



Shown with tubing for clarity; tubing not included.

Gauge Connection



Only one gauge with a 50 mm (2 in.) or larger dial size fits directly into the body.

Ordering Information

Build an LPRS10 and LPRS15 series regulator ordering number by combining the designators in the sequence shown below.

1	2	3	4	5	6	7	8	9	10	11
LPRS	FA	10	A	1	- 02	- 2	- V	V	V	- G93

1 Series
LPRS = 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 = EN 1092 (DIN) flange

3 Size
10 = 1 in. / DN25
15 = 1 1/2 in. / DN40

4 Pressure Class
Omit designator if flanges are not ordered.
A = ASME class 150
N = EN class PN40

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

6 Body Material
02 = 316L SS

7 Pressure Control Range
2 = 1.4 to 14.5 psig (0.10 to 1.0 bar)
3 = 4.3 to 43 psig (0.30 to 3.0 bar)

8 Seal Material
V = Fluorocarbon FKM
N = Nitrile
E = EPDM
L = Low temperature Nitrile

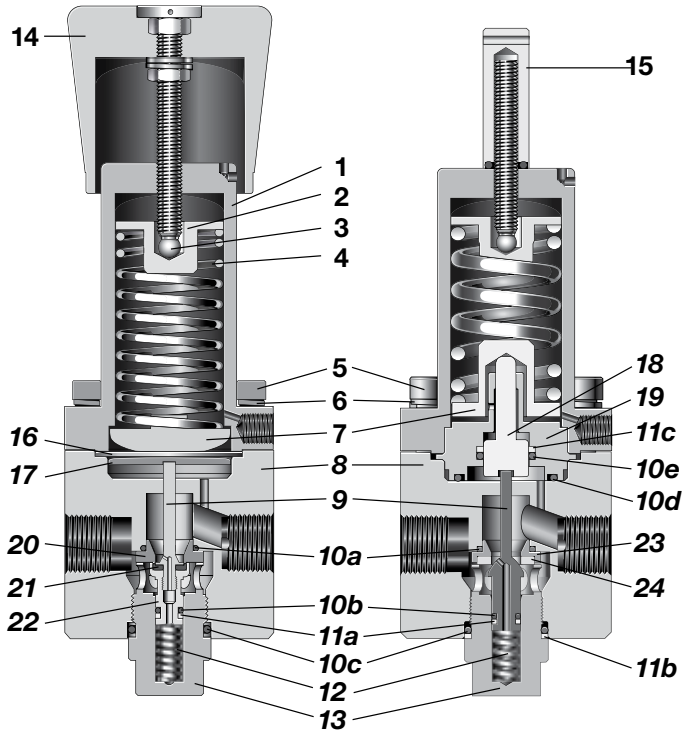
9 Diaphragm
V = Fluorocarbon FKM
N = Nitrile
E = EPDM
L = Low temperature Nitrile

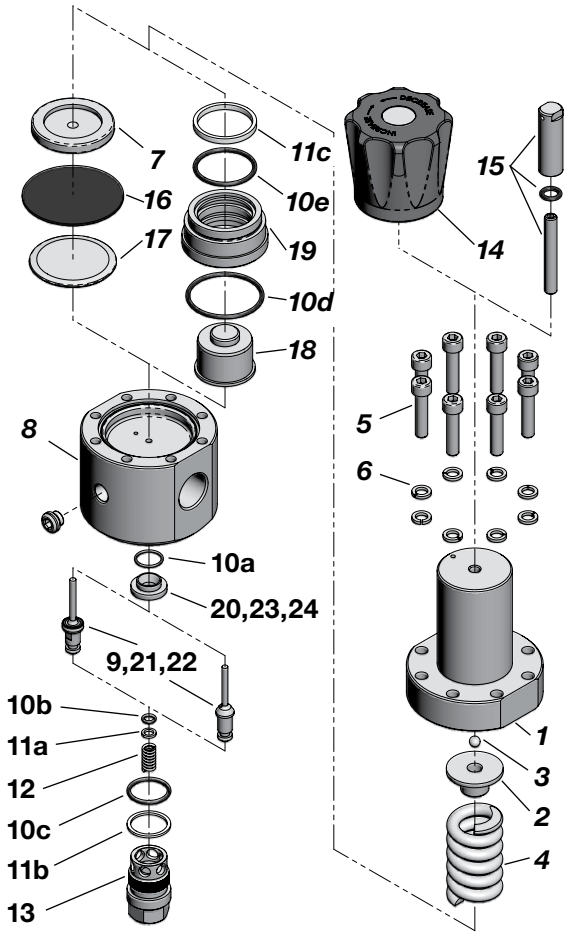
10 Seat Seal Material
V = Fluorocarbon FKM
N = Nitrile
E = EPDM
L = Low temperature Nitrile

11 Options
A = Antitamper
N = NACE MR0175/ISO 15156
G93 = ASTM G93 Level C-cleaned

Pressure-Reducing Regulators Spring-Loaded—RS Series Maintenance Kits

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	Diaphragm Sensing Typical Contents	Piston Sensing Typical Contents
A1	Valve kit	Poppet and housing (9, 21, 22), O-rings (10a, 10b), Back-up ring (11a), Seat (20)	Poppet (9), O-rings (10a, 10b), Back-up rings (11a), Seat (23), Seat seal (24)
A2	Soft valve kit	Poppet and housing (9, 21 22), O-ring (10b), Back-up ring (11a)	O-ring (10a), Seat (23), Seat seal (24)
B1	Service kit	Poppet and housing (9, 21, 22), O-rings (10a, 10b, 10c), Back-up ring (11a), Diaphragm (16), Seat (20)	Poppet (9), O-rings (10a, 10b, 10c, 10d, 10e), Back-up rings (11a, 11b, 11c), Seat (23), Seat seal (24)
B2	Seal kit	O-rings (10a, 10b, 10c), Back-up ring (11a), Diaphragm (16)	O-rings (10a, 10b, 10c, 10d, 10e), Back-up rings (11a, 11b, 11c)
C1	Overhaul kit	Spring guides (2, 7), Ball (3), Set spring (4), Poppet and housing (9, 21, 22), O-rings (10a, 10b, 10c), Back-up ring (11a), Poppet spring (12), Body plug (13), Diaphragm (16), Diaphragm plate (17), Seat (20)	Spring guide (2), Ball (3), Set spring (4), Poppet (9), O-rings (10a, 10b, 10c, 10d, 10e), Back-up rings (11a, 11b, 11c), Poppet spring (12), Body plug (13), Piston (18), Piston plate (19), Seat (23), Seat seal (24)
C2	Body plug kit	O-ring (10c), Body plug (13)	O-ring (10c), Body plug (13), Back-up ring (11b)
C3	Sensing kit	Diaphragm (16)	Piston (18), Piston plate (19), O-rings (10d, 10e), Back-up ring (11c)
C4	Range spring kit	Range spring (4)	Range spring (4)
C5	Poppet spring kit	Poppet spring (12)	Poppet spring (12)
D1	Handle kit	Handle assembly (14)	Handle assembly (14)
E1	Hardware kit	Bolts (5), Washers (6)	Bolts (5), Washers (6)

Ordering Information

To order a maintenance kit, add the **kit type designator** to the regulator ordering number. Example: RSN4-02-1-VVV-**B1**

Pressure-Reducing, Dome-Loaded and Air-Loaded Regulators—RD and RA Series

These pressure-reducing, dome-loaded and air-loaded regulators are suitable for most gases and liquids, including acids and oils. These regulators feature various poppet designs, a pressure-sensing diaphragm (piston in RD2 series), and a choice of seat and seal materials to accommodate a variety of pressure, temperature, and flow conditions.

These regulators are available with a choice of threaded end connections from 1/4 to 2 in., and with flange end connections from 1/2 to 4 in.

The RDH series regulators are high-pressure versions of the RD series regulators, and the LPRD series are low-pressure, high-accuracy versions of the RD series regulators. The RA series regulators are air-loaded regulators.

These regulators are available with many options, including a variety of gauge connection configurations, a pilot regulator (RD series only), external feedback (RD series only), special cleaning to ASTM G93 Level C, and NACE MR0175/ISO 15156-compliant models.

Features

- Dome-loaded and air-loaded pressure control
- Diaphragm sensing design except RD2 series
- 316L stainless steel materials of construction for corrosion resistance
- Maximum inlet pressure ratings:
  1015 to 5800 psig (70.0 to 400 bar)
- Outlet pressure control ranges:
  Up to 0 to 5800 psig (0 to 400 bar)

RD2

RD(H)6, 8

RD(H)10, 15

RD(H)6DP

RA4, 6, 8

RD(H)20, 25

RD(H)30, 40

LPRD25, 30, 40

Pressure-Reducing, Dome-Loaded and Air-Loaded Regulators—RD and RA Series

Pressure-Temperature Ratings

Seal Material	Temperature Range °F (°C)	Material Designator
Fluorocarbon FKM	5 to 176 (–15 to 80)	V
Standard Nitrile	-4 to 176 (–20 to 80)	N
Low-Temp Nitrile	-49 to 176 (–45 to 80)	L
EPDM	-4 to 176 (–20 to 80)	E
FFKM	14 to 176 (–10 to 80)	F

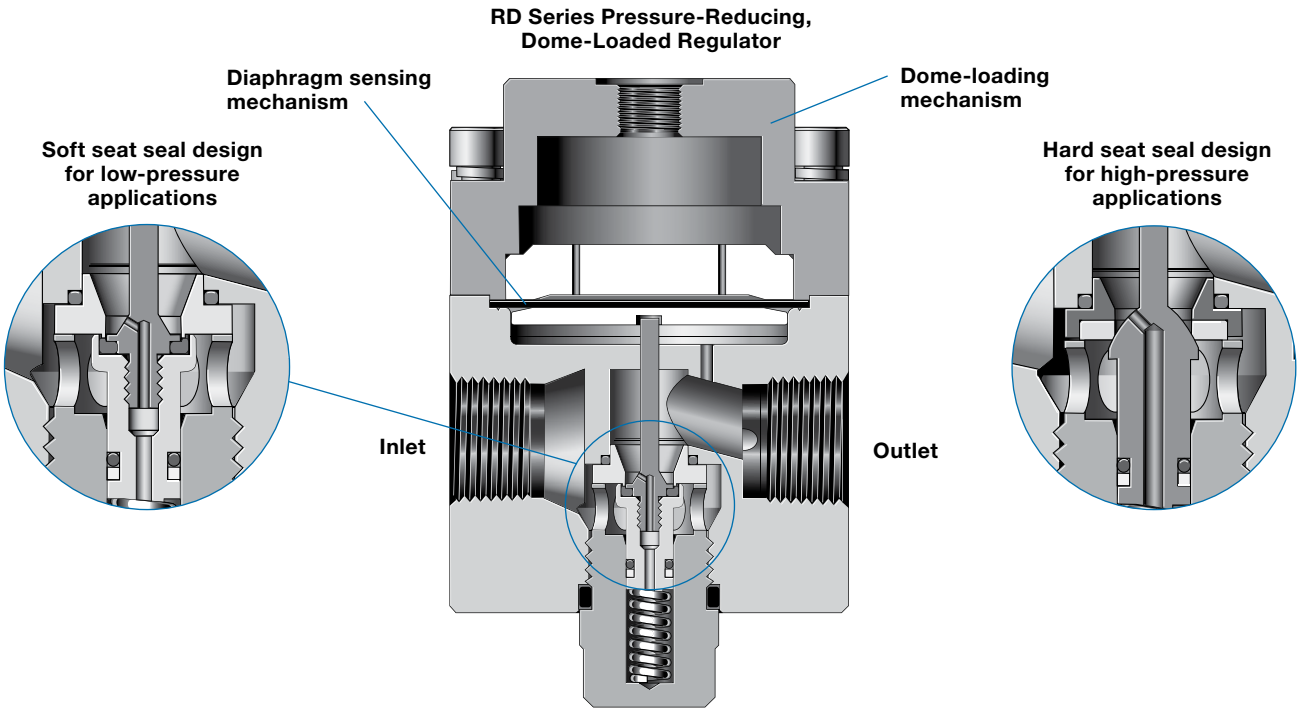
Seat Material	PCTFE	PEEK	Fluorocarbon FKM, Nitrile, EPDM, FFKM
Temperature °F (°C)	Maximum Inlet Pressure / Working Pressure psig (bar)		
-49 to -40 (–45 to -40)	–	–	1015 (70.0)
-40 to 95 (–40 to 35)	5 800 (400)	5 800 (400)	
149 (65)	3987 (275)		
176 (80)	1812 (125)		

Technical Data—Performance

Series	Maximum Inlet Pressure① psig (bar)	Maximum Outlet Control Pressure① psig (bar)	Flow Coefficient (C_v)	Sensing Type	Flow Data on Page
RD2	5800 (400)	5800 (400)	0.05	Piston	47
RD6DP	1015 (70.0)	1015 (70.0)	1.95	Diaphragm	—
RDH6DP	5800 (400)	3335 (230)			
RD6	1015 (70.0)	1015 (70.0)	1.95	Diaphragm	51
RDH6	5800 (400)	5800 (400)			
RD8	1015 (70.0)	1015 (70.0)	2.07	Diaphragm	—
RDH8	5800 (400)	5800 (400)			
RD10	1015 (70.0)	1015 (70.0)	3.79	Diaphragm	61
RDH10	5800 (400)	3625 (250)			
RD15	1015 (70.0)	1015 (70.0)	7.30	Diaphragm	66, 70
RDH15	5800 (400)	3625 (250)			
RD20	1015 (70.0)	1015 (70.0)	13	Diaphragm	73, 74
RDH20	5800 (400)	2900 (200)			
RD25	1015 (70.0)	1015 (70.0)	21	Diaphragm	—
RDH25	4060 (280)	2900 (200)			
RD30	1015 (70.0)	1015 (70.0)	36	Diaphragm	—
RDH30	4060 (280)	2900 (200)			
RD40	1015 (70.0)	1015 (70.0)	73	Diaphragm	—
RDH40	4060 (280)	2900 (200)			
LPRD20	232 (16.0)	29 (2.0)	13	Diaphragm	—
LPRD25			21		
LPRD30			36		
LPRD40			73		
RA4	5800 (400)	5800 (400)	1.84	Diaphragm	—
RA6					
RA8					

① Regulator pressure rating may be limited by connection type.

Pressure-Reducing, Dome-Loaded and Air-Loaded Regulators—RD and RA Series



Technical Data—Design

Series	Seat Diameter in. (mm)	Inlet and Outlet Connections	Gauge Connection	Dome Connection	Weight (Without Flanges) lb (kg)	More Information on Page
RD2	0.087 (2.2)	1/4 in. NPT	1/4 in. NPT	1/8 in. NPT	3.1 (1.4)	46
RD6DP	0.39 (10.0)	3/4 in. NPT, ISO/BSP parallel thread, EN or ASME flanges	1/4 in. NPT	1/4 in. NPT	10.6 (4.8)	55
RDH6DP						
RD6	0.39 (10.0)	3/4 in. NPT, ISO/BSP parallel thread, EN or ASME flanges	1/4 in. NPT	1/4 in. ISO/BSP parallel thread	8.8 (4.0)	50
RDH6						
RD8	0.39 (10.0)	1 in. NPT, ISO/BSP parallel thread, EN or ASME flanges	1/4 in. NPT	1/4 in. ISO/BSP parallel thread	8.8 (4.0)	50
RDH8						
RD10	0.55 (14.0)	1 in. NPT, ISO/BSP parallel thread, EN or ASME flanges	1/4 in. NPT or ISO/BSP parallel thread	1/4 in. ISO/BSP parallel thread	17.6 (6.0)	59
RDH10	0.53 (13.5)					
RD15	0.75 (19.0)	1 1/2 in. NPT, ISO/BSP parallel thread, EN or ASME flanges	1/4 in. NPT or ISO/BSP parallel thread	1/4 in. ISO/BSP parallel thread	19.8 (9.0)	59
RDH15						
RD20	0.98 (25.0)	2 in. NPT, ISO/BSP parallel thread, EN or ASME flanges	Use P1 gauge connections on pilot regulator	1/4 in. ISO/BSP parallel thread	44.0 (20)	72
RDH20						
RD25	1.25 (32.0)	2 1/2 in. EN or ASME flanges	Use P1 gauge connections on pilot regulator	1/4 in. ISO/BSP parallel thread	88.0 (40)	72
RDH25						
RD30	1.65 (42.0)	3 in. EN or ASME flanges	Use P1 gauge connections on pilot regulator	1/4 in. ISO/BSP parallel thread	136 (62)	84
RDH30						
RD40	2.36 (60.0)	4 in. EN or ASME flanges	Use P1 gauge connections on pilot regulator	1/4 in. ISO/BSP parallel thread	183 (83)	84
RDH40						
LPRD20	0.98 (25.0)	2 in. EN or ASME flanges	Inlet and outlet gauges included	1/4 in. ISO/BSP parallel thread	Varies with model and end connection	99
LPRD25	1.25 (32.0)	2 1/2 in. EN or ASME flanges				99
LPRD30	1.65 (42.0)	3 in. EN or ASME flanges				99
LPRD40	2.36 (60.0)	4 in. EN or ASME flanges				99
RA4	0.39 (10.0)	1/2 in. NPT, ISO/BSP parallel thread, EN or ASME flanges	1/4 in. NPT	1/4 in. ISO/BSP parallel thread	12.5 (5.7)	101
RA6		3/4 in. NPT, ISO/BSP parallel thread, EN or ASME flanges			13.6 (6.2)	
RA8		1 in. ISO/BSP parallel thread, EN or ASME flanges			13.6 (6.2)	

Compact, General-Purpose Dome-Loaded Pressure-Reducing Regulators—RD2 Series

Features

- Piston sensing
- Integral 25 µm filter
- Cartridge poppet assembly for ease of service
- Bottom mounting

Options

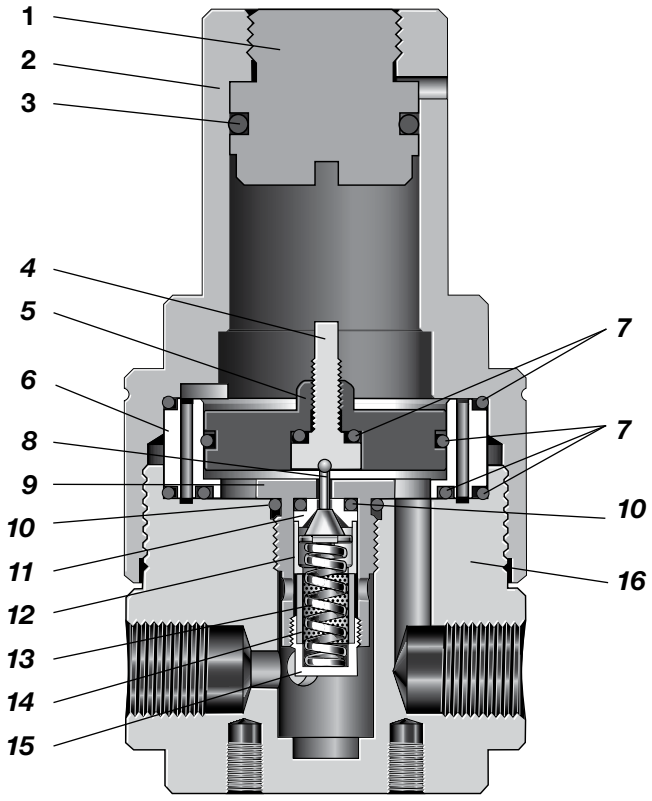
- No filter—for liquid applications
- NACE MR0175/ISO 15156-compliant models (nonventing and no-filter models only)
- Special cleaning to ASTM G93 Level C
- Panel mounting kit sold separately—no disassembly required

Technical Data

Series	Maximum Inlet Pressure psig (bar)	Maximum Outlet Control Pressure psig (bar)	Sensing Type	Temperature Range °F (°C)	Flow Coefficient (C_v)	Seat Diameter in. (mm)	Inlet and Outlet Connections	Gauge / Dome Connection	Weight lb (kg)
RD2	5800 (400)	5800 (400)	Piston	–40 to 95 (–40 to 35) See **Pressure-Temperature Ratings,** page 921.	0.05	0.087 (2.2)	1/4 in. NPT	Gauge: 1/4 in. NPT Dome: 1/8 in. NPT	3.1 (1.4)

See page 47 to 48 for flow data.

Materials of Construction



Component	Material / Specification
1 *Dome plug*	*316L SS / A479*
2 *Dome*	
3 *Dome plug O-ring*	*FKM, EPDM, nitrile, or FFKM*
4 *Non-relieving plug*	*316L SS / A479*
5 *Piston*	
6 *Piston plate*	
7 *Piston O-rings*	*FKM, EPDM, nitrile, or FFKM*
8 *Poppet*	*431 SS / A276*
9 *Poppet housing*	*316L SS / A479*
10 *O-rings*	*FKM, EPDM, nitrile, or FFKM*
11 *Seat*	*PEEK or PCFTE*
12 *Seat retainer*	*316L SS / A479*
13 *Poppet spring*	*302 SS / A313*
14 *Filter*	*316L SS*
15 *Plug*	*316L SS / A479*
16 *Body*	
Wetted lubricants: Silicone-based and synthetic hydrocarbon-based	

Wetted components listed in *italics*.
Gauge plugs (not shown): 431 SS / A276.

Flow Data

The graphs illustrate the change or “droop” in outlet pressures as the flow rate increases.

For more flow curve information, contact your authorized Swagelok representative.

RD2 Series

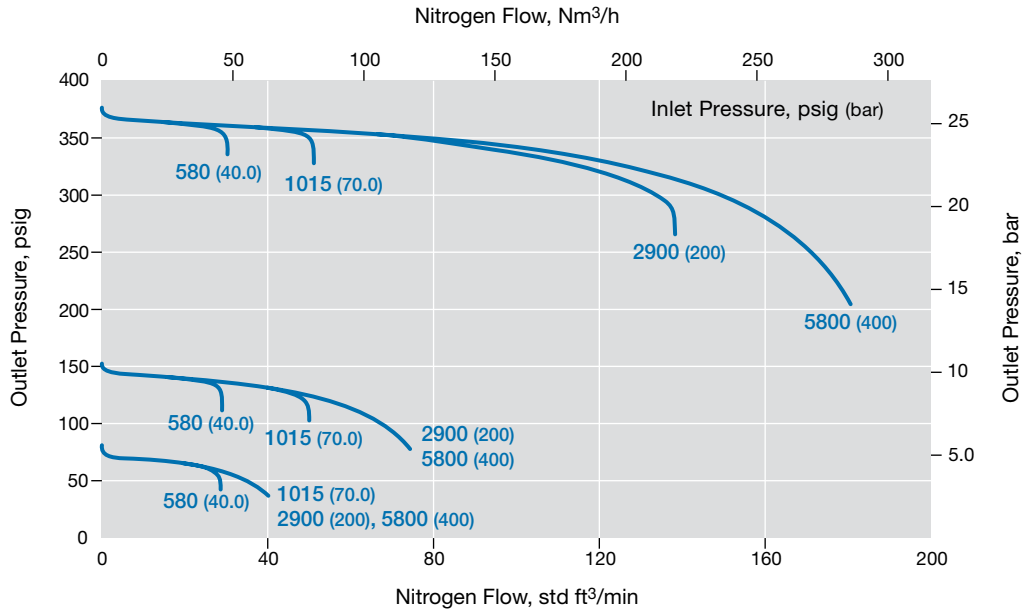
Flow Coefficient: 0.05

Maximum Inlet Pressure: 5800 psig (400 bar)

Outlet Pressure Control Range: 0 to 5800 psig (0 to 400 bar)

Pressure Control Range

0 to 5800 psig (0 to 400 bar)



RD2 Series

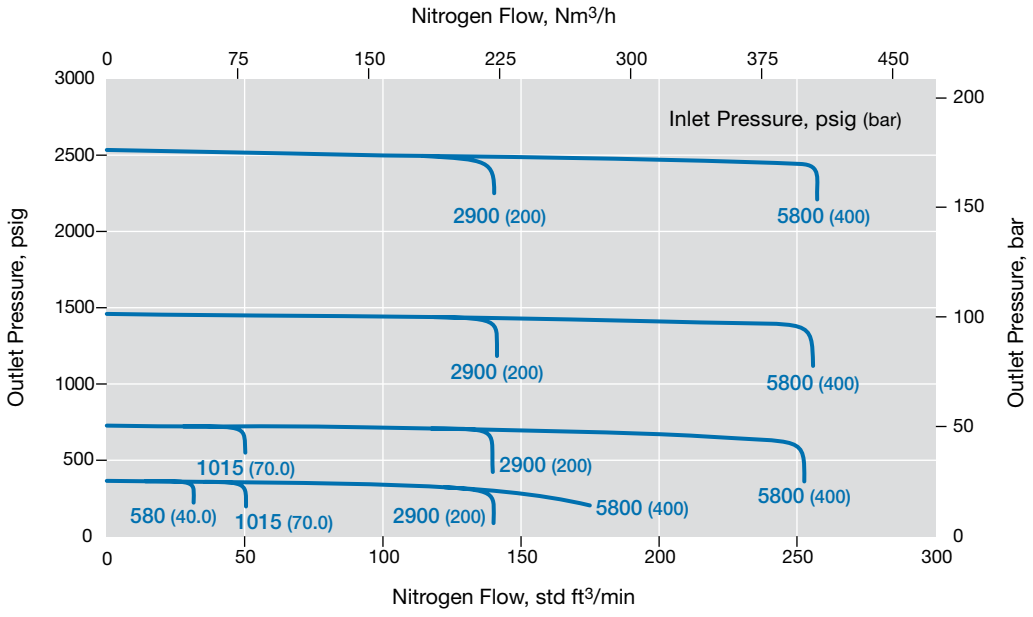
Flow Coefficient: 0.05

Maximum Inlet Pressure: 5800 psig (400 bar)

Outlet Pressure Control Range: 0 to 5800 psig (0 to 400 bar)

Pressure Control Range

0 to 5800 psig (0 to 400 bar)



Flow Data

The graphs illustrate the change or “droop” in outlet pressures as the flow rate increases.

For more flow curve information, contact your authorized Swagelok representative.

RD2 Series

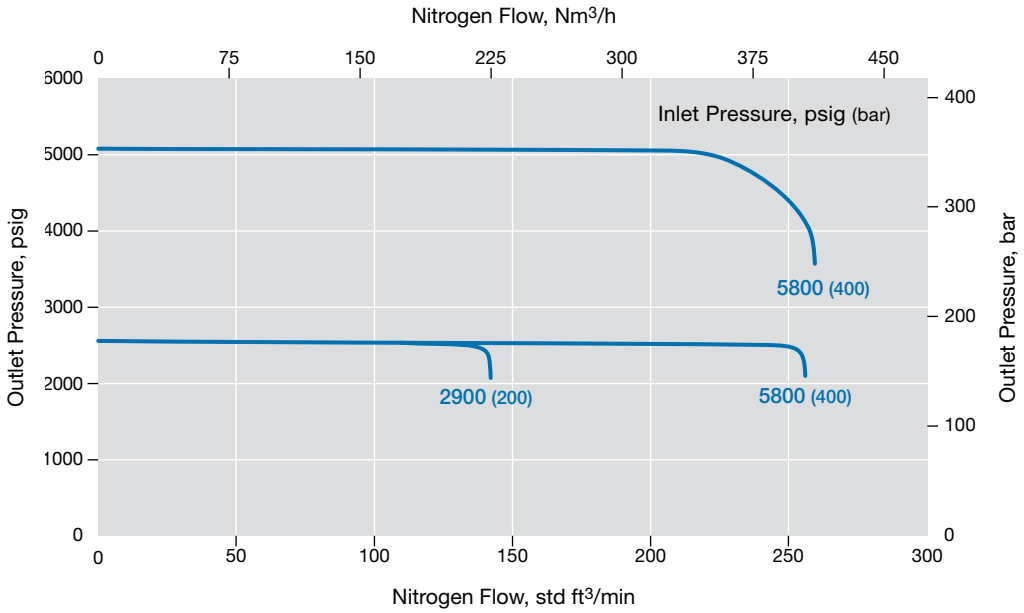
Flow Coefficient: 0.05

Maximum Inlet Pressure: 5800 psig (400 bar)

Outlet Pressure Control Range: 0 to 5800 psig (0 to 400 bar)

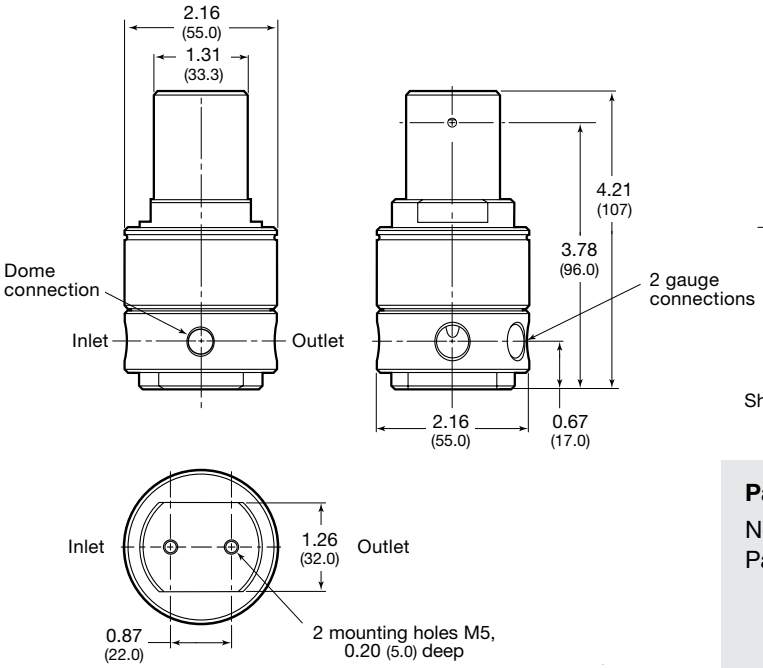
Pressure Control Range

0 to 5800 psig (0 to 400 bar)



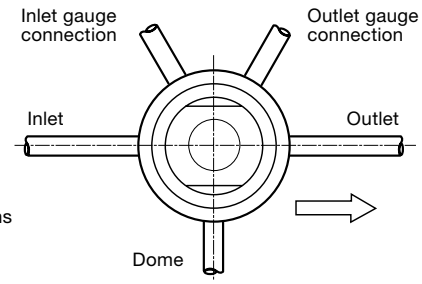
Dimensions

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



Configuration

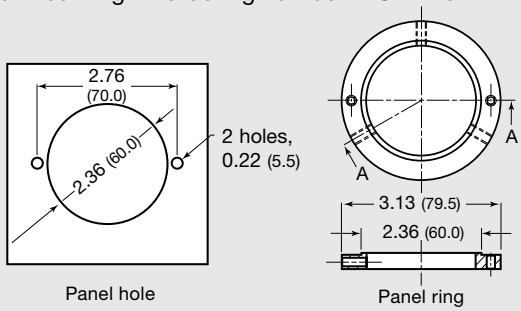
Top



Shown with tubing for clarity; tubing not included.

Panel Mounting Kit

No disassembly required when using panel mount kit.
Panel mounting kit ordering number: **RS2-P-02**



Ordering Information

Build an RD2 series regulator ordering number by combining the designators in the sequence shown below.

1	2	3	4	5	6	7
RD	N2	- 02	- V	V	K	- L

1 Series
RD = 5800 psig (400 bar) maximum inlet pressure

2 Inlet / Outlet
N2 = 1/4 in. female NPT

3 Body Material
02 = 316L SS

4 Seal Material
V = Fluorocarbon FKM
N = Nitrile
E = EPDM
F = FFKM
L = Low temperature Nitrile

5 Piston Seal Material
V = Fluorocarbon FKM
N = Nitrile
E = EPDM
F = FFKM
L = Low temperature Nitrile

6 Seat Material
K = PCTFE
P = PEEK

7 Options
L = No filter
N = NACE MR0175/ISO 15156
G93 = ASTM G93 Level C-cleaned

General-Purpose, Dome-Loaded Pressure-Reducing Regulators—RD(H)6 and RD(H)8 Series

Features

- Balanced poppet design
- Diaphragm sensing
- Dome-to-outlet pressure ratio approximately 1:1

Options

- Antitamper
- Pilot regulator (not shown)
- Gauge connections—choice of 4 configurations
- NACE MR0175/ISO 15156-compliant models
- Special cleaning to ASTM G93 Level C

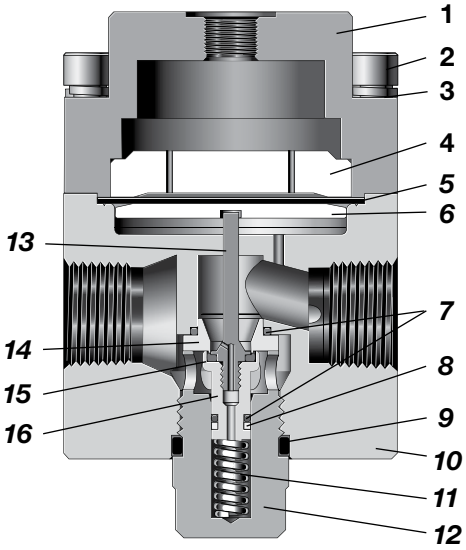
Technical Data

Series	Maximum Inlet Pressure psig (bar)	Maximum Outlet Control Pressure psig (bar)	Sensing Type	Temperature Range °F (C°)	Flow Coefficient (C_v)	Seat Diameter in. (mm)	Inlet and Outlet Connections	Gauge / Dome Connection	Weight (Without Flanges) lb (kg)
RD6 RDH6	RD: 1015 (70.0) RDH: 5800 (400)	RD: 1015 (70.0) RDH: 5800 (400) (2537 [175] with pilot regulator)	Diaphragm	–49 to 176 (–45 to 80) See **Pressure-Temperature Ratings,** page 921.	1.95	0.39 (10.0)	3/4 in. NPT, ISO/BSP parallel thread, EN or ASME flange	Gauge: 1/4 in. NPT; Dome: 1/4 in. ISO/BSP parallel thread	8.8 (4.0)
RD8 RDH8					2.07		1 in. NPT, ISO/BSP parallel thread, EN or ASME flange		

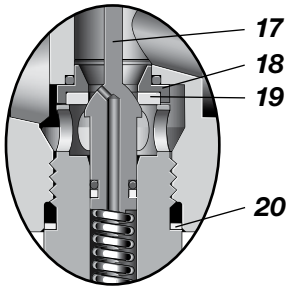
See page 51 to 53 for flow data.

Materials of Construction

RD6 Series Regulator with Soft Seat Seal



RDH6 Series Regulator with Hard Seat Seal



Component	Material / Specification
1 *Dome*	*316L SS / A479*
2 Cap screw	A4-80
3 Washer	A4
4 *Dome plate*	*316L SS / A479*
5 *Diaphragm*	*EPDM, FKM, or nitrile*
6 *Diaphragm plate*	*316L SS / A479*
7 *O-ring*	*EPDM, FKM, or nitrile*
8 *Backup ring*	*PTFE*
9 *Plug O-ring*	*EPDM, FKM, or nitrile*
10 *Body*	*316L SS / A479*
11 *Poppet spring*	*302 SS / A313*
12 *Body plug*	*316L SS / A479*
RD Series Only Components	
13 *Poppet*	*316L SS / A479*
14 *Seat*	
15 *Seat seal*	*EPDM, FKM, or nitrile*
16 *Poppet housing*	*316L SS/ A479*
RDH Series Only Components	
17 *Poppet*	*S17400 or 431 SS / A276*
18 *Seat*	*316L SS/ A479*
19 *Seat seal*	*PCTFE or PEEK*
20 *Backup ring*	*PTFE*
Wetted lubricants: Silicone-based and synthetic hydrocarbon-based	

Wetted components listed in *italics*.
Gauge plugs (not shown): 431 SS / A276.

Flow Data

The graphs illustrate the change or “droop” in outlet pressures as the flow rate increases.

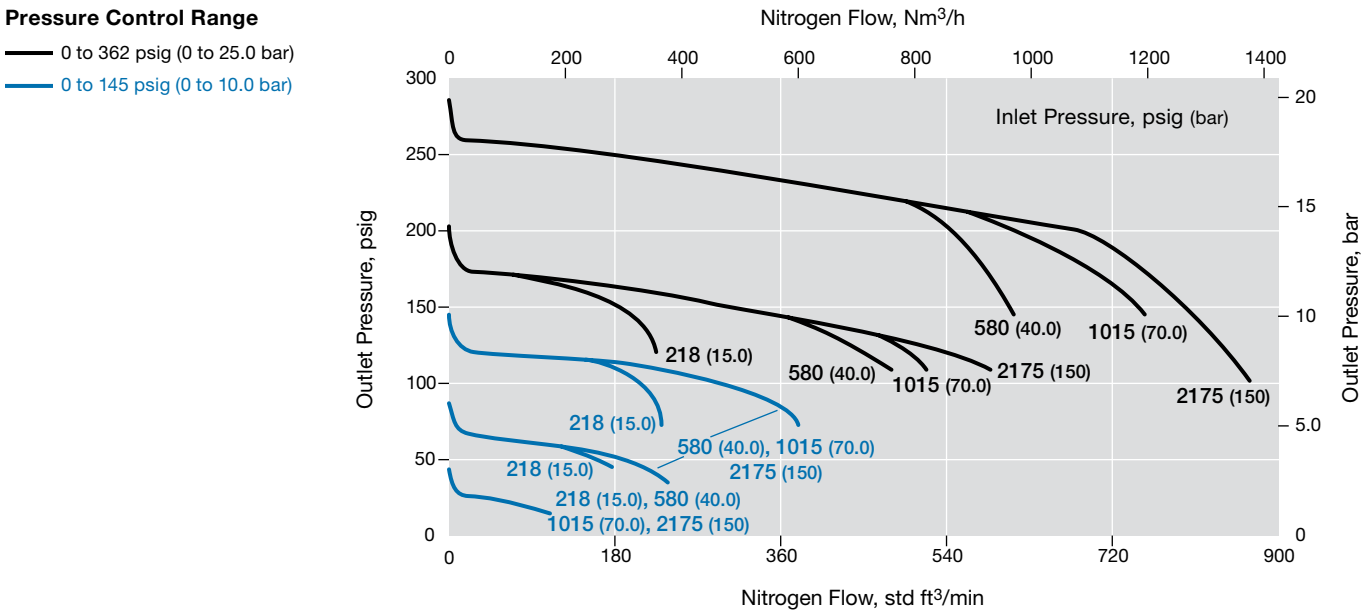
For more flow curve information, contact your authorized Swagelok representative.

RDH6 Series

Flow Coefficient: 1.95

Maximum Inlet Pressure: 5800 psig (400 bar)

Outlet Pressure Control Range: 0 to 362 psig (0 to 25.0 bar)

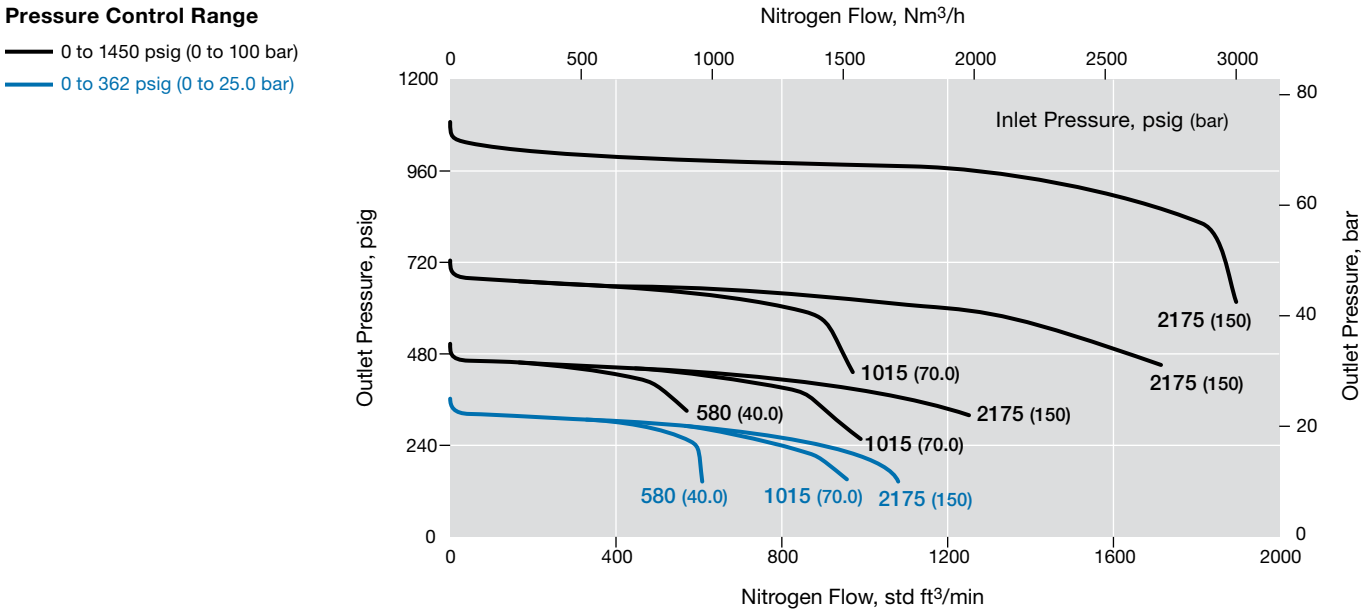


RDH6 Series

Flow Coefficient: 1.95

Maximum Inlet Pressure: 5800 psig (400 bar)

Outlet Pressure Control Range: 0 to 1450 psig (0 to 100 bar)



Flow Data

The graphs illustrate the change or “droop” in outlet pressures as the flow rate increases.

For more flow curve information, contact your authorized Swagelok representative.

RDH6 Series

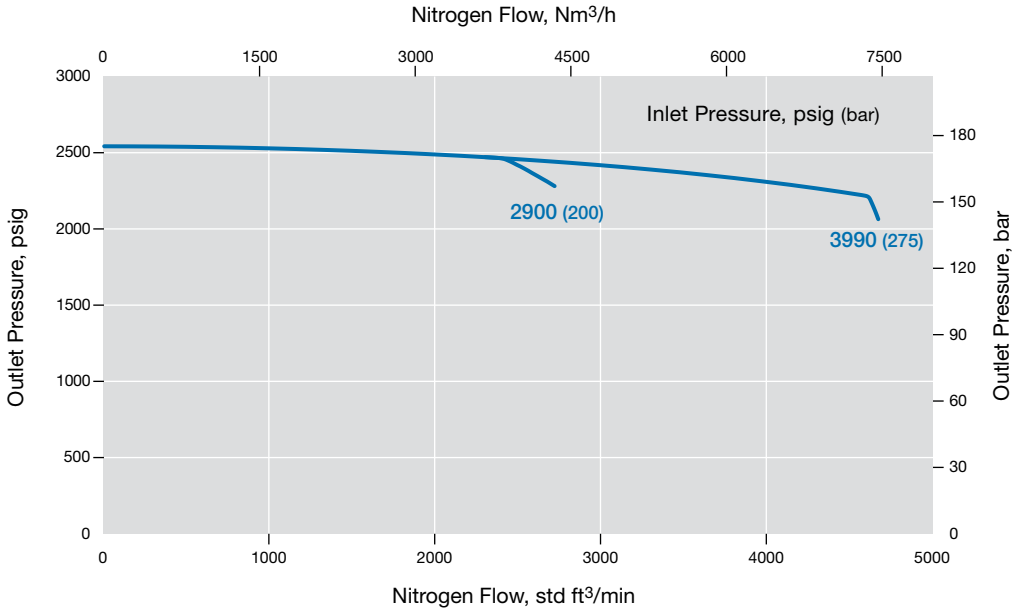
Flow Coefficient: 1.95

Maximum Inlet Pressure: 3990 psig (275 bar)

Outlet Pressure Control Range: 0 to 2537 psig (0 to 175 bar)

Pressure Control Range

0 to 2537 psig (0 to 175 bar)



RD8 Series

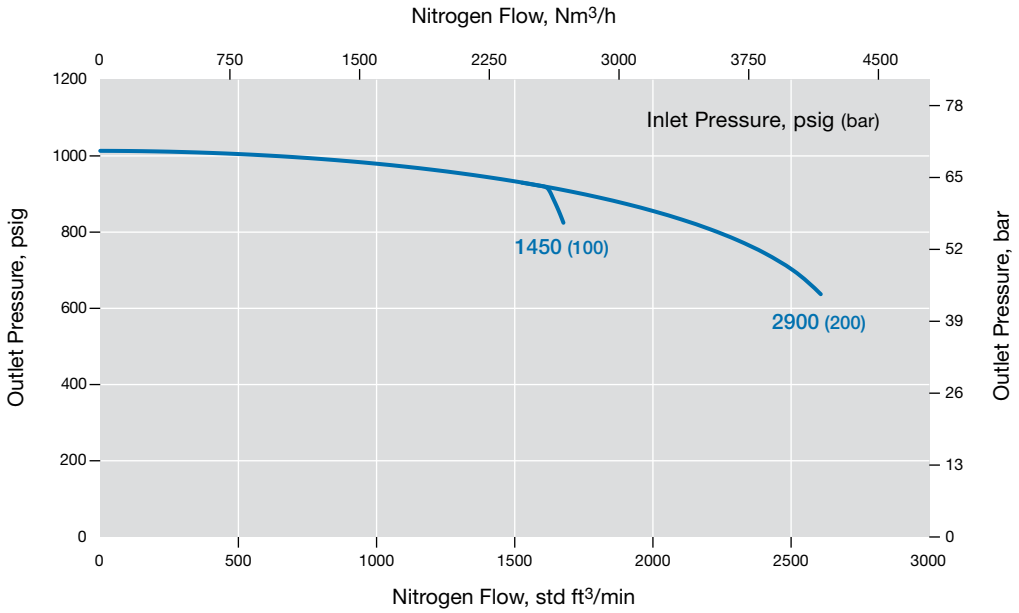
Flow Coefficient: 2.07

Maximum Inlet Pressure: 2900 psig (200 bar)

Outlet Pressure Control Range: 0 to 1015 psig (0 to 70.0 bar)

Pressure Control Range

0 to 1015 psig (0 to 70.0 bar)



Flow Data

The graphs illustrate the change or “droop” in outlet pressures as the flow rate increases.

For more flow curve information, contact your authorized Swagelok representative.

RDH8 Series

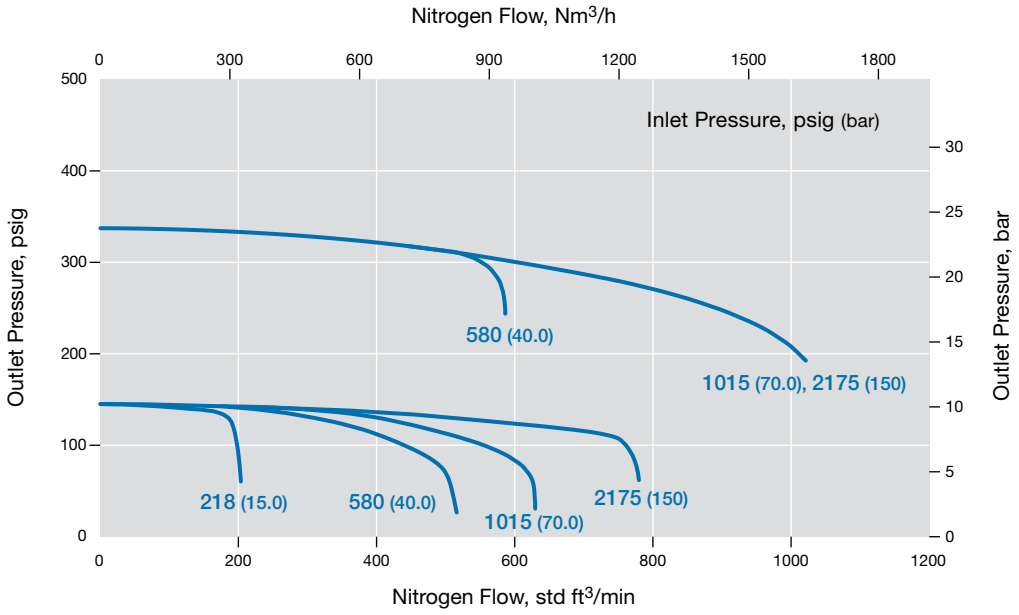
Flow Coefficient: 2.07

Maximum Inlet Pressure: 2175 psig (150 bar)

Outlet Pressure Control Range: 0 to 362 psig (0 to 25.0 bar)

Pressure Control Range

0 to 362 psig (0 to 25.0 bar)



RDH8 Series

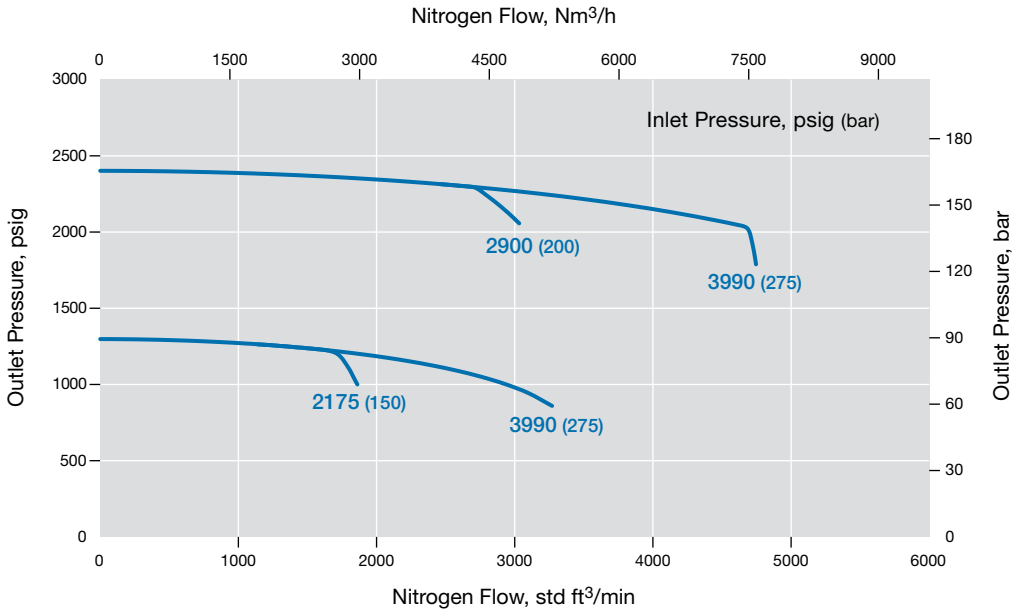
Flow Coefficient: 2.07

Maximum Inlet Pressure: 3990 psig (275 bar)

Outlet Pressure Control Range: 0 to 2537 psig (0 to 175 bar)

Pressure Control Range

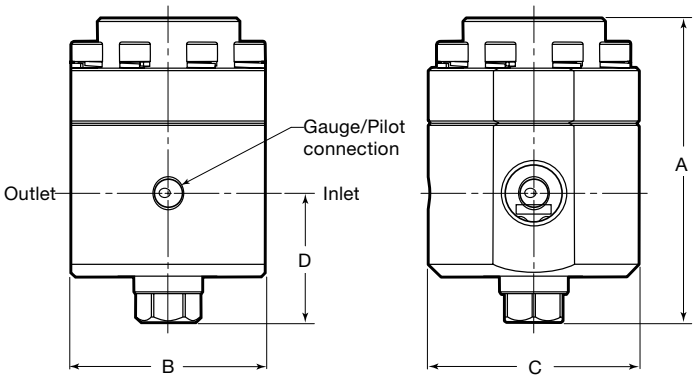
0 to 2537 psig (0 to 175 bar)



Dimensions

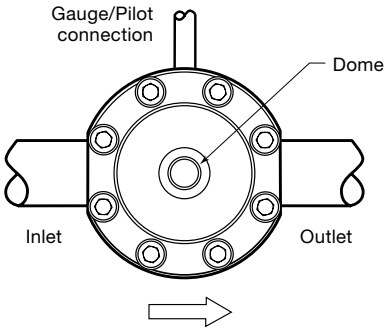
Dimensions, in inches (millimeters), are for reference only and are subject to change.

Series	End Connection Size	Dimensions, in. (mm)			
		A	B	C	D
RD(H)6	3/4 in.	5.12 (130)	3.22 (82.0)	3.50 (89.0)	2.16 (55.0)
RD(H)8	1 in.		3.07 (78.0)		



Standard Configuration

Top



Shown with tubing for clarity; tubing not included.

