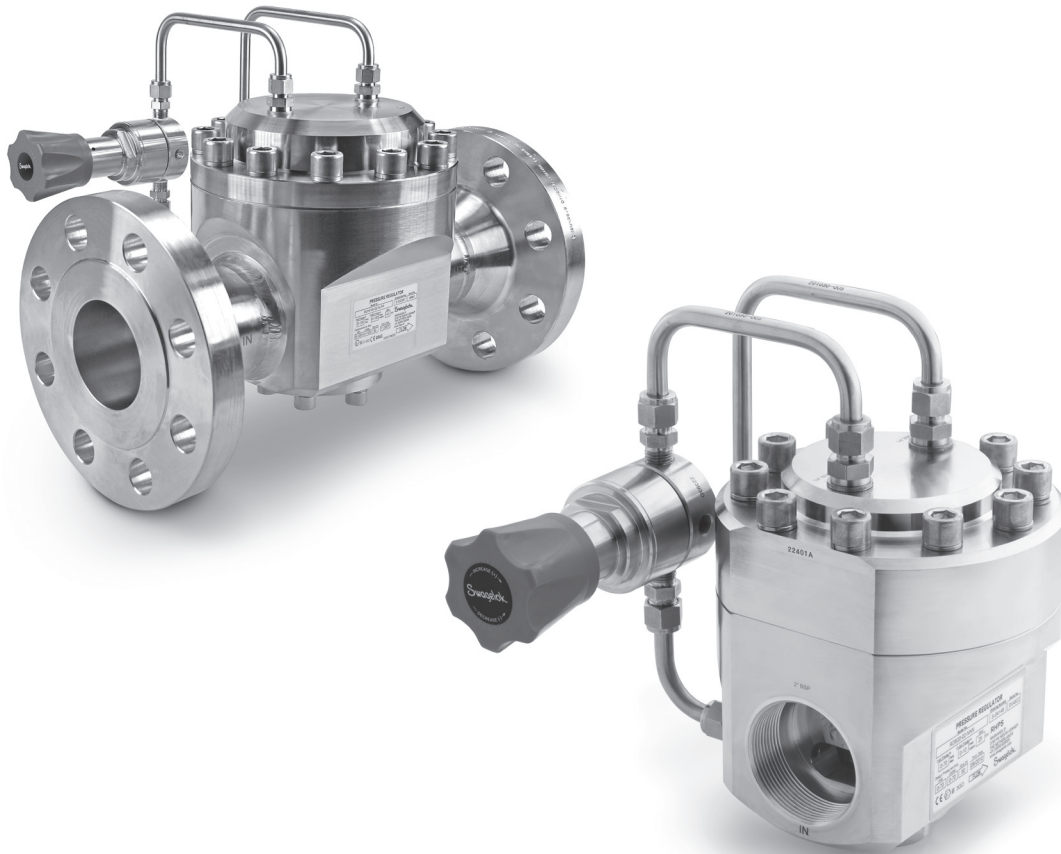


# Pressure Regulators RHPS Series



- Pressure-reducing models
- Back-pressure models
- Spring- and dome-
- 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)

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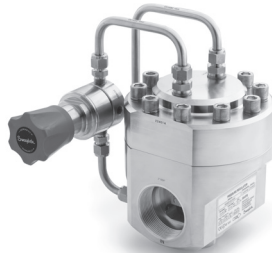
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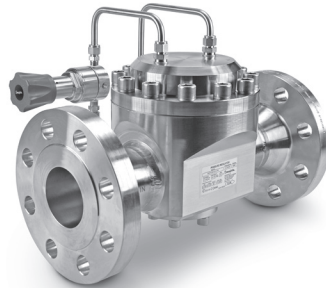
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## Features

### 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

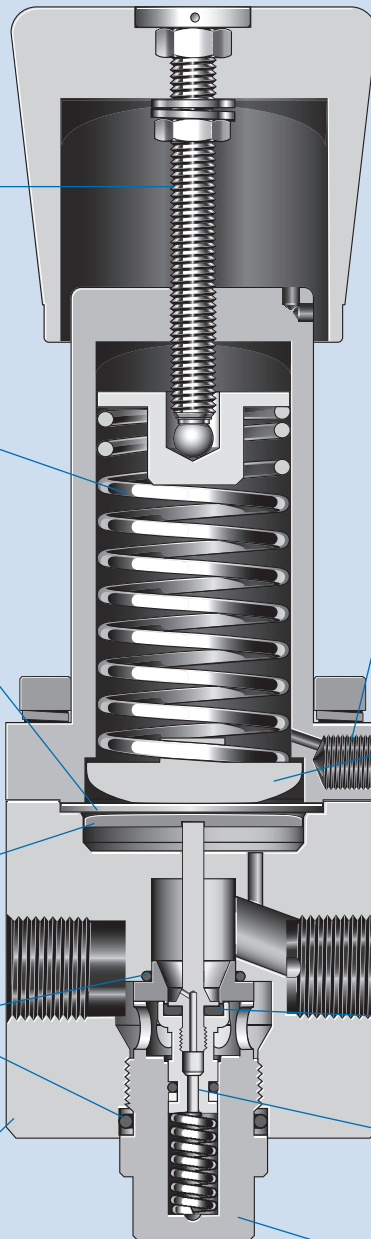
available in a variety of materials for enhanced chemical compatibility in a wide range of applications.