Ordering Information

Build an RD(H)6 and RD(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
RD	FA	6	A	1	- 02 -	X	- V	V	V	- GN2

1 Series
- **RD** = 1015 psig (70.0 bar) maximum inlet pressure
- **RDH** = 5800 psig (400 bar) maximum inlet pressure

2 Inlet / Outlet
- **B** = Female ISO/BSP parallel thread
- **N** = Female NPT
- **FA** = ASME B16.5 flange
- **FD** = EN 1092 (DIN) flange

3 Size
- **6** = 3/4 in. / DN20
- **8** = 1 in. / DN25

4 Pressure Class

Omit designator if flanges are not ordered.
- **A** = ASME class 150
- **B** = ASME class 300
- **C** = ASME class 600
- **E** = ASME class 1500
- **F** = ASME class 2500
- **M** = EN class PN16
- **N** = EN class PN40

5 Flange Facing

Omit designator if flanges are not ordered.
- **1** = Raised face smooth
- **3** = RTJ

6 Body Material
- **02** = 316L SS

7 Pressure Control Range
- **X** = No pilot regulator, standard

RD series with RS2 series pilot regulator
- **3** = 0 to 1015 psig (0 to 70.0 bar)

RDH series with RS2 series pilot regulator
- **4** = 0 to 145 psig (0 to 10.0 bar)
- **5** = 0 to 362 psig (0 to 25.0 bar)
- **6** = 0 to 1450 psig (0 to 100 bar)
- **7** = 0 to 2537 psig (0 to 175 bar)

For higher pressure control ranges with a pilot regulator, contact your authorized Swagelok representative for information.

8 Seal Material
- **V** = Fluorocarbon FKM
- **N** = Nitrile
- **E** = EPDM
- **L** = Low temperature Nitrile

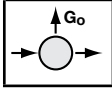
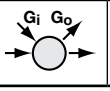
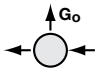
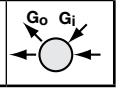
9 Diaphragm / Piston O-Rings
- **V** = Fluorocarbon FKM
- **N** = Nitrile
- **E** = EPDM
- **L** = Low temperature Nitrile

10 Seat Seal Material

RD series
- **V** = Fluorocarbon FKM
- **N** = Nitrile
- **E** = EPDM
- **L** = Low temperature Nitrile

RDH series
- **K** = PCTFE
- **P** = PEEK

11 Options
- **A** = Antitamper
- **GN2** = Gauge connection, see below
- **GN4** = Gauge connection, see below
- **GN5** = Gauge connection, see below
- None = Standard connection, see below

Gauge Connection Configuration			
Standard	GN2	GN4	GN5
			

Standard (GN1) and GN4 only available with no pilot.
- **N** = NACE MR0175/ISO 15156
- **G93** = ASTM G93 Level C-cleaned

Differential Pressure, Dome-Loaded Pressure Reducing Regulators—RD(H)6DP Series

Features

- Balanced poppet design
- Diaphragm sensing
- Adjustable bias
- Dome-to-outlet pressure ratio approximately 1:1
- Antitamper and anti-blowout stem

Options

- Gauge connection—choice of 4 configurations
- NACE MR0175/ISO 15156-compliant models
- Special cleaning to ASTM G93 Level C

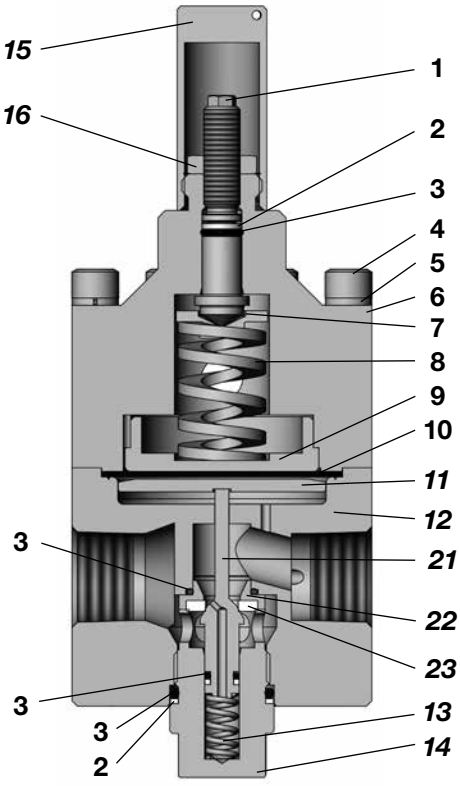
Technical Data

Series	Maximum Inlet Pressure psig (bar)	Maximum Outlet Control Pressure psig (bar)	Sensing Type	Bias Range psig (bar)	Temperature Range °F (C°)	Flow Coefficient (C_v)	Seat Diameter in. (mm)	Inlet and Outlet Connections	Gauge / Dome Connection	Weight (Without Flanges) lb (kg)
RD6DP	1015 (70.0)	1015 (70.0)	Diaphragm	14.5 to 145 (1.0 to 10.0)	–49 to 176 (–45 to 80) See **Pressure-Temperature Ratings,** page 921.	1.95	0.39 (10.0)	3/4 in. NPT, ISO/BSP parallel thread, EN or ASME flange	Gauge: 1/4 in. NPT; Dome: 1/4 in. NPT	11.2 (5.1)
RDH6DP	5800 (400)	3335 (230)								

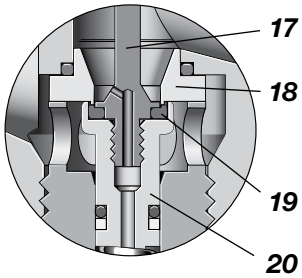
See page 56 to 57 for flow data.

Materials of Construction

RDH6DP Series Regulator



Soft seat seal design for low-pressure applications



Component	Material / Specification
1 Adjustment screw	316L SS / A479
2 *Backup ring*	*PTFE*
3 *O-ring*	*EPDM, FKM, nitrile*
4 Cap screw	A4-80
5 Washer	A4
6 Dome	316L SS / A479
7 Upper spring guide	316L SS / A479
8 Differential spring	50CRV4
9 Lower spring guide	316L SS / A479
10 *Diaphragm*	*EPDM, FKM, or nitrile*
11 *Diaphragm plate*	*316L SS / A479*
12 *Body*	
13 *Poppet spring*	*302 SS / A313*
14 *Body plug*	*316L SS / A479*
15 Antitamper cover	316L SS / A479
16 *Lock Nut*	*A4-80*
RD Series Only Components	
17 *Poppet*	*316L SS / A479*
18 *Seat*	
19 *Seat seal*	*EPDM, FKM, or nitrile*
20 *Poppet housing*	*316L SS / A479*
RDH Series Only Components	
21 *Poppet*	*S17400 / A276 or 431 SS*
22 *Seat*	*316L SS / A479*
23 *Seat seal*	*PCTFE or PEEK*
Wetted lubricants: Silicone-based and synthetic hydrocarbon-based	

Wetted components listed in *italics.*
Gauge plugs (not shown): 431 SS / A276.
Lockwire and lead seal for anti-tamper (not shown): 304 LEAD

Flow Data

The graphs illustrate the change or “droop” in outlet pressures as the flow rate increases.

For more flow curve information, contact your authorized Swagelok representative.

RD6DP Series

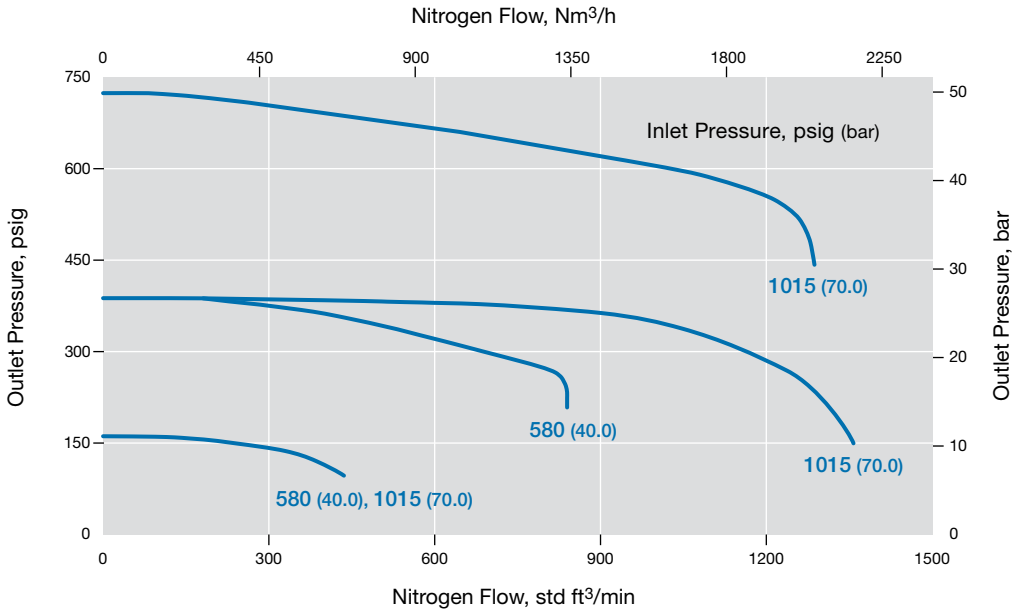
Flow Coefficient: 1.95

Maximum Inlet Pressure: 1015 psig (70.0 bar)

Outlet Pressure Control Range: 0 to 1015 psig (0 to 70.0 bar)

Pressure Control Range

0 to 1015 psig (0 to 70.0 bar)
All curves 29 psig (2.0 bar) bias



RD6DP Series

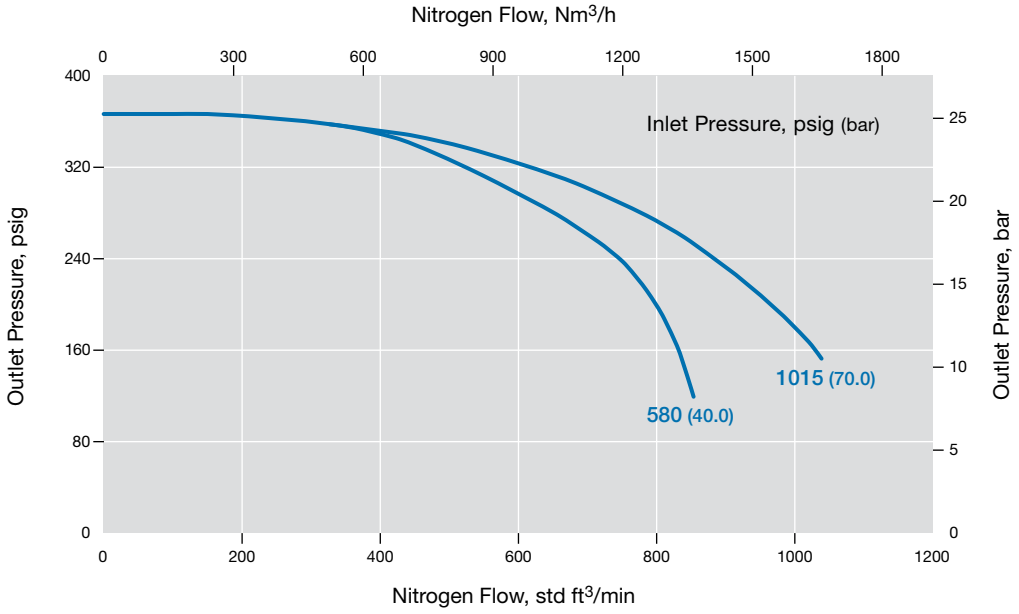
Flow Coefficient: 1.95

Maximum Inlet Pressure: 1015 psig (70.0 bar)

Outlet Pressure Control Range: 0 to 1015 psig (0 to 70.0 bar)

Pressure Control Range

0 to 1015 psig (0 to 70.0 bar)
All curves 116 psig (8.0 bar) bias



Flow Data

The graphs illustrate the change or “droop” in outlet pressures as the flow rate increases.

For more flow curve information, contact your authorized Swagelok representative.

RDH6DP Series

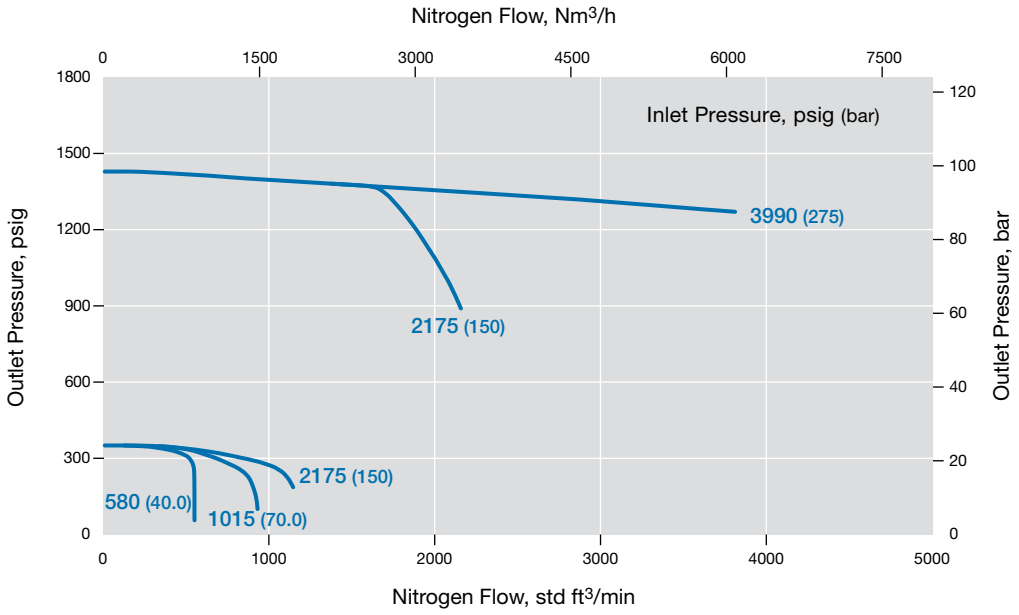
Flow Coefficient: 1.95

Maximum Inlet Pressure: 3990 psig (275 bar)

Outlet Pressure Control Range: 0 to 3335 psig (0 to 230 bar)

Pressure Control Range

0 to 3335 psig (0 to 230 bar)
All curves 29 psig (2.0 bar) bias



RDH6DP Series

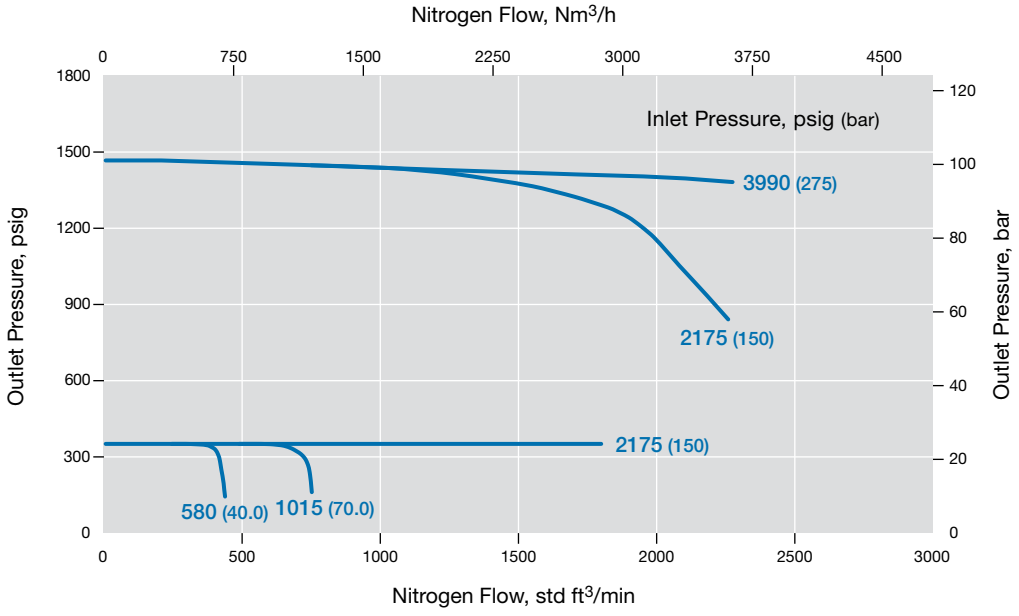
Flow Coefficient: 1.95

Maximum Inlet Pressure: 3990 psig (275 bar)

Outlet Pressure Control Range: 0 to 3335 psig (0 to 230bar)

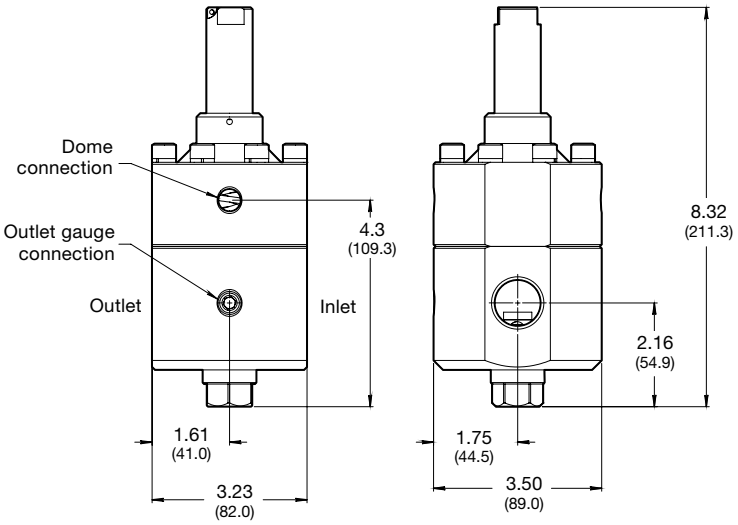
Pressure Control Range

0 to 3335 psig (0 to 230 bar)
All curves 116 psig (8.0 bar) bias

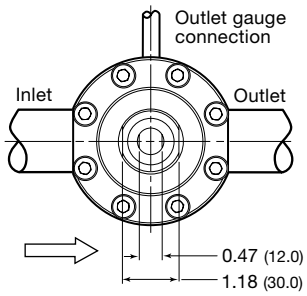


Dimensions

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



Standard Configuration
Top



Shown with tubing for clarity; tubing not included.

Ordering Information

Build an RD(H)6DP series regulator ordering number by combining the designators in the sequence shown below.

1	2	3	4	5	6	7	8	9	10	11
RD	FA	6	A	1	- 02	- V	V	V	DP2	- GN2

1 Series
RD = 1015 psig (70.0 bar) maximum inlet pressure
RDH = 5800 psig (400 bar) maximum inlet pressure

2 Inlet / Outlet
B = Female ISO/BSP parallel thread
N = Female NPT
FA = ASME B16.5 flange
FD = EN 1092 (DIN) flange

3 Size
6 = 3/4 in. / DN20
8 = 1 in. / DN25

4 Pressure Class
Omit designator if flanges are not ordered.
A = ASME class 150
B = ASME class 300
C = ASME class 600
E = ASME class 1500
F = ASME class 2500
M = EN class PN16
N = EN class PN40

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

6 Body Material
02 = 316L SS

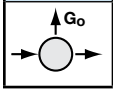
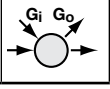
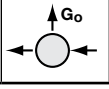
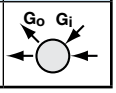
7 Seal Material
V = Fluorocarbon FKM
N = Nitrile
E = EPDM
L = Low temperature Nitrile

8 Diaphragm Material
V = Fluorocarbon FKM
N = Nitrile
E = EPDM
L = Low temperature Nitrile

9 Seat Seal Material
RD series
V = Fluorocarbon FKM
N = Nitrile
E = EPDM
L = Low temperature Nitrile
RDH series
K = PCTFE
P = PEEK

10 Differential Pressure
DP2 = 0 to 43 psig (0 to 3.0 bar) bias
DP3 = 0 to 145 psig (0 to 10.0 bar) bias

11 Options
GN2 = Gauge connection, see below
GN4 = Gauge connection, see below
GN5 = Gauge connection, see below
None = Standard connection, see below

Gauge Connection Configuration			
Standard	GN2	GN4	GN5
			

N = NACE MR0175/ISO 15156
G93 = ASTM G93 Level C-cleaned

Integral Pilot-Operated, Dome-Loaded Pressure-Reducing Regulators—RD(H)10 and RD(H)15 Series

Features

- Balanced poppet design
- Diaphragm sensing
- Integral pilot regulator with dynamic regulation
- Dome-to-outlet pressure ratio approximately 1:1
- Large dome for improved stability
- Pilot regulator for improved performance

Options

- External feedback (EF) for improved performance
  - EF to main regulator limited by standard outlet pressure range
  - EF to pilot regulator limited to 290 psig (20.0 bar)
- Gauge connections
- NACE MR0175/ISO 15156-compliant models
- Special cleaning to ASTM G93 Level C

Technical Data

Series	Maximum Inlet Pressure psig (bar)	Maximum Outlet Control Pressure psig (bar)	Sensing Type	Temperature Range °F (C°)	Flow Coefficient (C_v)	Seat Diameter in. (mm)	Inlet and Outlet Connections		Gauge / Dome Connection	Weight (Without Flanges and PR) lb (kg)
							Size	Type		
RD10 RDH10	RD: 1015 (70.0) (507 [35.0] with LRS4 pilot regulator) RDH: 5800 (400)	RD: 1015 (70.0) RDH: 3625 (250)	Diaphragm	–49 to 176 (–45 to 80) See **Pressure-Temperature Ratings,** page 921.	3.79	0.55 (14.0) 0.53 (13.5)	1 in.	NPT, ISO/BSP parallel thread, EN or ASME flange	Gauge / pilot: 1/4 in. NPT or ISO/BSP parallel thread① Dome: 1/4 in. ISO/BSP parallel thread	17.6 (8.0)
RD15 RDH15					7.30	0.75 (19.0)	1 1/2 in.			19.8 (9.0)

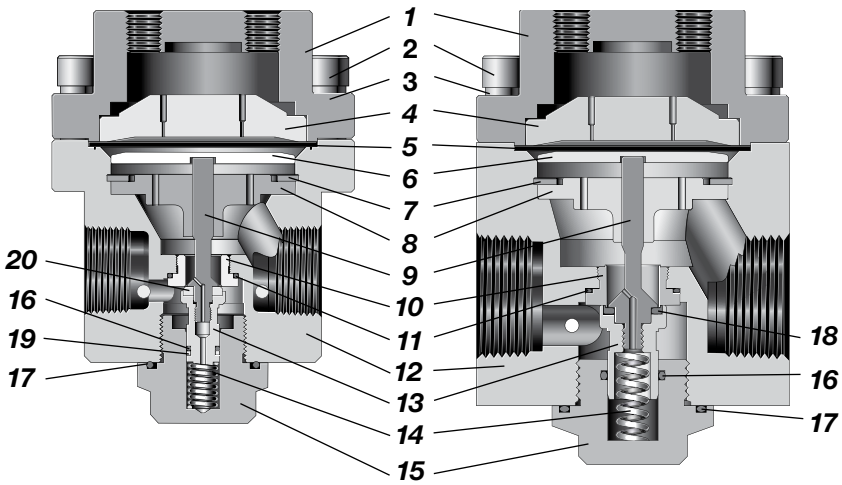
See pages 60 to 70 for flow data.

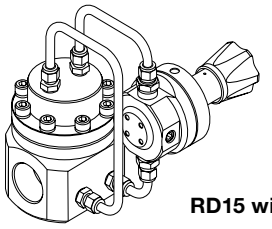
① Regulators with NPT inlet / outlet connections have 1/4 in. NPT gauge connections.

Materials of Construction

RDH10 Series Regulator with Hard Seat Seal

RD15 Series Regulator with Soft Seat Seal





RD15 with LRS4 pilot regulator

Component	Material / Specification
1 *Dome*	*316L SS / A479*
2 Cap screw	A4-80
3 Washer	A4
4 *Dome plate*	*316L SS / A479*
5 *Diaphragm*	*EPDM, FKM, or nitrile*
6 *Diaphragm plate*	*316L SS / A479*
7 *Retaining ring*	*Commercial stainless steel*
8 *Body plate*	*316L SS / A479*
9 *Poppet*	
10 *Seat*	
11 *O-ring*	*EPDM, FKM, or nitrile*
12 *Body*	*316L SS / A479*
13 *Poppet housing*	
14 *Poppet spring*	*302 SS / A313*
15 *Body plug*	*316L SS / A479*
16 *O-ring*	*EPDM, FKM, or nitrile*
17 *Plug O-ring*	
RD Series Only Components	
18 *Seat seal*	*EPDM, FKM, or nitrile*
RDH Series Only Components	
19 *Backup ring (RDH10 only)*	*PTFE*
20 *Seat seal*	*PCTFE or PEEK*
Wetted lubricants: Silicone-based and synthetic hydrocarbon-based	

Wetted components listed in *italics*.
Gauge plugs (not shown): 431 SS / A276.

Flow Data

The graphs illustrate the change or “droop” in outlet pressures as the flow rate increases.

For more flow curve information, contact your authorized Swagelok representative.

RD10 Series

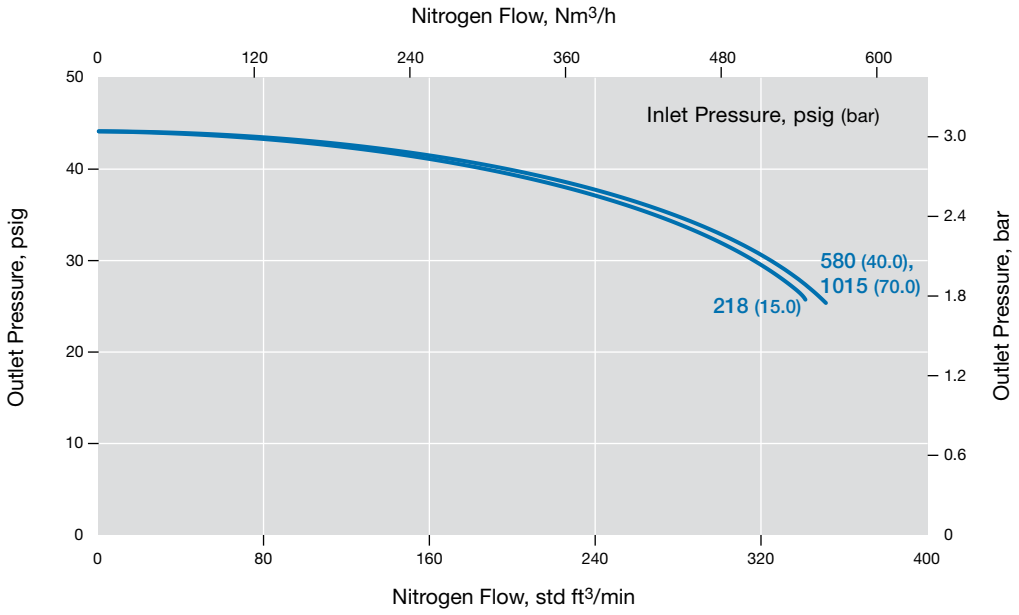
Flow Coefficient: 3.79

Maximum Inlet Pressure: 1015 psig (70.0 bar)

Outlet Pressure Control Range: 0 to 43 psig (0 to 3.0 bar)

Pressure Control Range

0 to 43 psig (0 to 3.0 bar)



RD10 Series

Flow Coefficient: 3.79

Maximum Inlet Pressure: 1015 psig (70.0 bar)

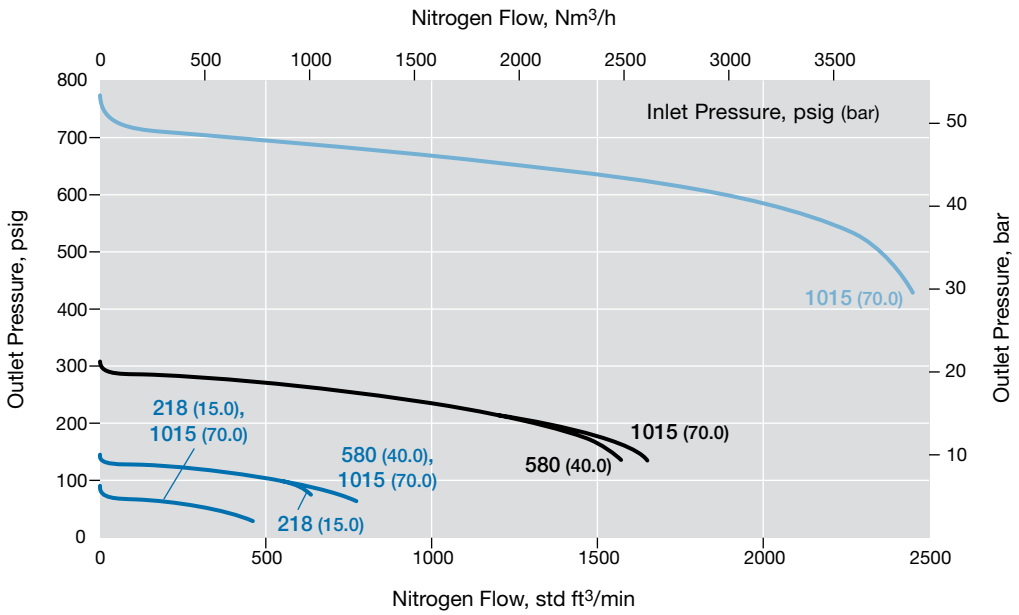
Outlet Pressure Control Range: 0 to 1015 psig (0 to 70.0 bar)

Pressure Control Range

0 to 1015 psig (0 to 70.0 bar)

0 to 290 psig (0 to 20.0 bar)

0 to 130 psig (0 to 9.0 bar)



Flow Data

The graphs illustrate the change or “droop” in outlet pressures as the flow rate increases.

For more flow curve information, contact your authorized Swagelok representative.

RDH10 Series

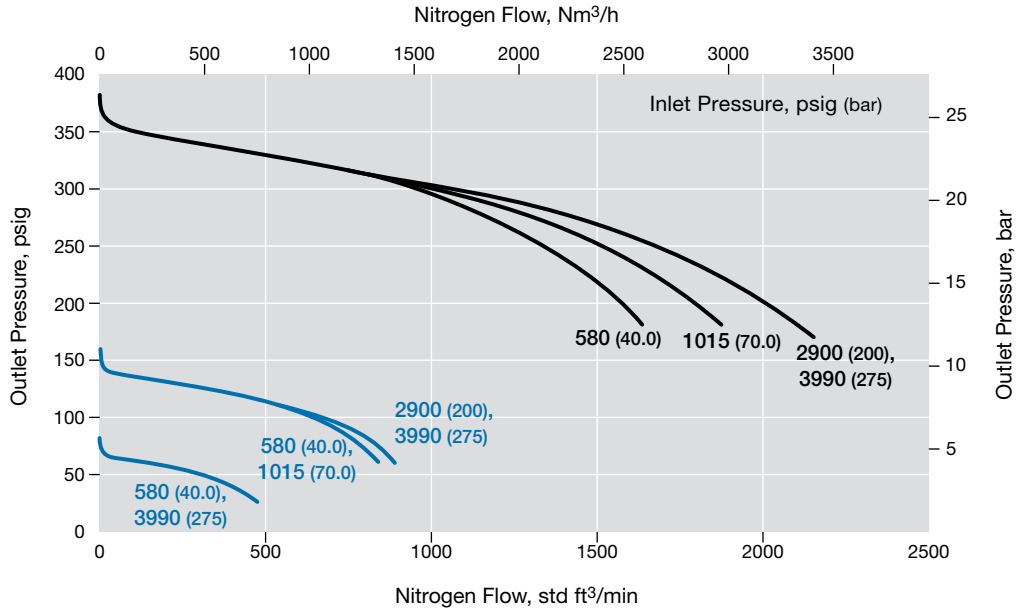
Flow Coefficient: 3.79

Maximum Inlet Pressure: 5800 psig (400 bar)

Outlet Pressure Control Range: 0 to 362 psig (0 to 25.0 bar)

Pressure Control Range

- 0 to 362 psig (0 to 25.0 bar)
- 0 to 145 psig (0 to 10.0 bar)



RDH10 Series

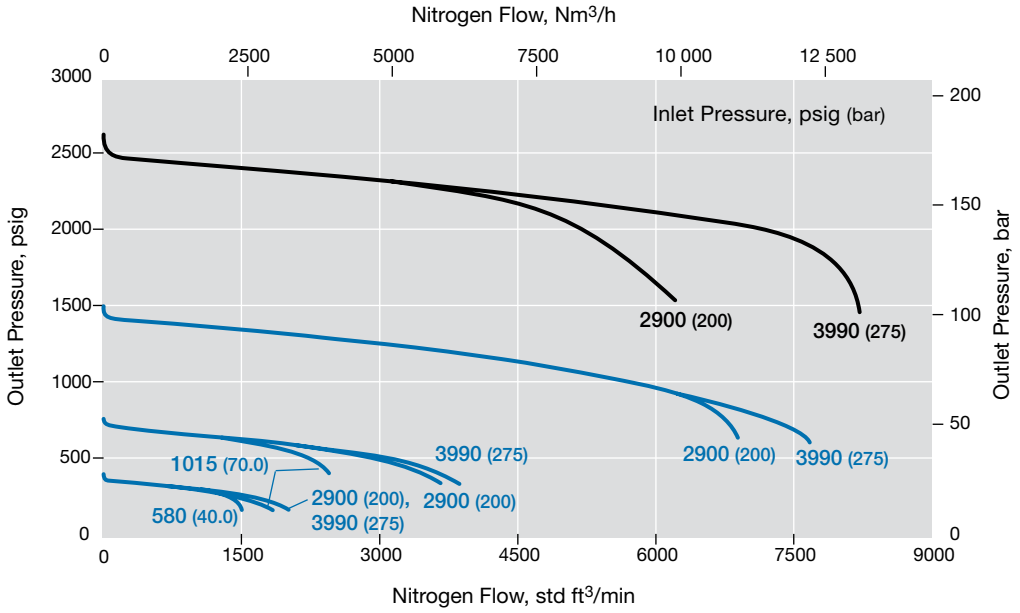
Flow Coefficient: 3.79

Maximum Inlet Pressure: 5800 psig (400 bar)

Outlet Pressure Control Range: 0 to 2537 psig (0 to 175 bar)

Pressure Control Range

- 0 to 2537 psig (0 to 175 bar)
- 0 to 1450 psig (0 to 100 bar)



Flow Data

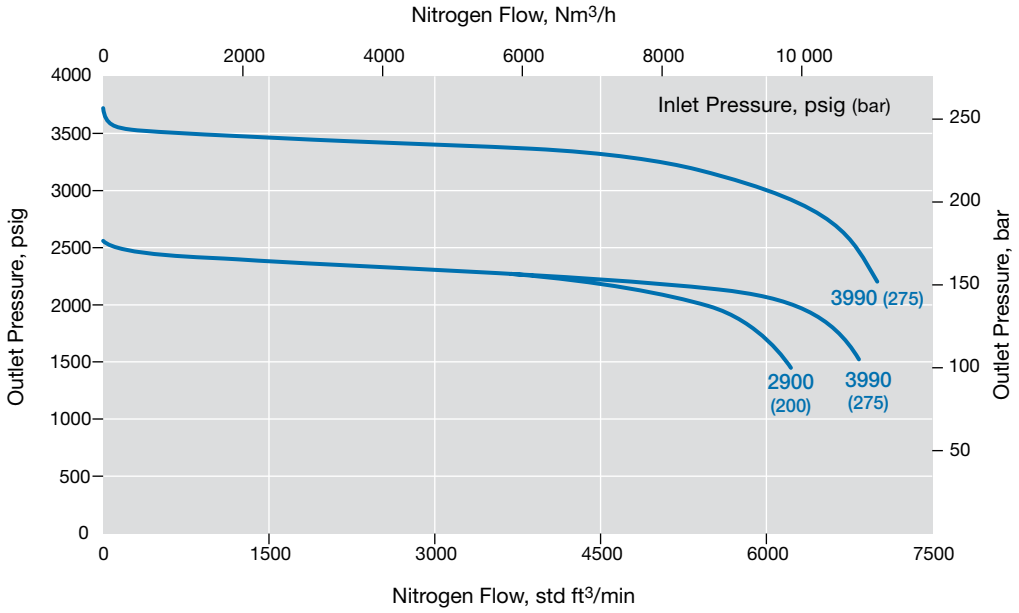
The graphs illustrate the change or “droop” in outlet pressures as the flow rate increases.
For more flow curve information, contact your authorized Swagelok representative.

RDH10 Series

Flow Coefficient: 3.79
Maximum Inlet Pressure: 5800 psig (400 bar)
Outlet Pressure Control Range: 0 to 3625 psig (0 to 250 bar)

Pressure Control Range

0 to 3625 psig (0 to 250 bar)

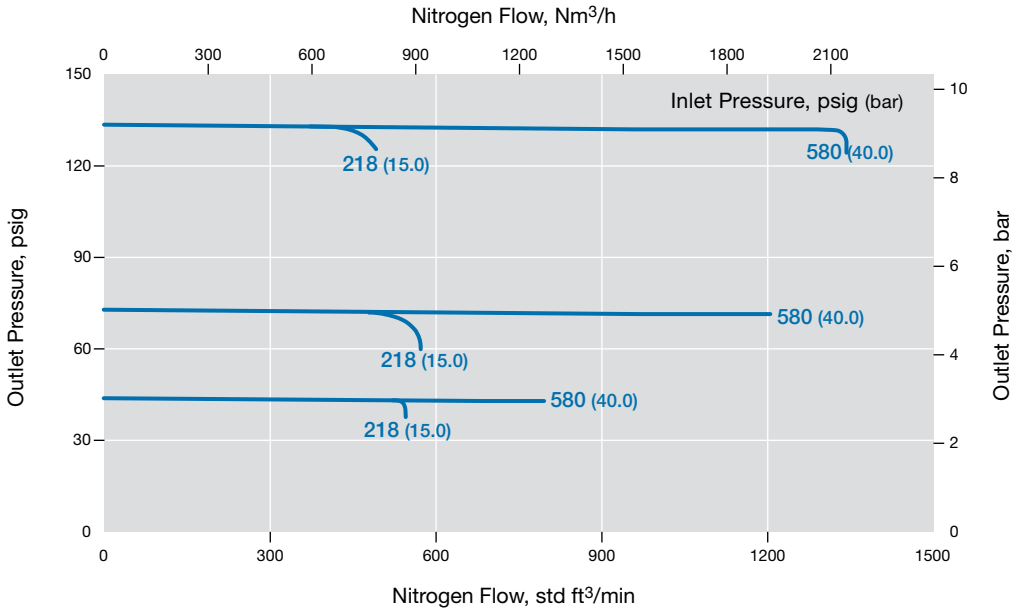


RD10-EF Series

Flow Coefficient: 3.79
Maximum Inlet Pressure: 580 psig (40.0 bar)
Outlet Pressure Control Range: 0 to 1015 psig (0 to 70.0 bar)

Pressure Control Range

0 to 1015 psig (0 to 70.0 bar)



Flow Data

The graphs illustrate the change or “droop” in outlet pressures as the flow rate increases.

For more flow curve information, contact your authorized Swagelok representative.

RD10-EF Series

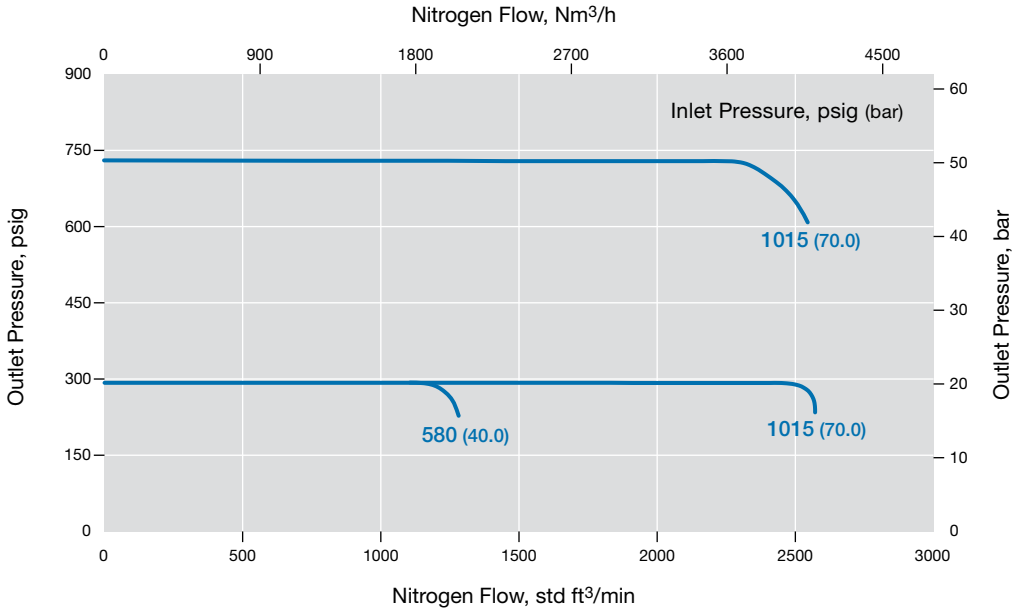
Flow Coefficient: 3.79

Maximum Inlet Pressure: 580 psig (40.0 bar)

Outlet Pressure Control Range: 0 to 1015 psig (0 to 70.0 bar)

Pressure Control Range

0 to 1015 psig (0 to 70.0 bar)



RDH10-EF Series

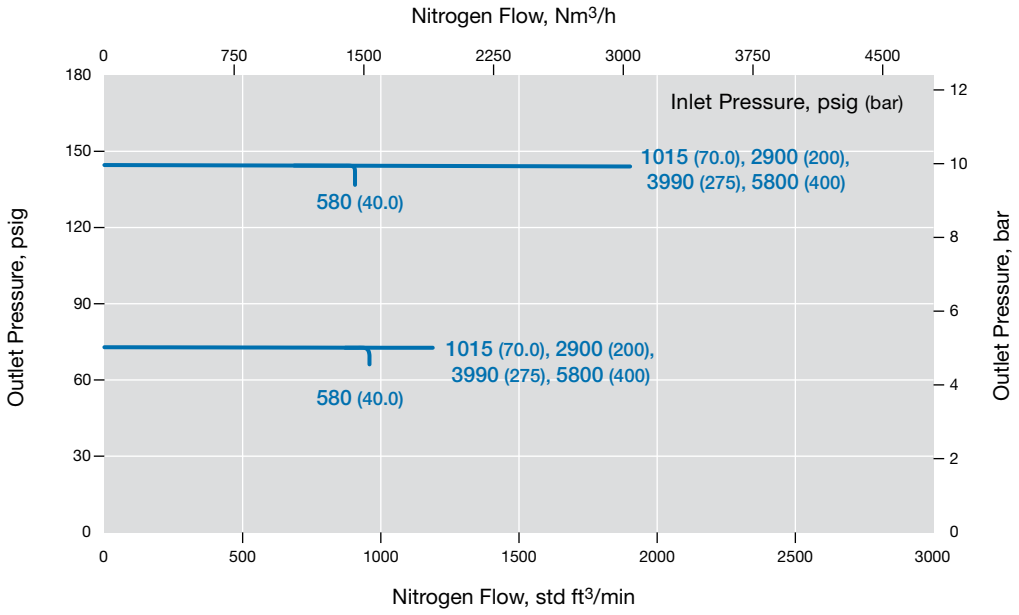
Flow Coefficient: 3.79

Maximum Inlet Pressure: 5800 psig (400 bar)

Outlet Pressure Control Range: 0 to 145 psig (0 to 10.0 bar)

Pressure Control Range

0 to 145 psig (0 to 10.0 bar)



Flow Data

The graphs illustrate the change or “droop” in outlet pressures as the flow rate increases.

For more flow curve information, contact your authorized Swagelok representative.

RDH10-EF Series

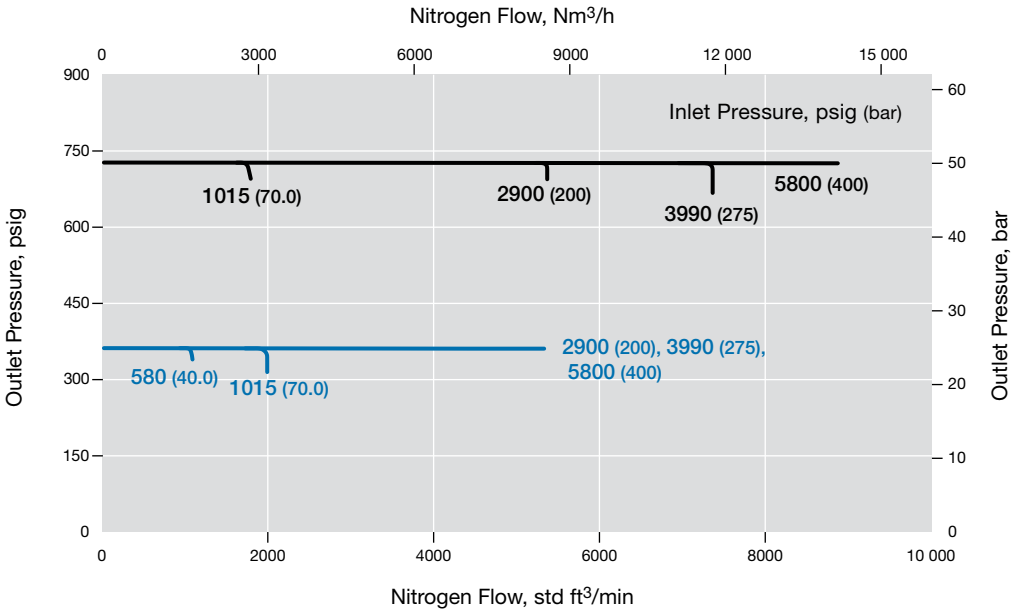
Flow Coefficient: 3.79

Maximum Inlet Pressure: 5800 psig (400 bar)

Outlet Pressure Control Range: 0 to 1450 psig (0 to 100 bar)

Pressure Control Range

- 0 to 1450 psig (0 to 100 bar)
- 0 to 362 psig (0 to 25.0 bar)



RDH10-EF Series

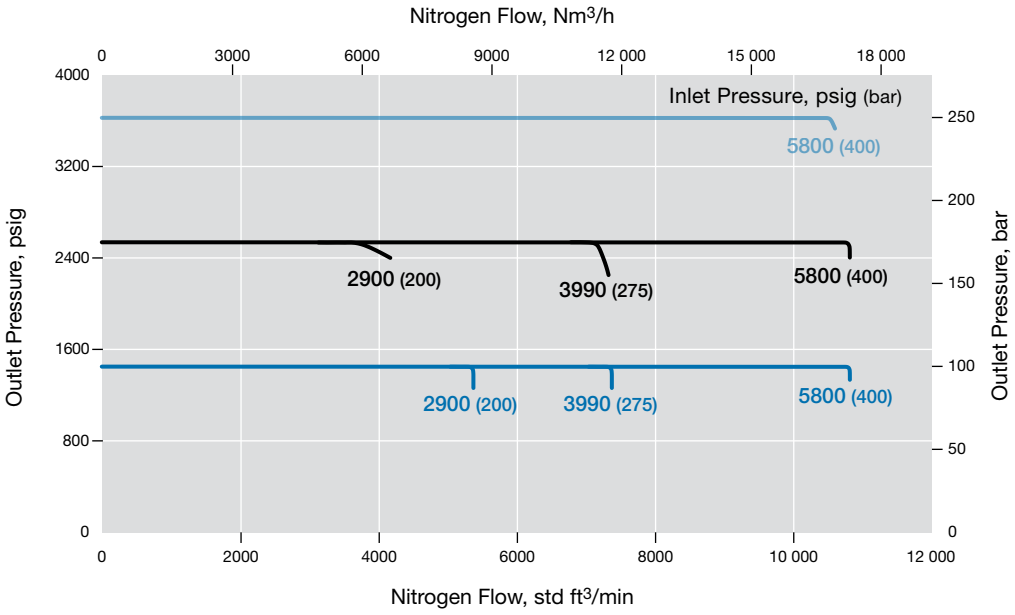
Flow Coefficient: 3.79

Maximum Inlet Pressure: 5800 psig (400 bar)

Outlet Pressure Control Range: 0 to 3625 psig (0 to 250 bar)

Pressure Control Range

- 0 to 3625 psig (0 to 250 bar)
- 0 to 2537 psig (0 to 175 bar)
- 0 to 1450 psig (0 to 100 bar)



Flow Data

The graphs illustrate the change or “droop” in outlet pressures as the flow rate increases.

For more flow curve information, contact your authorized Swagelok representative.

RD10-EFP Series

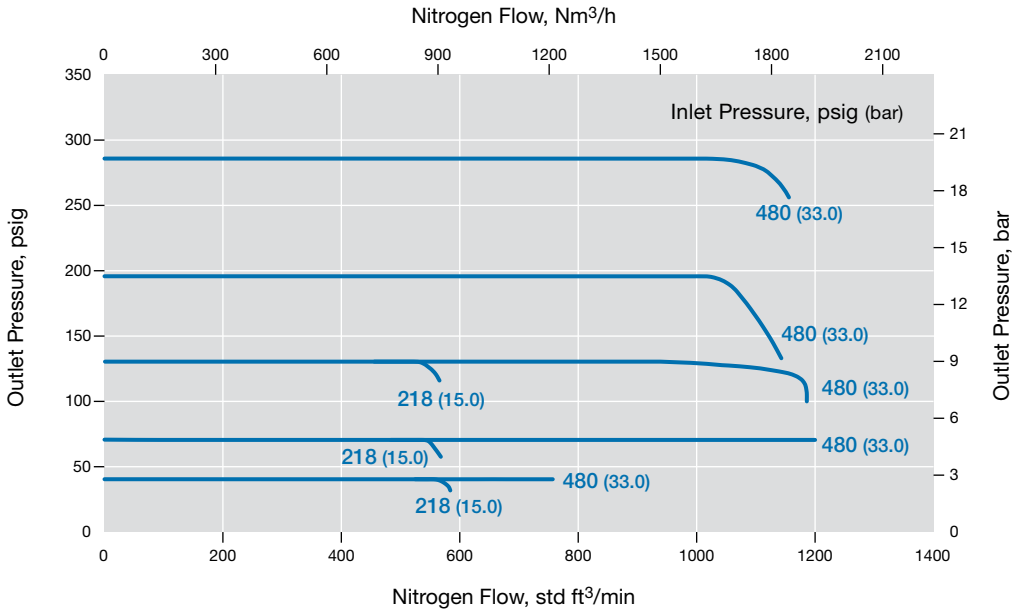
Flow Coefficient: 3.79

Maximum Inlet Pressure: 218 psig (15.0 bar)

Outlet Pressure Control Range: 0 to 500 psig (0 to 34.5 bar)

Pressure Control Range

0 to 500 psig (0 to 34.5 bar)



Flow Data

The graphs illustrate the change or “droop” in outlet pressures as the flow rate increases.

For more flow curve information, contact your authorized Swagelok representative.

RD15 Series

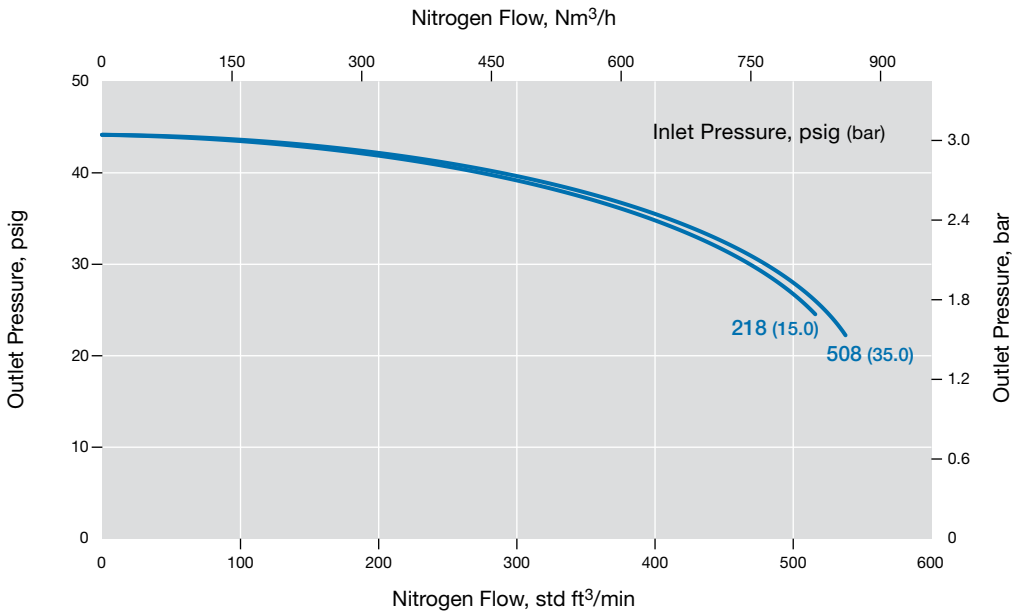
Flow Coefficient: 7.30

Maximum Inlet Pressure: 508 psig (35.0 bar)

Outlet Pressure Control Range: 0 to 43 psig (0 to 3.0 bar)

Pressure Control Range

0 to 43 psig (0 to 3.0 bar)



RD15 Series

Flow Coefficient: 7.30

Maximum Inlet Pressure: 1015 psig (70.0 bar)

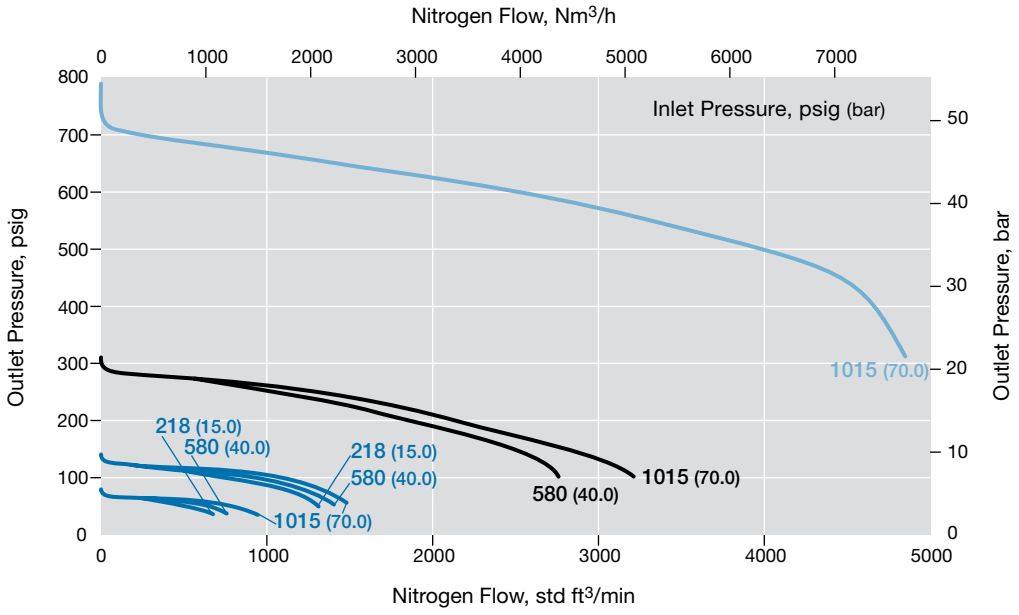
Outlet Pressure Control Range: 0 to 1015 psig (0 to 70.0 bar)

Pressure Control Range

0 to 1015 psig (0 to 70.0 bar)

0 to 290 psig (0 to 20.0 bar)

0 to 130 psig (0 to 9.0 bar)



Flow Data

The graphs illustrate the change or “droop” in outlet pressures as the flow rate increases.

For more flow curve information, contact your authorized Swagelok representative.

RDH15 Series

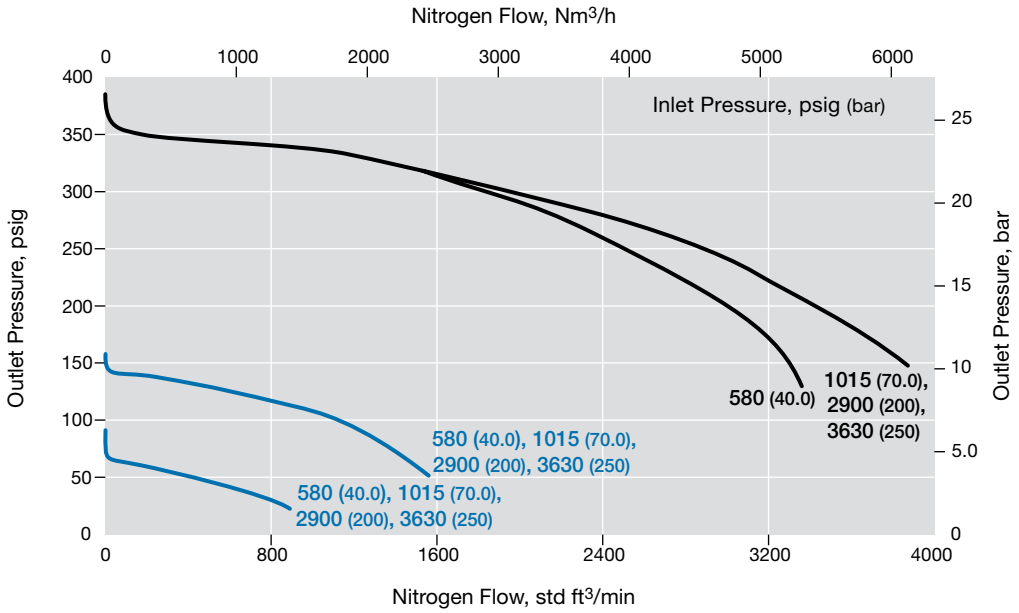
Flow Coefficient: 7.30

Maximum Inlet Pressure: 5800 psig (400 bar)

Outlet Pressure Control Range: 0 to 362 psig (0 to 25.0 bar)

Pressure Control Range

- 0 to 362 psig (0 to 25.0 bar)
- 0 to 145 psig (0 to 10.0 bar)



RDH15 Series

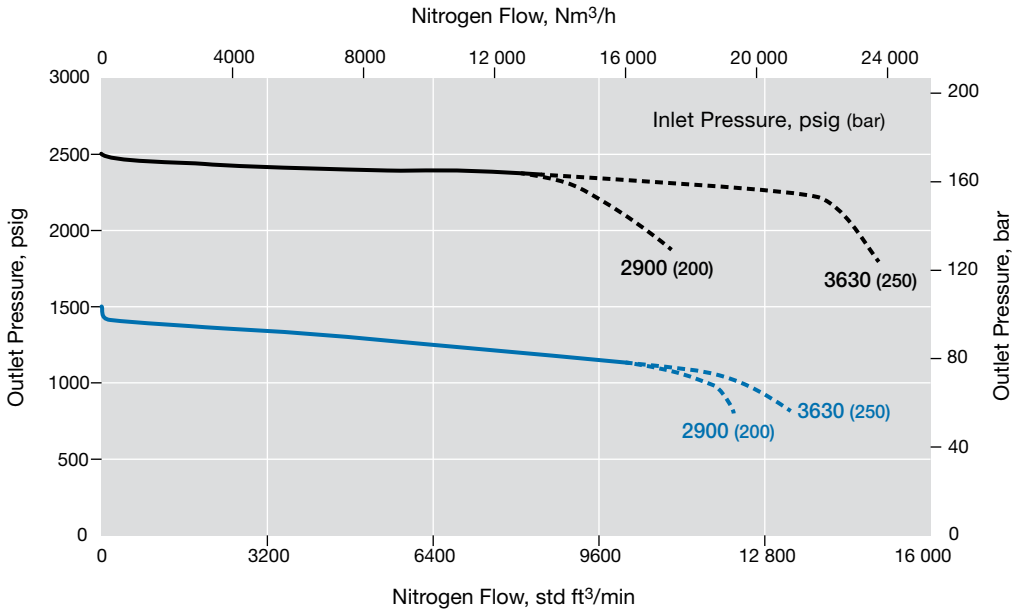
Flow Coefficient: 7.30

Maximum Inlet Pressure: 5800 psig (400 bar)

Outlet Pressure Control Range: 0 to 2537 psig (0 to 175 bar)

Pressure Control Range

- 0 to 2537 psig (0 to 175 bar)
- 0 to 2537 psig (0 to 175 bar), calculated
- 0 to 1450 psig (0 to 100 bar)
- 0 to 1450 psig (0 to 100 bar), calculated



Flow Data

The graphs illustrate the change or “droop” in outlet pressures as the flow rate increases.

For more flow curve information, contact your authorized Swagelok representative.

RDH15 Series

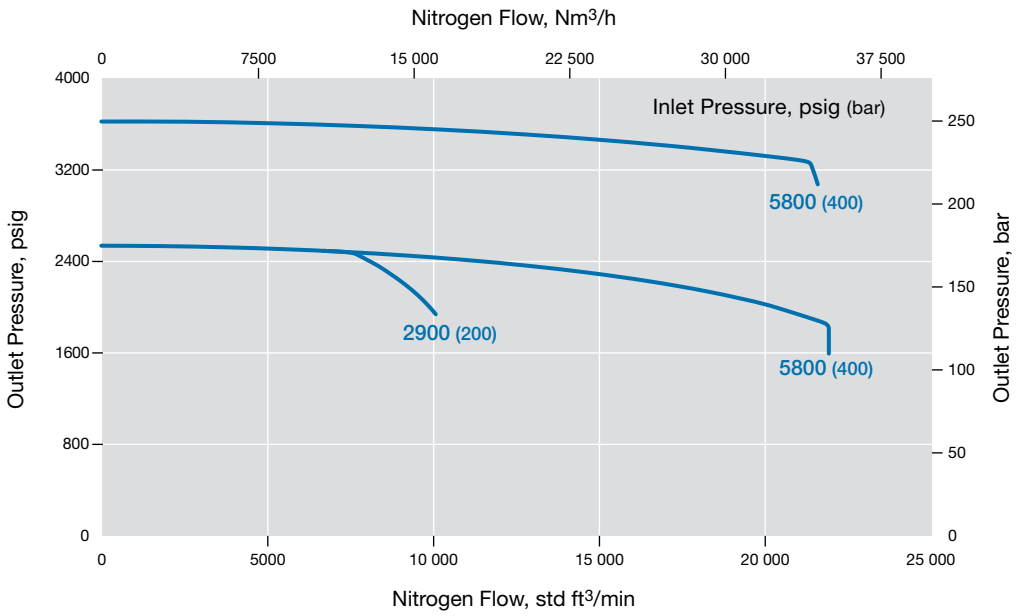
Flow Coefficient: 7.30

Maximum Inlet Pressure: 5800 psig (400 bar)

Outlet Pressure Control Range: 0 to 3625 psig (0 to 250 bar)

Pressure Control Range

0 to 3625 psig (0 to 250 bar)



Flow Data

The graphs illustrate the change or “droop” in outlet pressures as the flow rate increases.

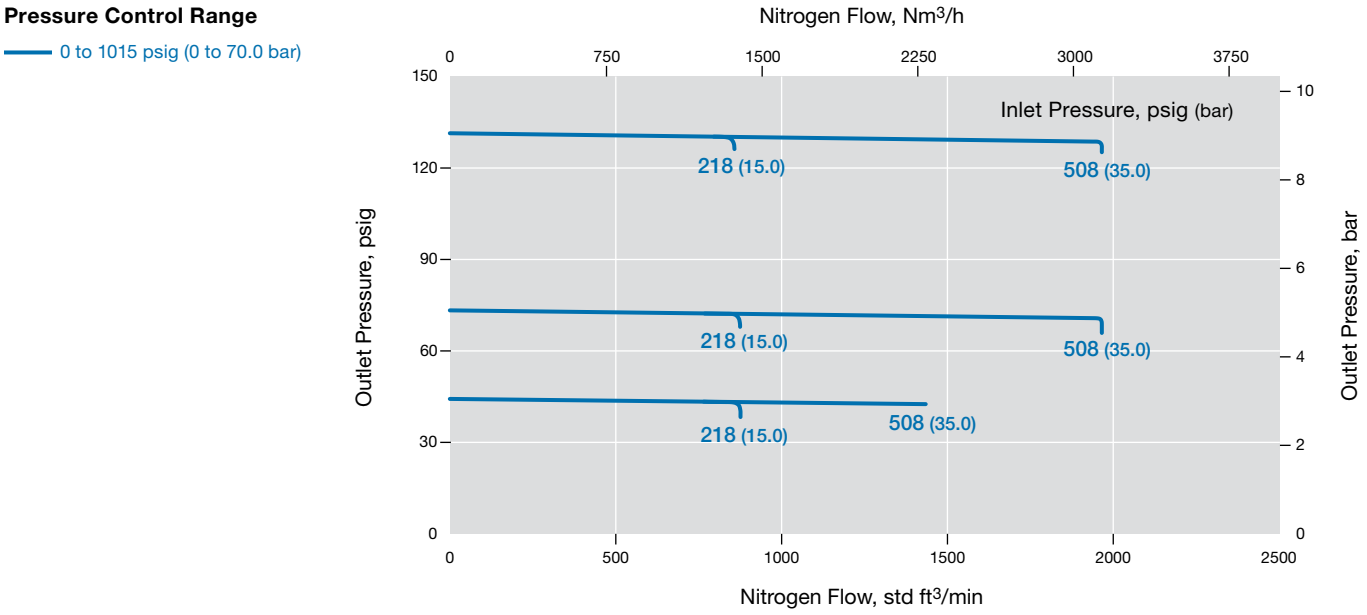
For more flow curve information, contact your authorized Swagelok representative.

RD15-EF Series

Flow Coefficient: 7.30

Maximum Inlet Pressure: 508 psig (35.0 bar)

Outlet Pressure Control Range: 0 to 1015 psig (0 to 70.0 bar)

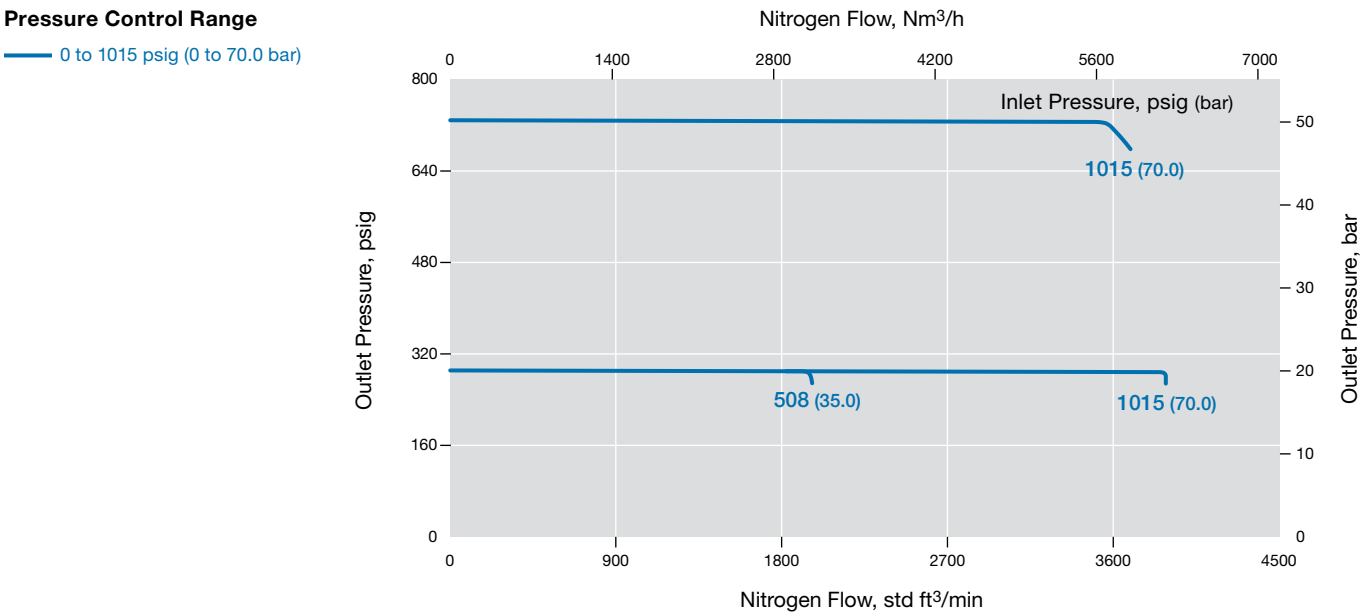


RD15-EF Series

Flow Coefficient: 7.30

Maximum Inlet Pressure: 1015 psig (70.0 bar)

Outlet Pressure Control Range: 0 to 1015 psig (0 to 70.0 bar)



Flow Data

The graphs illustrate the change or “droop” in outlet pressures as the flow rate increases.

For more flow curve information, contact your authorized Swagelok representative.

RDH15-EF Series

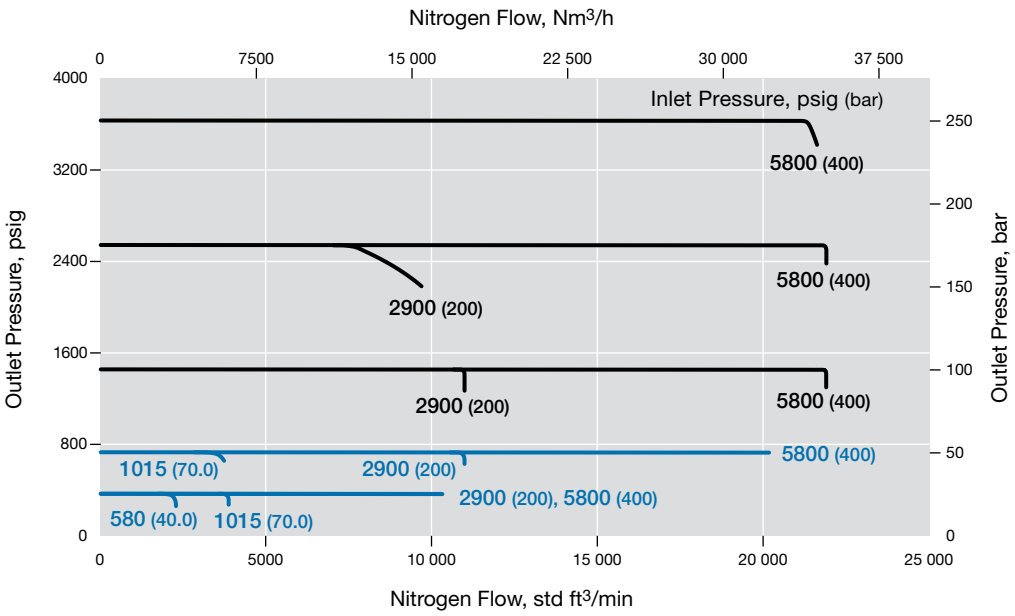
Flow Coefficient: 7.30

Maximum Inlet Pressure: 5800 psig (400 bar)

Outlet Pressure Control Range: 0 to 3625 psig (0 to 250 bar)

Pressure Control Range

- 0 to 3625 psig (0 to 250 bar)
- 0 to 1450 psig (0 to 100 bar)



RD15-EFP Series

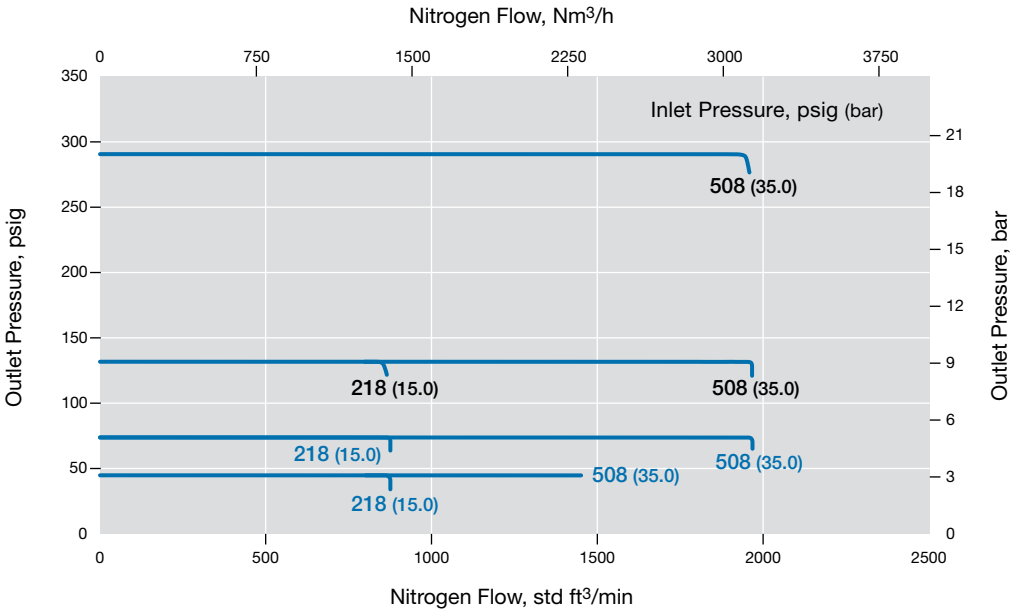
Flow Coefficient: 7.30

Maximum Inlet Pressure: 508 psig (35.0 bar)

Outlet Pressure Control Range: 0 to 290 psig (0 to 20.0 bar)

Pressure Control Range

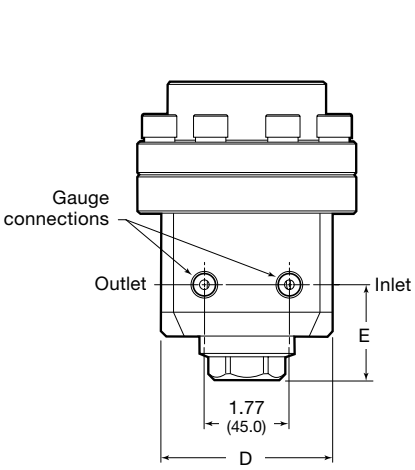
- 0 to 290 psig (0 to 20.0 bar)

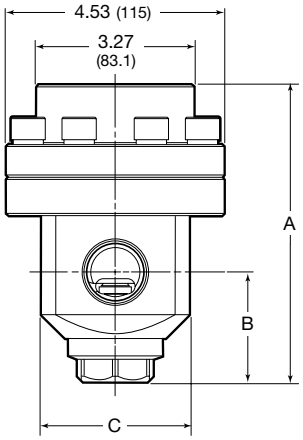


Dimensions

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

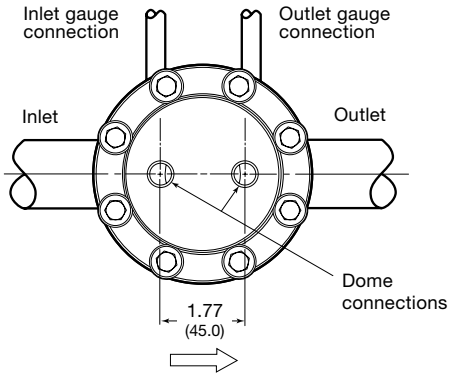
Series	End Connection Size	Dimensions, in. (mm)				
		A	B	C	D	E
RD(H)10	1 in.	6.18 (157)	2.28 (58.0)	3.07 (78.0)	3.54 (90.0)	1.97 (50.0)
RD(H)15	1 1/2 in.	6.61 (168)	2.44 (62.0)	3.78 (96.0)	4.53 (115)	2.03 (51.5)





Configuration

Top



Shown with tubing for clarity; tubing not included.

Ordering Information

Build an RD(H)10 and RD(H)15 series regulator ordering number by combining the designators in the sequence shown below.

1	2	3	4	5		6	7	8	9	10	11
RD	FA	10	A	1	-	02	- X -	V	V	V	- EF

1 Series

RD = 1015 psig (70.0 bar) maximum inlet pressure (507 psig [35.0 bar] with pilot regulator, options **0, 1,** or **2**)

RDH = 5800 psig (400 bar) maximum inlet pressure

2 Inlet / Outlet

B = Female ISO/BSP parallel thread

N = Female NPT

FA = ASME B16.5 flange

FD = EN 1092 (DIN) flange

3 Size

10 = 1 in. / DN25

15 = 1 1/2 in. / DN40

4 Pressure Class

Omit designator if flanges are not ordered.

A = ASME class 150

B = ASME class 300

C = ASME class 600

E = ASME class 1500

F = ASME class 2500

M = EN class PN16

N = EN class PN40

5 Flange Facing

Omit designator if flanges are not ordered.

1 = Raised face smooth

3 = RTJ

6 Body Material

02 = 316L SS

7 Pilot Regulator Options

Pressure Control Range

X = No pilot regulator, optional

RD series with LRS4 series pilot regulator

0 = 0 to 43 psig (0 to 3.0 bar)

1 = 0 to 130 psig (0 to 9.0 bar)

2 = 0 to 290 psig (0 to 20.0 bar)

RD series with RS2 series pilot regulator

3 = 0 to 1015 psig (0 to 70.0 bar)

RDH series with RS2 series pilot regulator

4 = 0 to 145 psig (0 to 10.0 bar)

5 = 0 to 362 psig (0 to 25.0 bar)

6 = 0 to 1450 psig (0 to 100 bar)

7 = 0 to 2537 psig (0 to 175 bar)

8 = 0 to 3625 psig (0 to 250 bar)

8 Seal Material

V = Fluorocarbon FKM

N = Nitrile

E = EPDM

L = Low temperature Nitrile

9 Diaphragm Material

V = Fluorocarbon FKM

N = Nitrile

E = EPDM

L = Low temperature Nitrile

10 Seat Seal Material

RD series

V = Fluorocarbon FKM

N = Nitrile

E = EPDM

L = Low temperature Nitrile

RDH series

K = PCTFE

P = PEEK

11 Options

EF = External feedback to main regulator

EFP = External feedback to pilot regulator, limited to 290 psig (20.0 bar)

N = NACE MR0175/ISO 15156

G93 = ASTM G93 Level C-cleaned

Integral Pilot-Operated, Dome-Loaded Pressure-Reducing Regulators—RD(H)20 and RD(H)25 Series

Features

- Balanced poppet design
- Diaphragm sensing
- Integral pilot regulator with dynamic regulation
- Dome-to-outlet pressure ratio approximately 1:1
- Large dome for improved stability

Options

- External feedback (EF) for improved performance
  - EF to main regulator limited by standard outlet pressure range
  - EF to pilot regulator limited to 290 psig (20.0 bar)
- NACE MR0175/ISO 15156-compliant models
- Special cleaning to ASTM G93 Level C

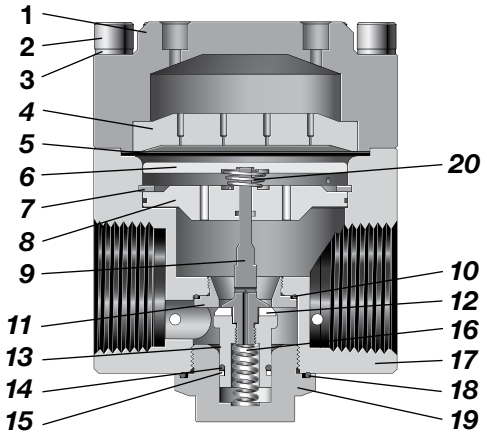
Technical Data

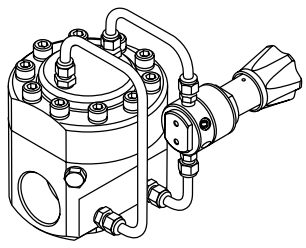
Series	Maximum Inlet Pressure psig (bar)	Maximum Outlet Control Pressure psig (bar)	Sensing Type	Temperature Range °F (C°)	Flow Coefficient (C_v)	Seat Diameter in. (mm)	Inlet and Outlet Connections	Gauge / Dome Connection	Weight (Without Flanges) lb (kg)
RD20 RDH20	RD: 1015 (70.0) (507 [35.0] with LRS4 pilot regulator) RDH: 5800 (400)	RD: 1015 (70.0) RDH: 2900 (200)	Diaphragm	–49 to 176 (–45 to 80) See **Pressure-Temperature Ratings,** page 921.	13	0.98 (25.0)	2 in. NPT, ISO/BSP parallel thread, EN or ASME flange	Use P1 gauge connection of pilot regulator.	44 (20)
RD25 RDH25	RD: 1015 (70.0) (507 [35.0] with LRS4 pilot regulator) RDH: 4060 (280)				21	1.25 (32.0)	2 1/2 in. EN or ASME flange	Dome: 1/4 in. ISO/BSP parallel thread	88 (40)

See pages 73 to 82 for flow data.

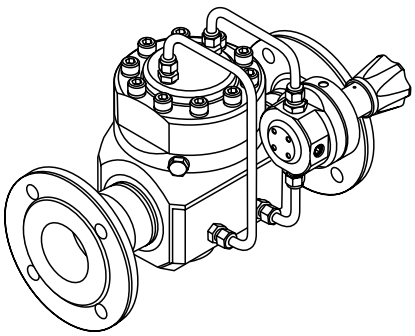
Materials of Construction

RDH20 Series Regulator with Hard Seat Seal





RDH20 with RS2 Pilot Regulator



RD25 with LRS4 Pilot Regulator

Component		Material / Specification
1 *Dome*		*316L SS / A479*
2 Cap screw		A4-80
3 Washer		A4
4 *Dome plate*		*316L SS / A479*
5 *Diaphragm*		*EPDM, FKM, or nitrile*
6 *Diaphragm plate*		*316L SS / A479*
7 *Retaining ring*		*Commercial stainless steel*
8 *Body plate*		*316L SS / A479*
9 *Poppet*		
10 *O-ring*		*EPDM, FKM, or nitrile*
11 *Seat*		*316L SS / A479*
12 *Seat seal*	*RD*	*EPDM, FKM, or nitrile*
	RDH	*PCTFE or PEEK*
13 *Poppet housing*		*316L SS / A479*
14 *O-ring*		*EPDM, FKM, or nitrile*
15 *Backup ring*		*PTFE*
16 *Poppet spring*		*302 SS / A313*
17 *Body*		*316L SS/ A479*
18 *Plug O-ring*		*EPDM, FKM, or nitrile*
19 *Body plug*		*316L SS / A479*
20 *Conical spring (RDH20 only)*		*302 SS / A313*
Wetted lubricants: Silicone-based and synthetic hydrocarbon-based		

Wetted components listed in *italics.*
Gauge plugs (not shown): 431 SS / A276.

Flow Data

The graphs illustrate the change or “droop” in outlet pressures as the flow rate increases.

For more flow curve information, contact your authorized Swagelok representative.

RD20 Series

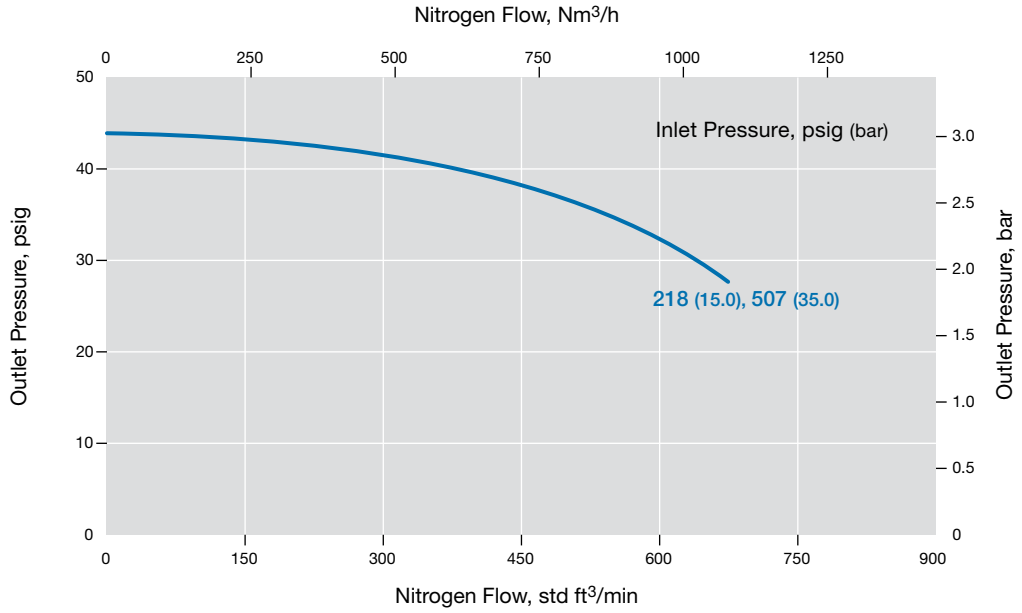
Flow Coefficient: 13

Maximum Inlet Pressure: 507 psig (35.0 bar)

Outlet Pressure Control Range: 0 to 43 psig (0 to 3.0 bar)

Pressure Control Range

0 to 43 psig (0 to 3.0 bar)



RD20 Series

Flow Coefficient: 13

Maximum Inlet Pressure: 1015 psig (70.0 bar)

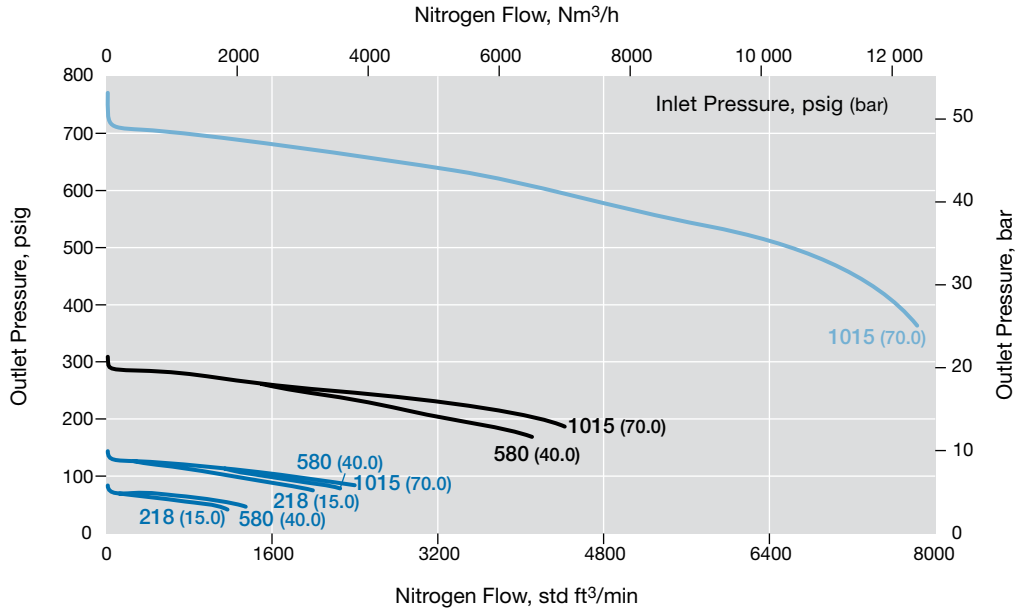
Outlet Pressure Control Range: 0 to 1015 psig (0 to 70.0 bar)

Pressure Control Range

0 to 1015 psig (0 to 70.0 bar)

0 to 290 psig (0 to 20.0 bar)

0 to 130 psig (0 to 9.0 bar)



Flow Data

The graphs illustrate the change or “droop” in outlet pressures as the flow rate increases.

For more flow curve information, contact your authorized Swagelok representative.

RDH20 Series

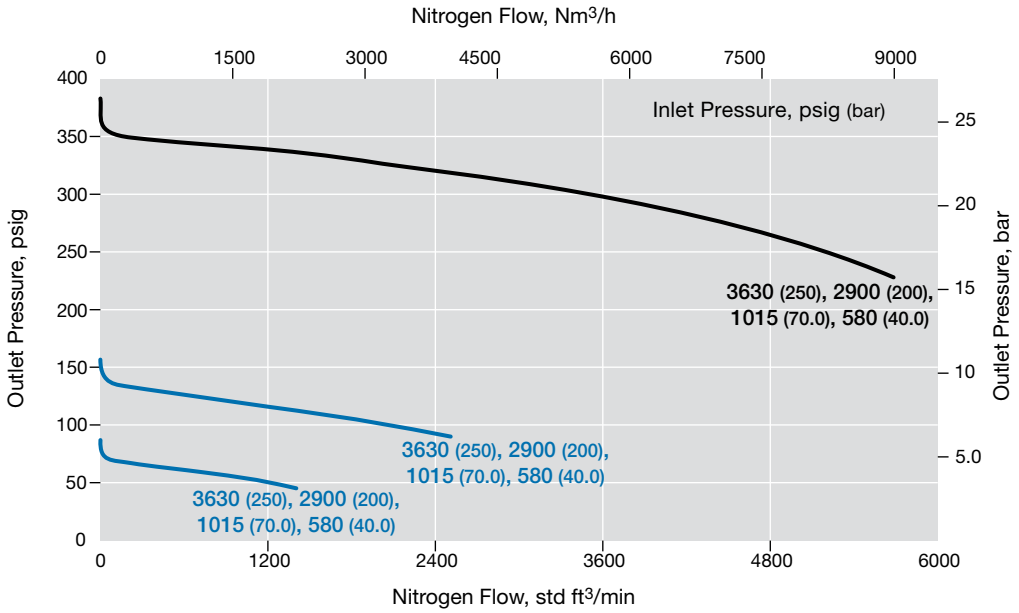
Flow Coefficient: 13

Maximum Inlet Pressure: 5800 psig (400 bar)

Outlet Pressure Control Range: 0 to 362 psig (0 to 25.0 bar)

Pressure Control Range

- 0 to 362 psig (0 to 25.0 bar)
- 0 to 145 psig (0 to 10.0 bar)



RDH20 Series

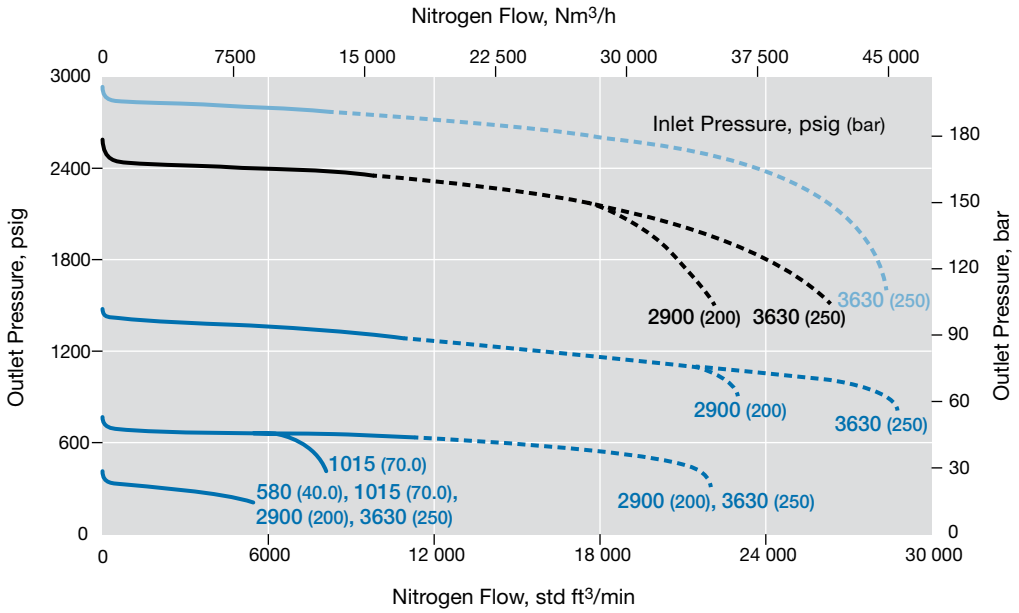
Flow Coefficient: 13

Maximum Inlet Pressure: 5800 psig (400 bar)

Outlet Pressure Control Range: 0 to 2900 psig (0 to 200 bar)

Pressure Control Range

- 0 to 2900 psig (0 to 200 bar)
- 0 to 2900 psig (0 to 200 bar), calculated
- 0 to 2537 psig (0 to 175 bar)
- 0 to 2537 psig (0 to 175 bar), calculated
- 0 to 1450 psig (0 to 100 bar)
- 0 to 1450 psig (0 to 100 bar), calculated



Flow Data

The graphs illustrate the change or “droop” in outlet pressures as the flow rate increases.

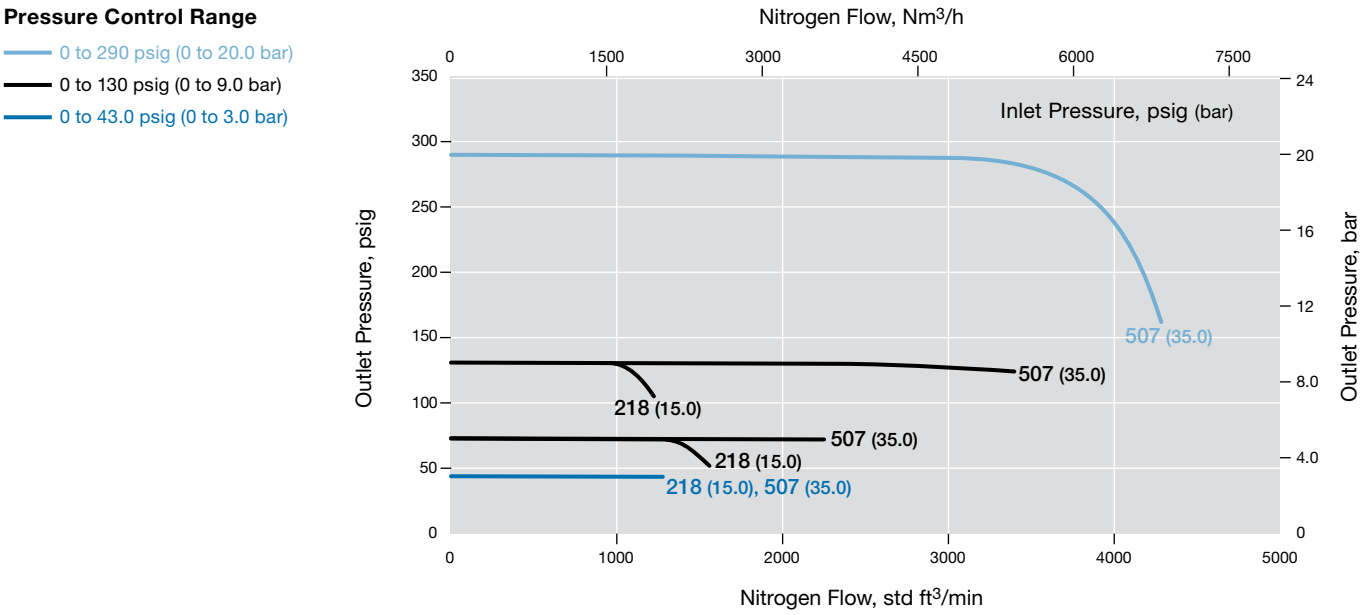
For more flow curve information, contact your authorized Swagelok representative.

RD20-EF Series

Flow Coefficient: 13

Maximum Inlet Pressure: 507 psig (35.0 bar)

Outlet Pressure Control Range: 0 to 290 psig (0 to 20.0 bar)

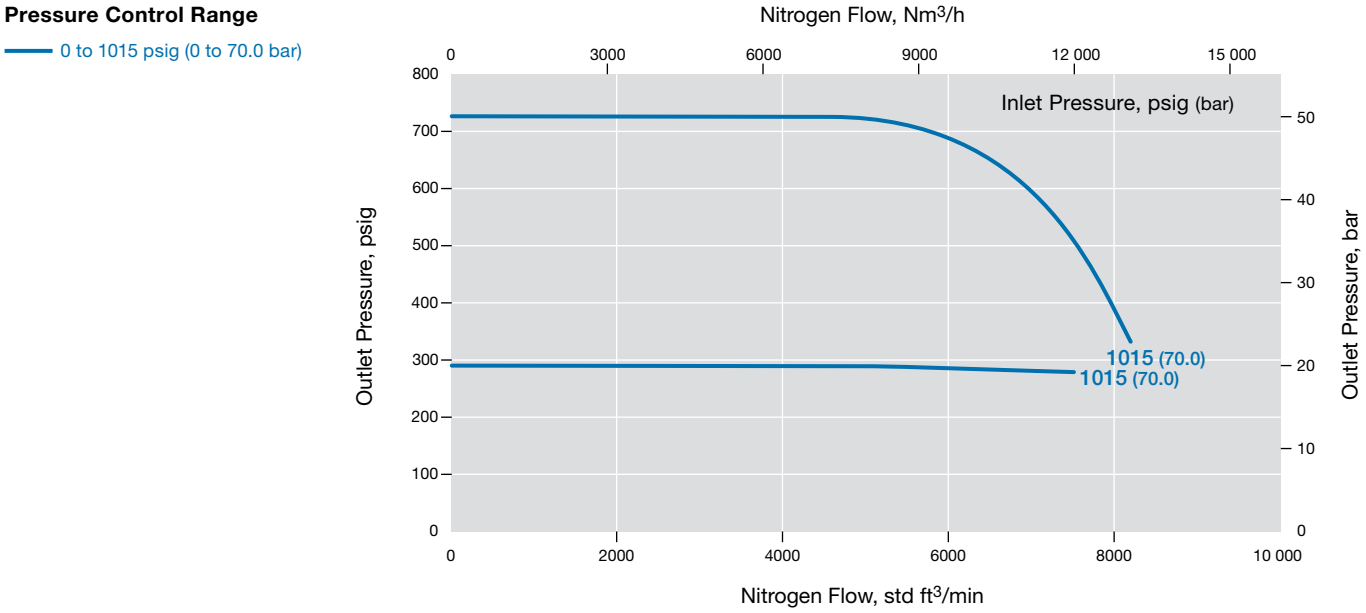


RD20-EF Series

Flow Coefficient: 13

Maximum Inlet Pressure: 1015 psig (70.0 bar)

Outlet Pressure Control Range: 0 to 1015 psig (0 to 70.0 bar)



Flow Data

The graphs illustrate the change or “droop” in outlet pressures as the flow rate increases.

For more flow curve information, contact your authorized Swagelok representative.

RD(H)20-EF Series

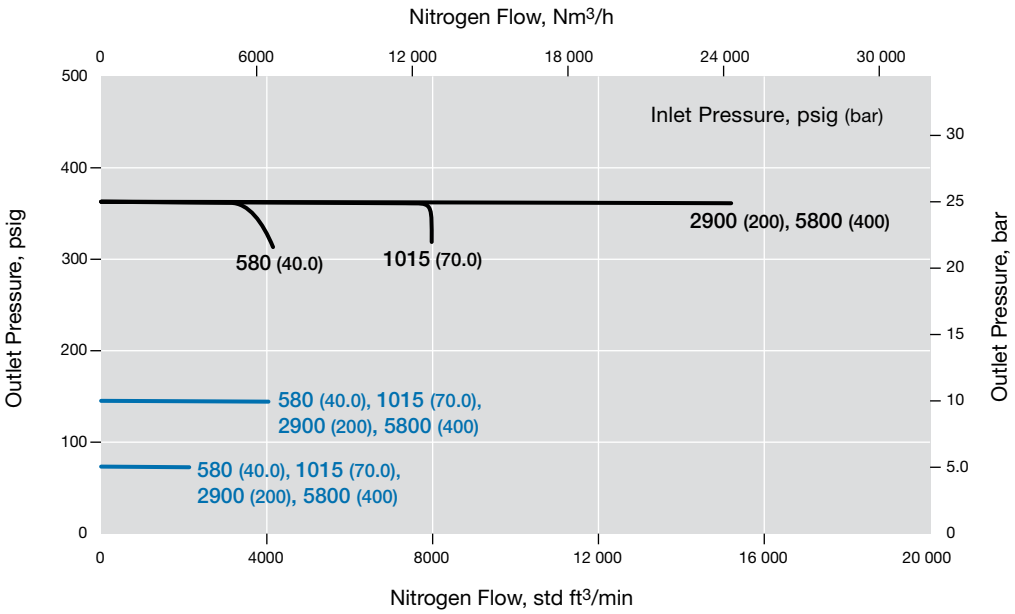
Flow Coefficient: 13

Maximum Inlet Pressure: 5800 psig (400 bar)

Outlet Pressure Control Range: 0 to 362 psig (0 to 25.0 bar)

Pressure Control Range

- 0 to 362 psig (0 to 25.0 bar)
- 0 to 145 psig (0 to 10.0 bar)



RD(H)20-EF Series

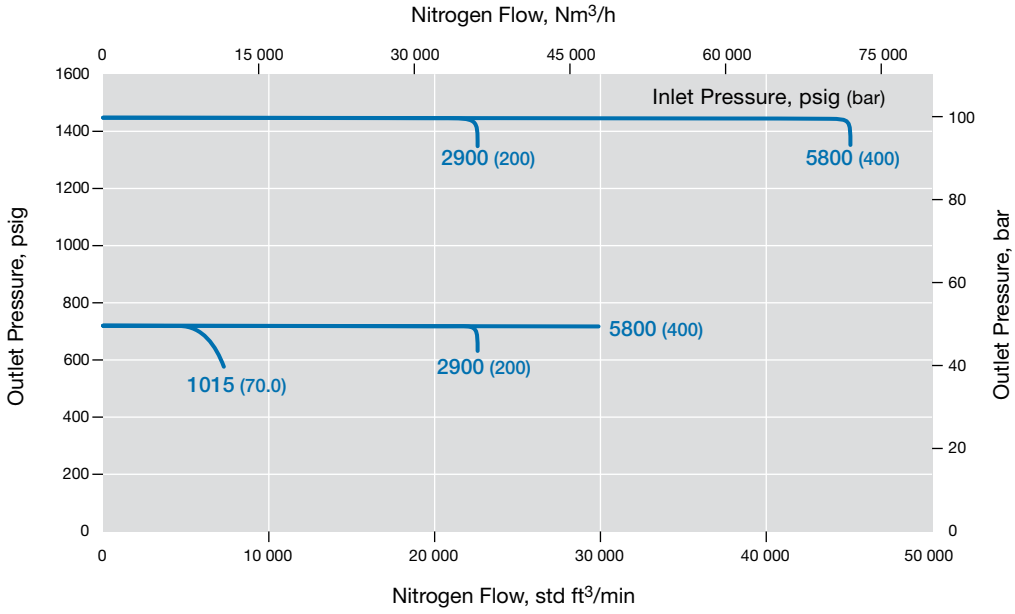
Flow Coefficient: 13

Maximum Inlet Pressure: 5800 psig (400 bar)

Outlet Pressure Control Range: 0 to 1450 psig (0 to 100 bar)

Pressure Control Range

- 0 to 1450 psig (0 to 100 bar)



Flow Data

The graphs illustrate the change or “droop” in outlet pressures as the flow rate increases.

For more flow curve information, contact your authorized Swagelok representative.

RD(H)20-EF Series

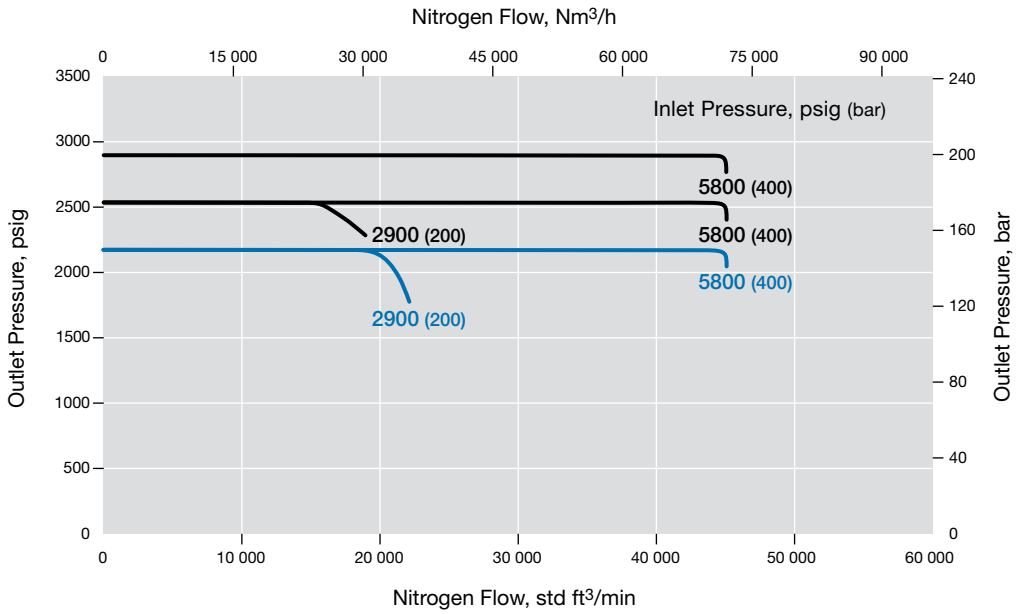
Flow Coefficient: 13

Maximum Inlet Pressure: 5800 psig (400 bar)

Outlet Pressure Control Range: 0 to 2900 psig (0 to 200 bar)

Pressure Control Range

- 0 to 2900 psig (0 to 200 bar)
- 0 to 2537 psig (0 to 175 bar)



RD20-EFP Series

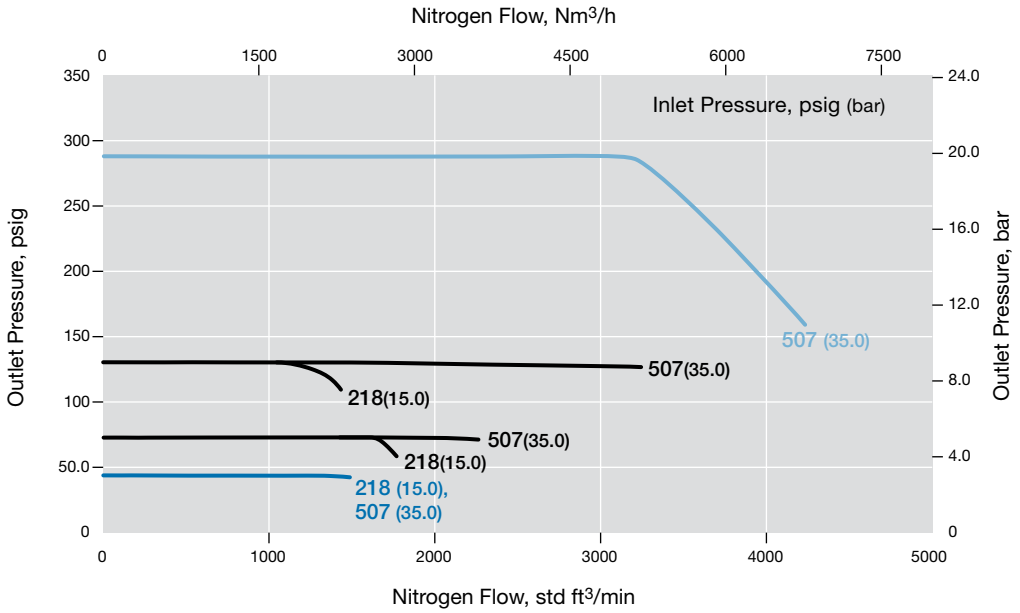
Flow Coefficient: 13

Maximum Inlet Pressure: 507 psig (35.0 bar)

Outlet Pressure Control Range: 0 to 290 psig (0 to 20.0 bar)

Pressure Control Range

- 0 to 290 psig (0 to 20.0 bar)
- 0 to 130 psig (0 to 9.0 bar)
- 0 to 43.0 psig (0 to 3.0 bar)



Flow Data

The graphs illustrate the change or “droop” in outlet pressures as the flow rate increases.