### Body Material

316L SS for improved corrosion resistance.

### 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.



### 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

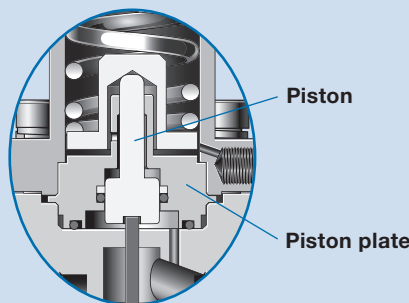
available in PCTFE, PEEK, and a variety of elastomers.

### Balanced Poppet Design

reduces supply-pressure effect and lockup.

### Body Plug

allows for easy maintenance and more up-time.



## Types of Regulators

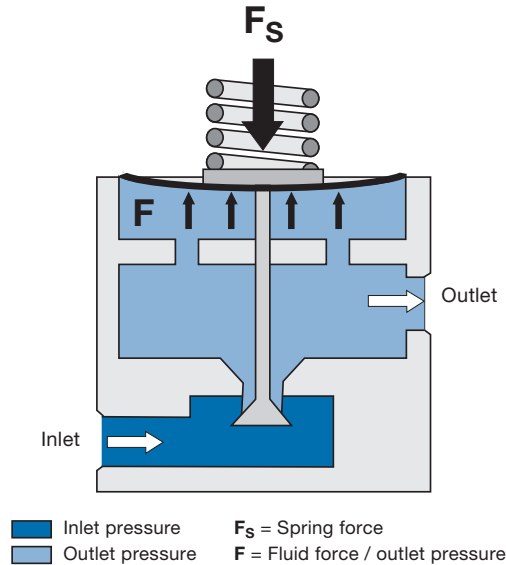
There are two types of RHPS series pressure regulators

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

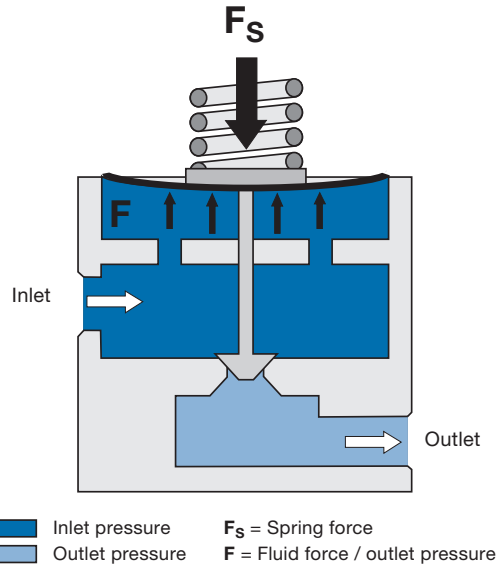
## How a Pressure Regulator Works

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



### Back-Pressure 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.

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



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.

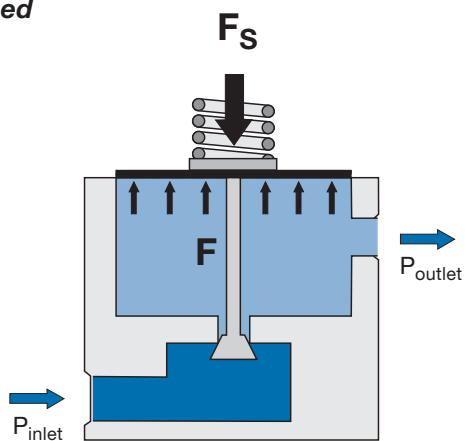
#### Spring-Loaded

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.

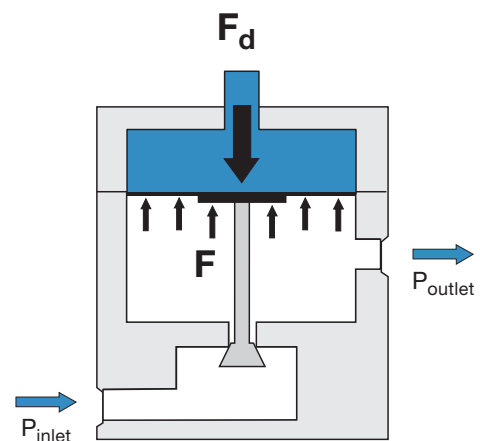
#### Dome-Loaded

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.