For more flow curve information, contact your authorized Swagelok representative.

RD25 Series

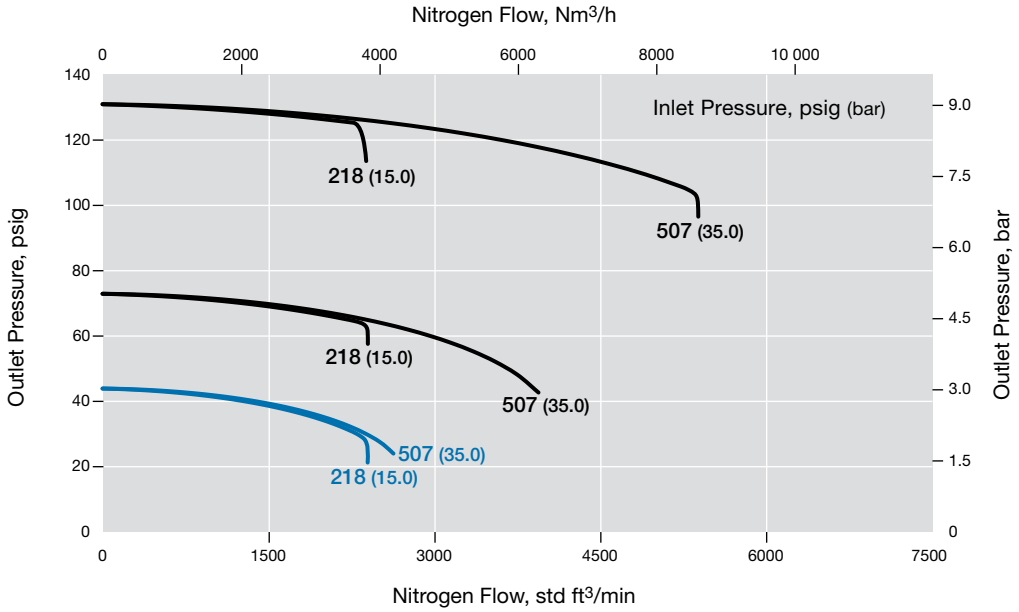
Flow Coefficient: 21

Maximum Inlet Pressure: 507 psig (35.0 bar)

Outlet Pressure Control Range: 0 to 130 psig (0 to 9.0 bar)

Pressure Control Range

- 0 to 130 psig (0 to 9.0 bar)
- 0 to 43.0 psig (0 to 3.0 bar)



RD25 Series

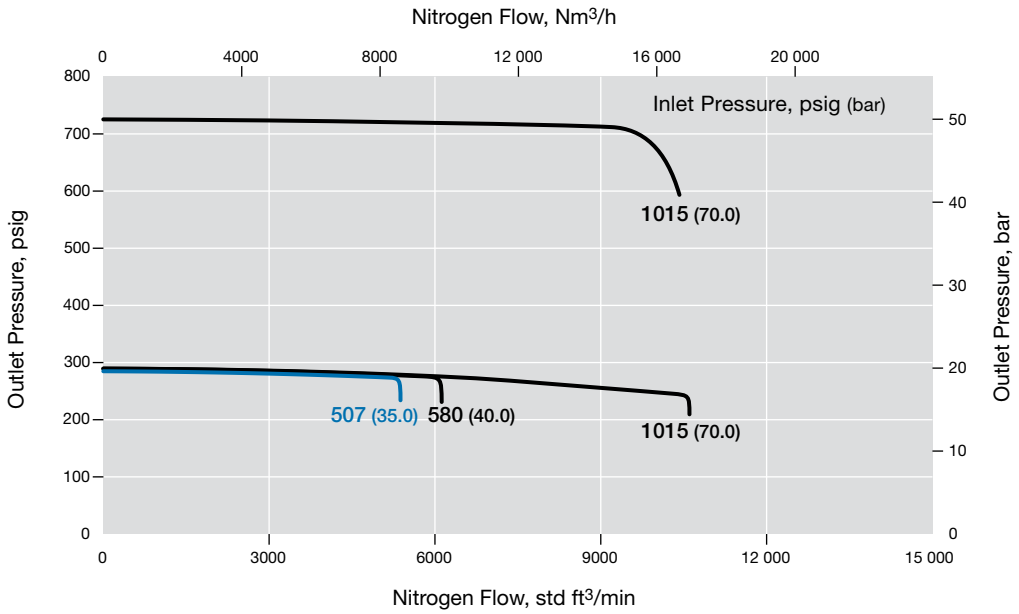
Flow Coefficient: 21

Maximum Inlet Pressure: 1015 psig (70.0 bar)

Outlet Pressure Control Range: 0 to 1015 psig (0 to 70.0 bar)

Pressure Control Range

- 0 to 1015 psig (0 to 70.0 bar)
- 0 to 290 psig (0 to 20.0 bar)



Flow Data

The graphs illustrate the change or “droop” in outlet pressures as the flow rate increases.

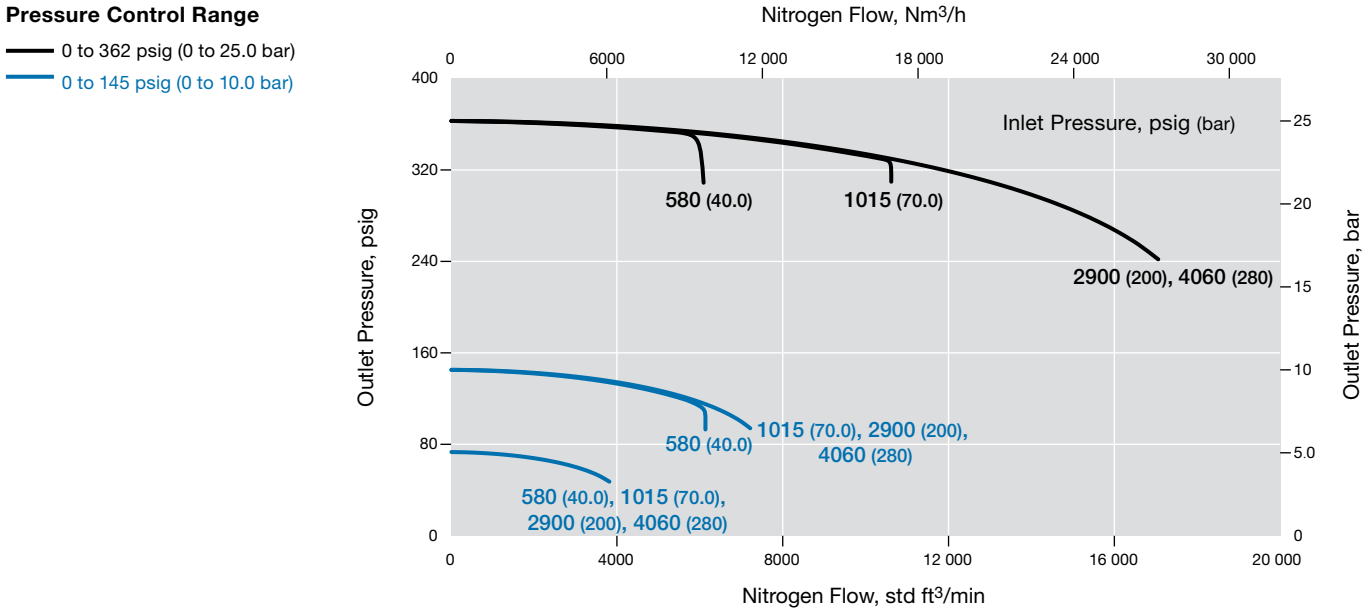
For more flow curve information, contact your authorized Swagelok representative.

RDH25 Series

Flow Coefficient: 21

Maximum Inlet Pressure: 4060 psig (280 bar)

Outlet Pressure Control Range: 0 to 362 psig (0 to 25.0 bar)

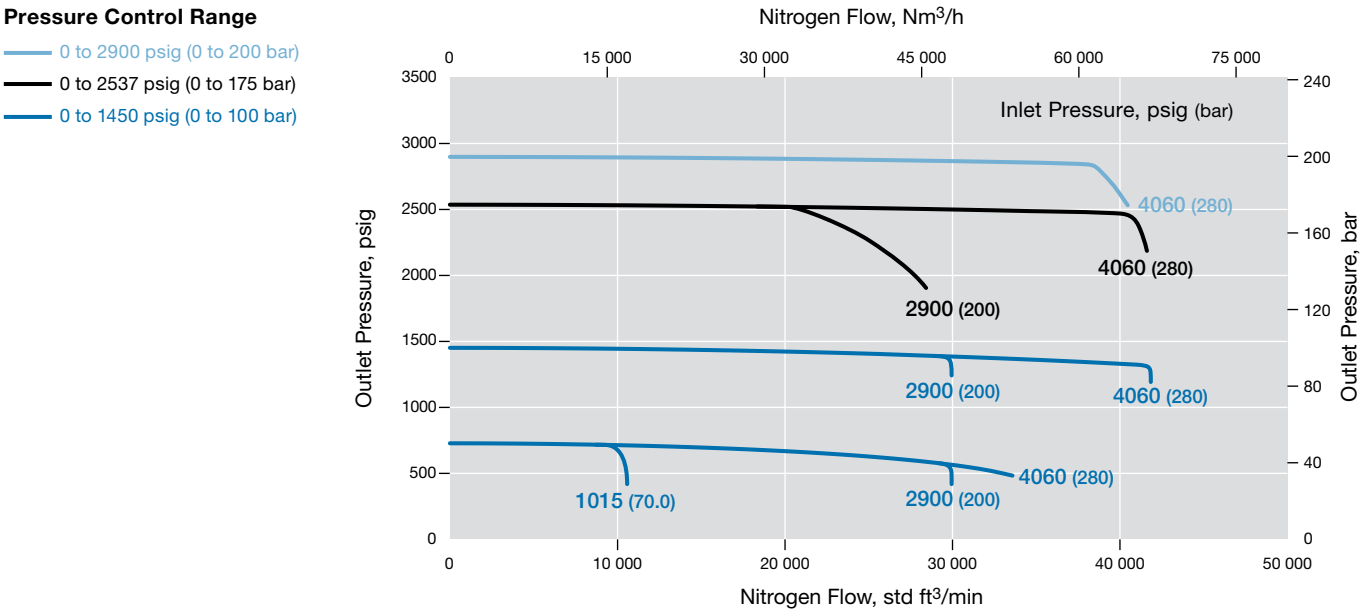


RDH25 Series

Flow Coefficient: 21

Maximum Inlet Pressure: 4060 psig (280 bar)

Outlet Pressure Control Range: 0 to 2900 psig (0 to 200 bar)



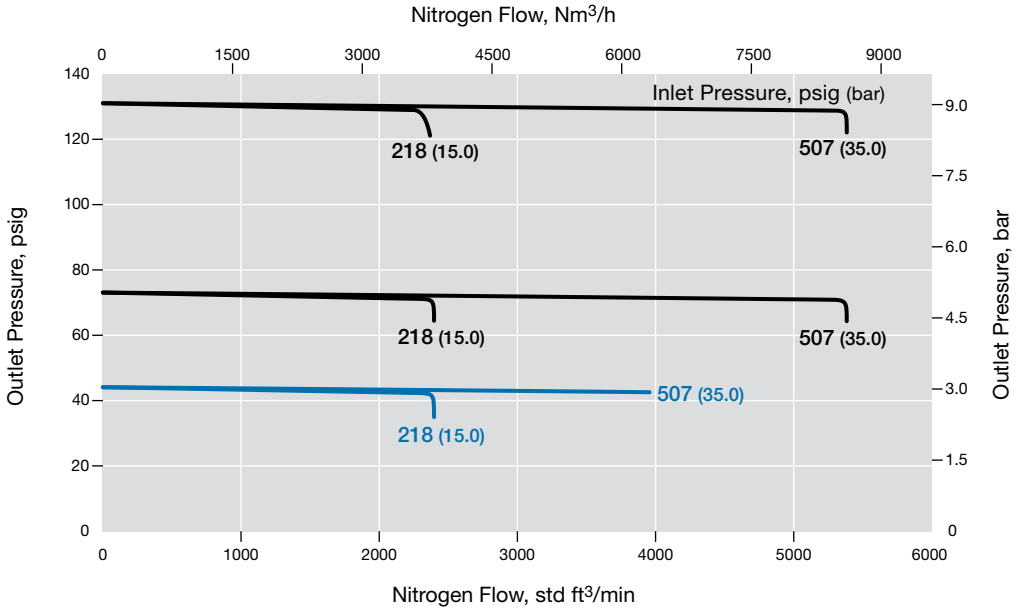
Flow Data

The graphs illustrate the change or “droop” in outlet pressures as the flow rate increases.
For more flow curve information, contact your authorized Swagelok representative.

RD25-EF Series

Flow Coefficient: 21
Maximum Inlet Pressure: 507 psig (35.0 bar)
Outlet Pressure Control Range: 0 to 130 psig (0 to 9.0 bar)

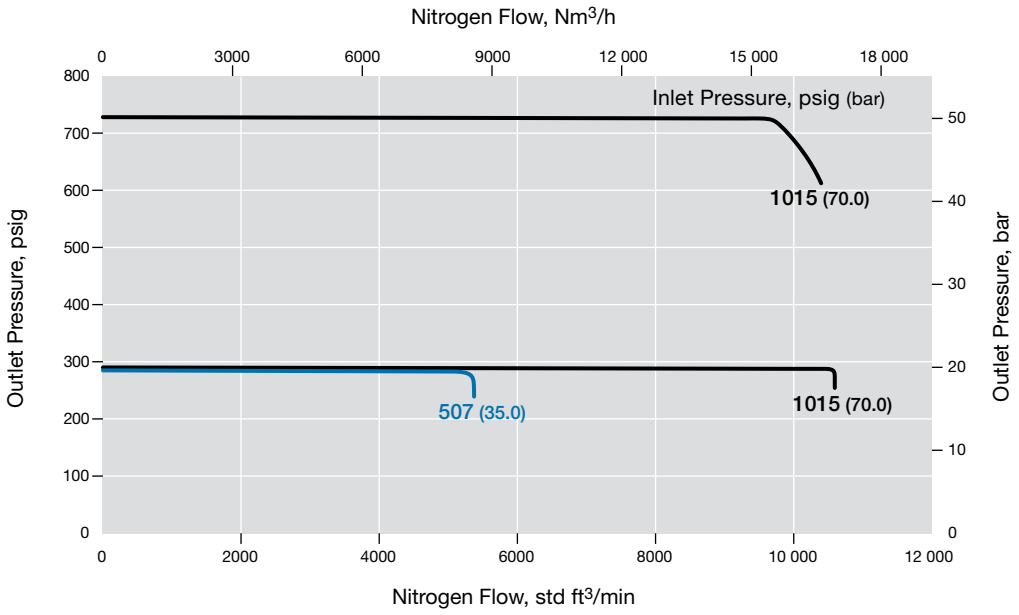
Pressure Control Range
0 to 130 psig (0 to 9.0 bar)
0 to 43.0 psig (0 to 3.0 bar)



RD25-EF Series

Flow Coefficient: 21
Maximum Inlet Pressure: 1015 psig (70.0 bar)
Outlet Pressure Control Range: 0 to 1015 psig (0 to 70.0 bar)

Pressure Control Range
0 to 1015 psig (0 to 70.0 bar)
0 to 290 psig (0 to 20.0 bar)



Flow Data

The graphs illustrate the change or “droop” in outlet pressures as the flow rate increases.

For more flow curve information, contact your authorized Swagelok representative.

RDH25-EF Series

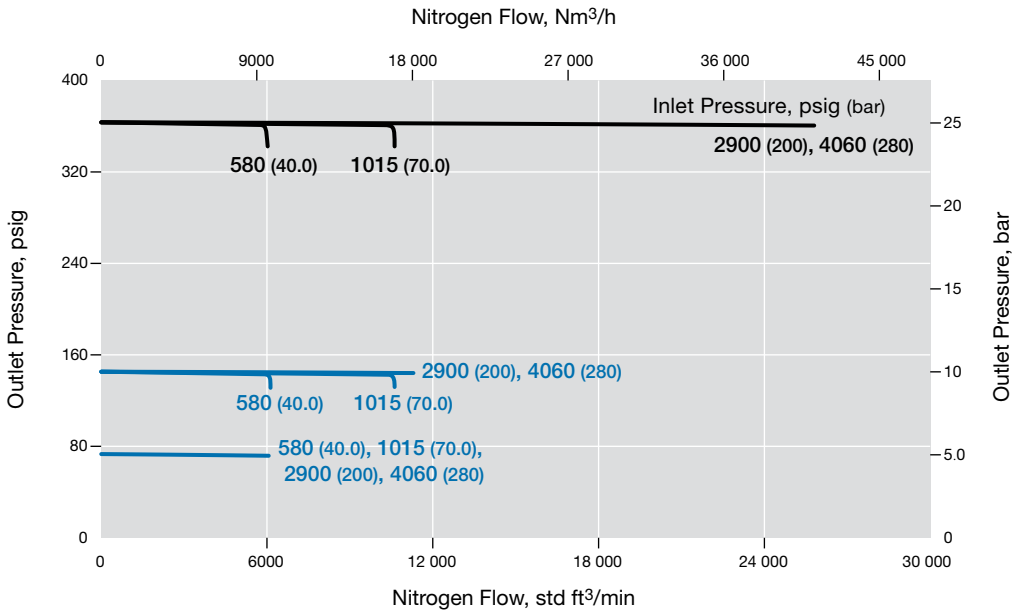
Flow Coefficient: 21

Maximum Inlet Pressure: 4060 psig (280 bar)

Outlet Pressure Control Range: 0 to 362 psig (0 to 25.0 bar)

Pressure Control Range

- 0 to 362 psig (0 to 25.0 bar)
- 0 to 145 psig (0 to 10.0 bar)



RDH25-EF Series

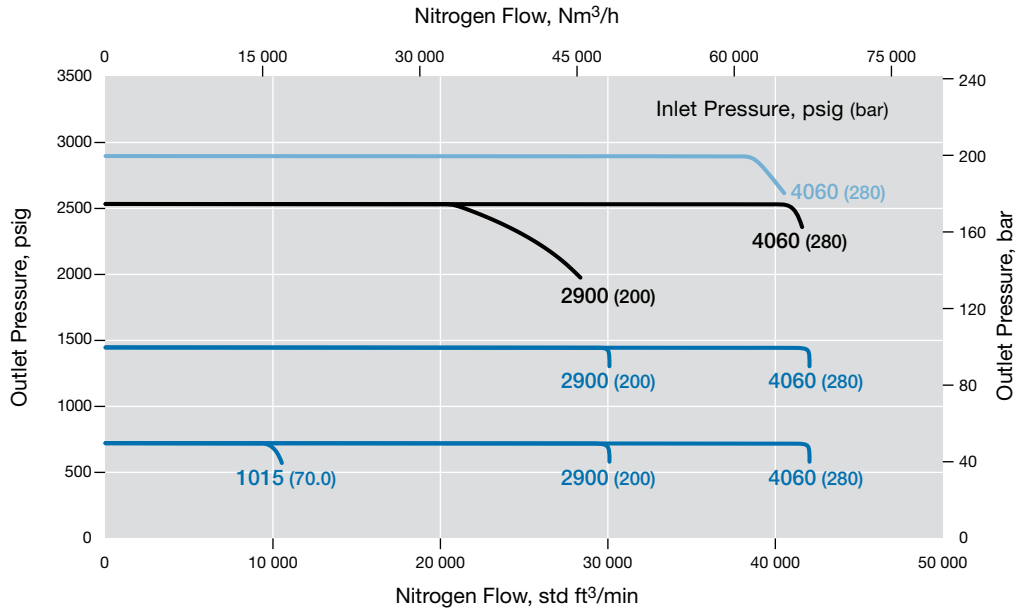
Flow Coefficient: 21

Maximum Inlet Pressure: 4060 psig (280 bar)

Outlet Pressure Control Range: 0 to 2900 psig (0 to 200 bar)

Pressure Control Range

- 0 to 2900 psig (0 to 200 bar)
- 0 to 2537 psig (0 to 175 bar)
- 0 to 1450 psig (0 to 100 bar)



Flow Data

The graphs illustrate the change or “droop” in outlet pressures as the flow rate increases.

For more flow curve information, contact your authorized Swagelok representative.

RD25-EFP Series

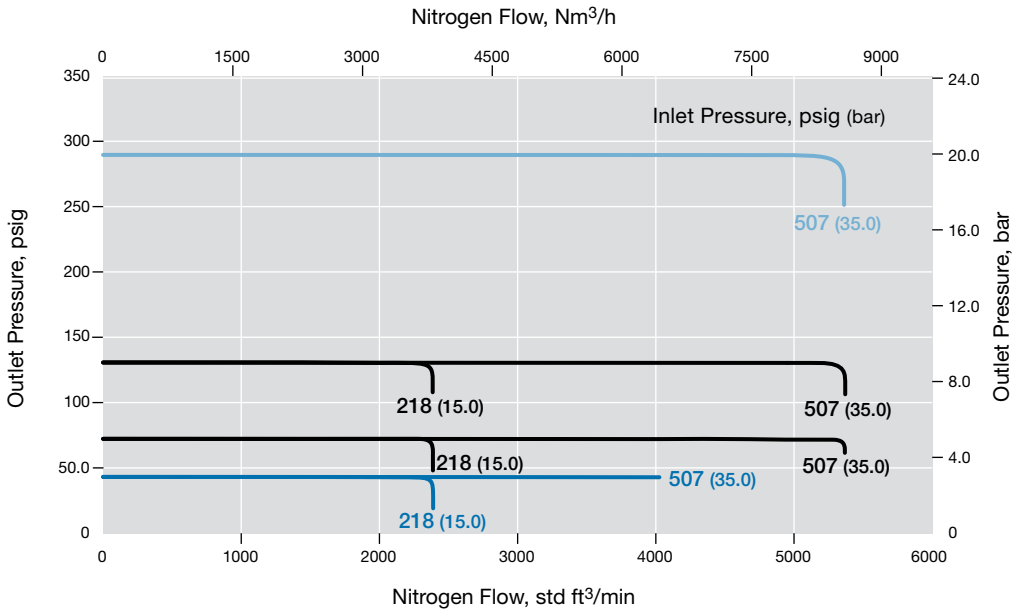
Flow Coefficient: 21

Maximum Inlet Pressure: 507 psig (35.0 bar)

Outlet Pressure Control Range: 0 to 290 psig (0 to 20.0 bar)

Pressure Control Range

- 0 to 290 psig (0 to 20.0 bar)
- 0 to 130 psig (0 to 9.0 bar)
- 0 to 43.0 psig (0 to 3.0 bar)

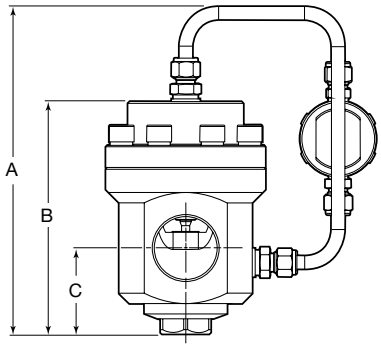


Dimensions

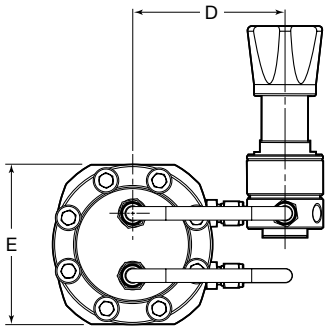
Dimensions, in inches (millimeters), are for reference only and are subject to change.

Series	End Connection Size	Dimensions, in. (mm)				
		A	B	C	D	E
RD(H)20	2 in.	9.33 (237)	7.28 (185)	2.44 (62.0)	4.33 (110)	5.51 (140)
RD(H)25	2 1/2 in.	11.8 (300)	9.25 (235)	3.42 (87.0)	4.92 (125)	6.69 (170)

Side



Top



Shown with RS2 series pilot regulator.

Ordering Information

Build an RD(H)20 and RD(H)25 series regulator ordering number by combining the designators in the sequence shown below.

1	2	3	4	5		6	7	8	9	10	11
RD	FA	20	A	1	-	02	- 0	- V	V	V	- EF

1 Series

RD = 1015 psig (70.0 bar) maximum inlet pressure (507 psig [35.0 bar] with pilot regulator, options **0, 1,** or **2**)
RDH = 5800 psig (400 bar) maximum inlet pressure (RDH20); 4060 psig (280 bar) maximum inlet pressure (RDH25)

2 Inlet / Outlet

B = Female ISO/BSP parallel thread①
N = Female NPT①
FA = ASME B16.5 flange
FD = EN 1092 (DIN) flange

① RD(H)20 only.

3 Size

20 = 2 in. / DN50
25 = 2 1/2 in. / DN65

4 Pressure Class

Omit designator if flanges are not ordered.
A = ASME class 150
B = ASME class 300
C = ASME class 600
E = ASME class 1500
F = ASME class 2500
M = EN class PN16
N = EN class PN40

5 Flange Facing

Omit designator if flanges are not ordered.
1 = Raised face smooth
3 = RTJ

6 Body Material

02 = 316L SS

7 Pilot Regulator Options

Pressure Control Range

X = No pilot regulator, optional

RD series with LRS4 series pilot regulator
0 = 0 to 43 psig (0 to 3.0 bar)
1 = 0 to 130 psig (0 to 9.0 bar)
2 = 0 to 290 psig (0 to 20.0 bar)

RD series with RS2 series pilot regulator
3 = 0 to 1015 psig (0 to 70.0 bar)

RDH series with RS2 series pilot regulator
4 = 0 to 145 psig (0 to 10.0 bar)
5 = 0 to 362 psig (0 to 25.0 bar)
6 = 0 to 1450 psig (0 to 100 bar)
7 = 0 to 2537 psig (0 to 175 bar)
8 = 0 to 2900 psig (0 to 200 bar)

8 Seal Material

V = Fluorocarbon FKM
N = Nitrile
E = EPDM
L = Low temperature Nitrile

9 Diaphragm Material

V = Fluorocarbon FKM
N = Nitrile
E = EPDM
L = Low temperature Nitrile

10 Seat Seal Material

RD series
V = Fluorocarbon FKM
N = Nitrile
E = EPDM
L = Low temperature Nitrile

RDH series
K = PCTFE
P = PEEK

11 Options

EF = External feedback to main regulator
EFP = External feedback to pilot regulator, limited to 290 psig (20.0 bar)
N = NACE MR0175/ISO 15156
G93 = ASTM G93 Level C-cleaned

Integral Pilot-Operated, Dome-Loaded Pressure-Reducing Regulators—RD(H)30 and RD(H)40 Series

Features

- Balanced poppet design
- Diaphragm sensing
- Integral pilot regulator with dynamic regulation
- Dome-to-outlet pressure ratio approximately 1:1
- Large dome for stability
- Floating seat for improved sealing reliability (patent pending)

Options

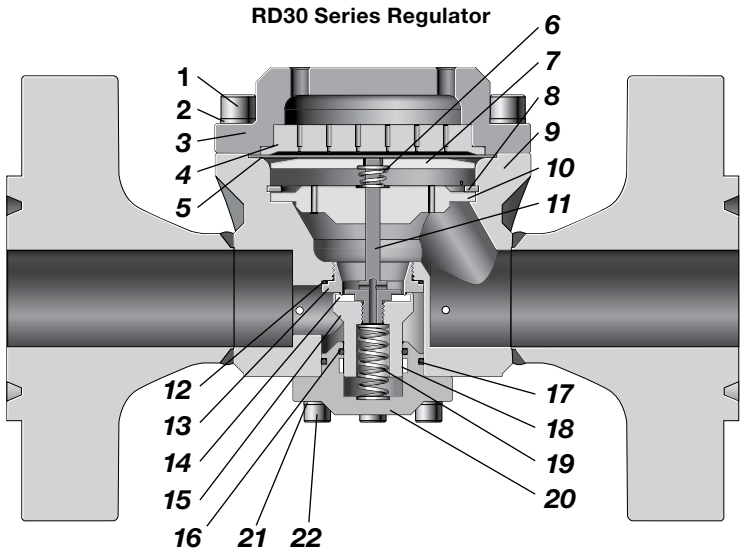
- External feedback (EF) for improved performance
  - EF to main regulator limited by standard outlet pressure range
  - EF to pilot regulator limited to 290 psig (20.0 bar)
- NACE MR0175/ISO 15156-compliant models
- Special cleaning to ASTM G93 Level C

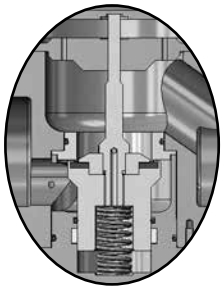
Technical Data

Series	Maximum Inlet Pressure psig (bar)	Maximum Outlet Control Pressure psig (bar)	Sensing Type	Temperature Range °F (C°)	Flow Coefficient (C_v)	Seat Diameter in. (mm)	Inlet and Outlet Connections	Gauge / Dome Connection	Weight (With Class 150 Flanges) lb (kg)
RD	1015 (70.0) (507 [35.0] with LRS4 pilot regulator)	1015 (70.0)	Diaphragm	–49 to 176 (–45 to 80) See **Pressure-Temperature Ratings,** page 921.	RD(H)30: 36 RD(H)40: 73	RD(H)30: 1.65 (42.0) RD(H)40: 2.36 (60.0)	EN or ASME flanges— RD(H)30: 3 in. RD(H)40: 4 in.	Use P1 gauge connection of pilot regulator. Dome: 1/4 in. ISO/BSP parallel thread	RD(H)30: 136 (62) RD(H)40: 183 (83)
RDH	4060 (280)	2900 (200)							

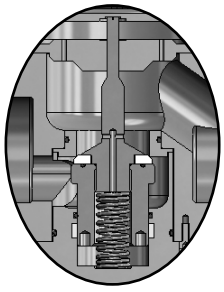
See pages 85 to 97 for flow data.

Materials of Construction





RD
Poppet and Seat



RDH
Poppet and Seat

Component		Material / Specification
1 Cap screw		A4-80
2 Washer		A4
3 *Dome*		*316L SS / A479*
4 *Dome plate*		*316L SS / A479*
5 *Diaphragm*		*EPDM, FKM, or nitrile*
6 *Conical spring (RD[H]30 only)*		*302 SS / A313*
7 *Diaphragm plate*		*316L SS / A479*
8 *Retaining ring*		*Commercial stainless steel*
9 *Body assembly (body, reducers, flanges)*		*316L SS / A479*
10 *Body plate*		
11 *Poppet*		*316L SS / A479*
12 *O-ring*		*EPDM, FKM, or nitrile*
13 *Seat*		*316L SS / A479*
14 *Seat seal*	*RD*	*EPDM, FKM, or nitrile*
	RDH	*PEEK*
15 *Poppet housing*		*316L SS / A479*
16 *O-ring*		*EPDM, FKM, or nitrile*
17 *Plug O-ring*		
18 *Guide ring*		*PTFE*
19 *Poppet spring*		*302 SS / A313*
20 *Body plug*		*316L SS / A479*
21 Washer		A4
22 Cap Screw		A4-80
Wetted lubricants: Silicone-based and synthetic hydrocarbon-based		

Wetted components listed in *italics*.
Gauge plugs (not shown): 431 SS / A276.

Flow Data

The graphs illustrate the change or “droop” in outlet pressures as the flow rate increases.

For more flow curve information, contact your authorized Swagelok representative.

RD30 Series

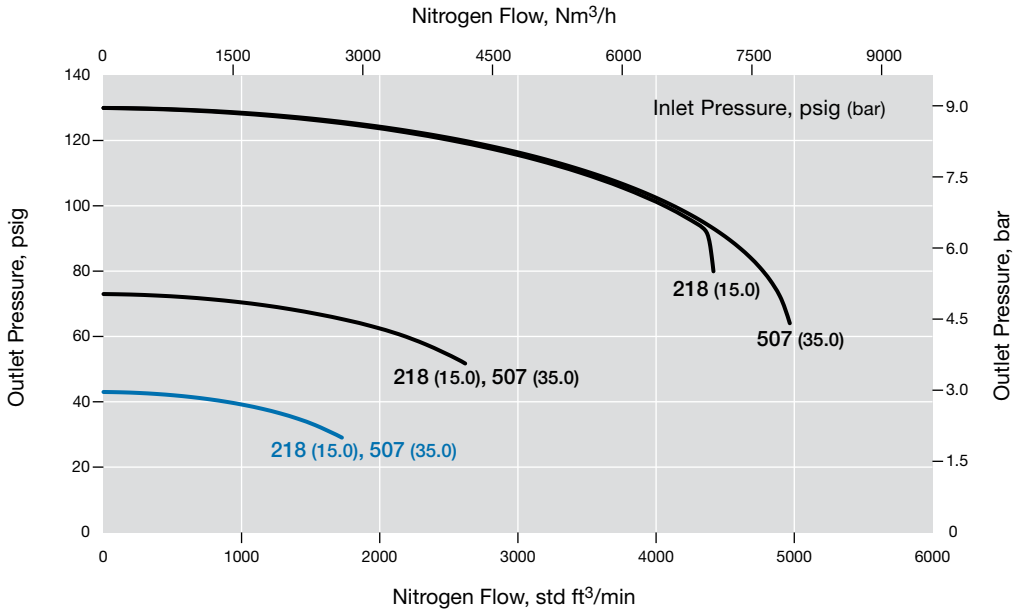
Flow Coefficient: 36

Maximum Inlet Pressure: 507 psig (35.0 bar)

Outlet Pressure Control Range: 0 to 130 psig (0 to 9.0 bar)

Pressure Control Range

- 0 to 130 psig (0 to 9.0 bar)
- 0 to 43.0 psig (0 to 3.0 bar)



RD30 Series

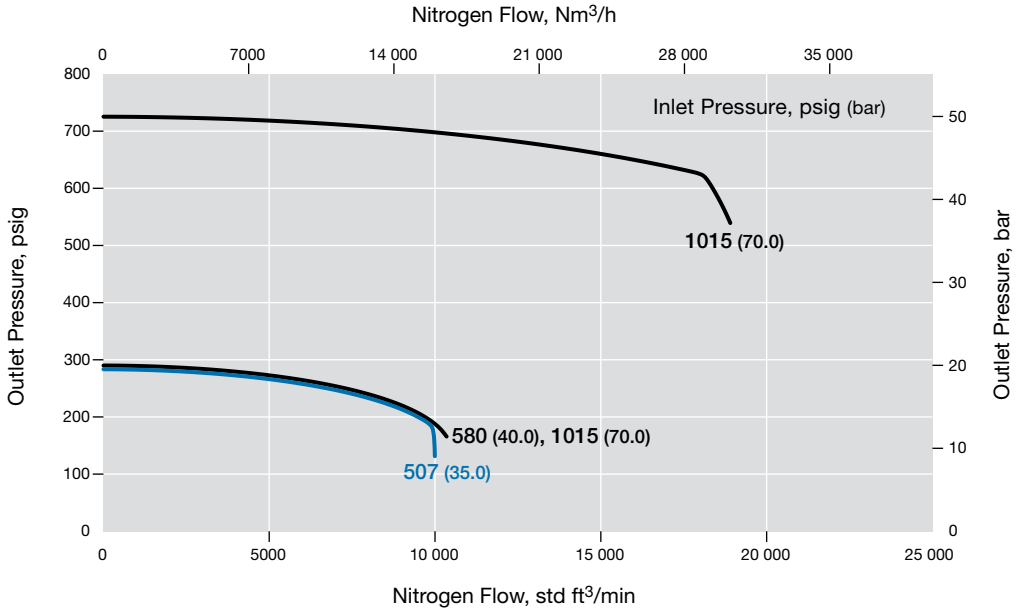
Flow Coefficient: 36

Maximum Inlet Pressure: 1015 psig (70.0 bar)

Outlet Pressure Control Range: 0 to 1015 psig (0 to 70.0 bar)

Pressure Control Range

- 0 to 1015 psig (0 to 70.0 bar)
- 0 to 290 psig (0 to 20.0 bar)



Flow Data

The graphs illustrate the change or “droop” in outlet pressures as the flow rate increases.

For more flow curve information, contact your authorized Swagelok representative.

RDH30 Series

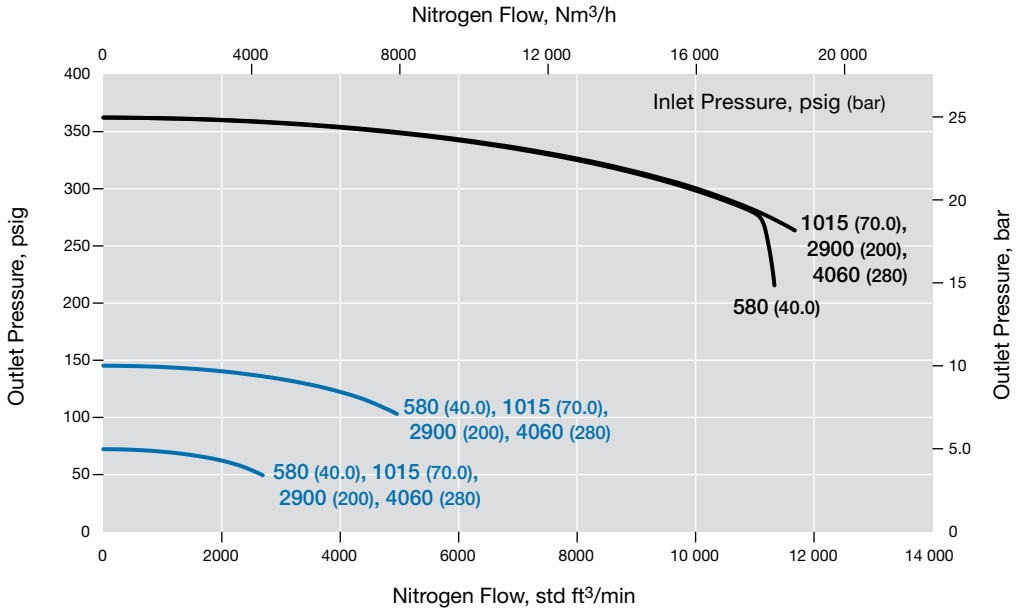
Flow Coefficient: 36

Maximum Inlet Pressure: 4060 psig (280 bar)

Outlet Pressure Control Range: 0 to 362 psig (0 to 25.0 bar)

Pressure Control Range

- 0 to 362 psig (0 to 25.0 bar)
- 0 to 145 psig (0 to 10.0 bar)



RDH30 Series

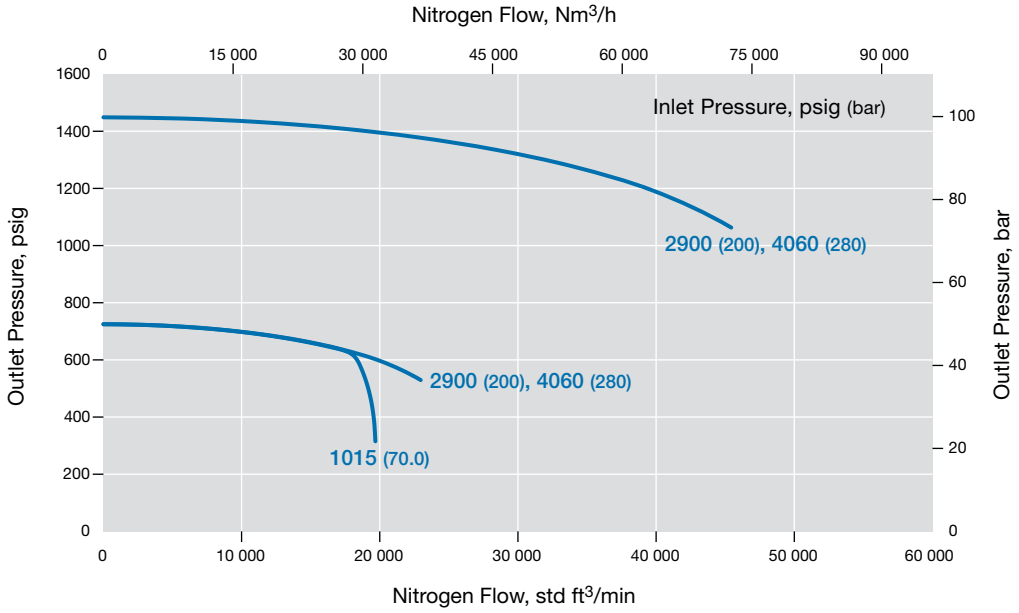
Flow Coefficient: 36

Maximum Inlet Pressure: 4060 psig (280 bar)

Outlet Pressure Control Range: 0 to 1450 psig (0 to 100 bar)

Pressure Control Range

- 0 to 1450 psig (0 to 100 bar)



Flow Data

The graphs illustrate the change or “droop” in outlet pressures as the flow rate increases.

For more flow curve information, contact your authorized Swagelok representative.

RDH30 Series

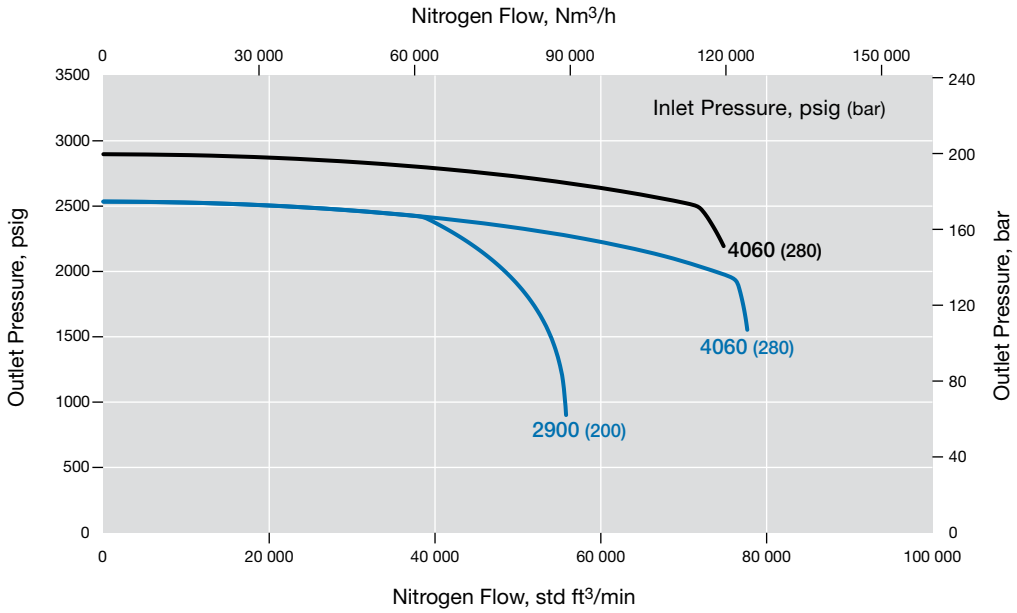
Flow Coefficient: 36

Maximum Inlet Pressure: 4060 psig (280 bar)

Outlet Pressure Control Range: 0 to 2900 psig (0 to 200 bar)

Pressure Control Range

- 0 to 2900 psig (0 to 200 bar)
- 0 to 2537 psig (0 to 175 bar)



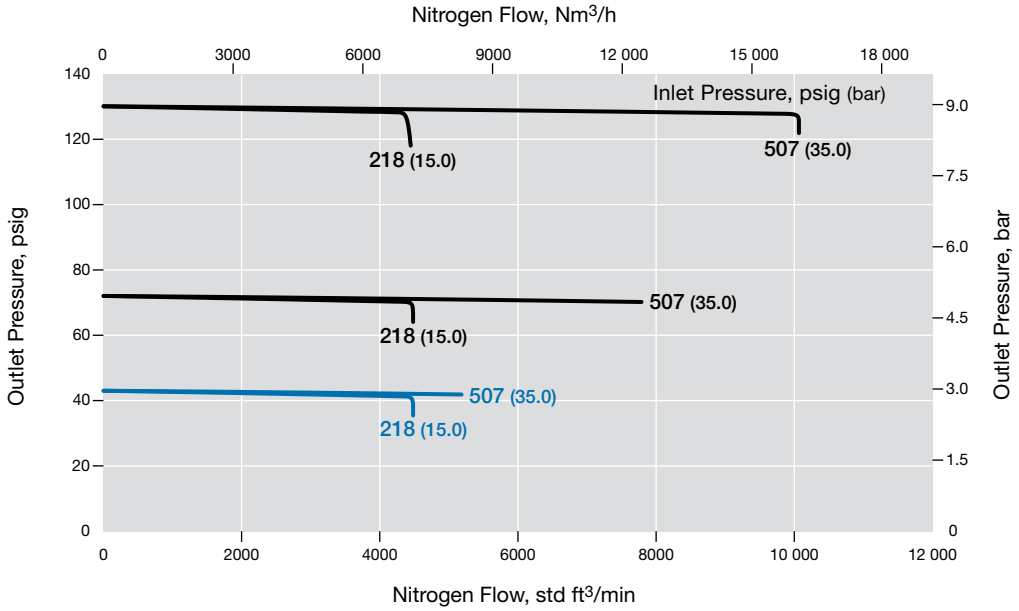
Flow Data

The graphs illustrate the change or “droop” in outlet pressures as the flow rate increases.
For more flow curve information, contact your authorized Swagelok representative.

RD30-EF Series

Flow Coefficient: 36
Maximum Inlet Pressure: 507 psig (35.0 bar)
Outlet Pressure Control Range: 0 to 130 psig (0 to 9.0 bar)

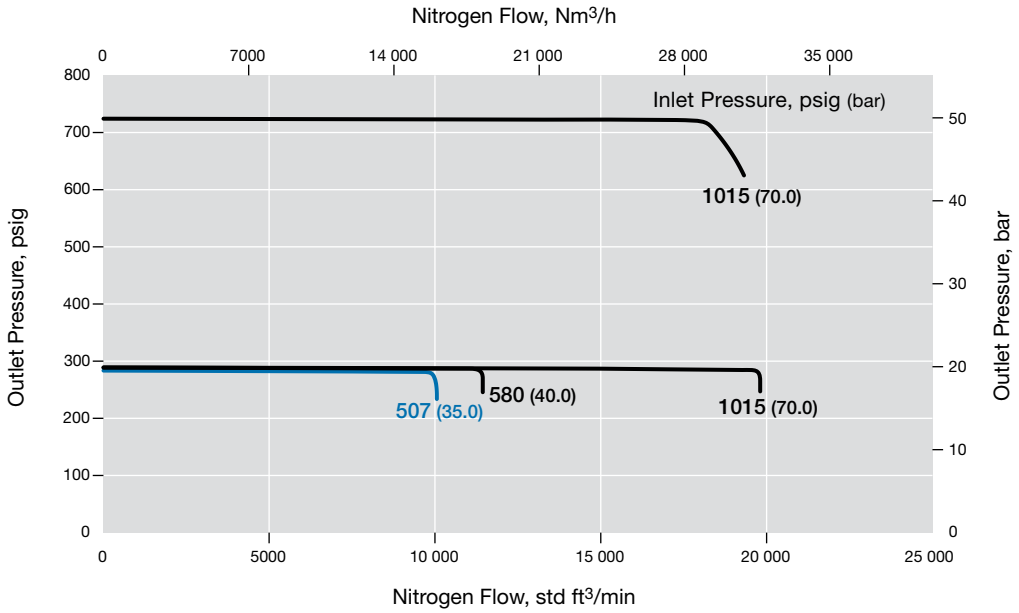
Pressure Control Range
- 0 to 130 psig (0 to 9.0 bar)
- 0 to 43.0 psig (0 to 3.0 bar)



RD30-EF Series

Flow Coefficient: 36
Maximum Inlet Pressure: 1015 psig (70.0 bar)
Outlet Pressure Control Range: 0 to 1015 psig (0 to 70.0 bar)

Pressure Control Range
- 0 to 1015 psig (0 to 70.0 bar)
- 0 to 290 psig (0 to 20.0 bar)



Flow Data

The graphs illustrate the change or “droop” in outlet pressures as the flow rate increases.

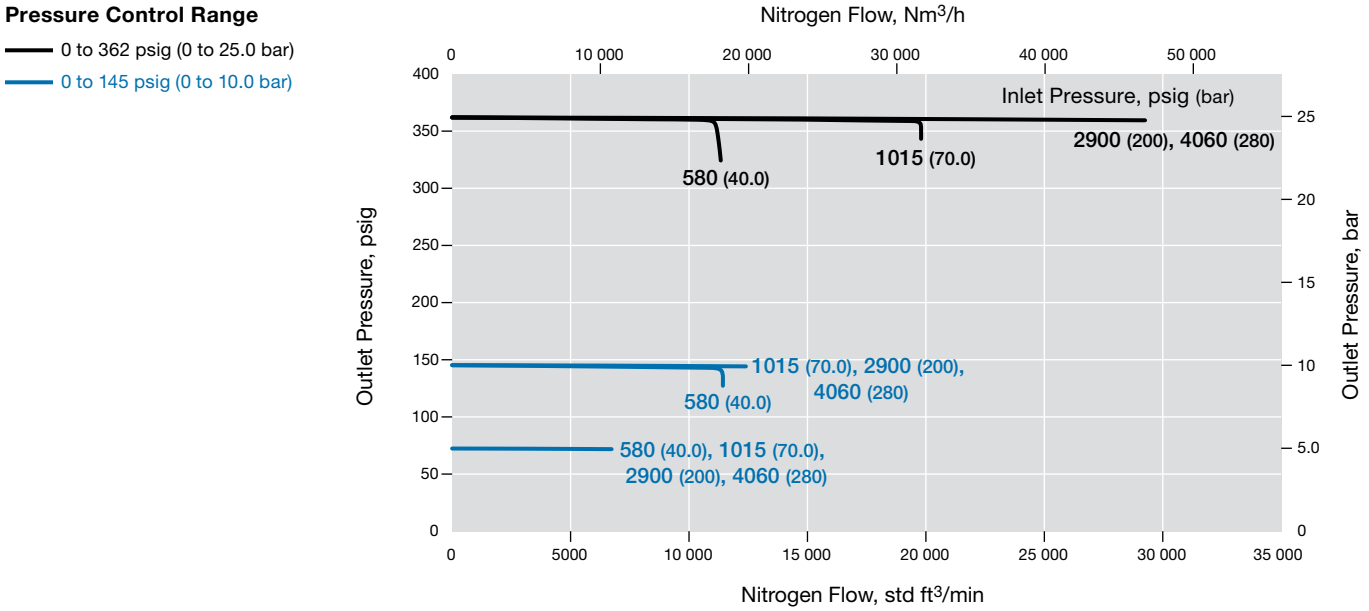
For more flow curve information, contact your authorized Swagelok representative.

RDH30-EF Series

Flow Coefficient: 36

Maximum Inlet Pressure: 4060 psig (280 bar)

Outlet Pressure Control Range: 0 to 362 psig (0 to 25.0 bar)

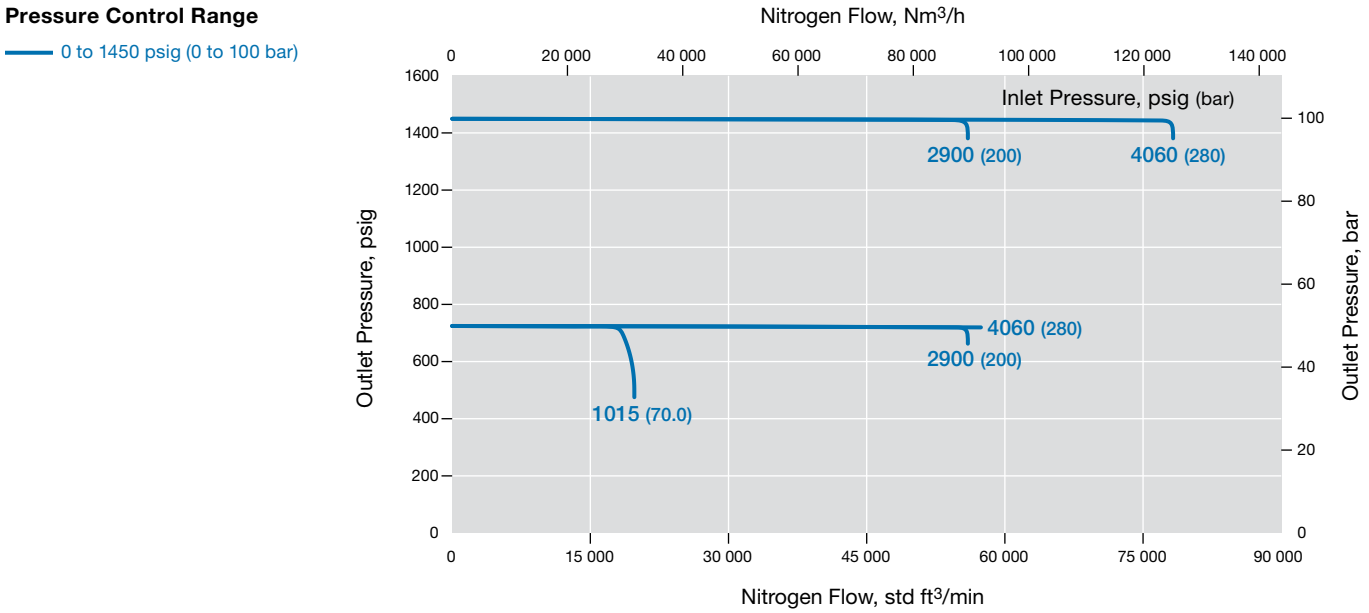


RDH30-EF Series

Flow Coefficient: 36

Maximum Inlet Pressure: 4060 psig (280 bar)

Outlet Pressure Control Range: 0 to 1450 psig (0 to 100 bar)



Flow Data

The graphs illustrate the change or “droop” in outlet pressures as the flow rate increases.

For more flow curve information, contact your authorized Swagelok representative.

RDH30-EF Series

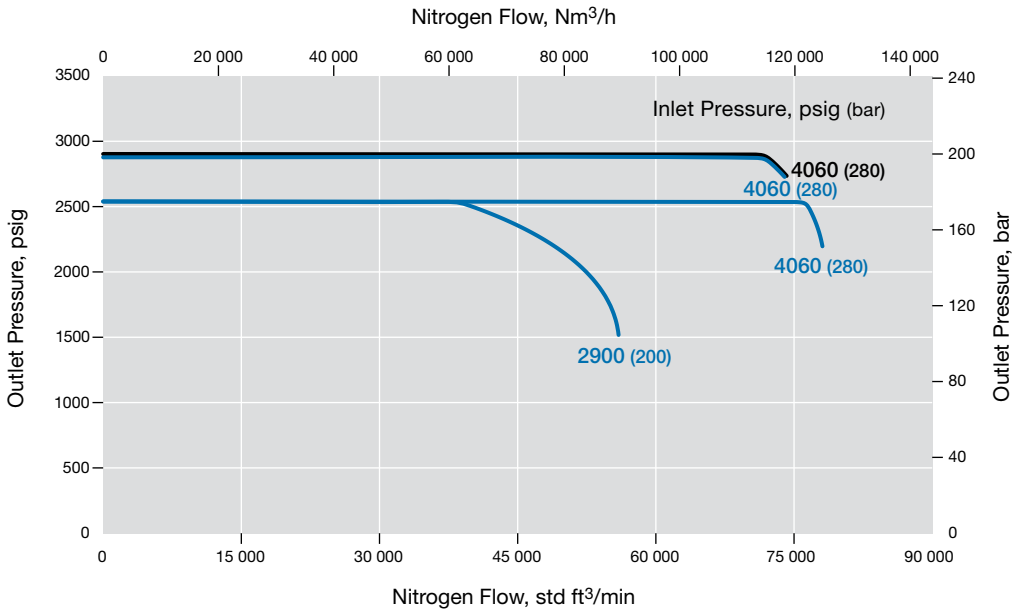
Flow Coefficient: 36

Maximum Inlet Pressure: 4060 psig (280 bar)

Outlet Pressure Control Range: 0 to 2900 psig (0 to 200 bar)

Pressure Control Range

- 0 to 2900 psig (0 to 200 bar)
- 0 to 2537 psig (0 to 175 bar)



Flow Data

The graphs illustrate the change or “droop” in outlet pressures as the flow rate increases.

For more flow curve information, contact your authorized Swagelok representative.

RD30-EFP Series

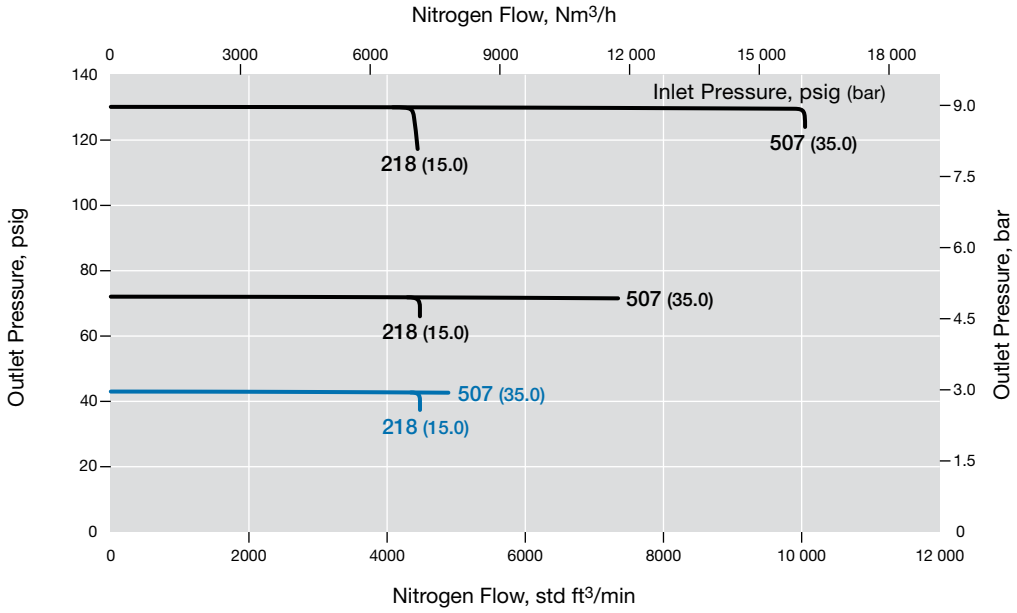
Flow Coefficient: 36

Maximum Inlet Pressure: 507 psig (35.0 bar)

Outlet Pressure Control Range: 0 to 130 psig (0 to 9.0 bar)

Pressure Control Range

- 0 to 130 psig (0 to 9.0 bar)
- 0 to 43.0 psig (0 to 3.0 bar)



RD30-EFP Series

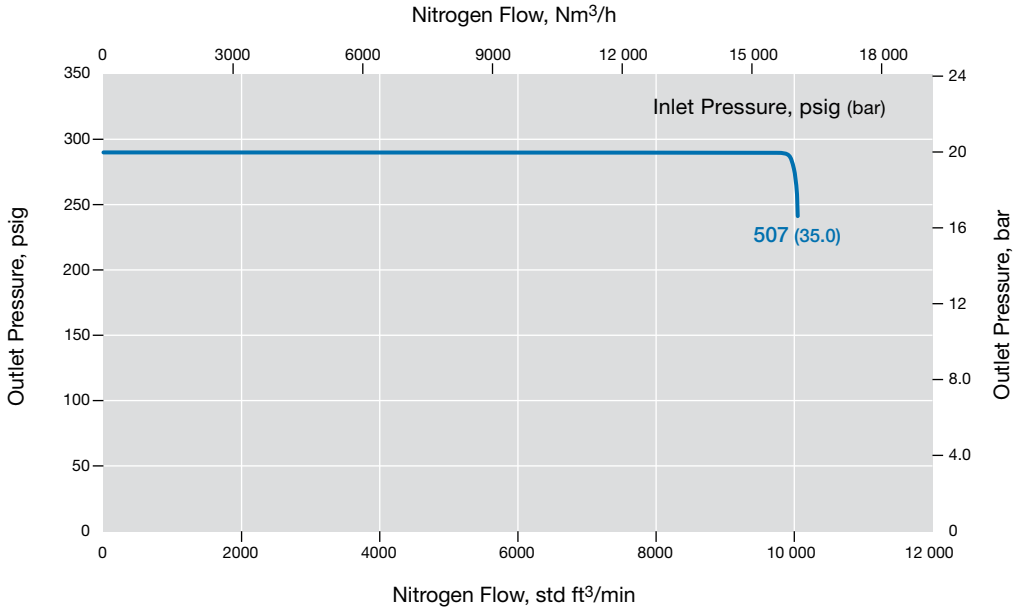
Flow Coefficient: 36

Maximum Inlet Pressure: 507 psig (35.0 bar)

Outlet Pressure Control Range: 0 to 290 psig (0 to 20.0 bar)

Pressure Control Range

- 0 to 290 psig (0 to 20.0 bar)



Flow Data

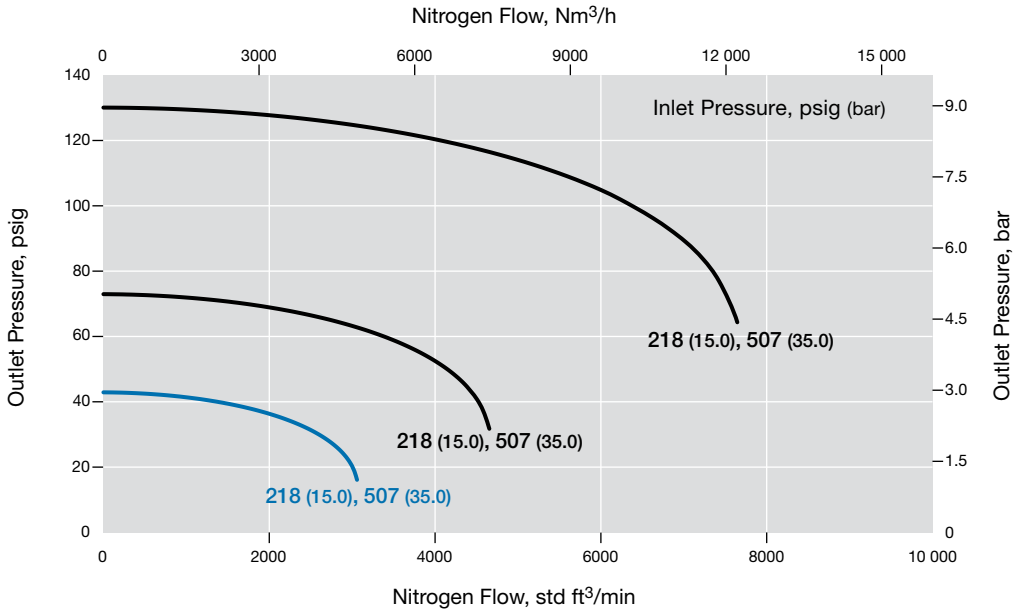
The graphs illustrate the change or “droop” in outlet pressures as the flow rate increases.
For more flow curve information, contact your authorized Swagelok representative.

RD40 Series

Flow Coefficient: 73
Maximum Inlet Pressure: 507 psig (35.0 bar)
Outlet Pressure Control Range: 0 to 130 psig (0 to 9.0 bar)

Pressure Control Range

- 0 to 130 psig (0 to 9.0 bar)
- 0 to 43.0 psig (0 to 3.0 bar)

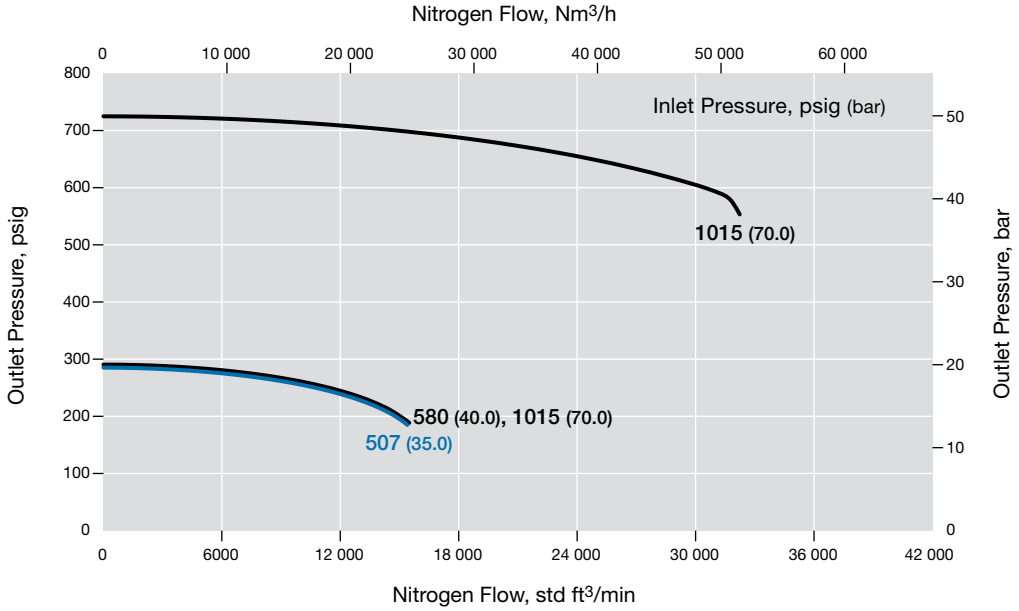


RD40 Series

Flow Coefficient: 73
Maximum Inlet Pressure: 1015 psig (70.0 bar)
Outlet Pressure Control Range: 0 to 1015 psig (0 to 70.0 bar)

Pressure Control Range

- 0 to 1015 psig (0 to 70.0 bar)
- 0 to 290 psig (0 to 20.5 bar)



Flow Data

The graphs illustrate the change or “droop” in outlet pressures as the flow rate increases.

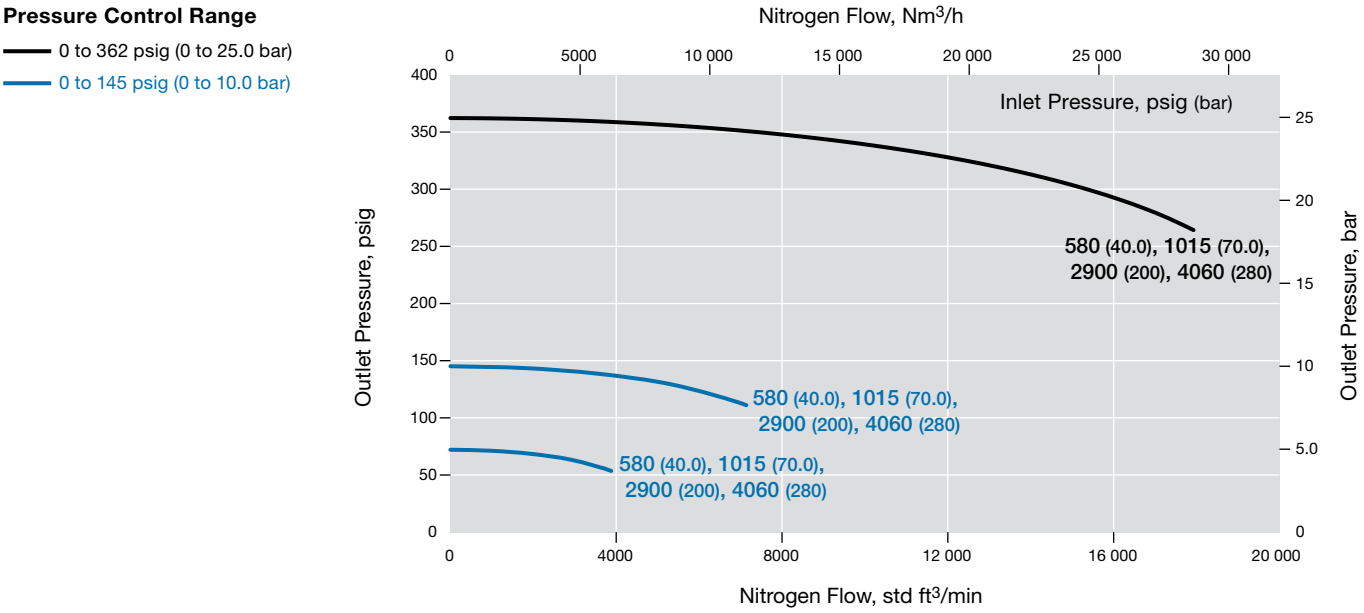
For more flow curve information, contact your authorized Swagelok representative.

RDH40 Series

Flow Coefficient: 73

Maximum Inlet Pressure: 4060 psig (280 bar)

Outlet Pressure Control Range: 0 to 362 psig (0 to 25.0 bar)

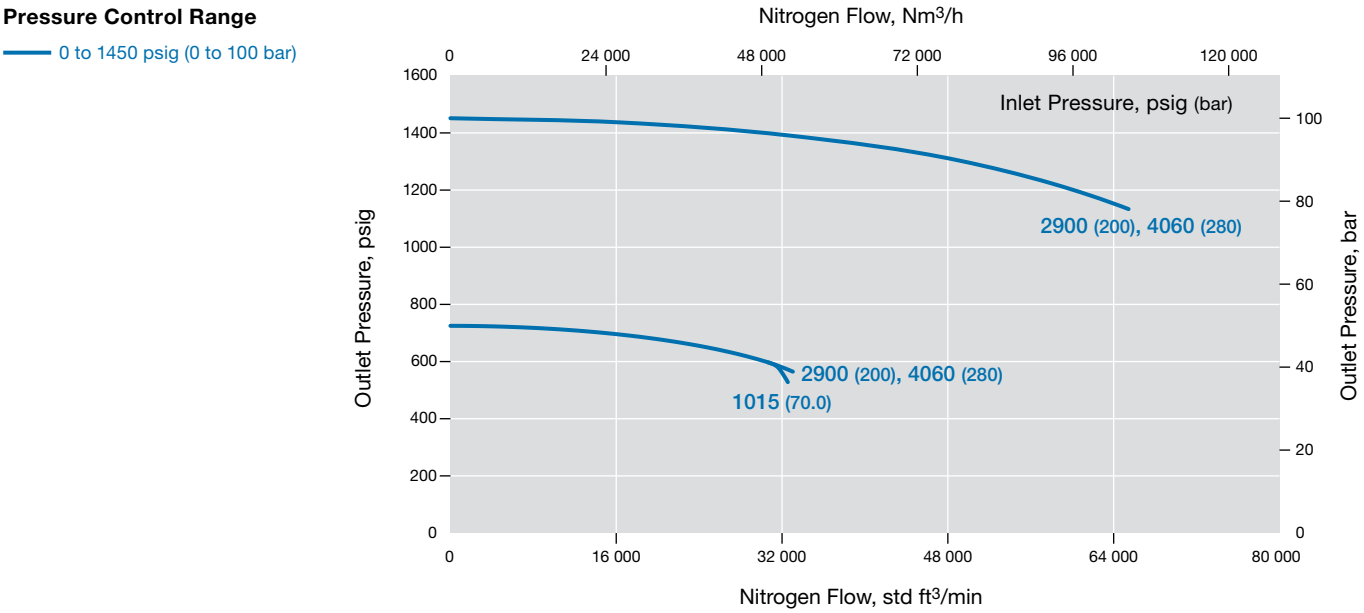


RDH40 Series

Flow Coefficient: 73

Maximum Inlet Pressure: 4060 psig (280 bar)

Outlet Pressure Control Range: 0 to 1450 psig (0 to 100 bar)



Flow Data

The graphs illustrate the change or “droop” in outlet pressures as the flow rate increases.

For more flow curve information, contact your authorized Swagelok representative.

RDH40 Series

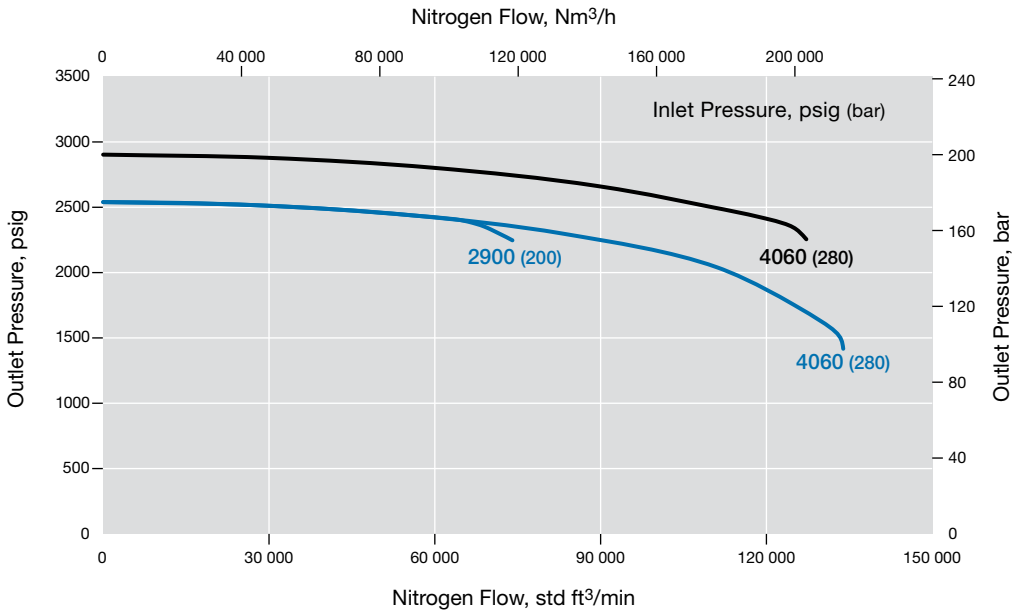
Flow Coefficient: 73

Maximum Inlet Pressure: 4060 psig (280 bar)

Outlet Pressure Control Range: 0 to 2900 psig (0 to 200 bar)

Pressure Control Range

- 0 to 2900 psig (0 to 200 bar)
- 0 to 2537 psig (0 to 175 bar)



RD40-EF Series

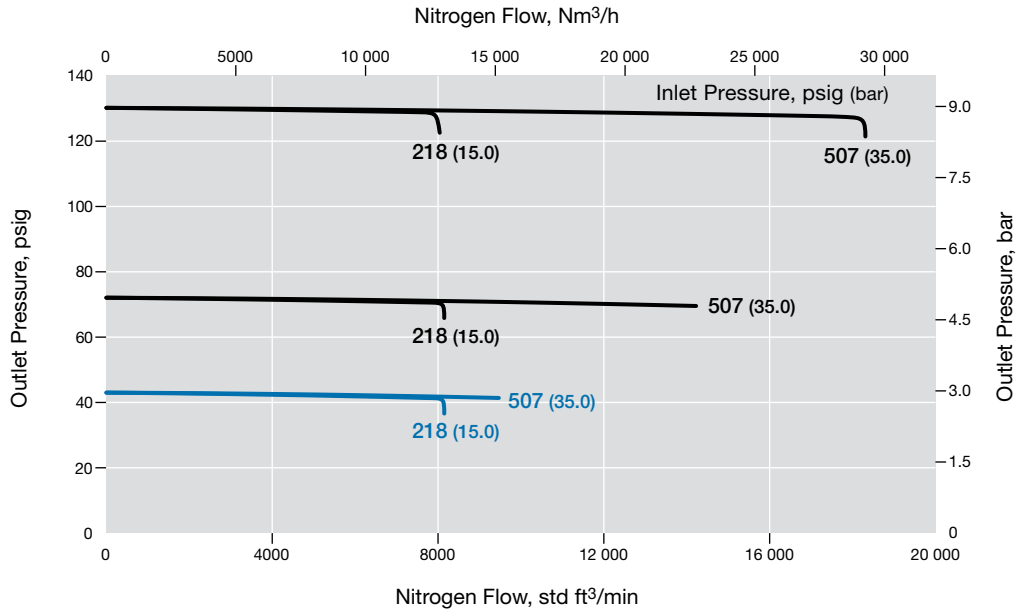
Flow Coefficient: 73

Maximum Inlet Pressure: 507 psig (35.0 bar)

Outlet Pressure Control Range: 0 to 130 psig (0 to 9.0 bar)

Pressure Control Range

- 0 to 130 psig (0 to 9.0 bar)
- 0 to 43.0 psig (0 to 3.0 bar)



Flow Data

The graphs illustrate the change or “droop” in outlet pressures as the flow rate increases.

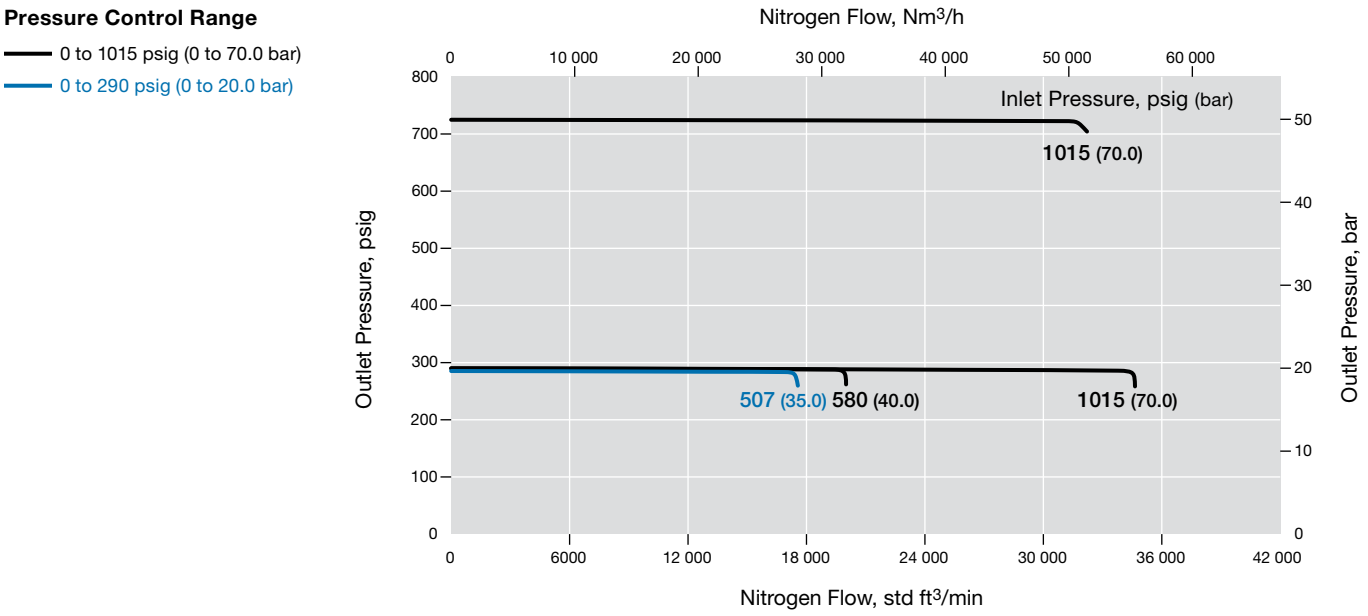
For more flow curve information, contact your authorized Swagelok representative.

RD40-EF Series

Flow Coefficient: 73

Maximum Inlet Pressure: 1015 psig (70.0 bar)

Outlet Pressure Control Range: 0 to 1015 psig (0 to 70.0 bar)

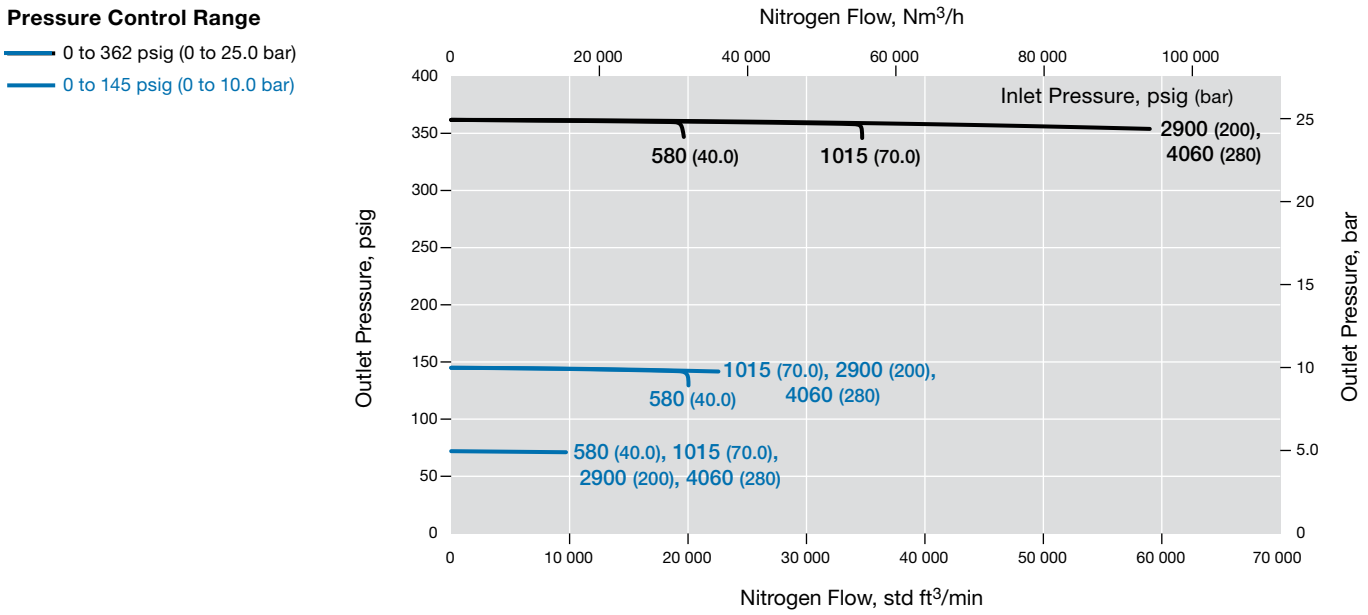


RDH40-EF Series

Flow Coefficient: 73

Maximum Inlet Pressure: 4060 psig (280 bar)

Outlet Pressure Control Range: 0 to 362 psig (0 to 25.0 bar)



Flow Data

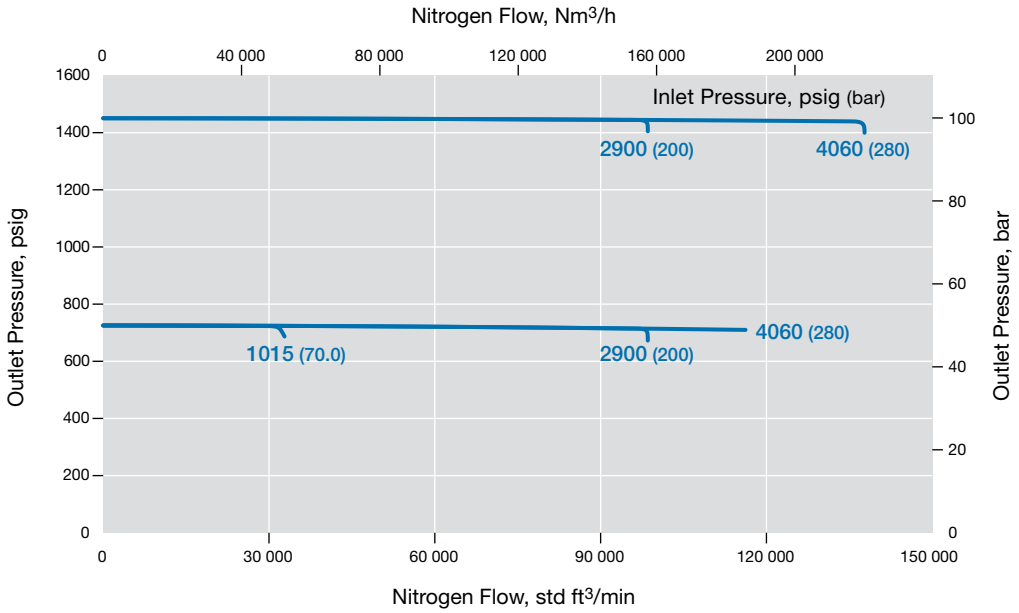
The graphs illustrate the change or “droop” in outlet pressures as the flow rate increases.
For more flow curve information, contact your authorized Swagelok representative.

RDH40-EF Series

Flow Coefficient: 73
Maximum Inlet Pressure: 4060 psig (280 bar)
Outlet Pressure Control Range: 0 to 1450 psig (0 to 100 bar)

Pressure Control Range

0 to 1450 psig (0 to 100 bar)



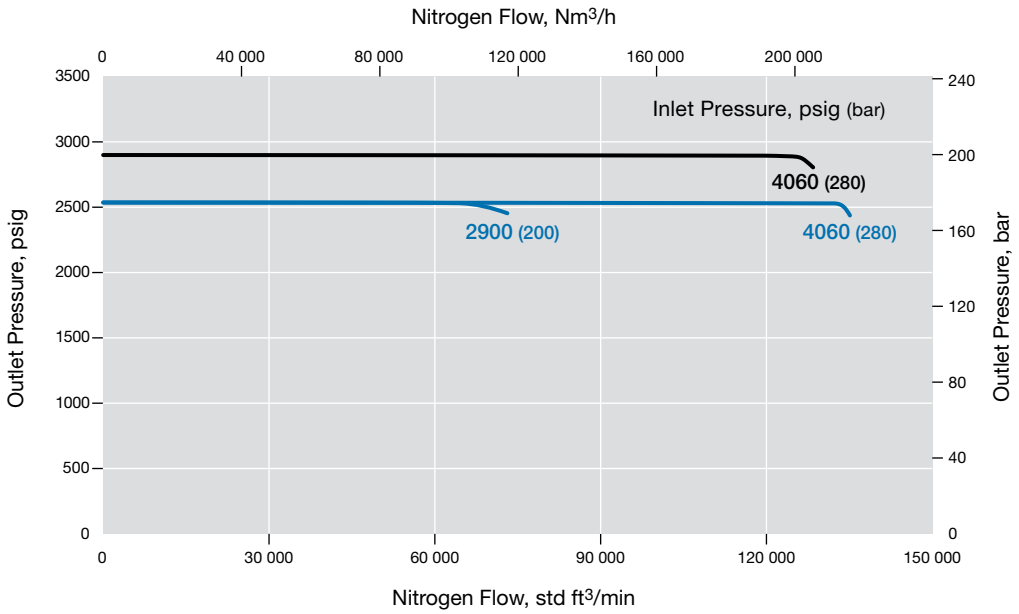
RDH40-EF Series

Flow Coefficient: 73
Maximum Inlet Pressure: 4060 psig (280 bar)
Outlet Pressure Control Range: 0 to 2900 psig (0 to 200 bar)

Pressure Control Range

0 to 2900 psig (0 to 200 bar)

0 to 2537 psig (0 to 175 bar)



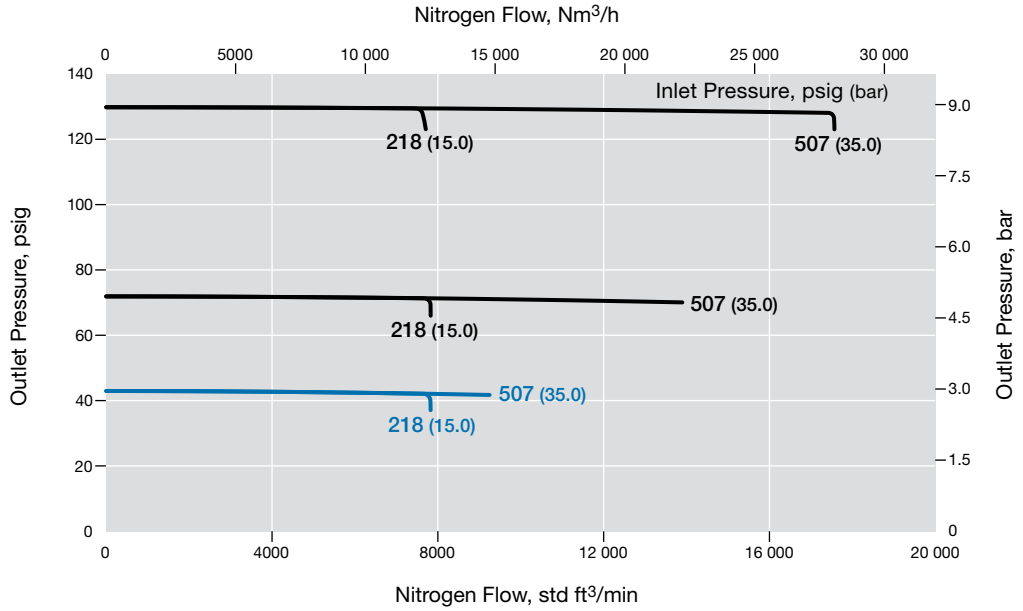
Flow Data

The graphs illustrate the change or “droop” in outlet pressures as the flow rate increases.
For more flow curve information, contact your authorized Swagelok representative.

RD40-EFP Series

Flow Coefficient: 73
Maximum Inlet Pressure: 507 psig (35.0 bar)
Outlet Pressure Control Range: 0 to 130 psig (0 to 9.0 bar)

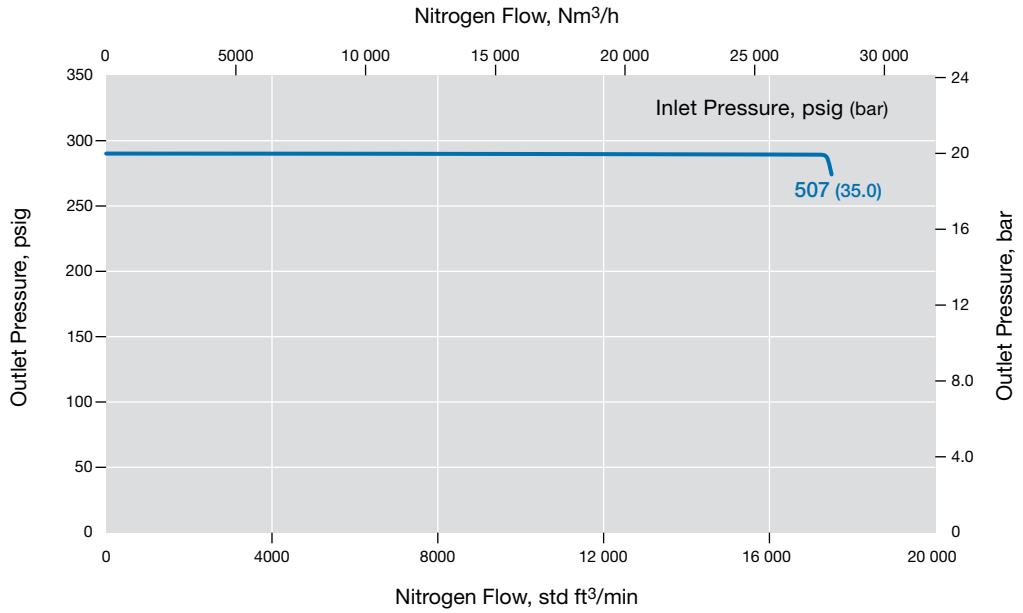
Pressure Control Range
0 to 130 psig (0 to 9.0 bar)
0 to 43.0 psig (0 to 3.0 bar)



RD40-EFP Series

Flow Coefficient: 73
Maximum Inlet Pressure: 507 psig (35.0 bar)
Outlet Pressure Control Range: 0 to 290 psig (0 to 20.0 bar)

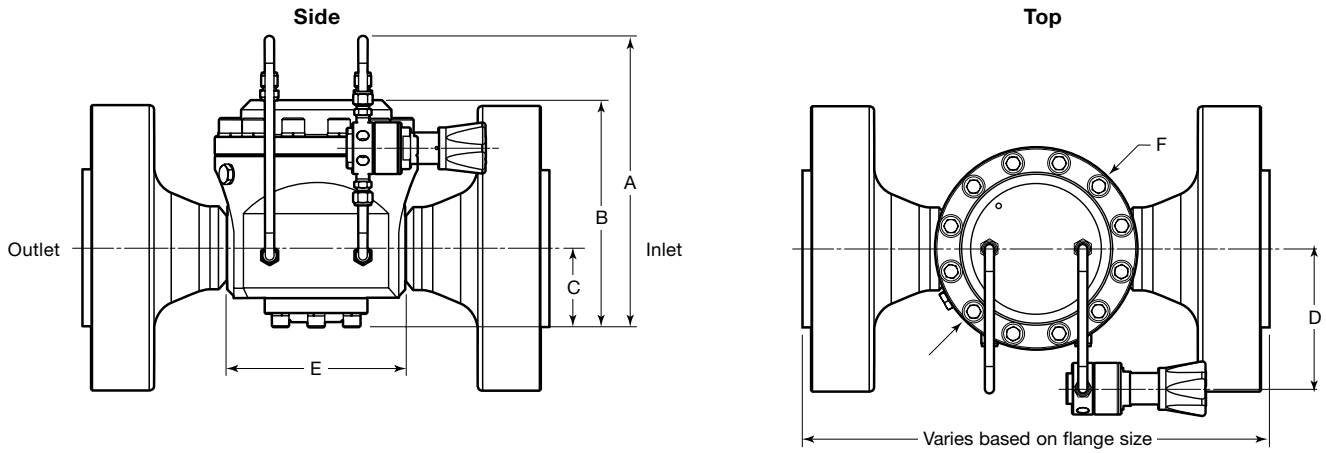
Pressure Control Range
0 to 290 psig (0 to 20.0 bar)



Dimensions

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

Series	End Connection Size	Dimensions, in. (mm)					
		A	B	C	D	E	F
RD(H)30	3 in.	12.2 (310)	9.55 (243)	3.33 (84.6)	5.91 (150)	7.48 (190)	8.50 (216)
RD(H)40	4 in.	14.0 (356)	11.4 (290)	4.37 (111)	5.91 (150)	8.27 (210)	8.50 (216)



Shown with RS2 series pilot regulator.

Ordering Information

Build an RD(H)30 and RD(H)40 series regulator ordering number by combining the designators in the sequence shown below.

1	2	3	4	5	6	7	8	9	10	11
RD	FA	30	A	1	- 02	- 0	- V	V	V	- EF

1 Series
RD = 1015 psig (70.0 bar) maximum inlet pressure (507 psig [35.0 bar] with pilot regulator, options **0, 1,** or **2**)
RDH = 4060 psig (280 bar) maximum inlet pressure

2 Inlet / Outlet
FA = ASME B16.5 flange
FD = EN 1092 (DIN) flange

3 Size
30 = 3 in. / DN80
40 = 4 in. / DN100

4 Pressure Class
A = ASME class 150
B = ASME class 300
C = ASME class 600
E = ASME class 1500
F = ASME class 2500
M = EN class PN16
N = EN class PN40

5 Flange Facing
1 = Raised face smooth
3 = RTJ

6 Body Material
02 = 316L SS

7 Pilot Regulator Options
Pressure Control Range
X = No pilot regulator, optional
RD series with LRS4 series pilot regulator
0 = 0 to 43 psig (0 to 3.0 bar)
1 = 0 to 130 psig (0 to 9.0 bar)
2 = 0 to 290 psig (0 to 20.0 bar)
RD series with RS2 series pilot regulator
3 = 0 to 1015 psig (0 to 70.0 bar
RDH series with RS2 series pilot regulator
4 = 0 to 145 psig (0 to 10.0 bar)
5 = 0 to 362 psig (0 to 25.0 bar)
6 = 0 to 1450 psig (0 to 100 bar)
7 = 0 to 2537 psig (0 to 175 bar)
8 = 0 to 2900 psig (0 to 200 bar)

8 Seal Material
V = Fluorocarbon FKM
N = Nitrile
E = EPDM
L = Low temperature Nitrile

9 Diaphragm Material
V = Fluorocarbon FKM
N = Nitrile
E = EPDM
L = Low temperature Nitrile

10 Seat Seal Material
RD series
V = Fluorocarbon FKM
N = Nitrile
E = EPDM
L = Low temperature Nitrile
RDH series
P = PEEK

11 Options
EF = External feedback to main regulator
EFP = External feedback to pilot regulator [outlet pressure limited to 290 psig (20.0 bar)]
N = NACE MR0175/ISO 15156
G93 = ASTM G93 Level C-cleaned

Integral Pilot-Operated, Dome-Loaded Pressure-Reducing Regulators, High Sensitivity—LPRD20, LPRD25, LPRD30, LPRD40 Series

Features

- Balanced poppet design
- Diaphragm sensing
- Integral pilot regulator (LPRS4 series) with dynamic regulation
- High flow
- Large diaphragm for high accuracy
- Integral feedback line
- Inlet and outlet gauges

Options

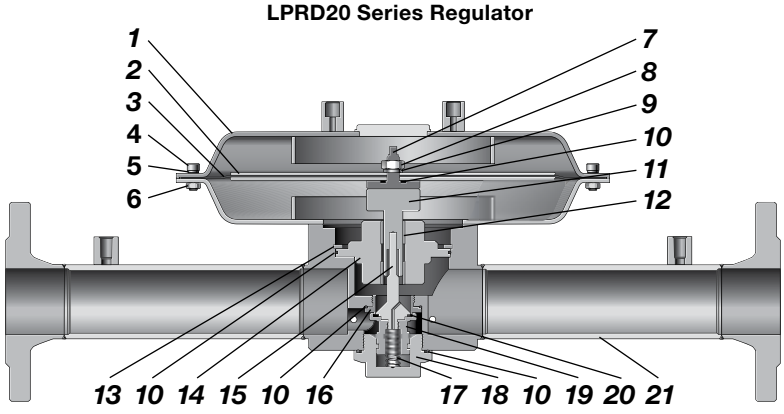
- Special cleaning to ASTM G93 Level C

Technical Data

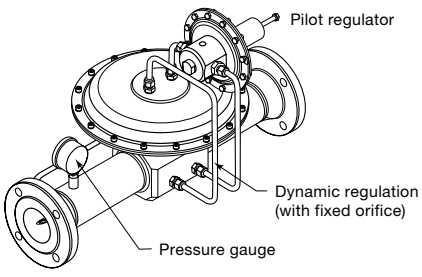
Series	Maximum Inlet Pressure psig (bar)	Maximum Outlet Control Pressure psig (bar)	Sensing Type	Temperature Range °F (C°)	Flow Coefficient (C_v)	Seat Diameter in. (mm)	Inlet and Outlet Connections	Gauges / Dome Connection	Weight lb (kg)
LPRD	232 (16.0)	29.0 (2.0)	Diaphragm	–49 to 176 (–45 to 80) See **Pressure-Temperature Ratings,** page 921.	LPRD20: 13 LPRD25: 21 LPRD30: 36 LPRD40: 73	LPRD20: 0.98 (25.0) LPRD25: 1.25 (32.0) LPRD30: 1.65 (42.0) LPRD40: 2.36 (60.0)	EN or ASME flanges— LPRD20: 2 in. LPRD25: 2 1/2 in. LPRD30: 3 in. LPRD40: 4 in.	Inlet and outlet gauges included. Dome: 1/4 in. ISO/BSP parallel thread	Varies with model and end connection

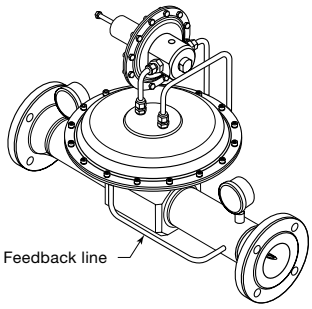
Materials of Construction

LPRD20 Series Regulator



LPRD20 with LPRS4 Pilot Regulator





Component	Material / Specification
1 *Dome assembly*	*316L SS / A479*
2 *Dome plate (2)*	
3 *Diaphragm*	*EPDM, FKM, or nitrile*
4 Cap screw	A4-80
5 Washer	A4
6 Nut	A2
7 *Diaphragm screw*	*316L SS / A479*
8 *Nut*	*A2*
9 *Washer*	*A4*
10 *O-ring*	*EPDM, FKM, or nitrile*
11 *Push rod*	*316L SS / A479*
12 *Guide bushing*	*PTFE*
13 *Retaining ring*	*Commercial stainless steel*
14 *Body plate*	*316L SS / A479*
15 *Poppet*	*431 SS / A276*
16 *Seat*	*316L SS / A479*
17 *Poppet spring*	*302 SS / A313*
18 *Body plug*	*316L SS / A479*
19 *Poppet housing*	
20 *Seat seal*	*EPDM, FKM, or nitrile*
21 *Body assembly*	*316L SS / A479*
Wetted lubricants: Silicone-based and synthetic hydrocarbon-based	

Wetted components listed in *italics.*
Gauge plugs (not shown): 431 SS / A276.

Flow Data

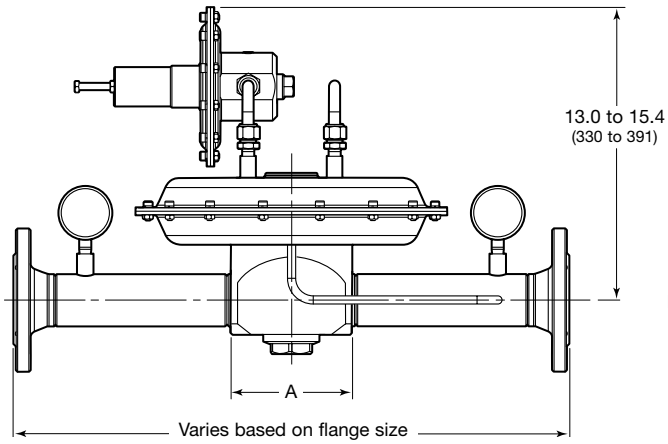
For flow curve information, contact your authorized Swagelok representative.

Dimensions

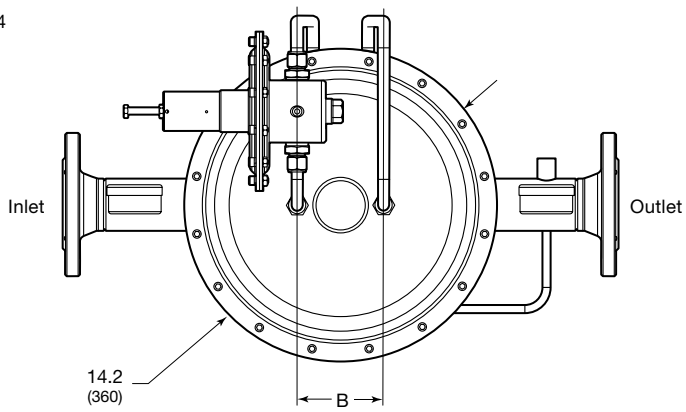
Dimensions, in inches (millimeters), are for reference only and are subject to change.

Series	End Connection Size	Dimensions, in. (mm)	
		A	B
LPRD20	2 in.	5.87 (149)	3.94 (100)
LPRD25	2 1/2 in.	7.01 (178)	2.56 (65.0)
LPRD30	3 in.	5.87 (149)	3.94 (100)
LPRD40	4 in.	8.66 (220)	3.94 (100)

Side



Top



Ordering Information

Build an LPRD series regulator ordering number by combining the designators in the sequence shown below.