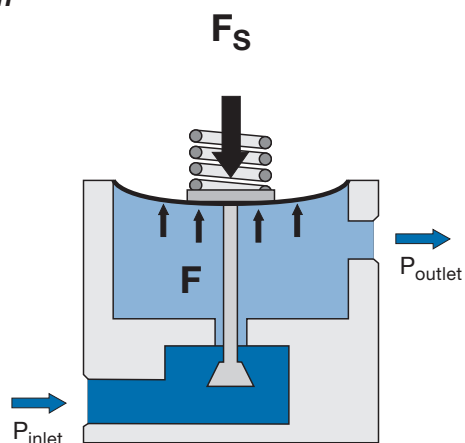
**Closed**



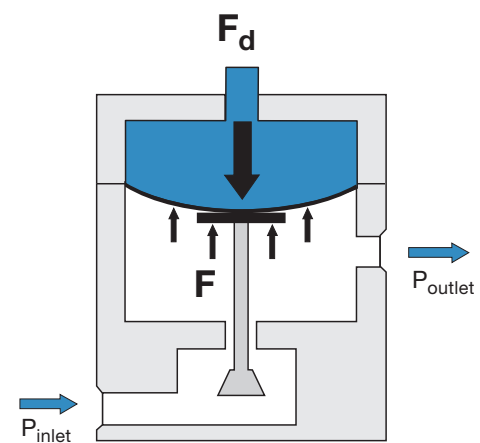
$$F_S \text{ or } F_d \leq F$$



**Open**



$$F_S \text{ or } F_d > F$$



#### 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).

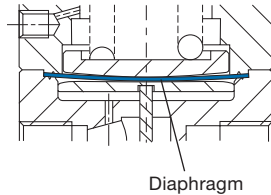
## Components

### 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.

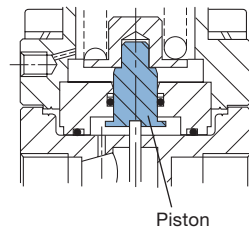
#### ■ Diaphragm Sensing

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.

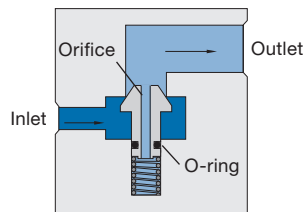


### Controlling Mechanisms

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.

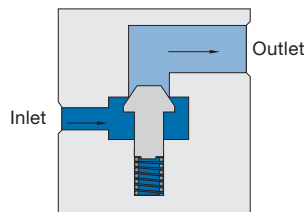
#### ■ Balanced Poppet

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.

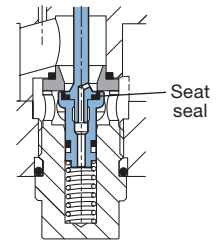


### Seat Design

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

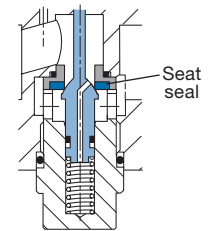
#### ■ Soft Seat Seal

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.

### 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) 20



LRS(H)4

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.

**⚠ Improper installation of gauges in NPT threaded ports can result in galling issues.**

To order gauge ports without factory plugs installed, contact your authorized Swagelok sales and service center.

### 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)
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)			
176 (80)	1812 (125)		