1	2	3	4	5	6	7	8	9	10	11
LPRD	FA	20	A	1	- 02	- 2	- V	V	V	- G93

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

2 Inlet / Outlet
FA = ASME B16.5 flange
FD = EN 1092 (DIN) flange

3 Size
20 = 2 in. / DN50
25 = 2 1/2 in. / DN65
30 = 3 in. / DN80
40 = 4 in. / DN100

4 Pressure Class
A = ASME class 150
N = EN class PN40

5 Flange Facing
1 = Raised face smooth
3 = RTJ

6 Body Material
02 = 316L SS

7 Pressure Control Range
2 = 1.4 to 14.5 psig (0.10 to 1.0 bar)
3 = 4.3 to 29 psig (0.30 to 2.0 bar)

8 Seal Material
V = Fluorocarbon FKM
N = Nitrile
E = EPDM
L = Low temperature Nitrile

9 Diaphragm Material
V = Fluorocarbon FKM
N = Nitrile
E = EPDM
L = Low temperature Nitrile

10 Seat Seal Material
V = Fluorocarbon FKM
N = Nitrile
E = EPDM
L = Low temperature Nitrile

11 Options
G93 = ASTM G93 Level C-cleaned

Air-Loaded, Pressure-Reducing Regulators—RA Series

Features

- Balanced poppet design
- Diaphragm sensing
- Air-loaded pressure control with a choice of pilot-to-outlet pressure ratios.
- Remote control
- Captured self-vent
- Choice of dome-to outlet pressure ratios: 1:15, 1:40, or 1:70
- Pneumatic actuation by spring-loaded regulator or proportional regulator

Options

- Gauge connection—choice of 4 configurations
- NACE MR0175/ISO 15156-compliant models
- Special cleaning to ASTM G93 Level C

⚠ **WARNING: Self-venting regulators can release system fluid to atmosphere. Position the self-vent hole away from operating personnel.**

Technical Data

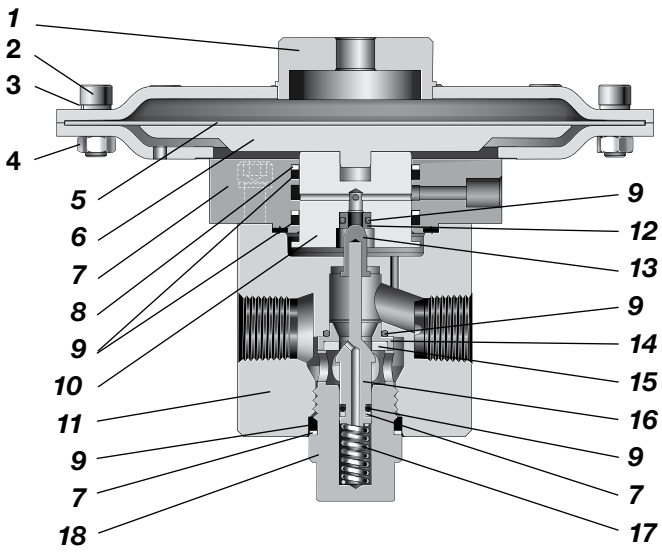
Series	Maximum Inlet Pressure psig (bar)	Maximum Outlet Control Pressure① psig (bar)	Temperature Range °C (°F)	Flow Coefficient (C_v)	Seat Diameter in. (mm)	Inlet and Outlet Connections	Gauge / Dome / Vent Connections	Weight (Without Flanges) lb (kg)
RA4	5800 (400)	5800 (400)	–40 to 176 (–40 to 80) See **Pressure-Temperature Ratings,** page 921.	1.84	0.39 (10.0)	1/2 in. NPT, ISO/BSP parallel thread, EN or ASME flanges	Gauge: 1/4 in. NPT Dome: 1/4 in. ISO/BSP parallel thread Vent: 1/8 in. ISO/BSP parallel thread	12.5 (5.7)
RA6						3/4 in. NPT, ISO/BSP parallel thread, EN or ASME flanges		13.6 (6.2)
RA8						1 in. ISO/BSP parallel thread, EN or ASME flanges		13.6 (6.2)

See pages 102 to 104 for flow data.

① Outlet control limited to 2175 psig (150 bar) for RA series with dome-to-pressure ratio of 1:15.

Materials of Construction

RA4 Series Regulator



Component	Material / Specification
1 *Dome assembly*	*316L SS / A479*
2 Cap screw	A4-80
3 Washer	A4
4 Nut	A2
5 *Diaphragm / support*	*EPDM, FKM, or nitrile / PTFE*
6 *Diaphragm plate*	*316L SS / A479*
7 *Piston plate assembly*	*316L SS / A479*
8 *Backup ring*	*PTFE*
9 *O-ring*	*EPDM, FKM, or nitrile*
10 *Piston*	*316L SS / A479*
11 *Body*	
12 *Relief seat*	*PCTFE or PEEK*
13 *Venting poppet*	*316L SS/ A479*
14 *Seat*	
15 *Seat seal*	*PCTFE or PEEK*
16 *Poppet*	*431 SS/ A276*
17 *Poppet spring*	*302 SS / A313*
18 *Body plug*	*316L SS / A479*
Wetted lubricants: Silicone-based and synthetic hydrocarbon-based	

Wetted components listed in *italics.*
Gauge plugs (not shown): 431 SS / A276.

Flow Data

The graphs illustrate the change or “droop” in outlet pressures as the flow rate increases.

For more flow curve information, contact your authorized Swagelok representative.

RA4 Series

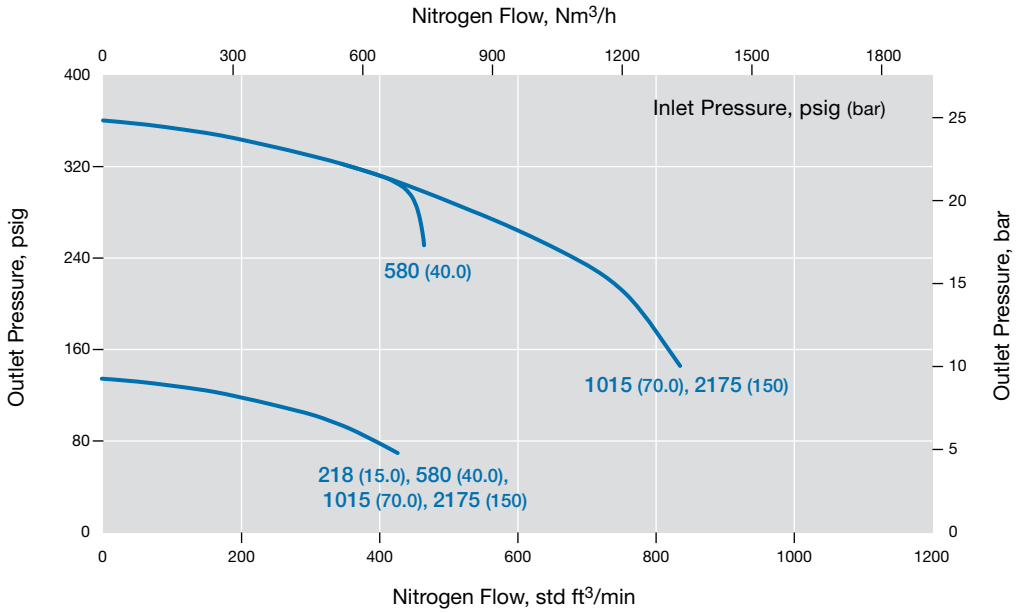
Flow Coefficient: 1.84

Maximum Inlet Pressure: 5800 psig (400 bar)

Outlet Pressure Ratio: 1:15, 1:40, 1:70

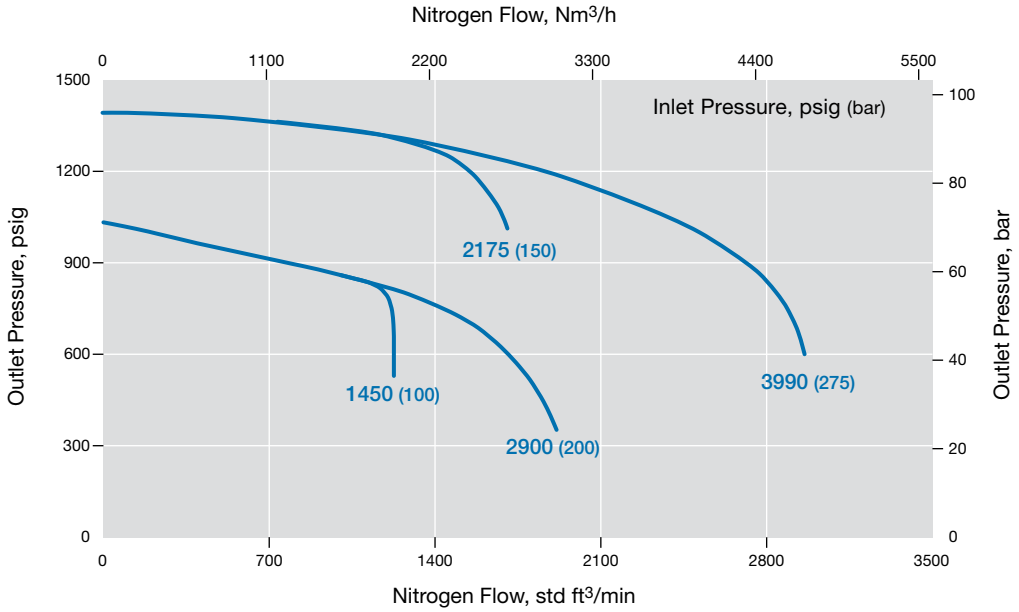
Pressure Ratio

1:15, 1:40, 1:70



Pressure Ratio

1:15, 1:40, 1:70



Flow Data

The graphs illustrate the change or “droop” in outlet pressures as the flow rate increases.

For more flow curve information, contact your authorized Swagelok representative.

RA4 Series

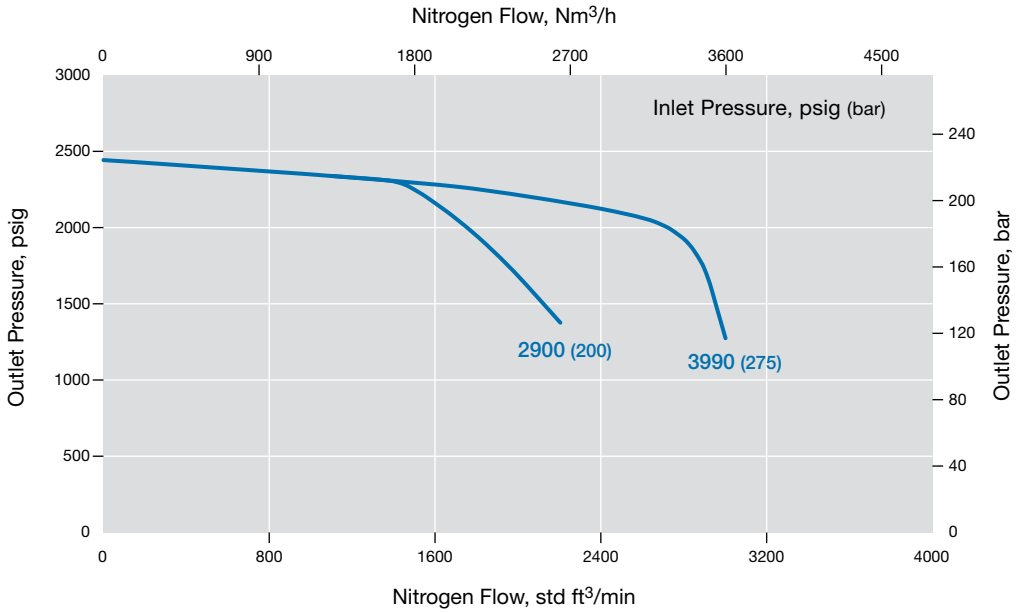
Flow Coefficient: 1.84

Maximum Inlet Pressure: 5800 psig (400 bar)

Outlet Pressure Ratio: 1:40, 1:70

Pressure Ratio

1:40, 1:70



RA6 and RA8 Series

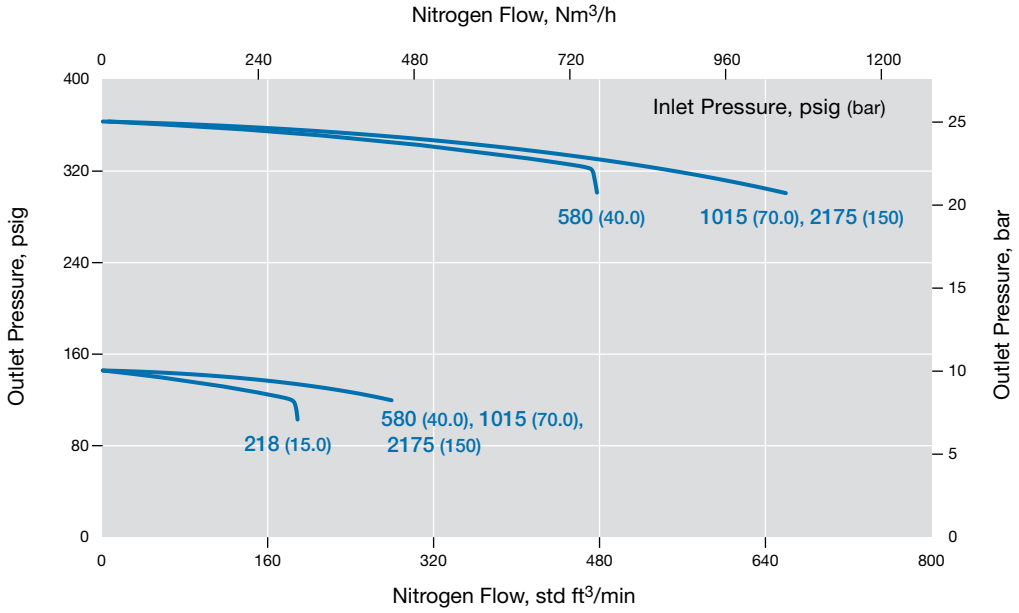
Flow Coefficient: 1.84

Maximum Inlet Pressure: 5800 psig (400 bar)

Outlet Pressure Ratio: 1:15, 1:40, 1:70

Pressure Ratio

1:15, 1:40, 1:70



Flow Data

The graphs illustrate the change or “droop” in outlet pressures as the flow rate increases.

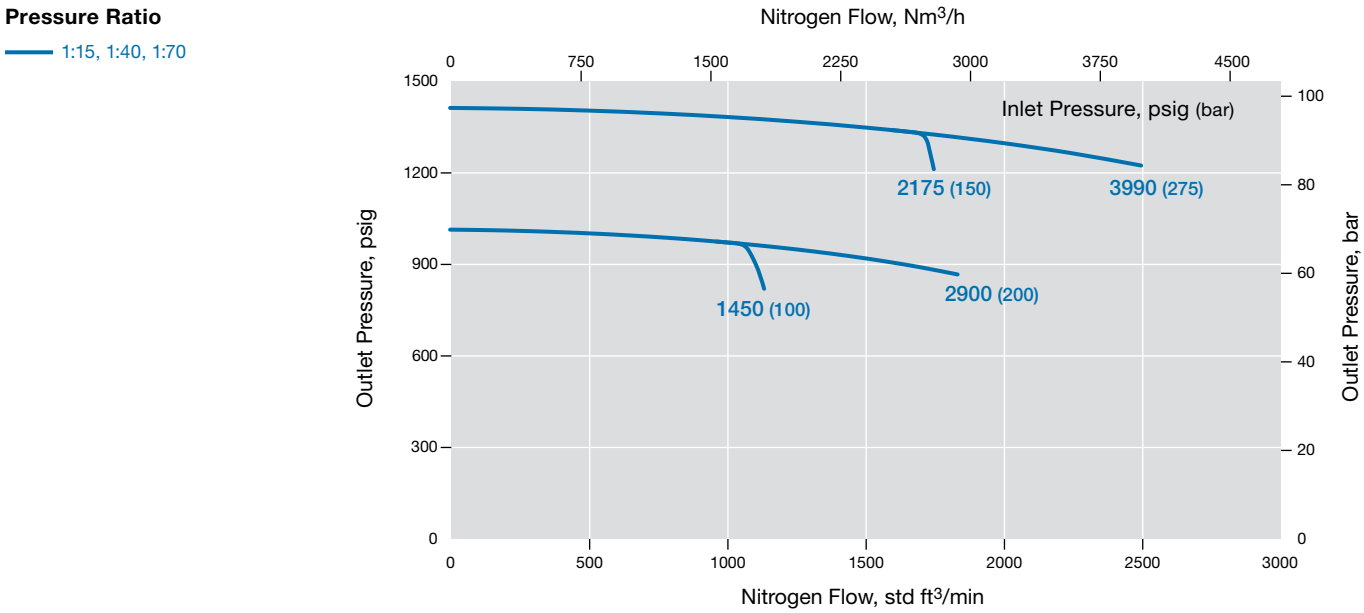
For more flow curve information, contact your authorized Swagelok representative.

RA6 and RA8 Series

Flow Coefficient: 1.84

Maximum Inlet Pressure: 5800 psig (400 bar)

Outlet Pressure Ratio: 1:15, 1:40, 1:70

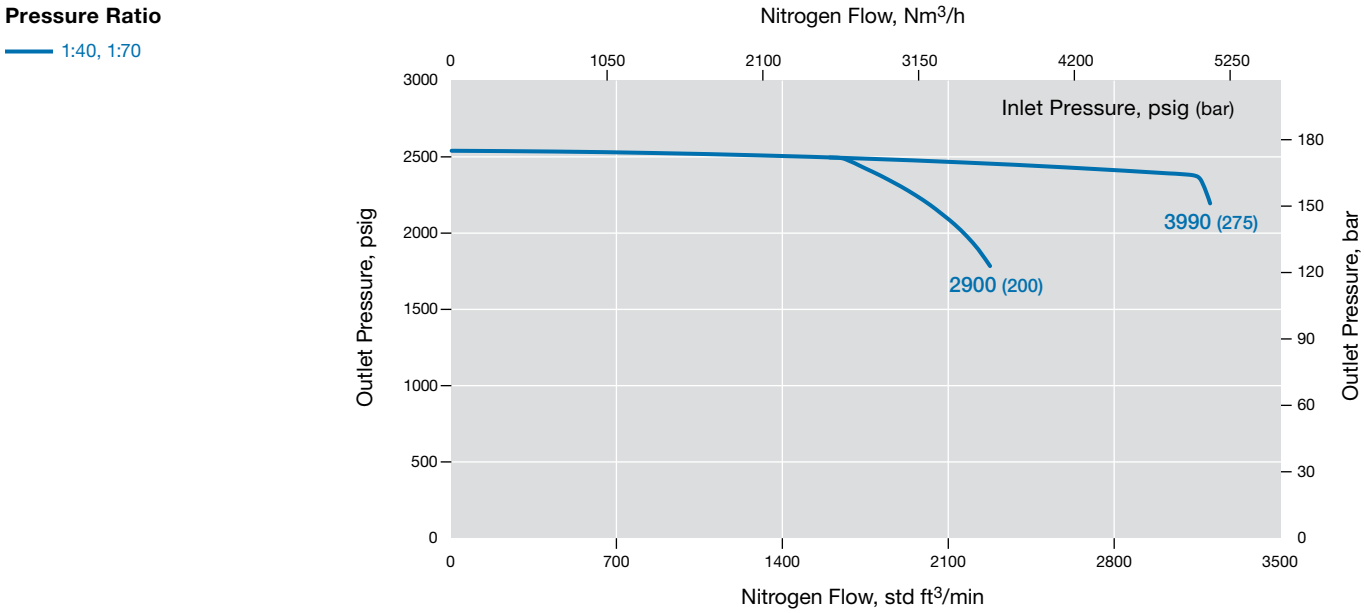


RA6 and RA8 Series

Flow Coefficient: 1.84

Maximum Inlet Pressure: 5800 psig (400 bar)

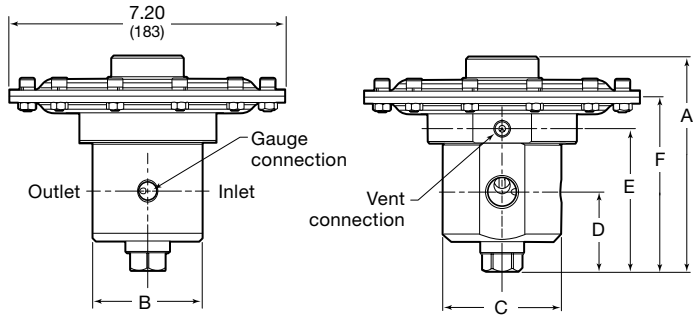
Outlet Pressure Ratio: 1:40, 1:70



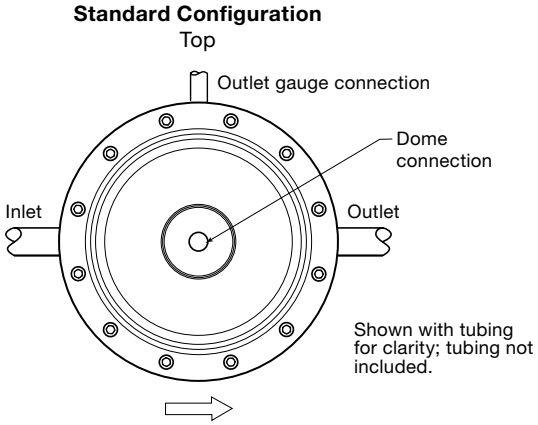
Dimensions

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

Series	End Connection Size	Dimensions, in. (mm)					
		A	B	C	D	E	F
RA4	1/2 in.	5.75 (146)	2.83 (72.0)	3.07 (78.0)	2.13 (54.0)	3.72 (94.6)	4.56 (116)
RA6	3/4 in.		3.20 (82.0)	3.50 (89.0)	2.20 (56.0)	3.72 (94.6)	
RA8	1 in.		3.07 (78.0)	3.50 (89.0)	2.20 (56.0)	4.02 (102)	



Standard Configuration



Ordering Information

Build an RA series regulator ordering number by combining the designators in the sequence shown below.

1	2	3	4	5		6	7	8	9		10		11
RA	FA	4	A	1	-	02	- V	V	K		- 15	-	GN2

1 Series
RA = 5800 psig (400 bar) maximum inlet pressure

2 Inlet / Outlet
B = Female ISO/BSP parallel thread
N = Female NPT
FA = ASME B16.5 flange
FD = EN 1092 (DIN) flange

3 Size
4 = 1/2 in. / DN15
6 = 3/4 in. / DN20
8 = 1 in. / DN25

4 Pressure Class
Omit designator if flanges are not ordered.
A = ASME class 150
B = ASME class 300
C = ASME class 600
E = ASME class 1500
F = ASME class 2500
M = EN class PN16
N = EN class PN40

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

6 Body Material
02 = 316L SS

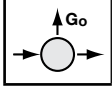
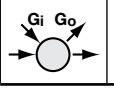
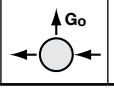
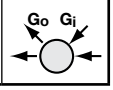
7 Seal Materials
V = Fluorocarbon FKM
N = Nitrile
E = EPDM
L = Low temperature Nitrile

8 Diaphragm Materials
V = Fluorocarbon FKM
N = Nitrile
E = EPDM
L = Low temperature Nitrile

9 Seat Seal Materials
K = PCTFE
P = PEEK

10 Ratio (Dome-to-Outlet Pressure)
15 = 1:15②
40 = 1:40
70 = 1:70

11 Options
GN2 = Gauge connection, see below①
GN4 = Gauge connection, see below
GN5 = Gauge connection, see below①
None = Standard connection, see below

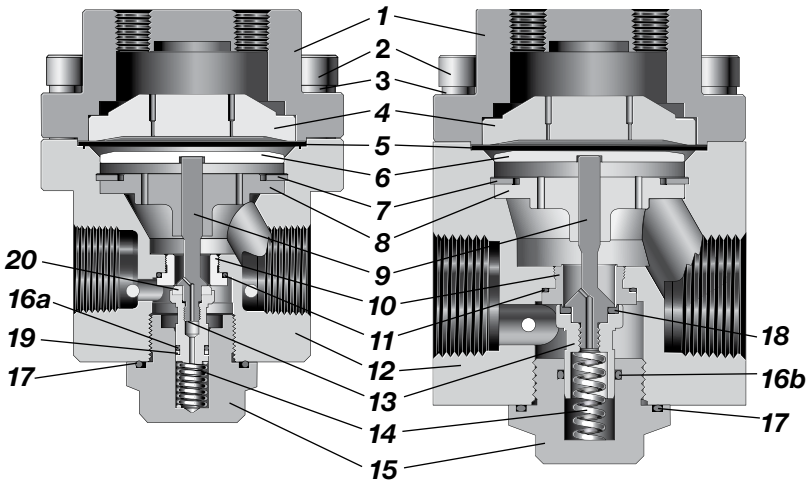
Gauge Connection Configuration			
Standard	GN2	GN4	GN5
			

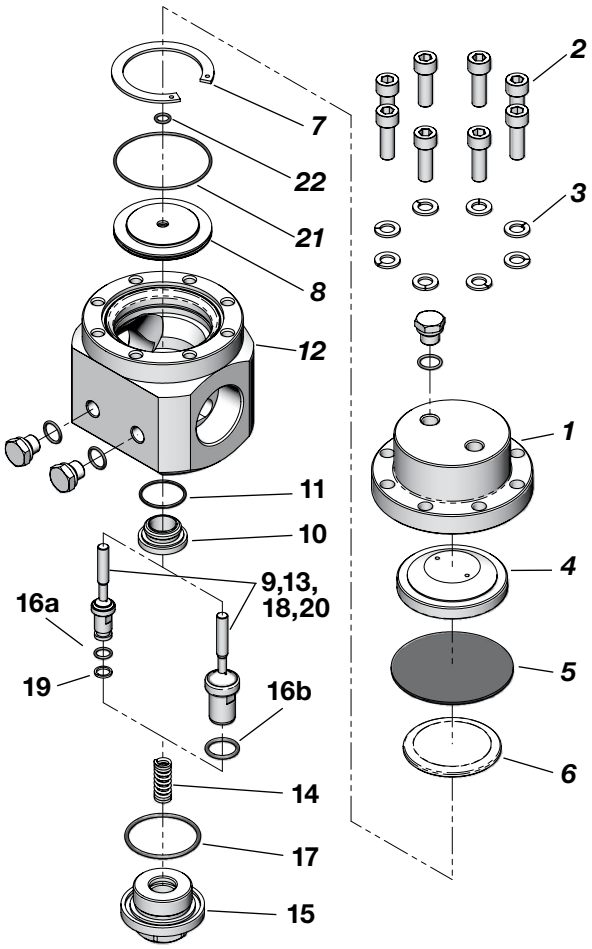
N = NACE MR0175/ISO 15156
G93 = ASTM G93 Level C-cleaned

① Not available in combination with flanges.
② Outlet control range limited to 2175 psig (150 bar).

Pressure-Reducing Regulators
Dome-Loaded—RD Series Maintenance Kits

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 (9, 13, 18 or 20), O-rings (11, 16a), Back-up rings (19), Seat (10),
A2	Soft valve kit	Poppet and housing (9, 13, 18 or 20), O-rings (16a), Back-up rings (19)
B1	Service kit	Poppet and housing (9, 13, 18 or 20), O-rings (11, 16a, 16b, 17, 21, 22), Back-up rings (19), Diaphragm (5), Seat (10)
B2	Seal kit	O-rings (11, 16a, 16b, 17, 21, 22), Back-up rings (19), Diaphragm (5)
C1	Overhaul kit	Poppet and housing (9, 13, 18 or 20), O-rings (11, 16a, 16b, 17, 21, 22), Back-up rings (19), Poppet spring (14), Body plug (15), Diaphragm (5), Diaphragm plate (6), Seat (10)
C2	Body plug kit	O-ring (17, 16b), Body plug (15)
C3	Sensing kit	Diaphragm (5)
C5	Poppet spring kit	Poppet spring (14)
E1	Hardware kit	Bolts (2), Washers (3)

Ordering Information

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

Example: RDN10-02-2-VVV-**C1**

Back-Pressure, Spring-Loaded Regulators—BS Series

The BS series back-pressure regulators are suitable for most gases and liquids. The BS series regulators feature a choice of sensing types (diaphragm or piston), and seat and seal materials to accommodate a variety of pressure, temperature, and flow conditions.

The BS series regulators are available in sizes from 1/4 to 1 1/2 in. with a choice of threaded or flange end connections.

The BSH series regulators are high-pressure versions of the BS series regulators, and the LBS series are low-pressure, high-accuracy versions of the BS series regulators.

The BS series regulators are available with several options, including a variety of gauge connection configurations, antitamper, special cleaning to ASTM G93 Level C, and NACE MR0175/ISO 15156-compliant models.

Features

- Spring-loaded pressure control
- Diaphragm or piston sensing types
- Blue knob or screw adjustment
- 316L SS materials of construction for corrosion resistance
- Maximum inlet pressure rating: 507 to 10 150 psig (35.0 to 700 bar)
- Inlet control pressure range: Up to 0 to 10 150 psig (0 to 700 bar)

BS(H)2

BS(H)4, 6, 8

BS(H)10, 15

LBS4

Pressure-Temperature Ratings

Seal Material	Temperature Range °F (°C)	Material Designator
Fluorocarbon FKM	5 to 176 (–15 to 80)	V
Standard Nitrile	-4 to 176 (–20 to 80)	N
Low temperature Nitrile	-49 to 176 (–45 to 80)	L
EPDM	-4 to 176 (–20 to 80)	E
FFKM	14 to 176 (–10 to 80)	F

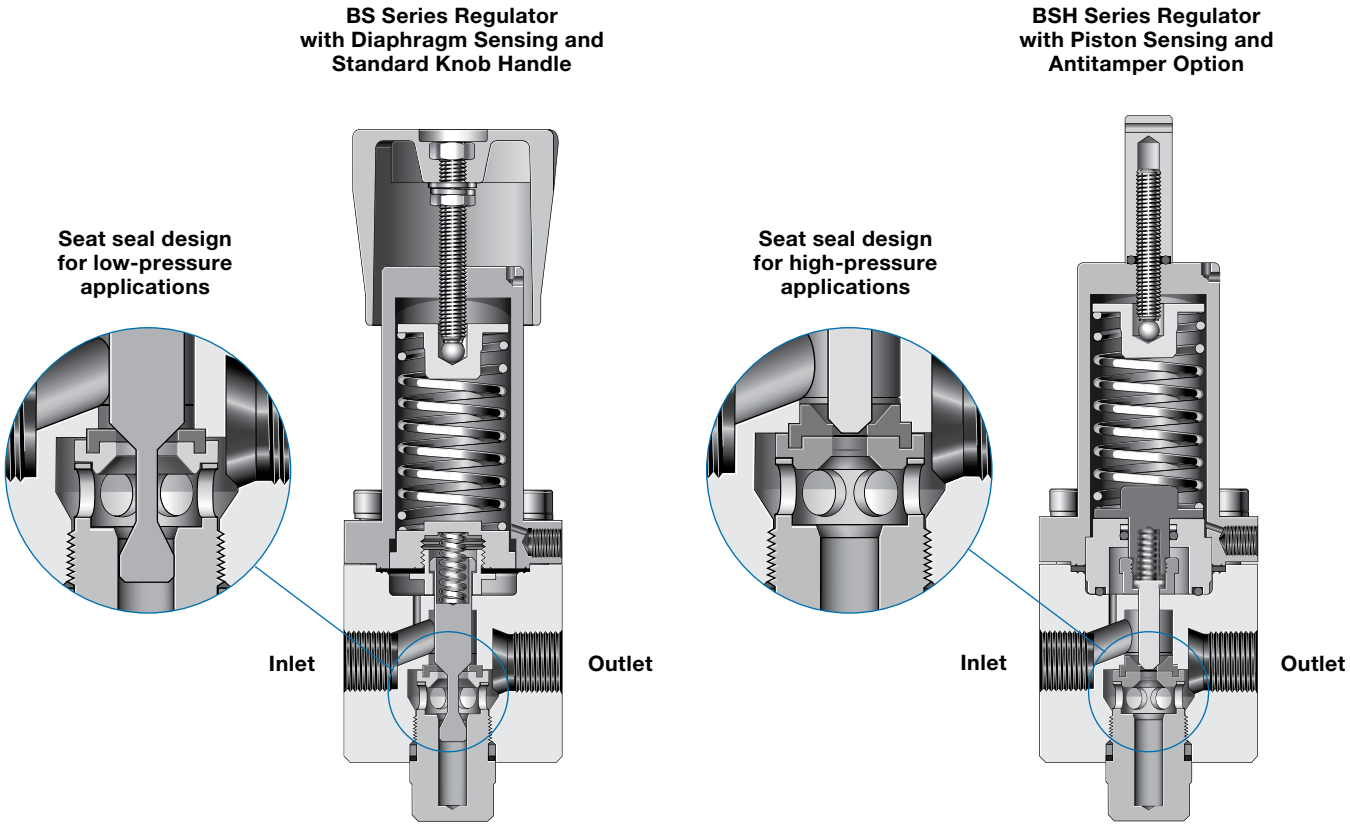
Seat Material	PCTFE	PEEK	Fluorocarbon FKM, Nitrile, EPDM, FFKM
Temperature °F (°C)	Maximum Inlet Pressure / Working Pressure psig (bar)		
-49 to -40 (–45 to -40)	–	–	1015 (70.0)
-40 to -4 (–40 to -20)	5800 (400)	5800 (400)	
95 (35)		10 150 (700)	
149 (65)	3987 (275)		
176 (80)	1812 (125)		

Technical Data—Performance Ratings

Series	Maximum Inlet Pressure① psig (bar)	Maximum Inlet Control Pressure① psig (bar)	Flow Coefficient (C_v)	Sensing Type	Flow Data on Page
BS2	5 800 (400)	5 075 (350)	0.10	Piston	110
BSH2	10 150 (700)	10 150 (700)			
BS4	1 015 (70.0)	406 (28.0) diaphragm 5 220 (360) piston	1.84 (0.39 in. [10.0 mm] seat) 0.49 (0.19 in. [5.0 mm] seat)	Diaphragm or piston	114
BSH4	5 800 (400)				
BS6	1 015 (70.0)	203 (14.0) diaphragm 5 220 (360) piston	1.95 (0.39 in. [10.0 mm] seat) 0.49 (0.19 in. [5.0 mm] seat)	Diaphragm or piston	115
BSH6	5 800 (400)				
BS8	1 015 (70.0)	203 (14.0) diaphragm 5 220 (360) piston	2.07 (0.39 in. [10.0 mm] seat) 0.49 (0.19 in. [5.0 mm] seat)	Diaphragm or piston	116
BSH8	5 800 (400)				
BS10	1 015 (70.0)	290 (20.0) diaphragm 3 625 (250) piston	3.84	Diaphragm or piston	—
BSH10	3 625 (250)				
BS15	1 015 (70.0)	290 (20.0) diaphragm 3 625 (250) piston	7.3	Diaphragm or piston	—
BSH15	3 625 (250)				
LBS4	507 (35.0)	290 (20.0)	1.3	Diaphragm	125

① Regulator pressure rating may be limited by connection type.

Back-Pressure, Spring-Loaded Regulators—BS Series



Technical Data—Design

Series	Seat Diameter in. (mm)	Inlet and Outlet Connections	Gauge Connection	Weight (Without Flanges) lb (kg)	More Information on Page
BS2 BSH2	0.087 (2.2)	1/4 in. NPT	1/4 in. NPT	3.3 (1.5)	109
BS4 BSH4	0.39 (10.0) or 0.19 (5.0)	1/2 in. NPT, ISO/BSP parallel thread, EN or ASME flanges	1/4 in. NPT	7.7 (3.5)	113
BS6 BSH6	0.39 (10.0) or 0.19 (5.0)	3/4 in. NPT, ISO/BSP parallel thread, EN or ASME flanges	1/4 in. NPT	9.9 (4.5)	113
BS8 BSH8	0.39 (10.0) or 0.19 (5.0)	1 in. NPT, ISO/BSP parallel thread, EN or ASME flanges	1/4 in. NPT	9.9 (4.5)	113
BS10 BSH10	0.53 (13.5)	1 in. NPT, ISO/BSP parallel thread, EN or ASME flanges	1/4 in. NPT or ISO/BSP parallel thread	16.7 (7.6)	118
BS15 BSH15	0.75 (19.0)	1 1/2 in. NPT, ISO/BSP parallel thread, EN or ASME flanges	1/4 in. NPT or ISO/BSP parallel thread	22.0 (10)	118
LBS4	0.31 (8.0)	1/2 in. NPT	1/4 in. NPT	5.7 (2.6)	124

Compact, General-Purpose, Spring-Loaded Back-Pressure Regulators—BS(H)2 Series

Features

- Piston sensing
- Bottom mounting
- Low-friction piston for better control

Options

- NACE MR0175/ISO 15156-compliant models
- Special cleaning to ASTM G93 Level C
- Panel mounting kit sold separately—no disassembly required

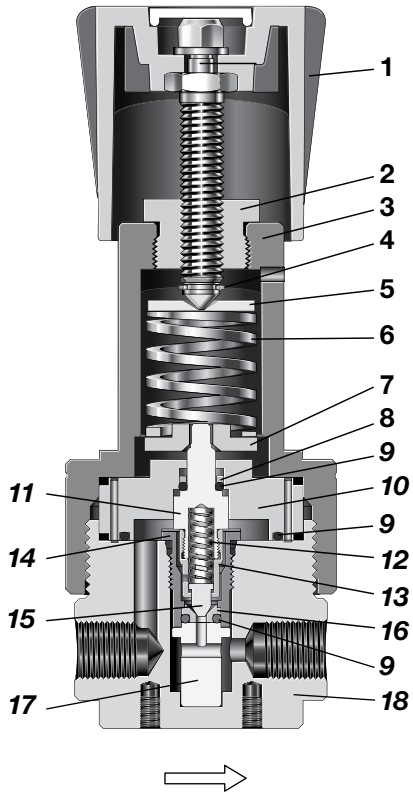
Technical Data

Series	Maximum Inlet Pressure psig (bar)	Maximum Inlet Control Pressure psig (bar)	Sensing Type	Temperature Range °F (°C)	Flow Coefficient (C_v)	Seat Diameter in. (mm)	Inlet and Outlet Connections	Gauge / Vent Connection	Weight lb (kg)
BS2	5 800 (400)	5 075 (350)	Piston	–40 to 176 (–40 to 80)	0.10	0.087 (2.2)	1/4 in. NPT	Gauge: 1/4 in. NPT Vent: 1/8 in. NPT	3.3 (1.5)
BSH2	10 150 (700)	10 150 (700)		–4 to 176 (–20 to 80)					

See **Pressure-Temperature Ratings,** page 107, for ratings.
See pages 110 to 111 for flow data.

Materials of Construction

BS2 Series Regulator with Standard Threaded Vent



Component	Material / Specification
1 Knob assembly with adjusting screw, nuts, washer	Blue ABS with 431 SS
2 Spring housing cover	431 SS / A276
3 Spring housing	316L SS / A479
4 C-ring	A2
5 Spring guide	316L SS / A479
6 Set spring	50CRV4
7 Bottom spring guide	316L SS / A479
8 Backup ring (BSH only)	PTFE
***9** O-rings*	*EPDM, FKM, FFKM, or nitrile*
***10** Piston plate*	*316L SS / A479*
***11** Piston*	
***12** Overtravel spring*	*302 SS / A313*
***13** Piston screw*	*316L SS / A479*
***14** Body plug*	
***15** Poppet*	*431 SS / A276*
***16** Seat*	*PCTFE or PEEK*
***17** Seat retainer*	*316L SS / A479*
***18** Body*	*316L SS / A479*
Wetted lubricants: Silicone-based and synthetic hydrocarbon-based	

Wetted components listed in *italics.*
Gauge plugs (not shown): 431 SS / A276.

Flow Data

The graphs illustrate the change in inlet or outlet pressure as the flow rate increases.

For more flow curve information, contact your authorized Swagelok representative.

BS(H)2 Series

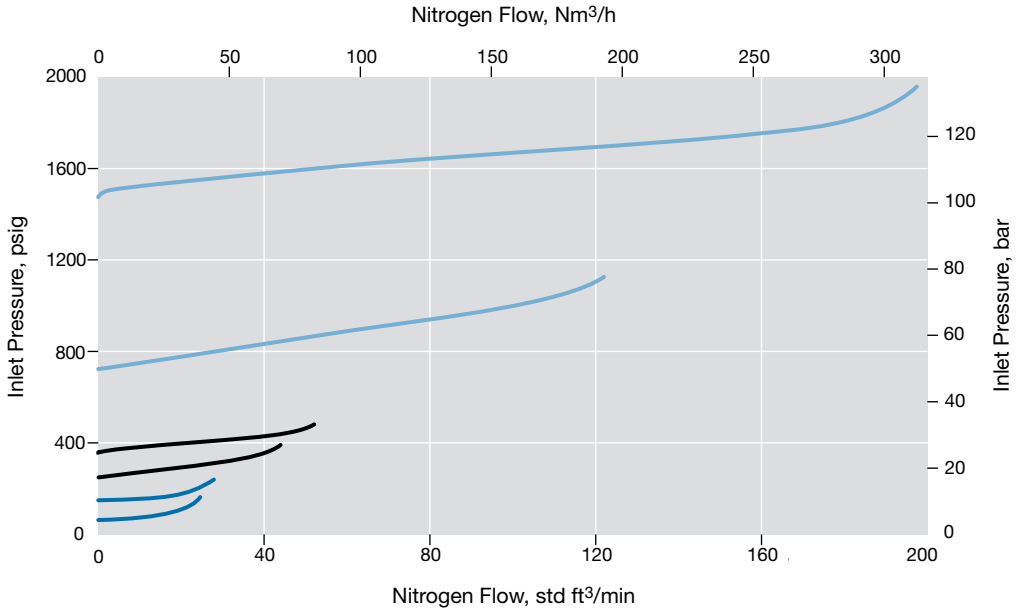
Flow Coefficient: 0.10

Maximum Inlet Pressure: BS2—5800 psig (400 bar); BSH2—10 150 psig (700 bar)

Inlet Pressure Control Range: 0 to 1450 psig (0 to 100 bar)

Pressure Control Range

- 0 to 1450 psig (0 to 100 bar)
- 0 to 362 psig (0 to 25.0 bar)
- 0 to 145 psig (0 to 10.0 bar)



BS(H)2 Series

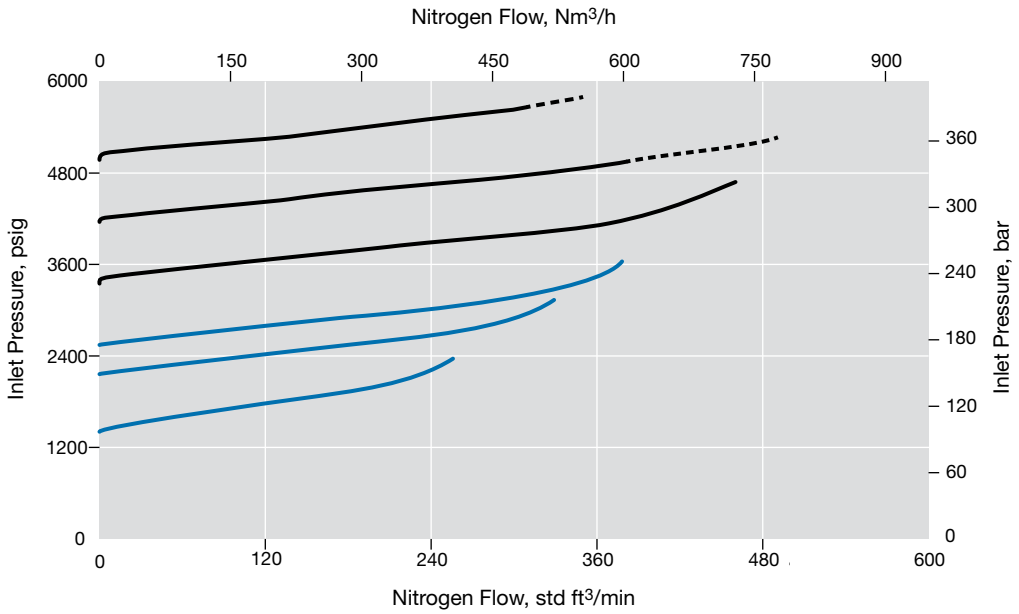
Flow Coefficient: 0.10

Maximum Inlet Pressure: BS2—5800 psig (400 bar); BSH2—10 150 psig (700 bar)

Inlet Pressure Control Range: 0 to 5075 psig (0 to 350 bar)

Pressure Control Range

- 0 to 5075 psig (0 to 350 bar)
- 0 to 5075 psig (0 to 350 bar), calculated
- 0 to 2537 psig (0 to 175 bar)



Flow Data

The graphs illustrate the change in inlet or outlet pressure as the flow rate increases.

For more flow curve information, contact your authorized Swagelok representative.

BSH2 Series

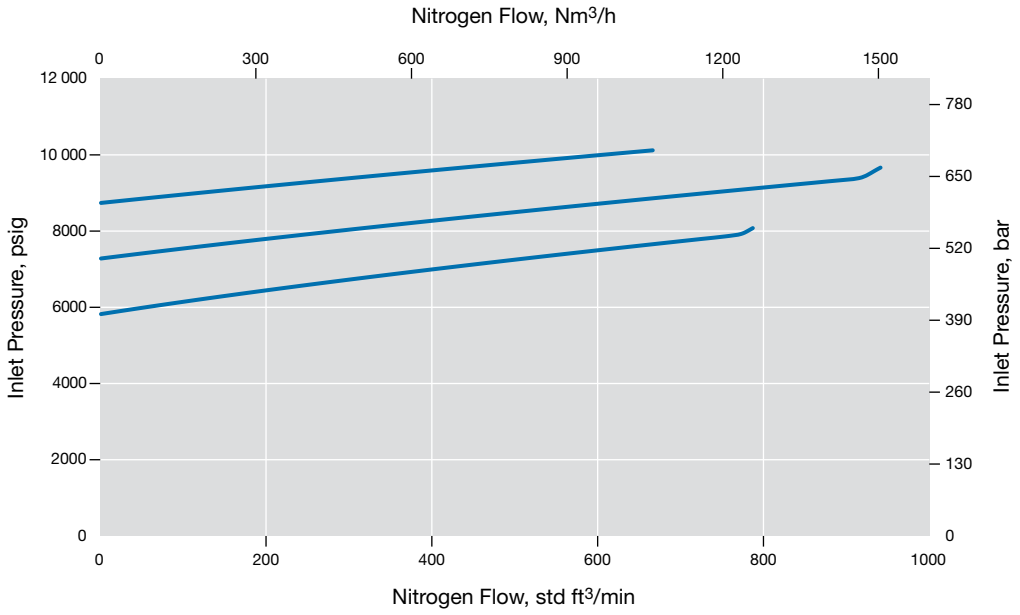
Flow Coefficient: 0.10

Maximum Inlet Pressure: 10 150 psig (700 bar)

Inlet Pressure Control Range: 0 to 10 150 psig (0 to 700 bar)

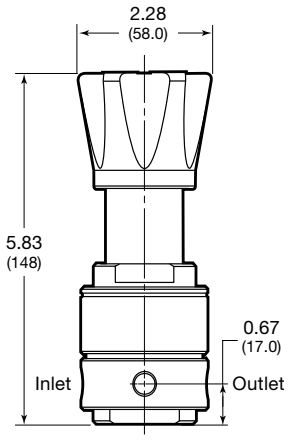
Pressure Control Range

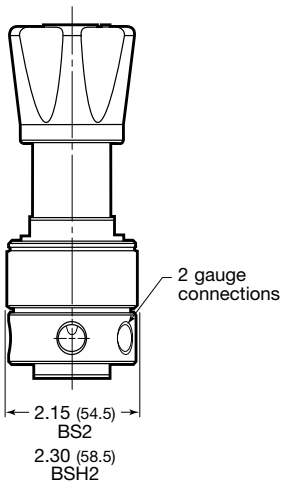
0 to 10 150 psig (0 to 700 bar)



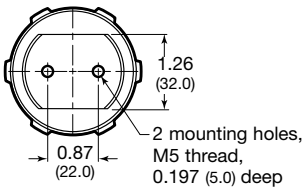
Dimensions

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



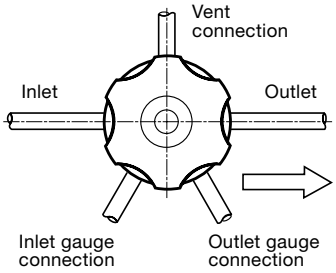


Bottom Mounting



Configuration

Top



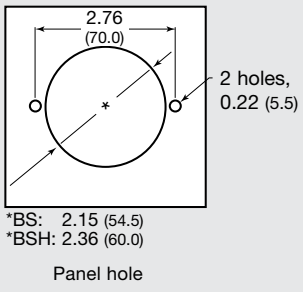
Shown with tubing for clarity; tubing not included.

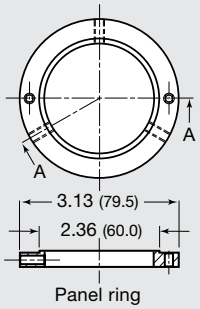
Panel Mounting Kit

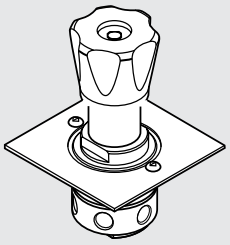
No disassembly required when using panel mount kit. Panel mounting kit ordering numbers:

BS2 series: **RS2-P-02**

BSH2 series: **RSH2-P-02**







Ordering Information

Build a BS2 or BSH2 series regulator ordering number by combining the designators in the sequence shown below.

1	2	3	4	5	6	7	8
BS	N2	- 02	- 1	- V	V	K	- N

1 Series

BS = 5800 psig (400 bar) maximum inlet pressure

BSH = 10 150 psig (700 bar) maximum inlet pressure

2 Inlet / Outlet

N2 = 1/4 in. female NPT

3 Body Material

02 = 316L SS

4 Pressure Control Range

BS and BSH series

1 = 0 to 145 psig (0 to 10.0 bar)
2 = 0 to 362 psig (0 to 25.0 bar)
3 = 0 to 1450 psig (0 to 100 bar)
4 = 0 to 2537 psig (0 to 175 bar)
5 = 0 to 5075 psig (0 to 350 bar)

BSH series only

6 = 0 to 10 150 psig (0 to 700 bar)

5 Seal Material

BS and BSH series

V = Fluorocarbon FKM
N = Nitrile
E = EPDM
F = FFKM

BS series only

L = Low temperature Nitrile

6 Piston Seals

BS and BSH series

V = Fluorocarbon FKM
N = Nitrile
E = EPDM
F = FFKM

BS series only

L = Low temperature Nitrile

7 Seat Material

BS series

K = PCTFE
P = PEEK

BSH series

P = PEEK

8 Options

N = NACE MR0175/ISO 15156
G93 = ASTM G93 Level C-cleaned

General-Purpose, Spring-Loaded Back-Pressure Regulators—BS(H)4, BS(H)6, and BS(H)8 Series

Features

- Diaphragm sensing: 0 to 406 psig (0 to 28.0 bar)
- Piston sensing: 0 to 5220 psig (0 to 360 bar)
- Threaded vent to monitor seal integrity

Options

- Antitamper
- Gauge connections —choice of 4 configurations
- NACE MR0175/ISO 15156-compliant models
- Special cleaning to ASTM G93 Level C

Technical Data

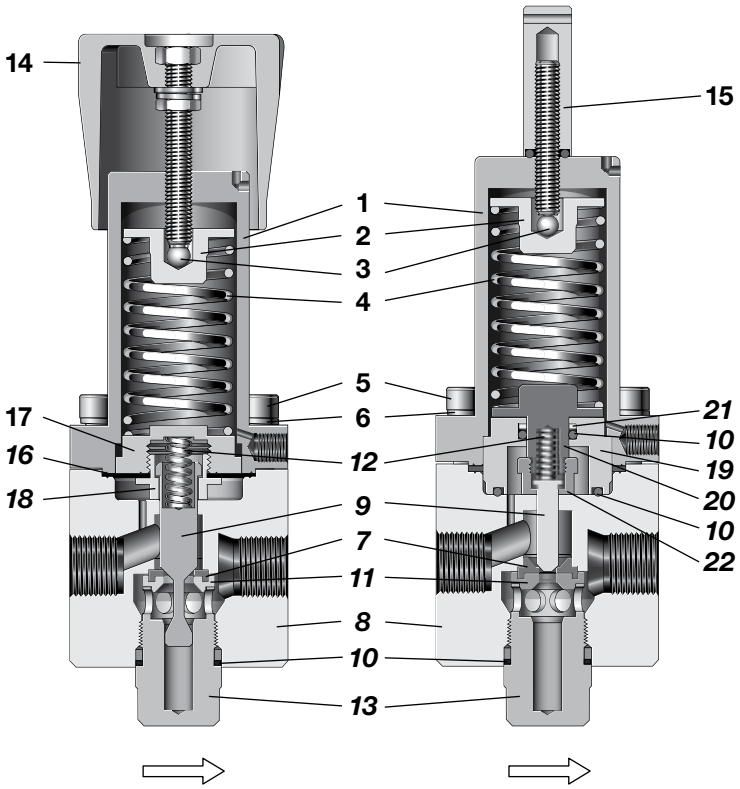
Series	Maximum Inlet Pressure psig (bar)	Maximum Inlet Control Pressure psig (bar)	Sensing Type	Temperature Range °F (°C)	Flow Coefficient (C_v)	Seat Diameter in. (mm)	Connections: Inlet and Outlet Size	Connections: Inlet and Outlet Type	Connections: Gauge and Vent	Weight (Without Flanges) lb (kg)
BS(H)4	BS: 1015 (70.0) BSH: 5800 (400)	BS4: 0 to 406 psig (28.0 bar) BS6, 8: 0 to 203 psig (14.0 bar) BSH: 5220 (360)	Diaphragm: BS4: 0 to 406 psig (28.0 bar) BS6, 8: 0 to 203 psig (14.0 bar) Piston: 0 to 5220 psig (360 bar)	–40 to 176 (–40 to 80) See **Pressure-Temperature Ratings,** page 985.	BS4: 1.84 BS6: 1.95 BS8: 2.07 with 0.39 in. (10.0 mm) seat; All: 0.49 with 0.19 in. (5.0 mm) seat	0.39 (10.0) for up to 1160 psig (80.0 bar) 0.19 (5.0) for 2175 to 5220 psig (150 to 360 bar)	1/2 in. DN15	NPT ISO/BSP parallel thread ASME or EN flange	Gauge: 1/4 in. NPT Vent: 1/8 in. ISO/BSP parallel thread	7.7 (3.5)
BS(H)6							3/4 in. DN20			9.9 (4.5)
BS(H)8							1 in. DN25			

See pages 114 and 116 for flow data.