### Technical Data—Performance

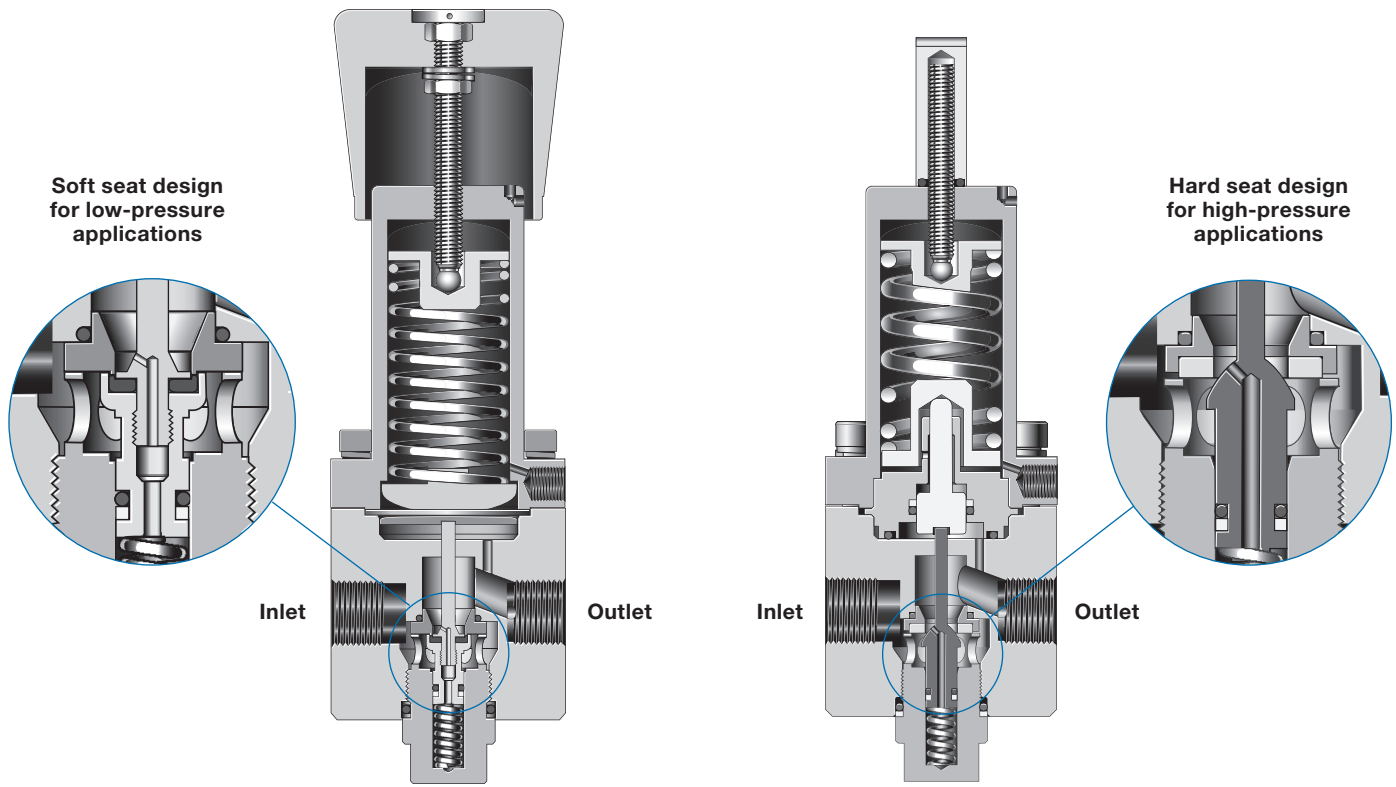
Series	Maximum Inlet Pressure <sup>①</sup> psig (bar)	Maximum Outlet Control Pressure <sup>①</sup> psig (bar)	Flow Coefficient (C <sub>v</sub> )	Sensing Type	Flow Data on Page
RS2	5 800 (400)	5 075 (350)	0.05	Piston	10
RSH2	10 150 (700)	10 150 (700)			
RS20	1 015 (70.0)	290 (20.0)	13	Diaphragm	—
RSH20	5 800 (400)				
LRS4	507 (35.0)	290 (20.0)	0.73	Diaphragm	17
LRS4	5 800 (400)		0.10		18

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

## Pressure-Reducing, Spring-Loaded Regulators—RS Series

**RS Series Regulator  
with Diaphragm Sensing  
and Standard Knob Handle**

**RSH Series Regulator  
with Piston Sensing  
and Antitamper Option**



### 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)	9
RSH2					
RS20	0.98 (25.0)	2 in. NPT, ISO/BSP parallel thread, EN or ASME flanges	ISO/BSP parallel thread	39.6 (18.0)	13
RSH20					
LRS4	0.23 (6.0)	1/2 in. NPT	1/4 in. NPT	5.7 (2.6)	16
LRS4	0.087 (2.2)				



## 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



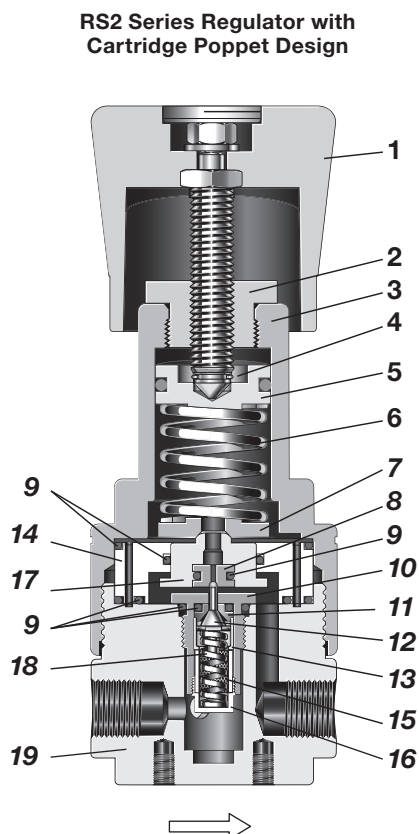
### Technical Data

Series	Maximum Inlet Pressure psig (bar)	Maximum Outlet Control Pressure psig (bar)	Sensing Type	Temperature Range °F (°C)	Flow Coefficient (C <sub>v</sub> )	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 7, for ratings.

See **Flow Data**, pages 10 to 11.

### 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 sales and service center.

### RS2 Series

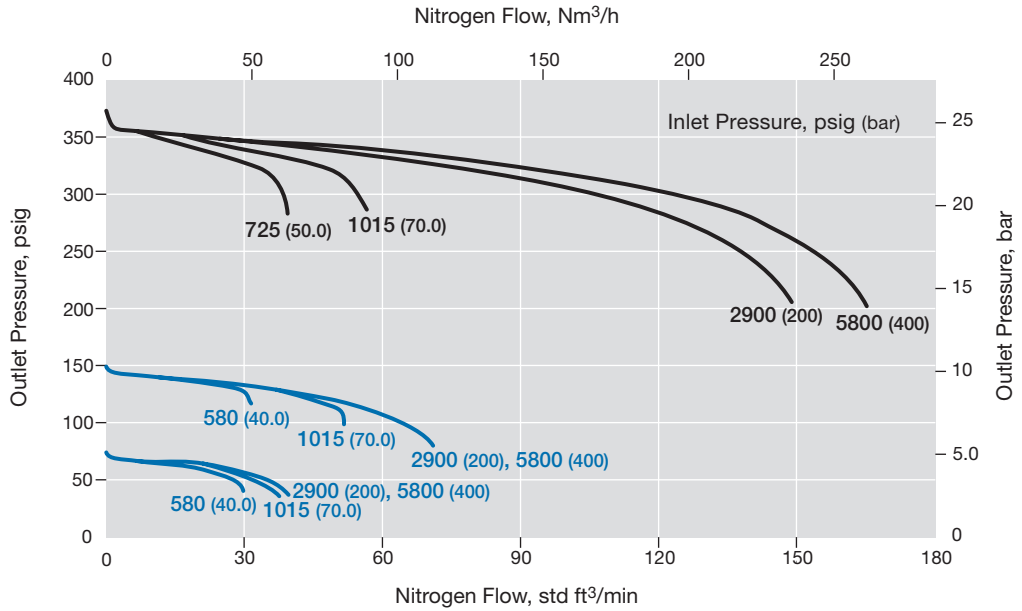
**Flow Coefficient: 0.05**

**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

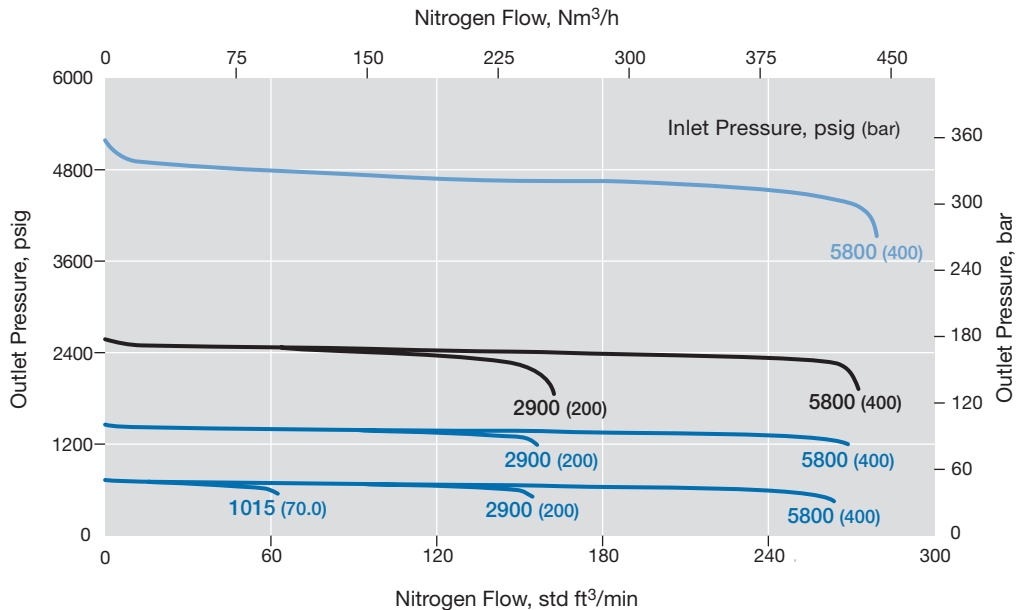
**Flow Coefficient: 0.05**

**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 sales and service center.

### RSH2 Series

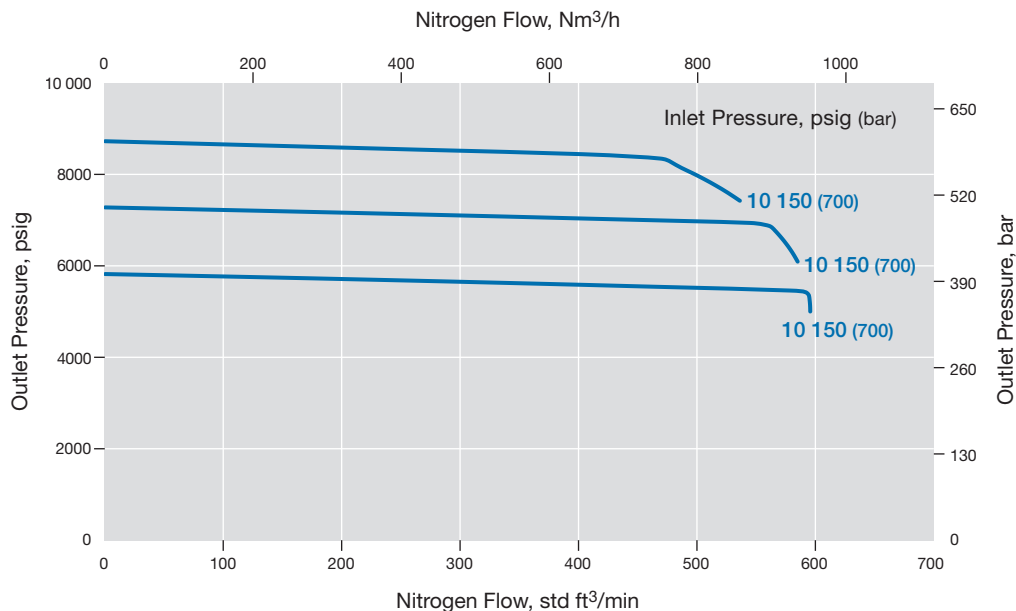
**Flow Coefficient: 0.05**

**Maximum Inlet Pressure: 10 150 psig (700 bar)**

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

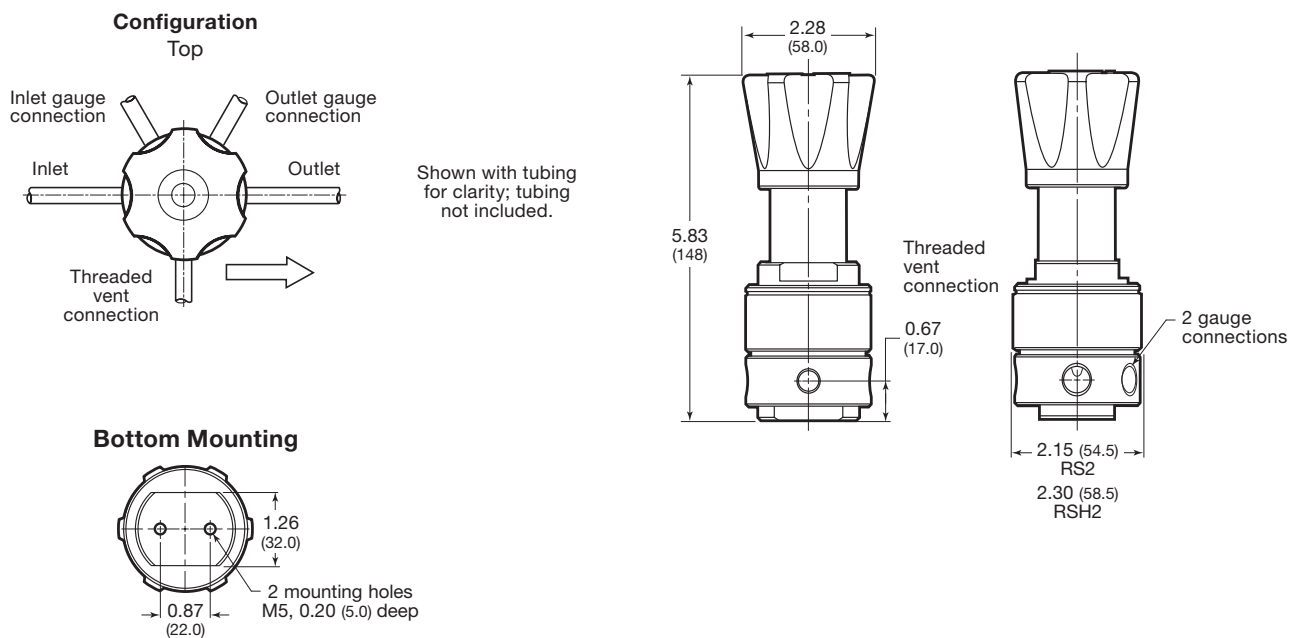
#### Pressure Control Range

— 0 to 10 150 psig (0 to 700 bar)

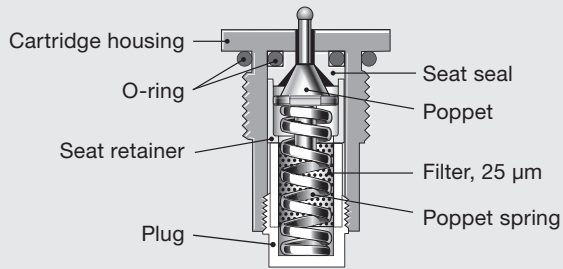


### Dimensions

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



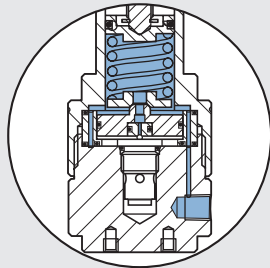
### Cartridge Poppet Assembly Detail



### 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.**



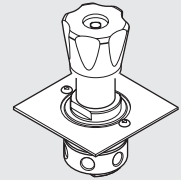
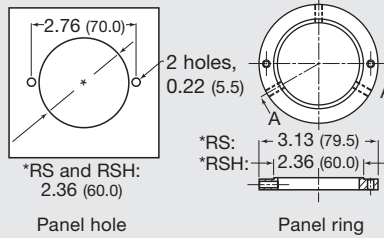
### Panel Mounting Kit

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)20 Series

## Features

- Balanced poppet design
- Diaphragm sensing

## 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 <sub>v</sub> )	Seat Diameter in. (mm)	Connections			Weight (Without Flanges) lb (kg)
							Inlet and Outlet		Gauge <sup>①②</sup>	
							Size	Type		
RS(H)20	RS: 1015 (70.0) RSH: 5800 (400)	290 (20.0)	Diaphragm	-49 to 176 (-45 to 80) See <b>Pressure-Temperature Ratings</b> , page 7.	13	0.98 (25.0)	2 in. DN50	NPT ISO/BSP parallel thread ASME or EN flange	1/4 in. NPT or ISO/BSP parallel thread	39.6 (18.0)

See page 14 for flow data.