Materials of Construction

BS Series Regulator with Diaphragm Sensing and Standard Knob

BSH Series Regulator with Piston Sensing and Antitamper Option



	Component	Material / Specification
Common Components	**1** Spring housing	316L SS / A479
	2 Spring guide	
	3 Ball	Commercial stainless steel
	4 Set spring	302 SS / A313
	5 Cap screw	A4-80
	6 Washer	A4
	7 *Seat seal*	*PCTFE or PEEK*
	8 *Body*	*316L SS / A479*
	9 *Poppet*	*431 SS / A276*
	10 *O-rings*	*EPDM, FKM, or nitrile*
	11 *Seat*	*316L SS / A479*
	12 *Overtravel spring*	*302 SS / A313*
	13 *Body plug*	*316L SS / A479*
Actuation	**14** Knob assembly with adjusting screw, nuts, washers	Blue ABS with A2-70
	15 Antitamper with O-ring, adjusting screw	316L SS and A2-70 (O-ring same as item **10**)
Sensing Mechanism	***Diaphragm Only***	
	16 *Diaphragm*	*EPDM, FKM, or nitrile*
	17 Diaphragm plate	316L SS / A479
	18 *Diaphragm screw*	*316L SS / A479*
	Piston Only	
	19 *Piston plate*	*316L SS / A479*
	20 *Piston*	
	21 *Backup ring*	*PTFE*
	22 *Piston screw*	*316L SS / A479*①
Wetted lubricant: Silicone-based, synthetic hydrocarbon-based		

① BSH4 (range 5 and 6), BSH6 (range 6), and BSH8 (range 6) the material will be Alloy 2507.

Wetted components listed in *italics*.

Gauge plugs (not shown): 431 SS / A276.

Flow Data

The graphs illustrate the change in inlet or outlet pressure as the flow rate increases.

For more flow curve information, contact your authorized Swagelok representative.

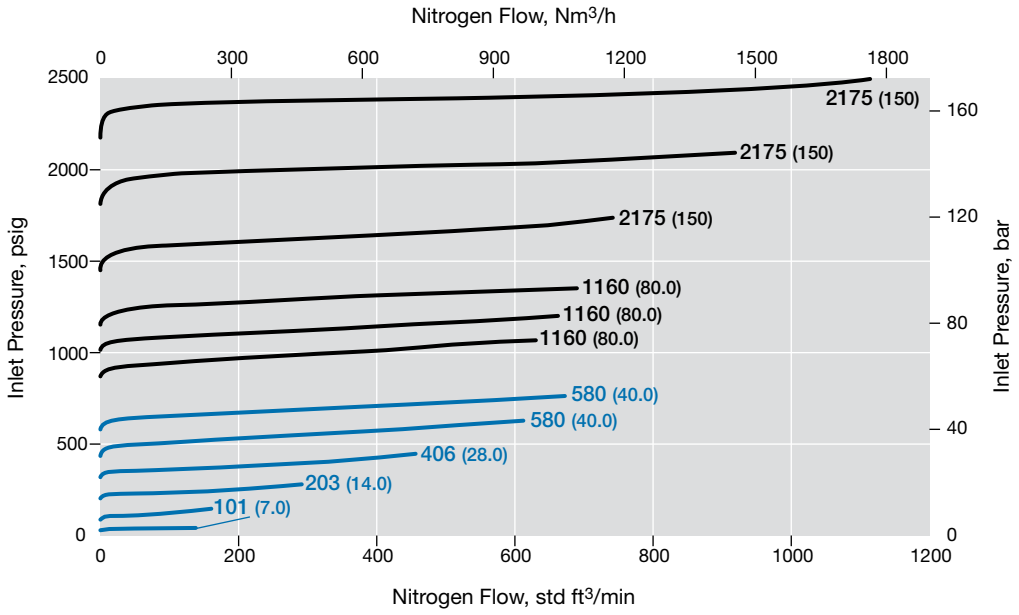
BS(H)4 Series

Flow Coefficient: 1.84

Maximum Inlet Pressure: BS4—1015 psig (70.0 bar); BSH4—5800 psig (400 bar)

Regulator Series

- BSH4 only
- BS4 and BSH4



BSH4 Series

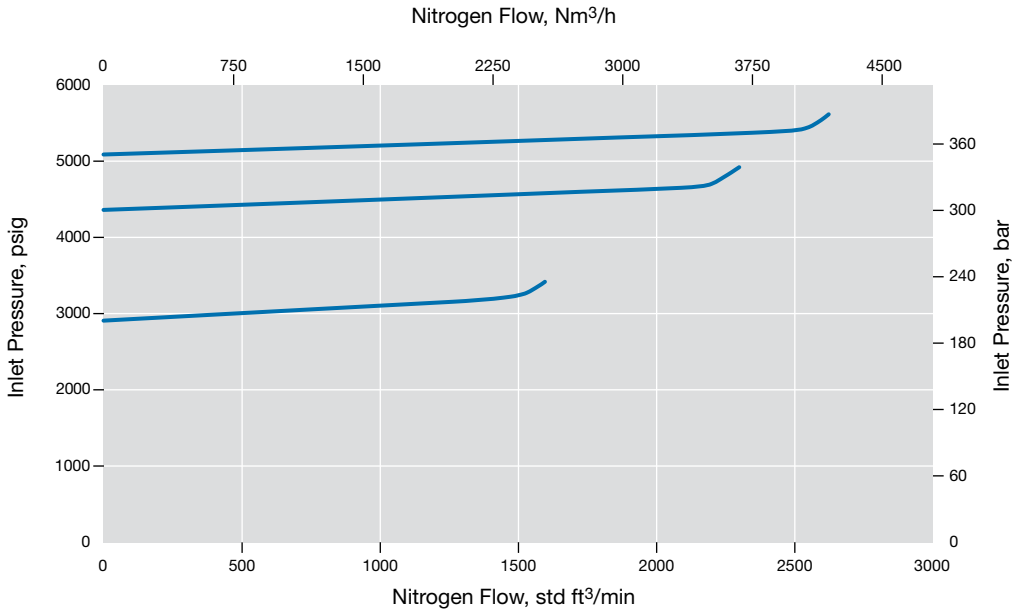
Flow Coefficient: 0.49

Maximum Inlet Pressure: 5800 psig (400 bar)

Inlet Pressure Control Range: 0 to 5220 psig (0 to 360 bar)

Pressure Control Range

- 0 to 5220 psig (360 bar)



Flow Data

The graphs illustrate the change in inlet or outlet pressure as the flow rate increases.

For more flow curve information, contact your authorized Swagelok representative.

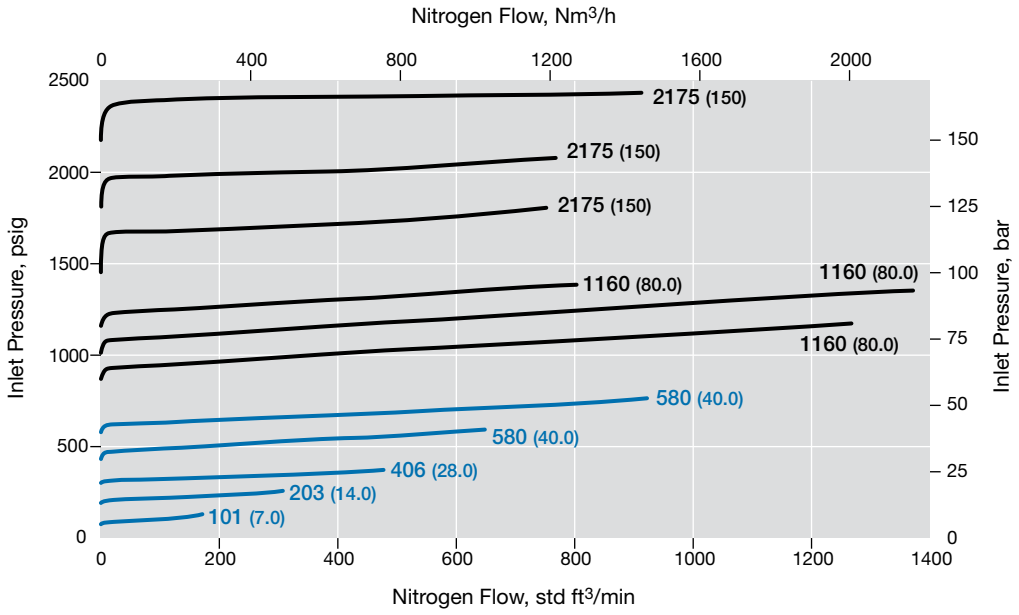
BS(H)6 Series

Flow Coefficient:1.95

Maximum Inlet Pressure: BS6—1015 psig (70.0 bar); BSH6—5800 psig (400 bar)

Regulator Series

- BSH6 only
- BS6 and BSH6



BSH6 Series

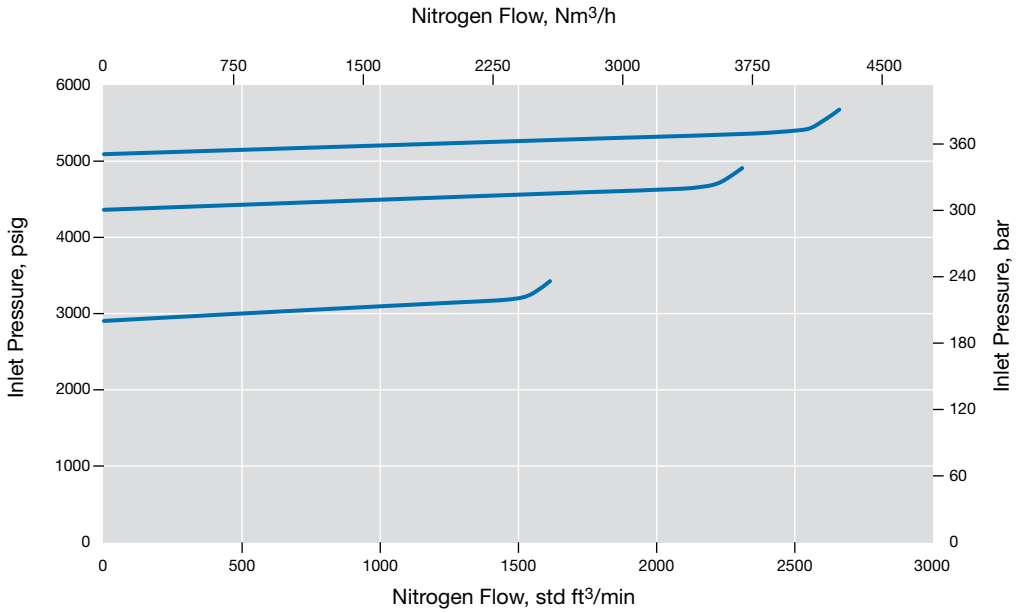
Flow Coefficient: 0.49

Maximum Inlet Pressure: 5800 psig (400 bar)

Inlet Pressure Control Range: 0 to 5220 psig (0 to 360 bar)

Pressure Control Range

- 0 to 5220 psig (360 bar)



Flow Data

The graphs illustrate the change in inlet or outlet pressure as the flow rate increases.

For more flow curve information, contact your authorized Swagelok representative.

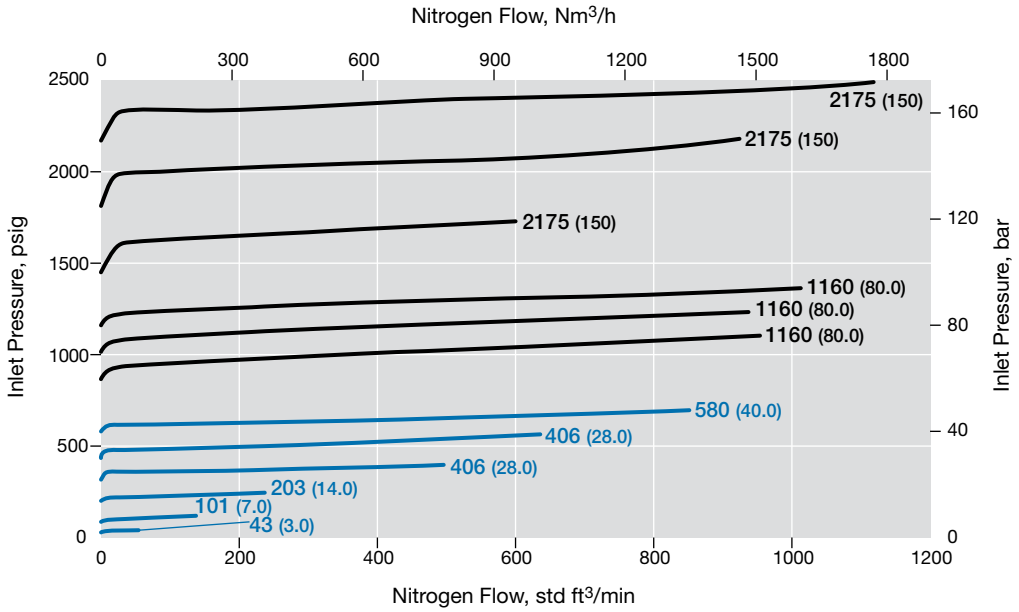
BS(H)8 Series

Flow Coefficient: 2.07

Maximum Inlet Pressure: BS8—1015 psig (70.0 bar); BSH8—5800 psig (400 bar)

Regulator Series

- BSH8 only
- BS8 and BSH8



BSH8 Series

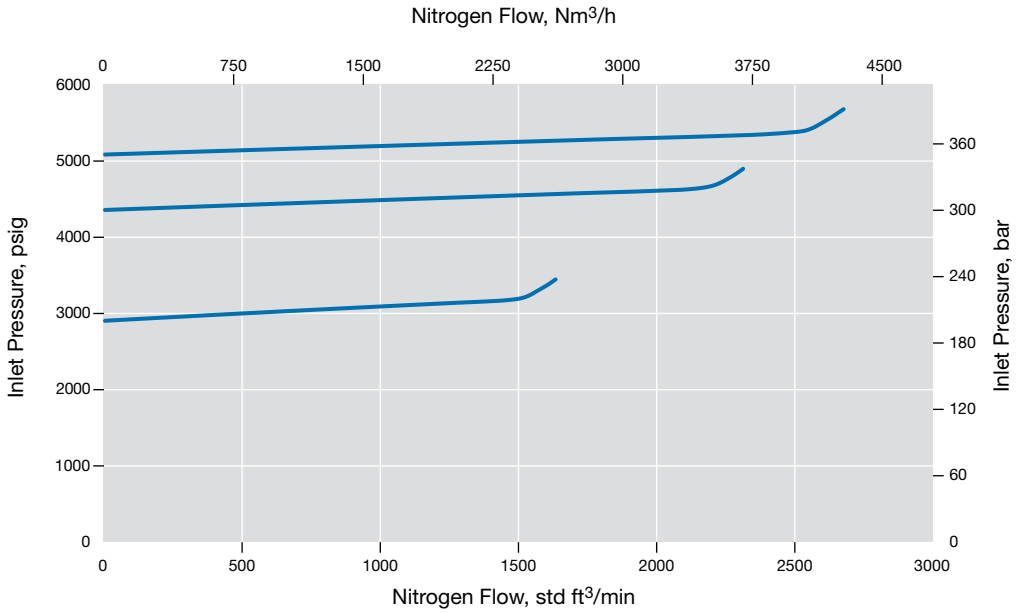
Flow Coefficient: 0.49

Maximum Inlet Pressure: 5800 psig (400 bar)

Inlet Pressure Control Range: 0 to 5220 psig (0 to 360 bar)

Pressure Control Range

- 0 to 5220 psig (360 bar)

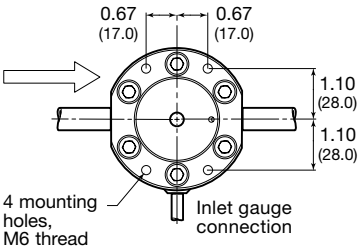


Dimensions

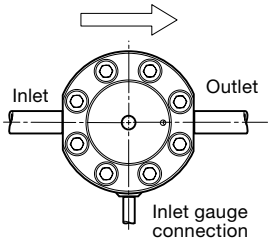
Dimensions, in inches (millimeters), are for reference only and are subject to change.

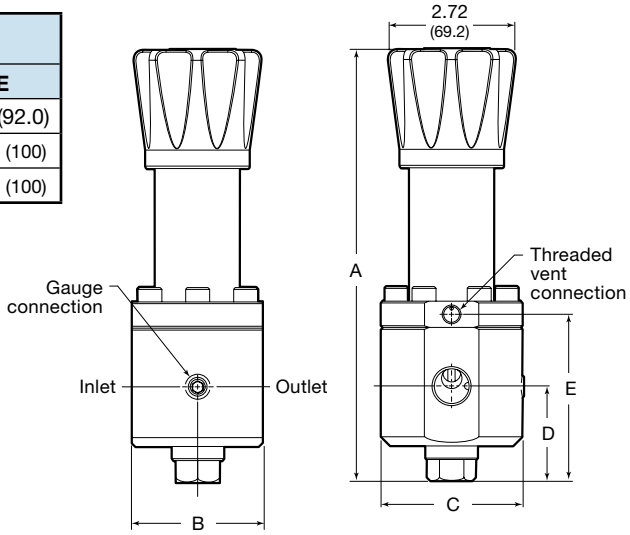
Series	End Connection Size	Dimensions, in. (mm)				
		A	B	C	D	E
BS(H)4	1/2 in.	9.06 (230)	2.83 (72.0)	3.07 (78.0)	2.09 (53.0)	3.62 (92.0)
BS(H)6	3/4 in.	9.25 (235)	3.23 (82.0)	3.50 (89.0)	2.20 (56.0)	3.94 (100)
BS(H)8	1 in.	9.25 (235)	3.07 (78.0)	3.50 (89.0)	2.20 (56.0)	3.94 (100)

Panel Mounting
BS(H)4 only



Configuration
Top





Shown with tubing for clarity; tubing not included.

Ordering Information

Build a BS(H)4, BS(H)6, and BS(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
BS	FA	4	A	1	- 02 -	1	- V	V	K -	GN2

1 Series
- **BS** = 1015 psig (70.0 bar) maximum inlet pressure
- **BSH** = 5800 psig (400 bar) maximum inlet pressure

2 Inlet / Outlet
- **B** = Female ISO/BSP parallel thread
- **N** = Female NPT
- **FA** = ASME B16.5 flange
- **FD** = EN 1092 (DIN) flange

3 Size
- **4** = 1/2 in. / DN15
- **6** = 3/4 in. / DN20
- **8** = 1 in. / DN25

4 Pressure Class
Omit designator if flanges are not ordered.
- **A** = ASME class 150
- **B** = ASME class 300
- **C** = ASME class 600
- **E** = ASME class 1500
- **F** = ASME class 2500
- **M** = EN class PN16
- **N** = EN class PN40

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

6 Body Material
- **02** = 316L SS

7 Pressure Control Range
Diaphragm sensing
- **1** = 0 to 43 psig (0 to 3.0 bar)
- **2** = 0 to 101 psig (0 to 7.0 bar)
- **3** = 0 to 203 psig (0 to 14.0 bar)
- **4** = 0 to 406 psig (0 to 28.0 bar)①

Piston sensing
- **4** = 0 to 406 psig (0 to 28.0 bar)②
- **5** = 0 to 580 psig (0 to 40.0 bar)
- **6** = 0 to 1160 psig (0 to 80.0 bar)
- **7** = 0 to 2175 psig (0 to 150 bar)
- **9** = 0 to 4060 psig (0 to 280 bar)
- **11** = 0 to 5220 psig (0 to 360 bar)

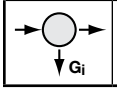
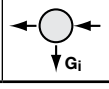
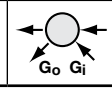
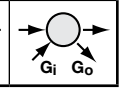
① BS(H)4 series only.
② BS(H)6 and BS(H)8 series only.

8 Seal Material
- **V** = Fluorocarbon FKM
- **N** = Nitrile
- **E** = EPDM
- **L** = Low temperature Nitrile

9 Diaphragm / Piston O-Rings
- **V** = Fluorocarbon FKM
- **N** = Nitrile
- **E** = EPDM
- **L** = Low temperature Nitrile

10 Seat Seal Material
- **K** = PCTFE
- **P** = PEEK

11 Options
- **A** = Antitamper
- **GN1** = Gauge connection, see below
- **GN2** = Gauge connection, see below
- **GN5** = Gauge connection, see below
- None = Standard connection, see below

Gauge Connection Configuration			
Standard	GN1	GN2	GN5
			

- **N** = NACE MR0175/ISO 15156
- **G93** = ASTM G93 Level C-cleaned

General-Purpose, Spring-Loaded Back-Pressure Regulators—BS(H)10 and BS(H)15 Series

Features

- Balanced poppet design
- Diaphragm sensing: 0 to 290 psig (0 to 20.0 bar)
- Piston sensing: 0 to 3625 psig (0 to 250 bar)
- High flow capacity

Options

- NACE MR0175/ISO 15156-compliant models
- Special cleaning to ASTM G93 Level C

Technical Data

Series	Maximum Inlet Pressure psig (bar)	Maximum Inlet Control Pressure psig (bar)	Sensing Type	Temperature Range °F (°C)	Flow Coefficient (C_v)	Seat Diameter in. (mm)	Connections			Weight (Without Flanges) lb (kg)
							Inlet and Outlet			
							Size	Type	Gauge	
BS(H)10	BS: 1015 (70.0)	BS: 290 (20.0)	Diaphragm: 0 to 290 psig (20.0 bar)	–49 to 176 (–45 to 80) See **Pressure-Temperature Ratings,** page 985.	3.84	0.53 (13.5)	1 in. DN25	NPT ISO/BSP parallel thread ASME or EN flange	1/4 in. NPT or ISO/BSP parallel①	16.7 (7.6)
BS(H)15	BSH: 3625 (250)	BSH: 3625 (250)	Piston: 0 to 3625 psig (0 to 250 bar)		7.3	0.75 (19.0)	1 1/2 in. DN40			22.0 (10.0)

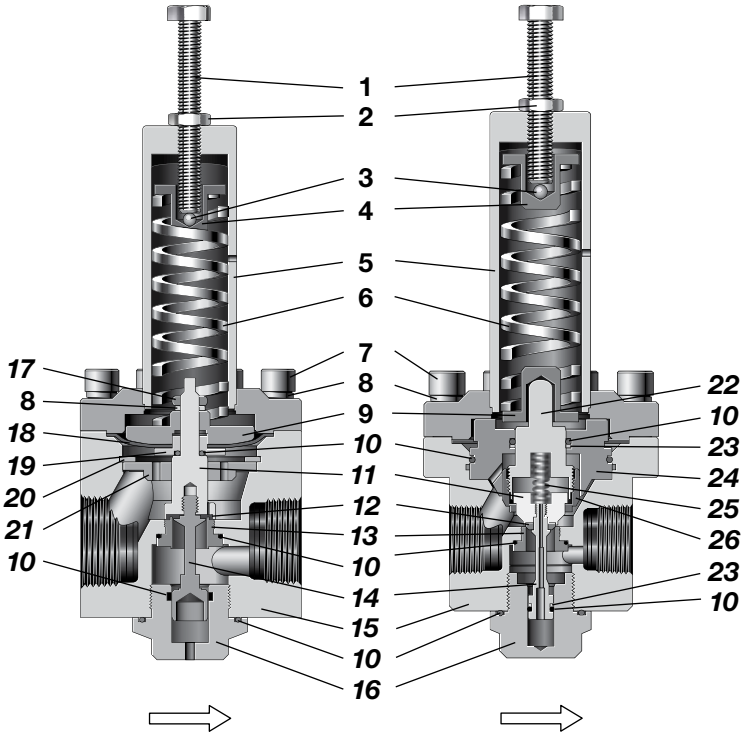
See pages 119 to 122 for flow data.

① Regulators with NPT inlet / outlet connections have 1/4 in. NPT gauge connections.

Materials of Construction

BS Series Regulator with Diaphragm Sensing and Soft Seat Seal

BSH Series Regulator with Piston Sensing and Hard Seat Seal



Component			Material / Specification
Common Components	**1** Adjusting screw		A2-70
	2 Set screw nut		A2
	3 Ball		420 SS (Hardened)
	4 Upper spring guide		316L SS / A479
	5 Spring housing assembly		
	6 Set spring		50CRV4
	7 Cap screw		A4-80
	8 Washer		A4
	9 Bottom spring guide		316L SS / A479
	***10** O-ring*		*EPDM, FKM, or nitrile*
	***11** Poppet housing*		*316L SS / A479*
	***12** Seat seal*	*BS*	*EPDM, FKM, or nitrile*
		BSH	*PCTFE or PEEK*
	***13** Seat*		*316L SS / A479*
	***14** Poppet*		
	***15** Body*		
	***16** Body plug*		
Diaphragm Only	**17** Nut		A4
	***18** Diaphragm*		*EPDM, FKM, or nitrile*
	***19** Clamp plate*		*316L SS / A479*
	***20** Retaining ring*		*1.4122 Steel*
	***21** Body plate*		*316L SS / A479*
Piston Only	***22** Piston*		*316L SS / A479*
	***23** Backup ring*		*PTFE*
	***24** Piston plate*		*316L SS / A479*
	***25** Overtravel spring*		*302 SS / A313*
	***26** Piston screw*		*316L SS / A479*
Wetted lubricant: Silicone-based, synthetic hydrocarbon-based			

Wetted components listed in *italics.*
Gauge plugs (not shown): 431 SS / A276.

Flow Data

The graphs illustrate the change in inlet or outlet pressure as the flow rate increases.

For more flow curve information, contact your authorized Swagelok representative.

BS10 Series

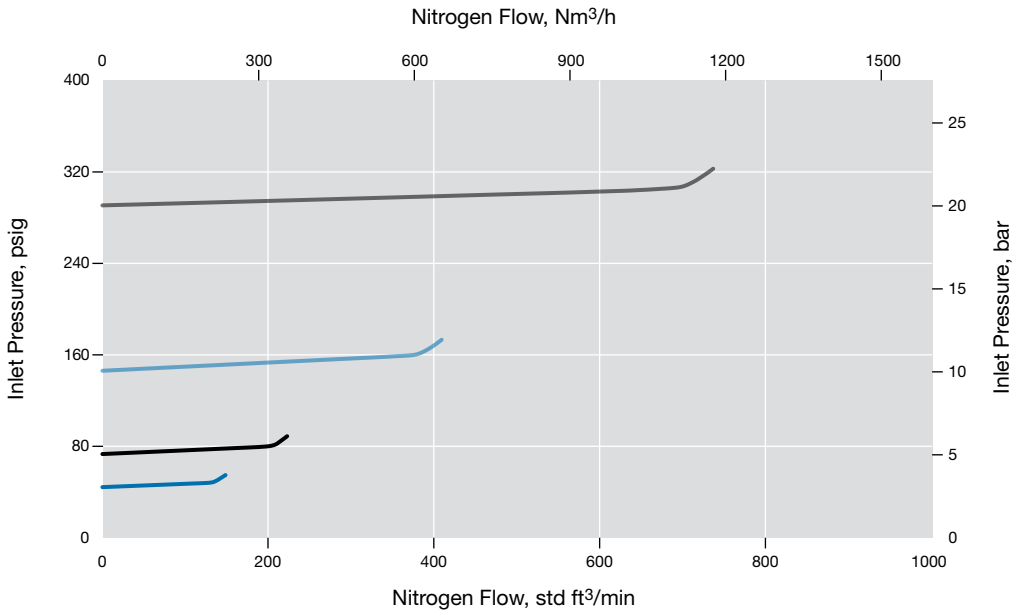
Flow Coefficient: 3.84

Maximum Inlet Pressure: 1015 psig (70 bar)

Inlet Pressure Control Range: 0 to 290 psig (0 to 20.0 bar)

Pressure Control Range

- 0 to 290 psig (0 to 20.0 bar)
- 0 to 145 psig (0 to 10.0 bar)
- 0 to 72 psig (0 to 5.0 bar)
- 0 to 43 psig (0 to 3.0 bar)



Flow Data

The graphs illustrate the change in inlet or outlet pressure as the flow rate increases.

For more flow curve information, contact your authorized Swagelok representative.

BSH10 Series

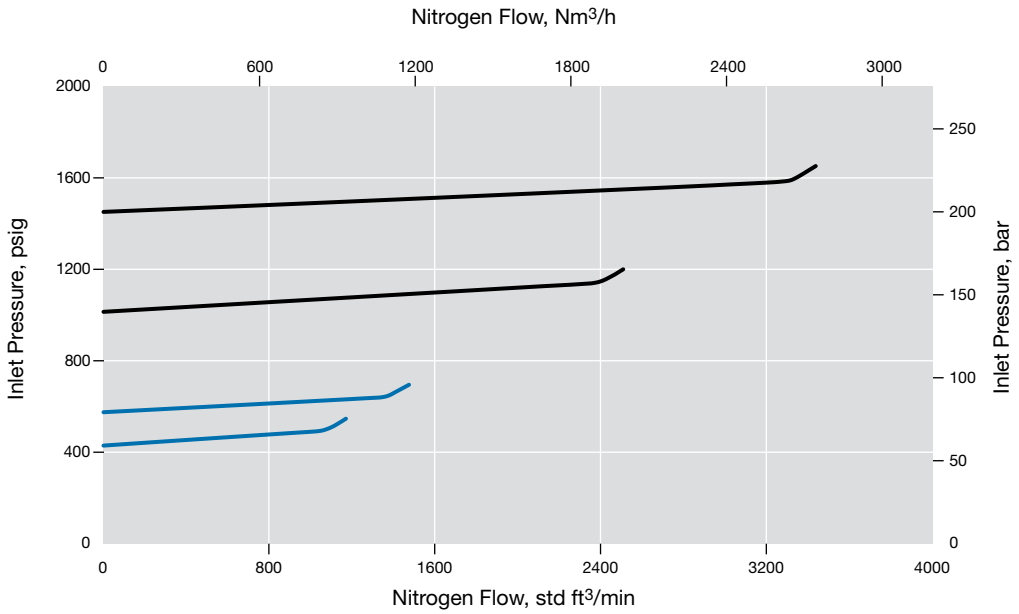
Flow Coefficient: 3.84

Maximum Inlet Pressure: 3625 psig (250 bar)

Inlet Pressure Control Range: 0 to 1450 psig (0 to 100 bar)

Pressure Control Range

- 0 to 1450 psig (0 to 100 bar)
- 0 to 580 psig (0 to 40.0 bar)



BSH10 Series

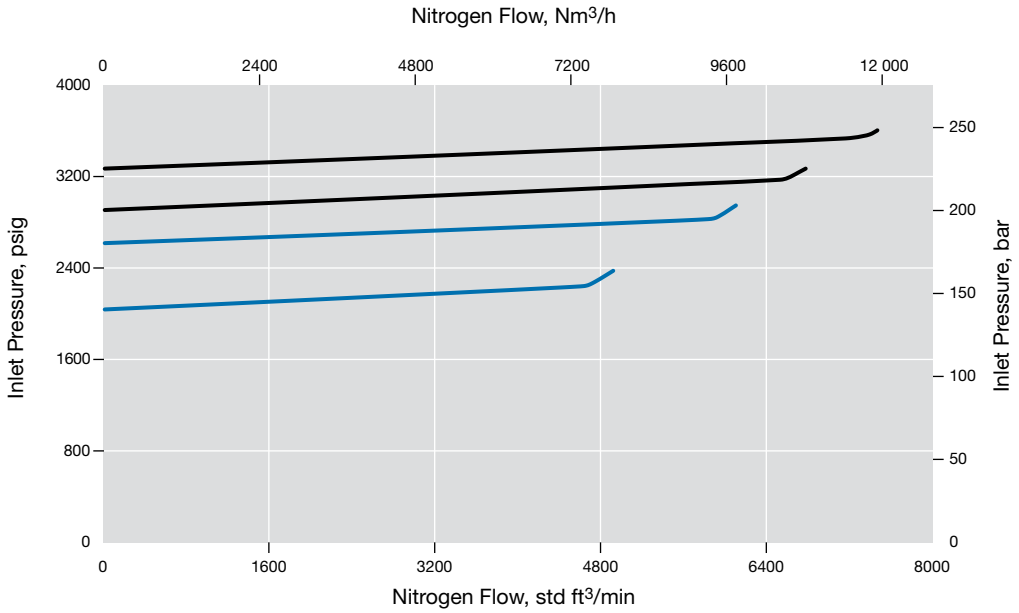
Flow Coefficient: 3.84

Maximum Inlet Pressure: 3625 psig (250 bar)

Inlet Pressure Control Range: 0 to 3625 psig (0 to 250 bar)

Pressure Control Range

- 0 to 3625 psig (0 to 250 bar)
- 0 to 2610 psig (0 to 180 bar)



Flow Data

The graphs illustrate the change in inlet or outlet pressure as the flow rate increases.

For more flow curve information, contact your authorized Swagelok representative.

BS15 Series

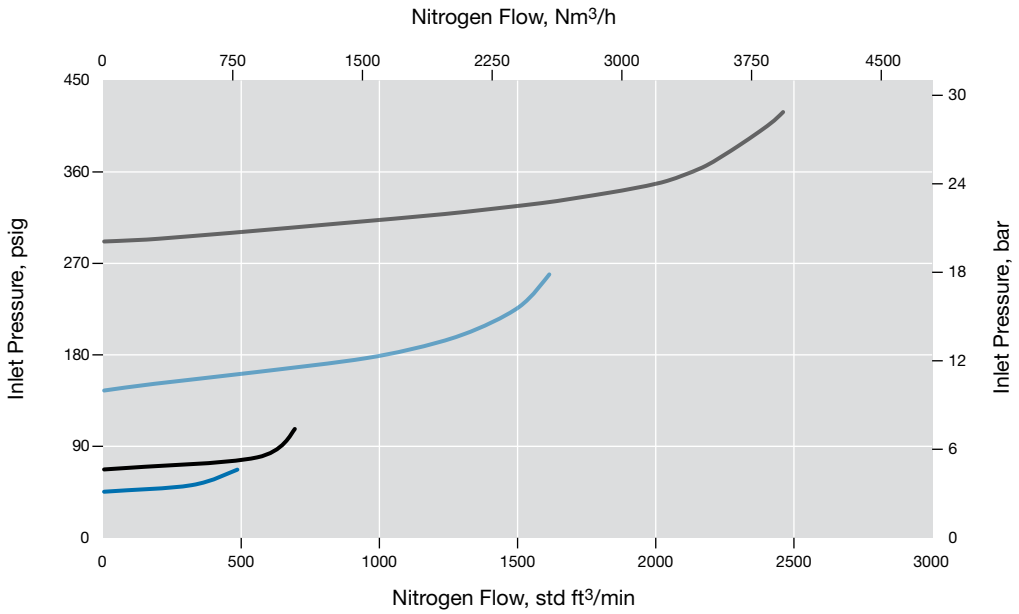
Flow Coefficient: 7.3

Maximum Inlet Pressure: 1015 psig (70 bar)

Inlet Pressure Control Range: 0 to 290 psig (0 to 20.0 bar)

Pressure Control Range

- 0 to 290 psig (0 to 20.0 bar)
- 0 to 145 psig (0 to 10.0 bar)
- 0 to 72 psig (0 to 5.0 bar)
- 0 to 43 psig (0 to 3.0 bar)



Flow Data

The graphs illustrate the change in inlet or outlet pressure as the flow rate increases.

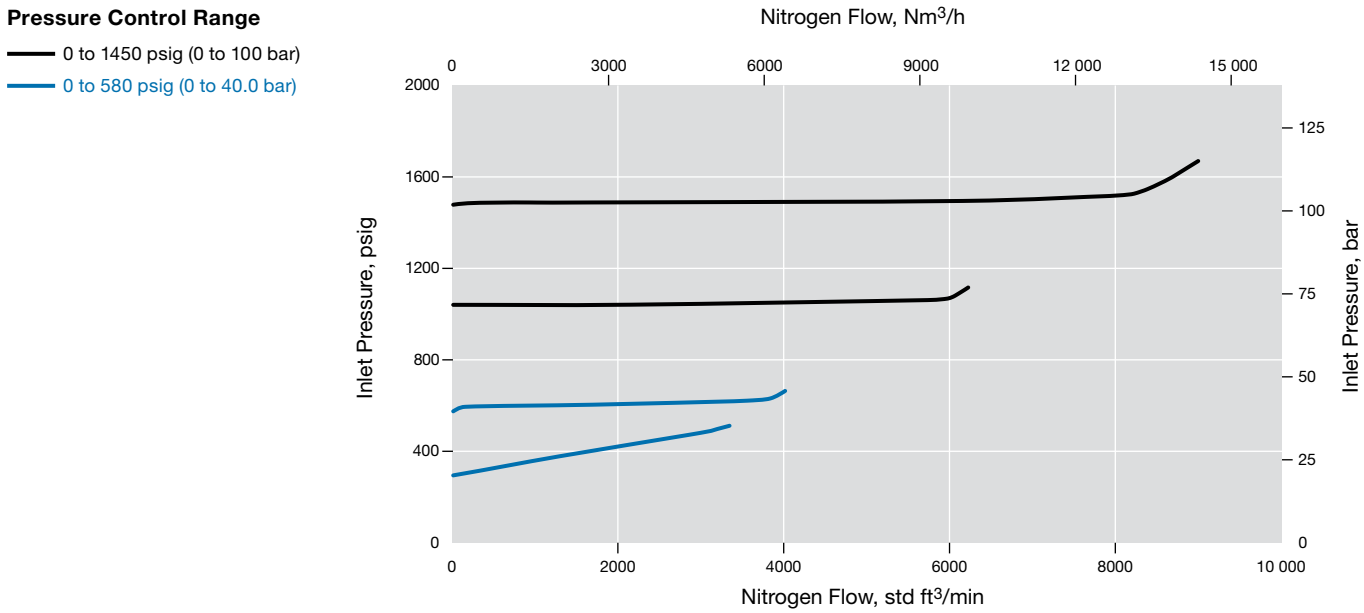
For more flow curve information, contact your authorized Swagelok representative.

BSH15 Series

Flow Coefficient: 7.3

Maximum Inlet Pressure: 3625 psig (250 bar)

Inlet Pressure Control Range: 0 to 1450 psig (0 to 100 bar)

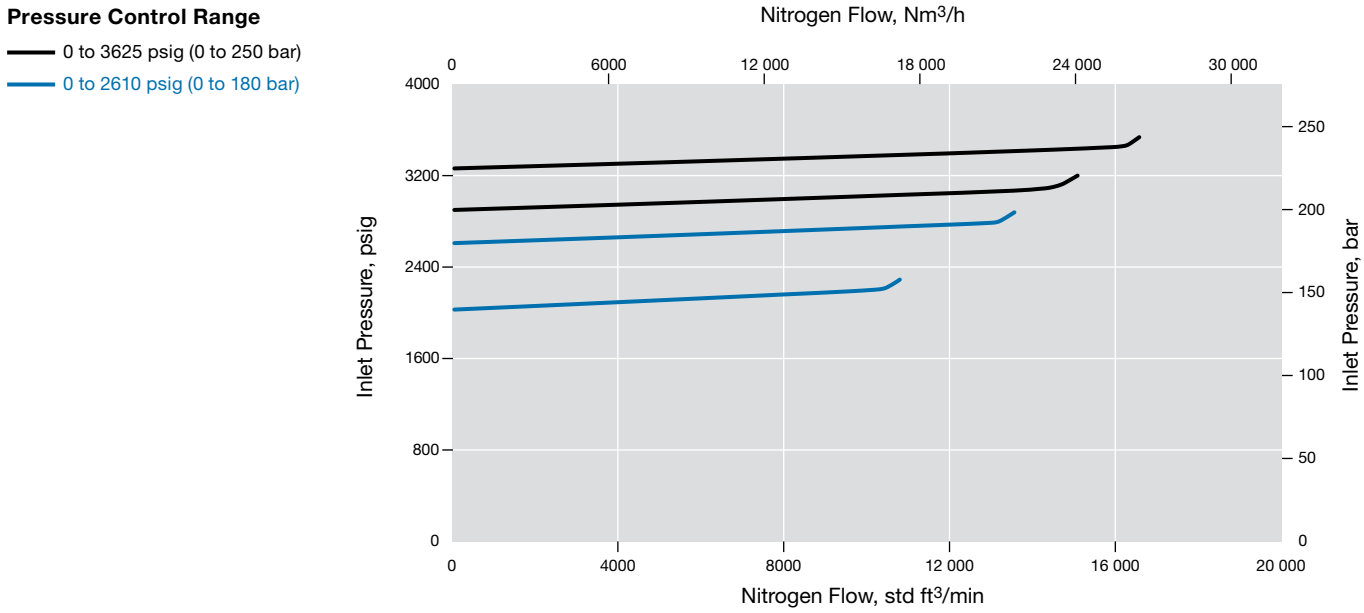


BSH15 Series

Flow Coefficient: 7.3

Maximum Inlet Pressure: 3625 psig (250 bar)

Inlet Pressure Control Range: 0 to 3625 psig (0 to 250 bar)

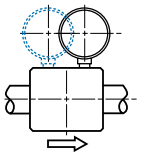


Dimensions

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

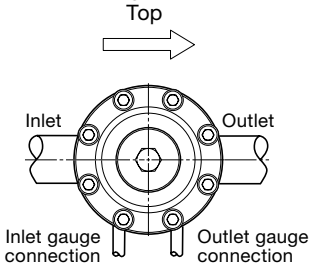
Series	End Connection Size	Dimensions, in. (mm)					
		A	B	C	D	E	F
BS(H)10	1 in.	10.5 (266)	3.54 (90.0)	3.07 (78.0)	2.28 (58.0)	1.97 (50.0)	1.77 (45.0)
BS(H)15	1 1/2 in.	10.8 (275)	4.53 (115)	3.78 (96.0)	2.44 (62.0)	2.01 (51.0)	1.77 (45.0)

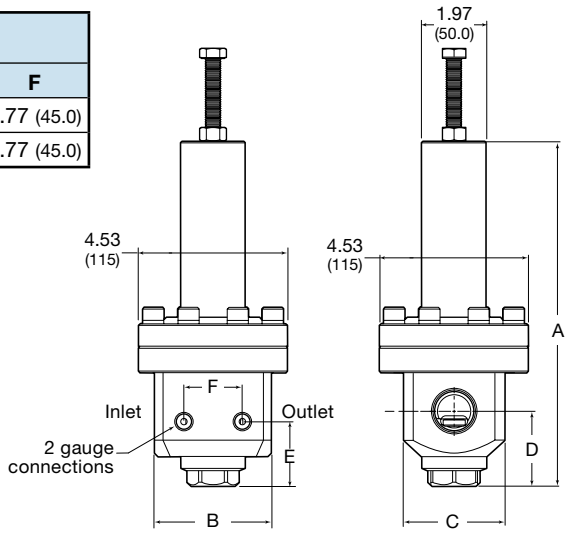
Gauge Connection



Only one gauge with a 50 mm (2 in.) or larger dial size fits directly into the body.

Configuration





Shown with tubing for clarity; tubing not included.

Ordering Information

Build a BS(H)10 and BS(H)15 series regulator ordering number by combining the designators in the sequence shown below.

1	2	3	4	5		6	7	8	9	10	11
BS	FA	10	A	1	-	02	- 1	- V	V	V	- N

1 Series
- **BS** = 1015 psig (70.0 bar) maximum inlet pressure
- **BSH** = 3625 psig (250 bar) maximum inlet pressure

2 Inlet / Outlet
- **B** = Female ISO/BSP parallel thread
- **N** = Female NPT
- **FA** = ASME B16.5 flange
- **FD** = EN 1092 (DIN) flange

3 Size
- **10** = 1 in. / DN25
- **15** = 1 1/2 in. / DN40

4 Pressure Class

Omit designator if flanges are not ordered.
- **A** = ASME class 150
- **B** = ASME class 300
- **C** = ASME class 600
- **E** = ASME class 1500
- **F** = ASME class 2500
- **M** = EN class PN16
- **N** = EN class PN40

5 Flange Facing

Omit designator if flanges are not ordered.
- **1** = Raised face smooth
- **3** = RTJ

6 Body Material
- **02** = 316L SS

7 Pressure Control Range

Diaphragm sensing (BS series only)
- **1** = 0 to 43 psig (0 to 3.0 bar)
- **2** = 0 to 72 psig (0 to 5.0 bar)
- **3** = 0 to 145 psig (0 to 10.0 bar)
- **4** = 0 to 290 psig (0 to 20.0 bar)

Piston sensing (BSH series only)
- **5** = 0 to 580 psig (0 to 40.0 bar)
- **6** = 0 to 1450 psig (0 to 100 bar)
- **7** = 0 to 2610 psig (0 to 180 bar)
- **8** = 0 to 3625 psig (0 to 250 bar)

8 Seal Material
- **V** = Fluorocarbon FKM
- **N** = Nitrile
- **E** = EPDM
- **L** = Low temperature Nitrile

9 Diaphragm / Piston O-Rings
- **V** = Fluorocarbon FKM
- **N** = Nitrile
- **E** = EPDM
- **L** = Low temperature Nitrile

10 Seat Seal Material

BS series
- **V** = Fluorocarbon FKM
- **N** = Nitrile
- **E** = EPDM
- **L** = Low temperature Nitrile

BSH series
- **K** = PCTFE
- **P** = PEEK

11 Options
- **N** = NACE MR0175/ISO 15156
- **G93** = ASTM G93 Level C-cleaned

High-Sensitivity, Spring-Loaded Back-Pressure Regulators—LBS4 Series

Features

- Diaphragm sensing
- Bottom mounting and panel mounting

Options

- NACE MR0175/ISO 15156-compliant model
- Special cleaning to ASTM G93 Level C

Technical Data

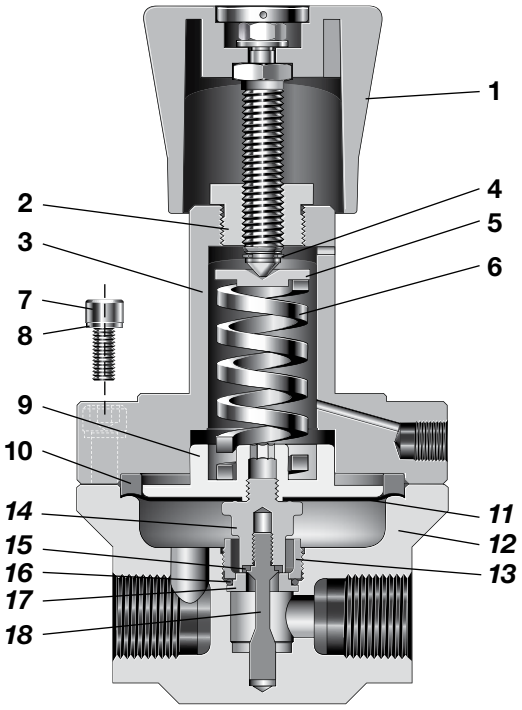
Series	Maximum Inlet Pressure psig (bar)	Maximum Inlet Control Pressure① psig (bar)	Sensing Type	Temperature Range °F (°C)	Flow Coefficient (C_v)	Seat Diameter in. (mm)	Inlet and Outlet Connection	Gauge Connection	Weight lb (kg)
LBS4	507 (35.0)	290 (20.0)	Diaphragm	–49 to 176 (–45 to 80) See **Pressure-Temperature Ratings,** page 985.	1.3	0.31 (8.0)	1/2 in. NPT	1/4 in. NPT	5.7 (2.6)

See pages 125 and 126 for flow data.

① Maximum inlet control pressure limited to 130 psig (9.0 bar) for regulators built with 316SS diaphragms.

Materials of Construction

LBS Series Regulator with Soft Seat



Component	Material / Specification
1 Knob assembly with adjusting screw, nuts	Blue ABS with 431 SS
2 Spring housing cover	316L SS / A479
3 Spring housing	
4 C-ring	A2
5 Spring guide	316L SS / A479
6 Set spring	50CRV4
7 Cap screw	A4-80
8 Washer	A2
9 Bottom spring guide	316L SS / A479
10 Clamp ring	
***11** Diaphragm*	*PTFE or 316L SS*
***12** Body*	*316L SS / A479*
***13** Seat retainer*	
***14** Poppet housing*	
***15** Seat seal*	*FKM, FFKM, EPDM, or nitrile*
***16** O-ring*	*PTFE*
***17** Seat*	*316L SS / A479*
***18** Poppet*	*431 SS / A276*
Wetted lubricants: Silicone-based, synthetic hydrocarbon-based	

Wetted components listed in *italics.*
Gauge plugs (not shown): 431 SS / A276.

Flow Data

The graphs illustrate the change in inlet or outlet pressure as the flow rate increases.

For more flow curve information, contact your authorized Swagelok representative.