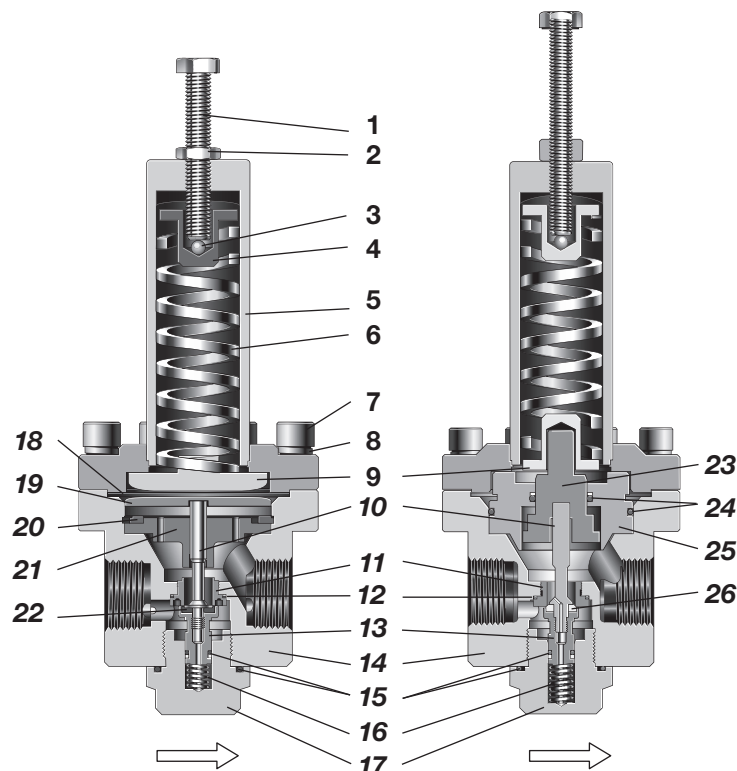
① Regulators with NPT inlet / outlet connections have 1/4 in. NPT gauge connections.

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	<i>S17400 SS or 316L SS</i>
	11 Seat	<i>316L SS / A479</i>
	12 Seat O-ring	<i>EPDM, FKM, or nitrile</i>
	13 Poppet housing	<i>316L SS / A479</i>
	14 Body	<i>316L SS / A479</i>
	15 O-rings	<i>EPDM, FKM, or nitrile</i>
	16 Poppet spring	<i>302 SS / A313</i>
	17 Body plug	<i>316L SS / A479</i>
Diaphragm	18 Diaphragm	<i>EPDM, FKM, or nitrile</i>
	19 Diaphragm plate	<i>316L SS / A479</i>
	20 Retaining ring	<i>Commercial stainless steel</i>
	21 Body plate	<i>316L SS / A479</i>
	22 Seat seal	<i>EPDM, FKM, or nitrile</i>
Piston	23 Piston	<i>316L SS / A479</i>
	24 Piston O-rings	<i>EPDM, FKM, or nitrile</i>
	25 Piston plate	<i>316L SS / A479</i>
	26 Seat seal	<i>PEEK or PCTFE</i>

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 sales and service center.