LBS4 Series

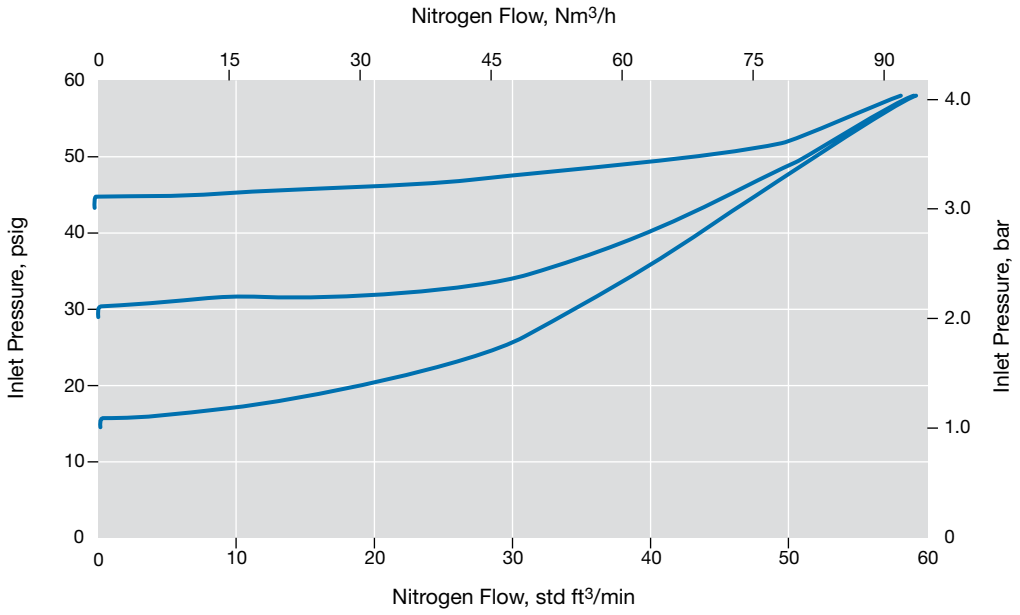
Flow Coefficient: 1.3

Maximum Inlet Pressure: 507 psig (35.0 bar)

Inlet Pressure Control Range: 0 to 43 psig (0 to 3.0 bar)

Pressure Control Range

0 to 43 psig (0 to 3.0 bar)



LBS4 Series

Flow Coefficient: 1.3

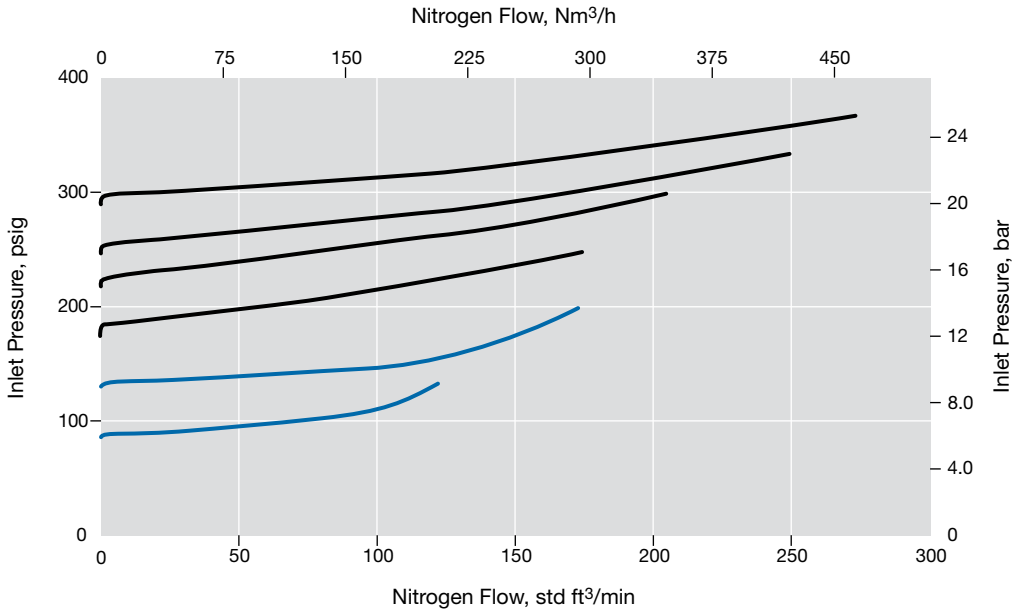
Maximum Inlet Pressure: 507 psig (35.0 bar)

Inlet Pressure Control Range: 0 to 290 psig (0 to 20.0 bar)

Pressure Control Range

0 to 130 psig (0 to 9.0 bar)

0 to 290 psig (0 to 20.0 bar)



Flow Data

The graphs illustrate the change in inlet or outlet pressure as the flow rate increases.
For more flow curve information, contact your authorized Swagelok representative.

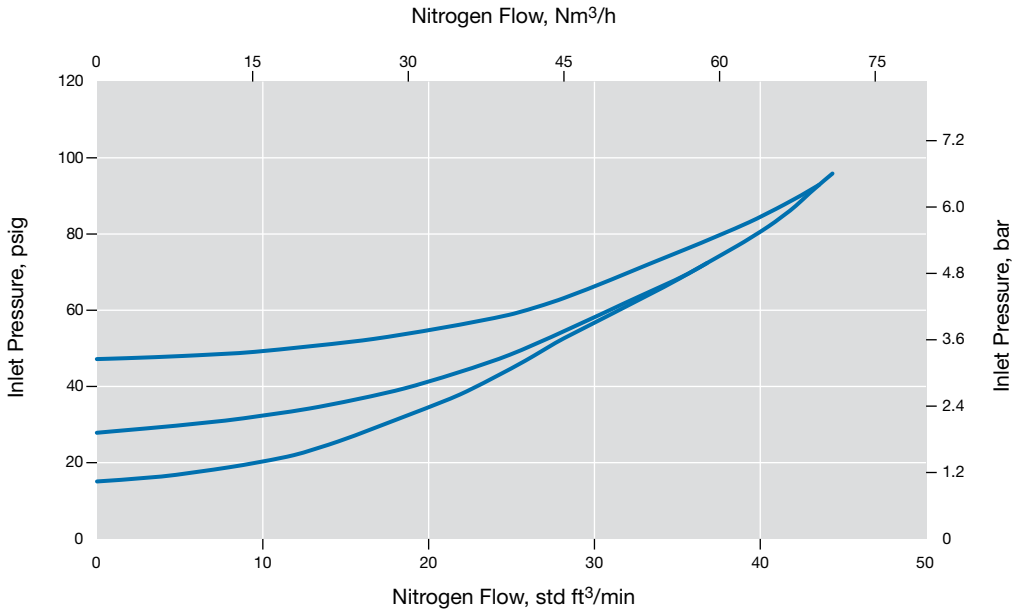
LBS4 Series

Flow Coefficient: 1.3
Maximum Inlet Pressure: 507 psig (35.0 bar)
Inlet Pressure Control Range: 0 to 43 psig (0 to 3.0 bar)

Pressure Control Range

0 to 43 psig (0 to 3.0 bar)

Optional 316L SS Diapragmh



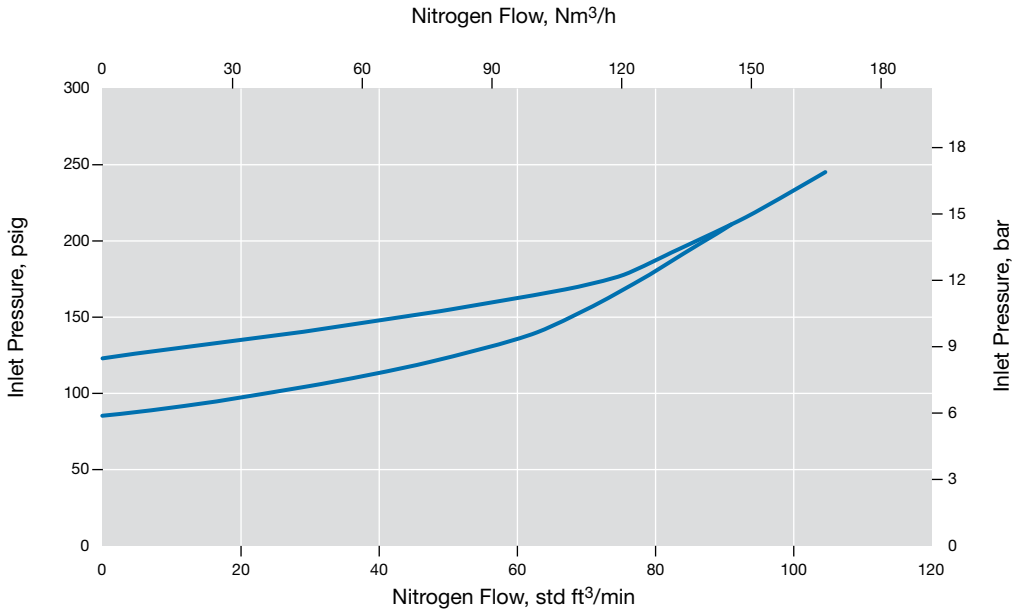
LBS4 Series

Flow Coefficient: 1.3
Maximum Inlet Pressure: 507 psig (35.0 bar)
Inlet Pressure Control Range: 0 to 130 psig (0 to 9.0 bar)

Pressure Control Range

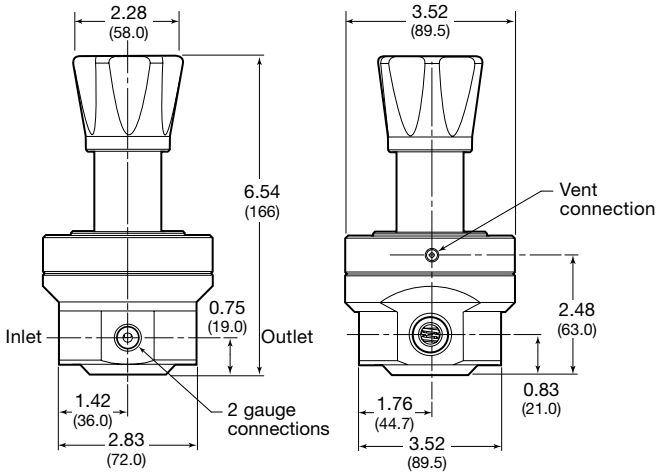
0 to 130 psig (0 to 9.0 bar)

Optional 316L SS Diapragmh



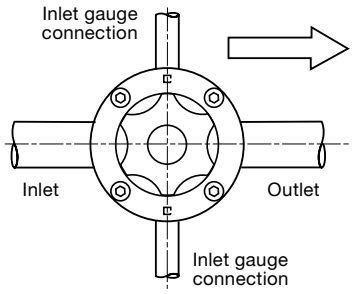
Dimensions

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



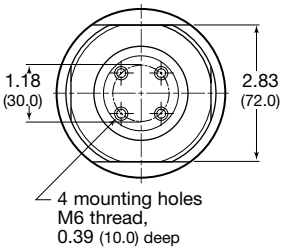
Configuration

Top

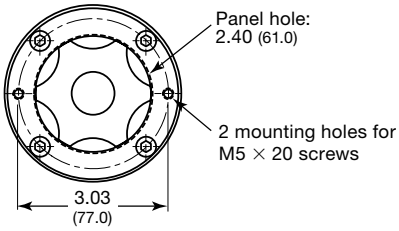


Shown with tubing for clarity; tubing not included.

Bottom Mounting



Panel Mounting



Ordering Information

Build an LBS4 series regulator ordering number by combining the designators in the sequence shown below.

1	2	3	4	5	6	7	8
LBS	N4 -	02 -	1 -	T	T	V	- N

1 Series
LBS = 507 psig (35.0 bar) maximum inlet pressure

2 Inlet / Outlet
N4 = 1/2 in. female NPT

3 Body Material
02 = 316L SS

4 Pressure Control Range
1 = 0 to 43 psig (0 to 3.0 bar)
2 = 0 to 130 psig (0 to 9.0 bar)
3 = 0 to 290 psig (0 to 20.0 bar)

5 Seal Material
T = PTFE
L = Low temperature Nitrile

6 Diaphragm
T = PTFE①
M = 316L SS: only for 0 to 43 psig (0 to 3.0 bar) and 0 to 130 psig (0 to 9.0 bar) pressure control ranges
L = Low temperature Nitrile

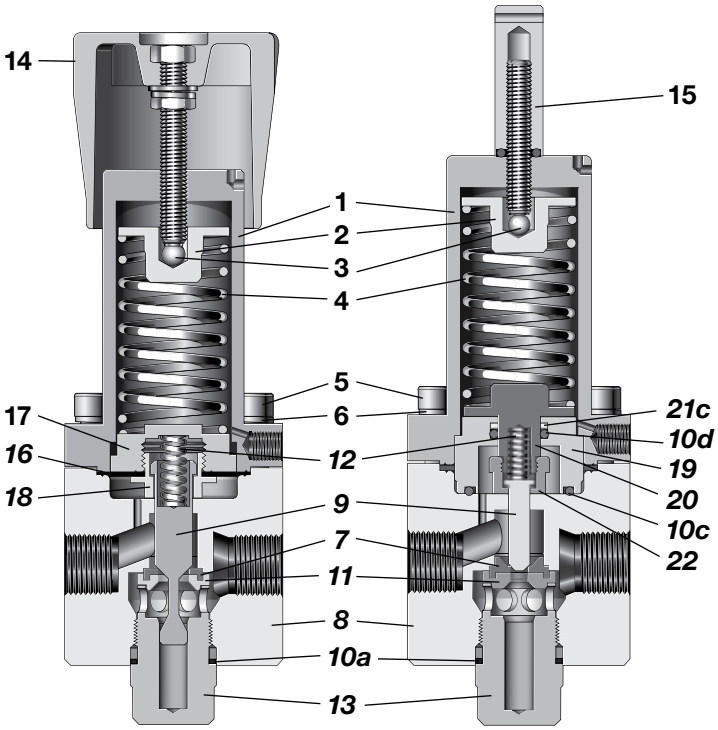
① Not available with Low temperature Nitrile option

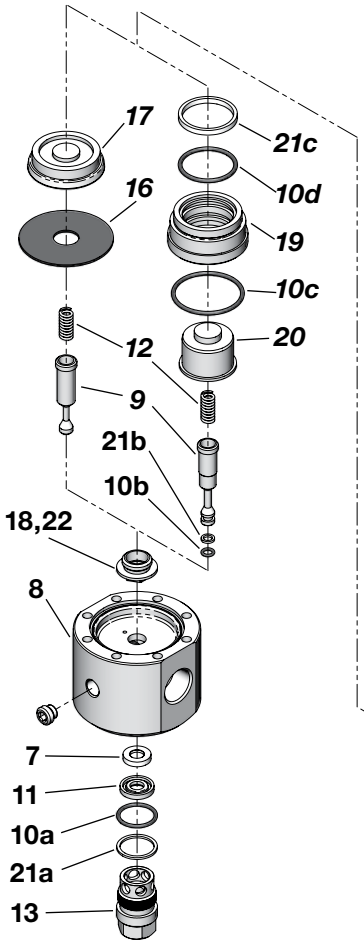
7 Seat Seal Material
V = Fluorocarbon FKM
N = Nitrile
E = EPDM
F = FFKM
L = Low temperature Nitrile

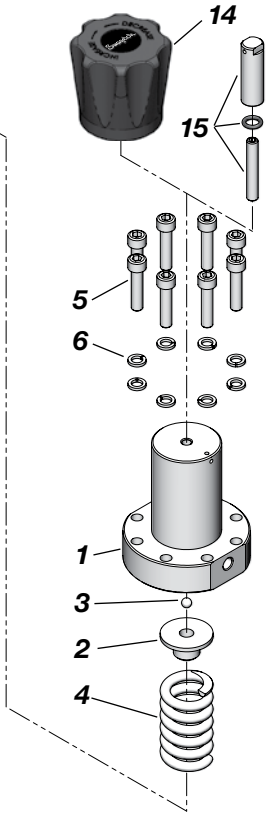
8 Options
N = NACE MR0175/ISO 15156
G93 = ASTM G93 Level C-cleaned

Back-Pressure Regulators
Spring-Loaded—BS Series Maintenance Kits

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	Diaphragm Sensing Typical Contents	Piston Sensing Typical Contents
A1	Valve kit	Poppet (9), Seat seal (7)	Poppet (9), Seat seal (7)
A2	Soft valve kit	Seat seal (7)	Seat seal (7)
B1	Service kit	Poppet (9), O-ring (10a), Diaphragm (16), Seat seal (7)	Poppet (9), O-rings (10a, 10b, 10c, 10d), Back-up rings (21a, 21b, 21c), Seat seal (7)
B2	Seal kit	O-ring (10a), Diaphragm (16)	O-rings (10a, 10b, 10c, 10d), Back-up rings (21a, 21b, 21c)
C1	Overhaul kit	Spring guide (2), Ball (3), Set spring (4), Poppet (9), O-ring (10a), Overtravel spring (12), Body plug (13), Diaphragm (16), Diaphragm plate (17), Diaphragm screw (18), Seat seal (7), Seat (11)	Spring guide (2), Ball (3), Set spring (4), Poppet (9), O-rings (10a, 10b, 10c, 10d), Back-up rings (21a, 21b, 21c), Overtravel spring (12), Body plug (13), Piston (20), Piston plate (19), Piston screw (22), Seat seal (7), Seat (11)
C2	Body plug kit	Body plug (13), O-ring (10a)	Body plug (13), O-ring (10a), Back-up ring (21a)
C3	Sensing kit	Diaphragm (16)	Piston (20), Piston plate (19), O-rings (10c, 10d), Back-up ring (21c)
C4	Range spring kit	Range spring (4)	Range spring (4)
C5	Poppet spring kit	Overtravel spring (12)	Overtravel spring (12)
D1	Handle kit	Handle assembly (14)	Handle assembly (14)
E1	Hardware kit	Bolts (5), Washers (6)	Bolts (5), Washers (6)

Ordering Information

To order a maintenance kit, add the **kit type designator** to the regulator ordering number. Example: BSN4-02-2-VVK-**C1**

Additional Products

- For additional Swagelok pressure regulators, refer to *Pressure Regulators catalog,* MS-02-230.

- For tank blanketing regulators, refer to *Tank Blanketing Pressure Regulators, RHPS Series* catalog, MS-02-431.

- For Swagelok pressure gauges, refer to *Industrial and Process Pressure Gauges* catalog, MS-02-170.

- For sanitary pressure regulators, refer to *Sanitary Pressure Regulators, RHPS Series* catalog, MS-02-436.

- For Swagelok tube fittings products, refer to *Gaugeable Tube Fittings and Adapter Fittings* catalog, MS-01-140.

⚠ **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.**

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

Swagelok

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.

Caution: Do not mix or interchange parts 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.

High-Flow, Manual Gas Pressure Regulators

HF Series

- Compact size with flow rates up to 200 std L/min
- Maximum inlet pressures up to 500 psig (34.4 bar)
- Manually adjustable outlet pressure up to 150 psig (10.3 bar)
- 316L VIM-VAR stainless steel body for ultrahigh-purity applications
- 1/4 in. VCR® metal face seal; 1/4 in. tube butt weld; 1.5 in. and 1.125 in. modular surface-mount end connections

Swagelok

Features

The Swagelok® HF series manual gas pressure regulator features a load spring which interacts with a unique pressure-sensing assembly to precisely control outlet pressure. Outlet pressure is easily adjusted by turning the handle.

- Compact, high-flow design allows close spacing of system components and process lines.
- Innovative, pressure-sensing assembly with welded diaphragm results in low droop, which eliminates the need for adjustment in many systems.
- High-purity design features tied poppet for positive shutoff and metal-to-metal seal to atmosphere and 316L VIM-VAR stainless steel body internally electropolished and finished to 5 µin. (0.13 µm) R_a.

1.5 in. Modular Surface-Mount Model

1.125 in. Modular Surface-Mount Model

Inline Model with Tube Butt Weld End Connections

Inline and 1.5 in. Modular Surface-Mount Models

- Provide flow rates up to 200 std L/min
- Are available in outlet pressures ranging from vacuum to 150 psig (10.3 bar) with four interchangeable, color-coded load springs
- Modular surface-mount regulator with is IGC™ compatible.

Self-Centering Poppet

- Minimizes creep
- Is offered in PCTFE for leak-tight shutoff.

Narrow-Profile Handle

- Permits easy access for pressure adjustments when system components and process lines are closely spaced
- Features both a finger-tip grip and knurled diameter for positive actuation.

1.125 in. Modular Surface-Mount Model

- Is designed for 1.125 in. C-seal and W-seal integrated gas systems
- Provide flow rates up to 160 std L/min
- Is available in two ranges: vacuum to 30 psig (2.0 bar) and vacuum to 60 psig (4.1 bar).

Pressure-Sensing Assembly

- Provides excellent lockup performance with perfluoroelastomer poppet.

Adjustable Outlet Pressure

- Is achieved by fine handle adjustment.
- Optional tamper-resistant handle allows user to set and seal outlet pressure.

Technical Data

Model	Pressure Rating psig (bar)		Temperature Rating °F (°C)		Supply-Pressure Effect (SPE)①	Flow Coefficient (C_v)	Flow Rate② std L/min	Orifice in. (mm)	Internal Volume in.^{3} (cm^3)
	Inlet	Outlet	Operating	Bakeout					
Inline and 1.5 in. modular surface mount	Vacuum to 500 (34.4)	Vacuum to 150 (10.3)	–10 to 150 (–23 to 65)	302 (150)	1.6	0.2	200	0.120 (3.0)	0.32 (5.2) with VCR end connections
1.125 in. modular surface mount	Vacuum to 150 (10.3)	Vacuum to 60 (4.1)	32 to 302 (0 to 150)	32 to 302 (0 to 150)	1.5	0.1	160	0.090 (2.3)	0.172 (2.8)

① The ratio of the change in outlet pressure for every 100 psi change in the inlet pressure.

② With inlet pressure at 100 psig (6.8 bar) and outlet pressure at 30 psig (2.0 bar)

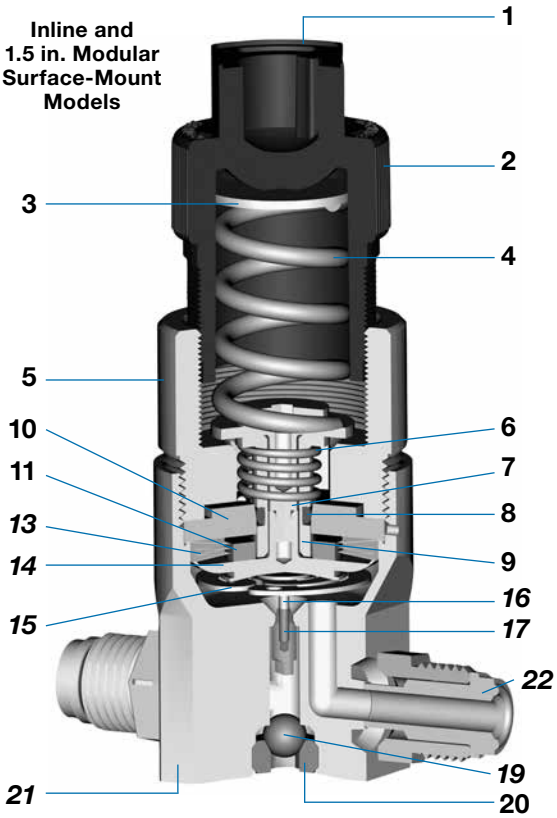
Process Specifications

Refer to Swagelok specifications *Special Cleaning and Packaging (SC-11)* catalog, MS-06-63, and *Ultrahigh-Purity Process Specification (SC-01)* catalog, MS-06-61, for details on processes, process controls, and process verification.

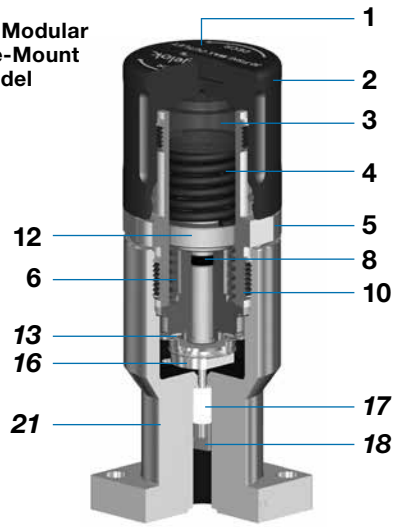
Cleaning	Assembly and Packaging	Process Designator	Process Specification	Wetted Surface Roughness (R_a)	Testing
Ultrahigh-purity cleaning with a continuously monitored, deionized water, ultrasonic cleaning system	Performed in ISO Class 4 work areas; regulators are double bagged and vacuum sealed in cleanroom bags	P	*Ultrahigh-Purity Process Specification (SC-01)*	5 µin. (0.13 µm) average, machine finished and electropolished	Inboard helium leak tested to a rate of 1×10^{-9} std cm^3/s
Special cleaning with non–ozone-depleting chemicals	Performed in specially cleaned areas; regulators are individually bagged	P1	*Special Cleaning and Packaging (SC-11)*		

Materials of Construction

Inline and 1.5 in. Modular Surface-Mount Models



1.125 in. Modular Surface-Mount Model



Component	Inline and 1.5 in. Modular Surface-Mount Models	1.125 in. Modular Surface-Mount Model
	Material Grade / ASTM Specification	
1 Label (not shown)	Aluminum	Polypropylene (tamper-resistant handle)
2 Standard handle	Blue nylon	Aluminum 6061-T6 / B211
Optional handle	Aluminum 6061-T6 / B211	—
Set screw (not shown)	—	Alloy steel / ANSI 18.3 (tamper-resistant handle)
3 Load disk	S17400 SS / A564	Polyetherimide / D5205
4 Load spring	S17700 SS / A313	
5 Bonnet nut	Silver-plated 316 SS / A479	
6 Balance spring	S17700 SS / A313	
7 Damper shaft	316 SS / A479	—
8 O-ring	Fluorocarbon FKM	
9 O-ring catch	Brass 360 / B16	—
10 Bonnet	S17400 SS / A564	
11 Backup ring	Brass 360 / B16	—
12 Return disk	—	Polyetherimide / D5205
13 *Diaphragm*	*Alloy 625 / AMS 5879*	
14 *Face plate*	*316L SS VIM-VAR / SEMI F20 Ultrahigh-Purity*①	—
15 *Poppet-retaining wafer*	*Alloy X-750 /B637*	—
16 *Stem*	*316L SS / A479*	
17 *Poppet*	*PCTFE / AMS 3650*	*Perfluoroelastomer FFKM*
18 *Poppet core*	—	*316L SS / A479*
19 *Poppet port seal*	*Alloy C-276 / B574*	—
20 Poppet port plug	316 SS / A479	—
21 *Body*	*316L SS VIM-VAR / SEMI F20 Ultrahigh-Purity*①	
22 *Welded end connections*	*316L SS VIM-VAR / SEMI F20 Ultrahigh-Purity*①	—

Wetted components listed in *italics*.

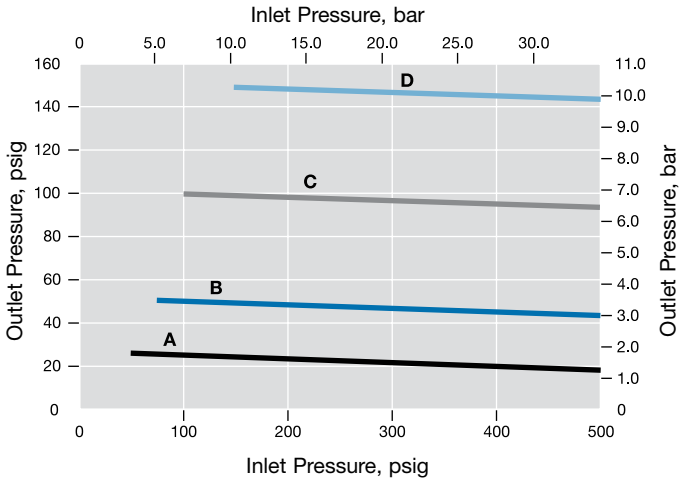
① 20 % minimum elongation allowed.

Operating Performance

Inline and 1.5 in. Modular Surface-Mount Models

Load Spring Range at Maximum Inlet and Outlet Pressures

The operating range for each load spring includes the area below each line.

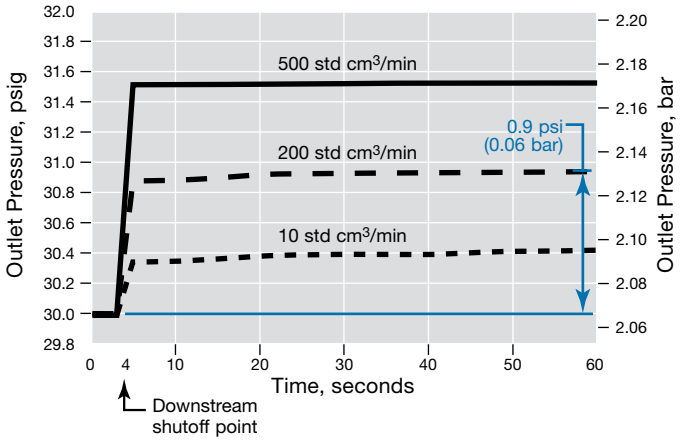


Load Spring	Outlet Pressure Range psig (bar)	Spring Color
A	Vacuum to 25 (1.7)	Red
B	5 to 50 (0.34 to 3.4)	White
C	10 to 100 (0.68 to 6.8)	Blue
D	20 to 150 (1.3 to 10.3)	Yellow

1.125 in. Modular Surface-Mount Model

Average Lockup Pressure

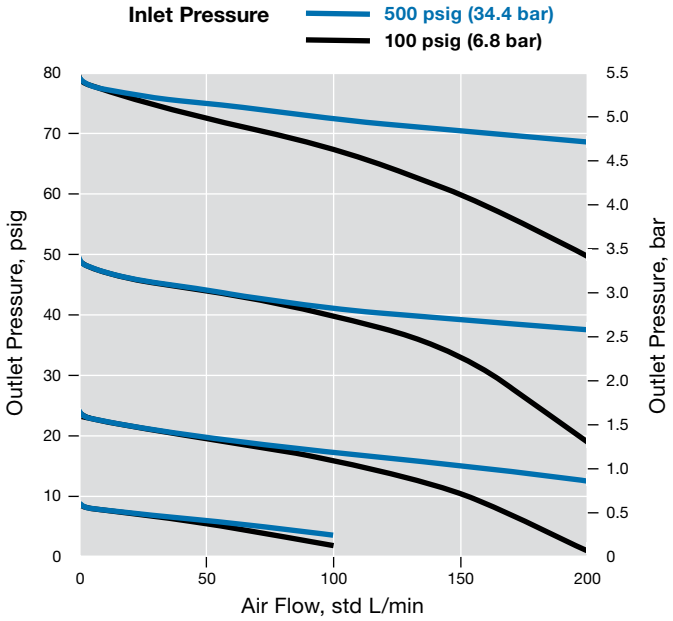
Example: For a flow rate of 200 std cm^3/min, after downstream flow is shut off, the change in outlet pressure is approximately 0.9 psi (0.06 bar).



Flow Data

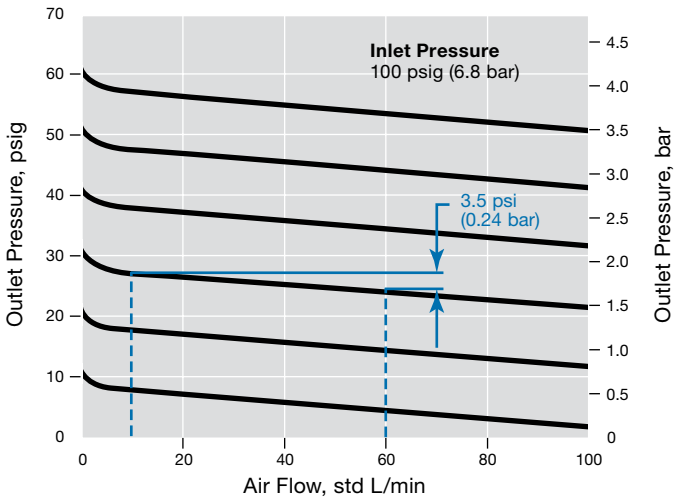
The graphs illustrate the change or “droop” in outlet pressure as the flow rate increases and the inlet pressure decreases.

Inline and 1.5 in. Modular Surface-Mount Models



1.125 in. Modular Surface-Mount Model

Example: For an outlet pressure of 30 psig as the flow rate increases from 10 to 60 std L/min, the differential outlet pressure, or droop, is approximately 3.5 psi (0.24 bar).

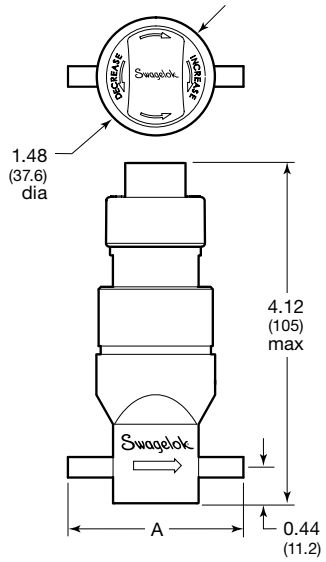


Dimensions

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

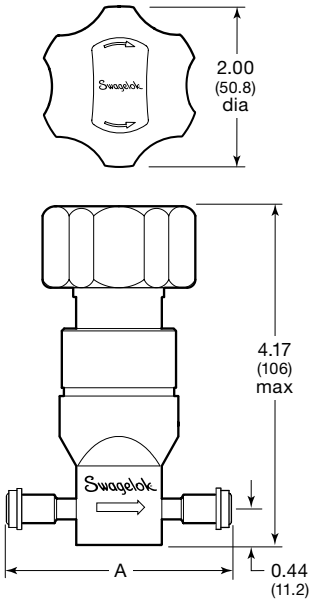
Inline Models

Standard Handle



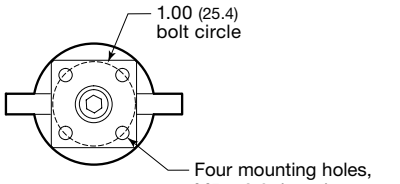
Tube Butt Weld End Connections

Low-Torque Handle



VCR End Connections

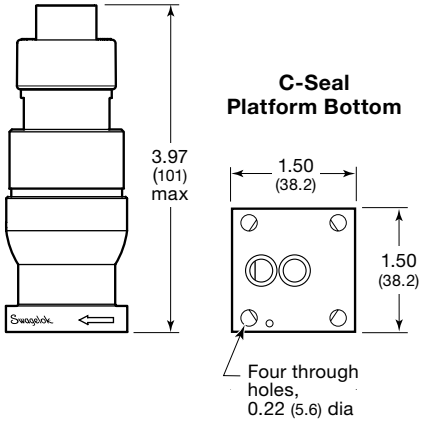
Bottom



End Connection	A, in. (mm)
Butt weld	2.15 (54.6)
VCR, short gland	2.78 (70.6)
VCR, long gland	3.70 (94.0)

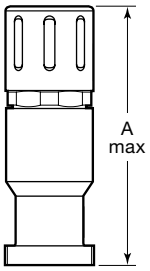
Modular Surface-Mount Models

1.50 in. Platform

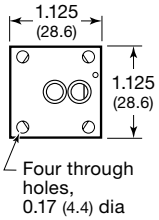


1.125 in. Platform

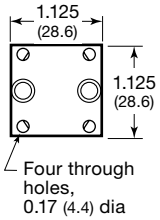
Standard Handle



C-Seal Platform Bottom



W-Seal Platform Bottom



Handle	A, in. (mm)
Standard	3.66 (93.0)
Tamper resistant	3.57 (90.7)

Ordering Information

Inline and 1.5 in. Modular Surface-Mount Models

To order a complete assembly, order a regulator and a spring kit. Regulators are stocked with narrow-profile blue nylon handles and without spring kits.

SS – **HFM3B** – **VCR4** – **P**

Body Material
316L VIM-VAR stainless steel

Model
HFM3B = inline
MSM-HFM3B = modular surface-mount

End Connections
VCR4 = 1/4 in. VCR **short** gland①
VCR4L = 1/4 in. VCR **long** gland①
BW4 = 1/4 in. tube butt weld
None = C-seal surface-mount (MSM-HFM3B only)

Process
P = Swagelok *Ultrahigh-Purity Process Specification (SC-01);* electropolished, R_a 5 µin. (0.13 µm) average
P1 = Swagelok *Special Cleaning and Packaging (SC-11);* electropolished, R_a 5 µin. (0.13 µm) average

① Swagelok VCR split-nut assemblies must be ordered separately. See below.

Spring Kits

Spring kits include a load spring, load disk, label, and installation instructions. To order, select the spring kit ordering number based on the desired outlet pressure range of the regulator.

Outlet Pressure Range psig (bar)	Spring Kit Ordering Number
Vacuum to 25 (1.7)	177-13K-HFM-A
5 to 50 (0.34 to 3.4)	177-13K-HFM-B
10 to 100 (0.68 to 6.8)	177-13K-HFM-C
20 to 150 (1.3 to 10.3)	177-13K-HFM-D①

① See **Low-Torque Handle,** page 7.

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.

Male split-nut assembly ordering number:
SS-4-VCR-4-SN

Female split-nut assembly ordering number:
SS-4-VCR-1-SN

Ordering Information

1.125 in. Modular Surface-Mount Model

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

SS – MSM-HFE ___ ___ – P – **A** ___

Body Material
316L VIM-VAR stainless steel

Model
Manual gas pressure regulator, 1.125 in. modular suface-mount

Seal
None = C-seal
-W = W-seal

Handle
-TR = Tamper-resistant handle (see below)
None = Standard handle

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

Outlet Pressure Range
A = Vacuum to 30 psig (2.0 bar)
B = Vacuum to 60 psig (4.1 bar)

Handle Color
-BK = Black
-GR = Green
-OR = Orange
-WH = White
-YW = Yellow
None = Blue

Options and Accessories

Inline and 1.5 in. Modular Surface-Mount Models

Factory-Installed Load Springs

Regulators can be ordered with a *factory-installed* load spring. To order, add the spring designator to the regulator ordering number.

Example:
SS-HFM3B-VCR4-P-**A**

Outlet Pressure Range psig (bar)	Spring Designator
Vacuum to 25 (1.7)	-A
5 to 50 (0.34 to 3.4)	-B
10 to 100 (0.68 to 6.8)	-C
20 to 150 (1.3 to 10.3)	-D

Aluminum Handles

Narrow-Profile Handle

The standard, narrow-profile handle is also available in aluminum with a choice of seven epoxy-coated colors.

To order a *factory-installed* narrow-profile aluminum handle on an HF series manual regulator, add the handle color designator to the regulator ordering number.

Example: SS-HFM3B-VCR4-P-**BK**

Handle Color	Designator
Black	-BK
Blue	-BL
Green	-GR
Orange	-OG
Red	-RD
White	-WH
Yellow	-YW

Low-Torque Handle

An optional six-lobed handle is available to provide a lower actuation torque. The low-torque handle is epoxy-coated aluminum and is available in seven colors.

The low-torque handle is suitable for use with the 20 to 150 psig (1.3 to 10.3 bar) spring kit. The handle has a diameter of 2.00 in. (50.8 mm), as shown on page 5, and is not recommended for use with modular surface-mount regulators.

To order a *factory-installed* low-torque aluminum handle, insert **L** and add the color designator to the regulator ordering number as shown.

Example: SS-HFM**L**3B-VCR4-P-**BK**

1.125 in. Modular Surface-Mount Model

Tamper-Resistant Handle

- Set—outlet pressure is adjusted using a set screw in the top of the handle.
- Seal—handle sticker is applied to prevent access to the set screw.

Maintenance Kits

Inline and 1.5 in. Modular Surface-Mount Models

Poppet Kits

A poppet kit includes one poppet, poppet port seal, and installation instructions.

Ordering number: **MS-3K-HFM3**

Poppet Tool

A poppet replacement tool is needed for poppet installation.

Ordering number: **MS-TOOL-HFM3**

Oxygen Service Hazards

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

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

Swagelok

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.

Caution: Do not mix or interchange parts 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.

Compact, High-Flow Gas Regulators

HF Series

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

Swagelok

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.

Cylinder Model (HFS4A Model)

Inline Point-of-Use Model (HFS4B Model)

Compact Inline Point-of-Use Model (HFS3B Model)

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)

HFD3B Model
VCR split-nut option

MSM-HFD3B Model
IGC II modular surface-mount

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

Model Number	Pressure Rating psig (bar) Max Inlet (p_1)	Pressure Rating psig (bar) Outlet (p_2) Range	Temperature Rating °F (°C) Operating	Temperature Rating °F (°C) Bakeout①	Supply-Pressure Effect (SPE)	Flow Coefficient (C_v)	Flow Capacity std L/min	Orifice Size in. (mm)	Internal Volume with 1/4 in. Butt Weld Ends in.³ (cm³)	Preset Outlet Pressure psig (bar)
Preset										
HFS4A	3000 (206)②	5 to 150 (0.35 to 10.3)	–10 to 150 (–23 to 65)	302 (150)	0.4	0.1	200	0.090 (2.3)	0.97 (15.9)	80 (5.5)
HFS4B					0.9	0.2	300	0.120 (3.0)		10 (0.68) 20 (1.3) 30 (2.0) 50 (3.4)
HFS3B	1000 (68.9)				1.3		200		0.40 (6.6)	
Adjustable Dome-Loaded										
HFD3B	1000 (68.9)	5 to 150 (0.35 to 10.3)	–10 to 150 (–23 to 65)	302 (150)	1.6	0.2	200	0.120 (3.0)	0.28 (4.7)	10 (0.68) 20 (1.3) 30 (2.0) 50 (3.4)
MSM-HFD3B									0.24 (3.9)	

① Contact your authorized Swagelok sales and service representative for more information.

② 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

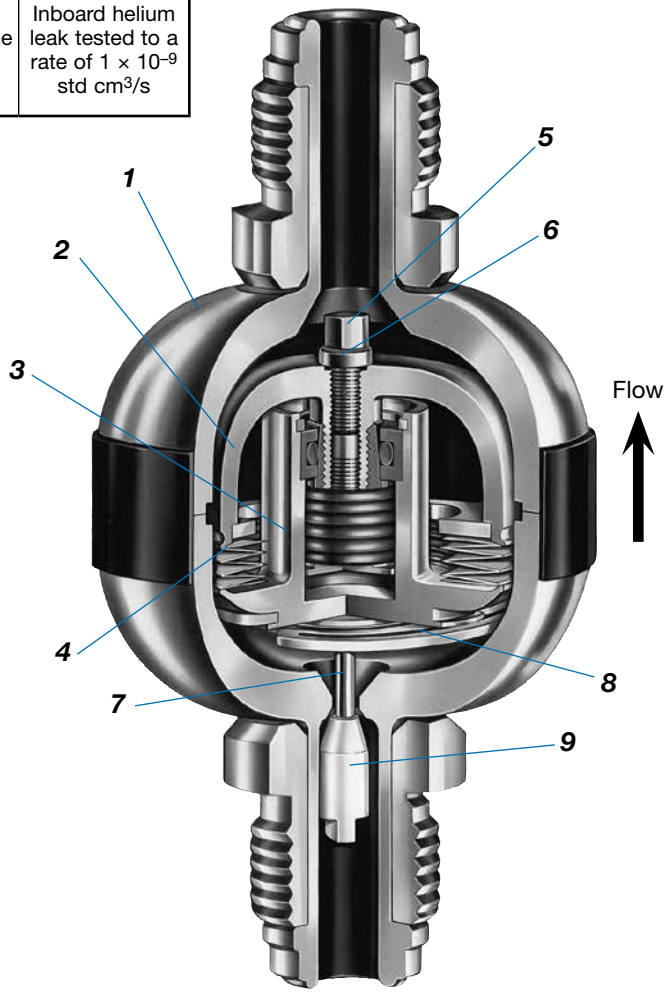
Refer to Swagelok *Ultrahigh-Purity Process Specification (SC-01)* catalog, MS-06-61, for details on processes, process controls, and process verification.

Cleaning	Assembly and Packaging	Wetted Surface Roughness (R_a)	Testing
Ultrahigh-purity cleaning with a continuously monitored, deionized water, ultrasonic cleaning system	Performed in Class 100 work areas; regulators are individually bagged and vacuum sealed in cleanroom bags	5 µin. (0.13 µm) average, machine finished and electropolished	Inboard helium leak tested to a rate of 1×10^{-9} std cm³/s

Materials of Construction

	Wetted Component	Material / Specification
1	*Body (inlet, outlet)*	*316L SS VIM-VAR / SEMI F20 Ultrahigh-Purity①*
2	*Support housing*	
3	*Face plate*	
4	*Diaphragm*	*Alloy 625 / AMS 5879*
5	*Fill screw*	*316L SS / ASTM A479*
6	*Fill screw gasket*	*Nickel 200 / ASTM B160*
7	*Stem*	*316L SS / ASTM A479*
8	*Poppet-retaining wafer*	*Alloy X-750 / ASTM B637*
9	*Poppet*	*PCTFE / AMS 3650*
10	*Poppet port seal (not shown)*	*Nickel 200 / ASTM B160*

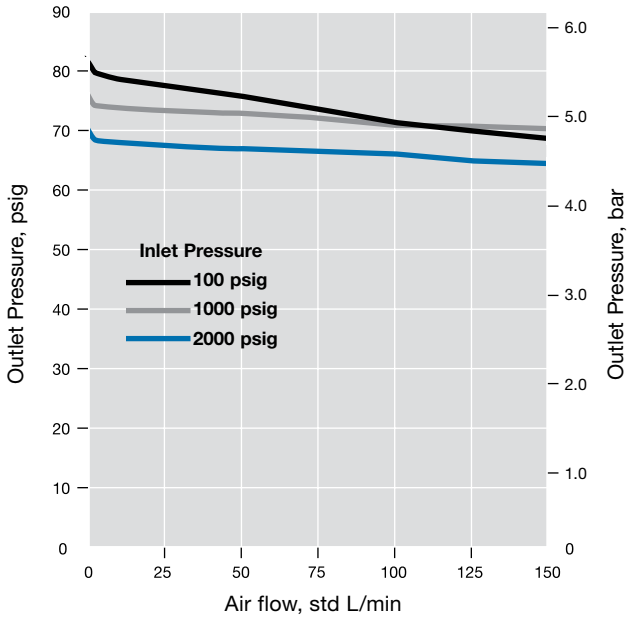
① 20 % minimum elongation allowed.



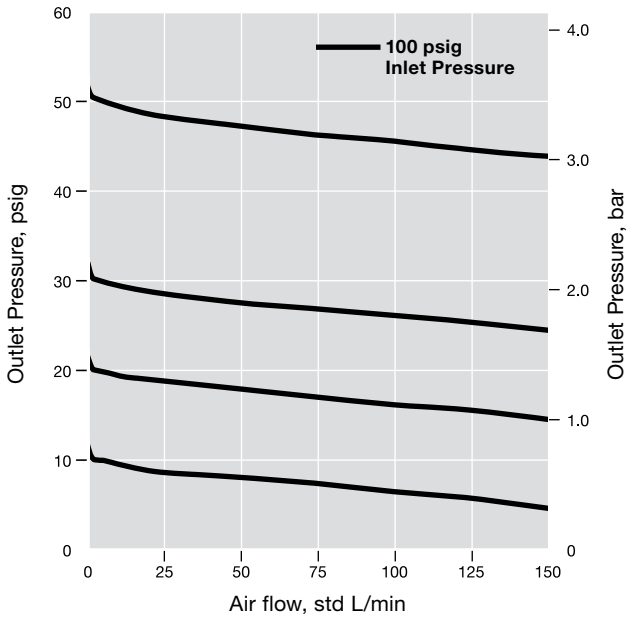
Swagelok

Flow Data

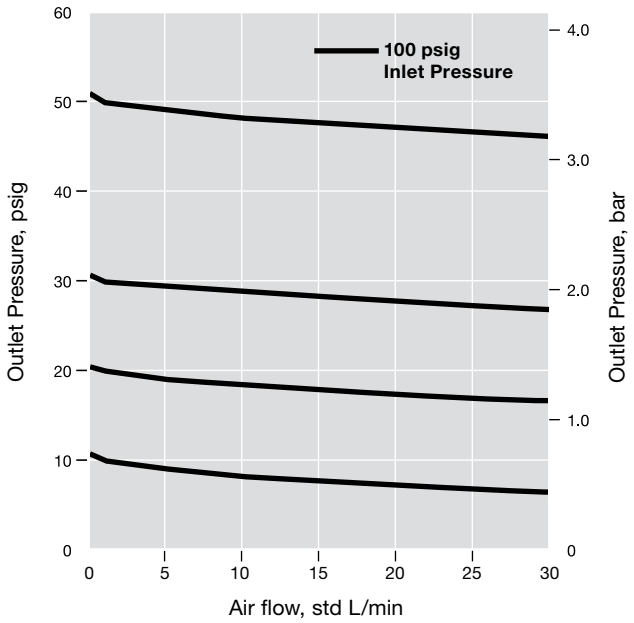
HFS4A Model



HFS4B Model



HFS3B, HFD3B, MSM-HFD3B Models



Calculating 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:

$$p_4 = p_3 + ([p_1 - p_2]/100) \times \text{SPE}$$

where:

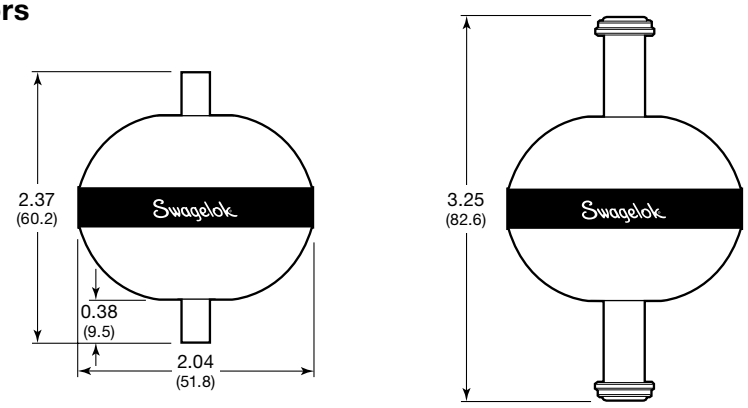
p_4 = adjusted outlet pressure
p_3 = initial outlet pressure
p_1 = initial inlet pressure
p_2 = new inlet pressure

Dimensions

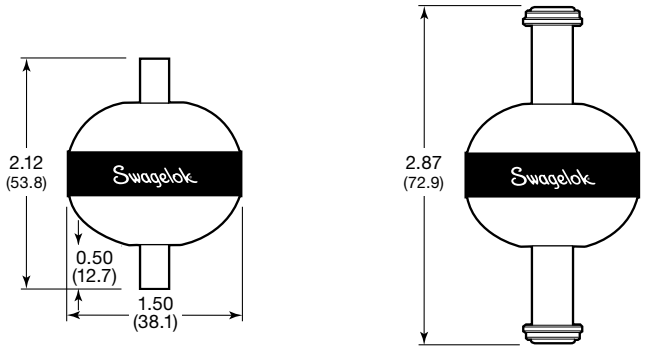
Dimensions, in inches (millimeters), are for reference only and are subject to change.

Preset Pressure Regulators

HFS4A and HFS4B Models

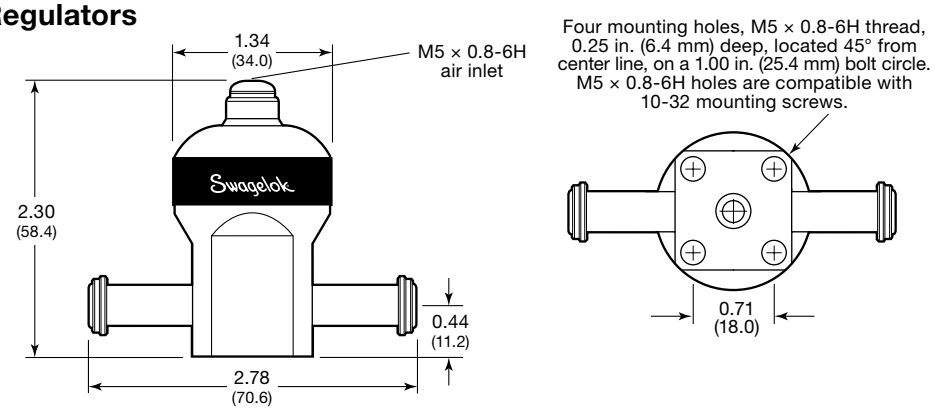


HFS3B Model

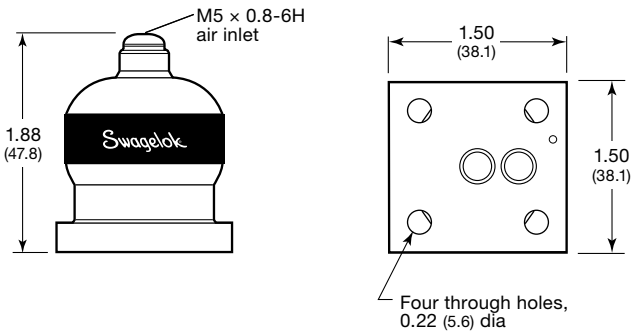


Dome-Loaded Pressure Regulators

HFD3B Model



MSM-HFD3B Surface-Mount Model



Ordering Information

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

SS – **HFS4A** __ – **HVCR4** – P **80**

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

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

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

① Swagelok VCR split-nut assemblies must be ordered separately. See below.

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.

Male split-nut assembly ordering number:
SS-4-VCR-4-SN

Female split-nut assembly ordering number:
SS-4-VCR-1-SN

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

Swagelok

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.

Caution: Do not mix or interchange parts 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.