#### RS20 Series

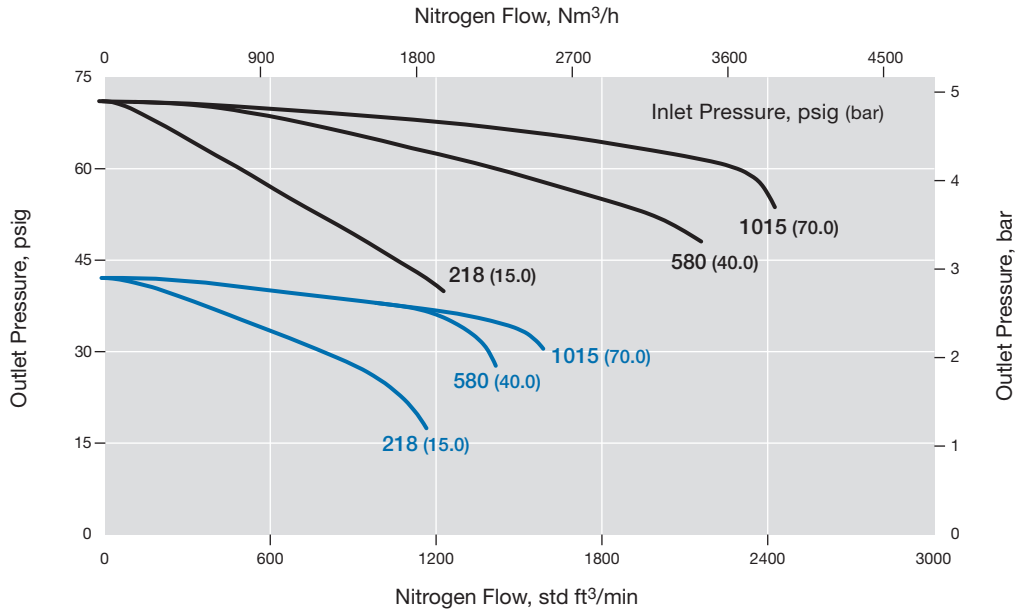
**Flow Coefficient: 13**

**Maximum Inlet Pressure: 1015 psig (70.0 bar)**

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

**Pressure Control Range**

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



#### RS20 Series

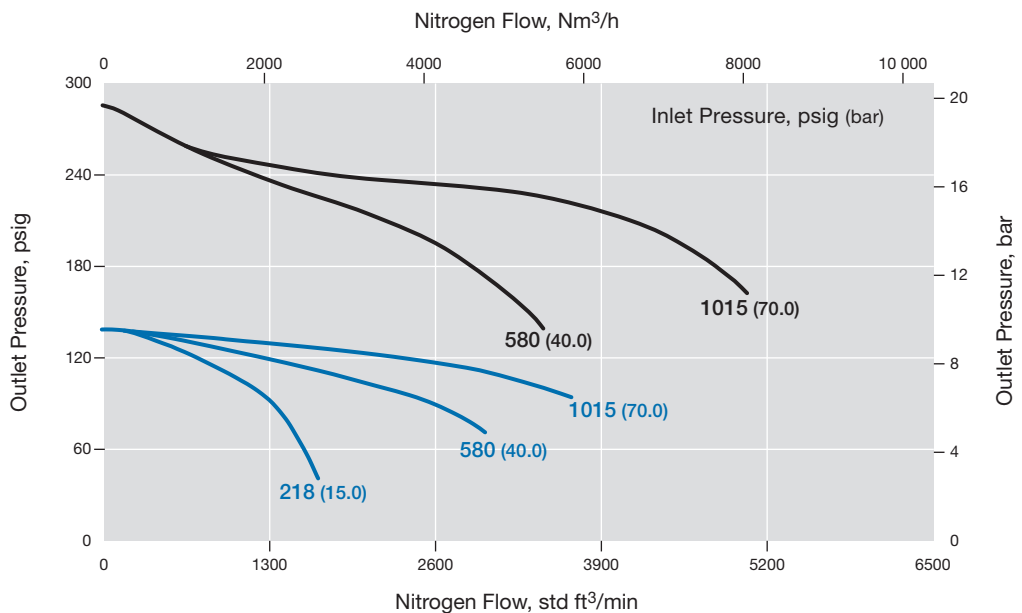
**Flow Coefficient: 13**

**Maximum Inlet Pressure: 1015 psig (70.0 bar)**

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

**Pressure Control Range**

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

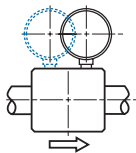


## Dimensions

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

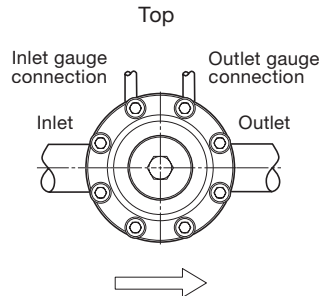
Series	End Connection Size	Dimensions, in. (mm)						
		A	B	C	D	E	F	G
RS(H)20	2 in.	11.3 (288)	5.51 (140)	3.93 (100)	2.44 (62.0)	1.85 (47.0)	2.56 (65.0)	6.30 (160)

### Gauge Connection

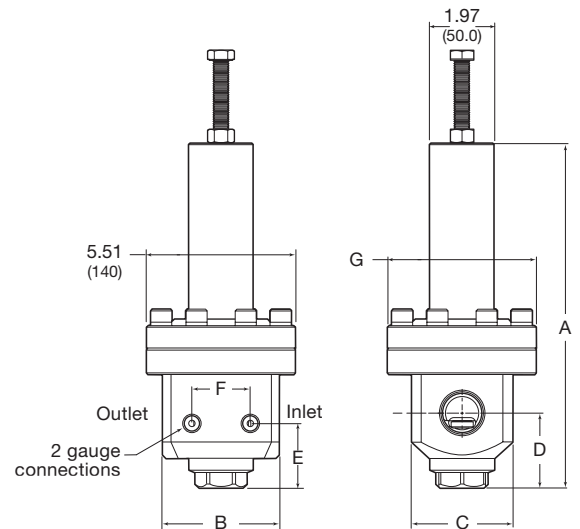


Only one gauge with a 50 mm (2 in.) or larger dial size fits directly into the body.

### Configuration



Shown with tubing for clarity; tubing not included.



## Ordering Information

Build an 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 20 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

**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)

### 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



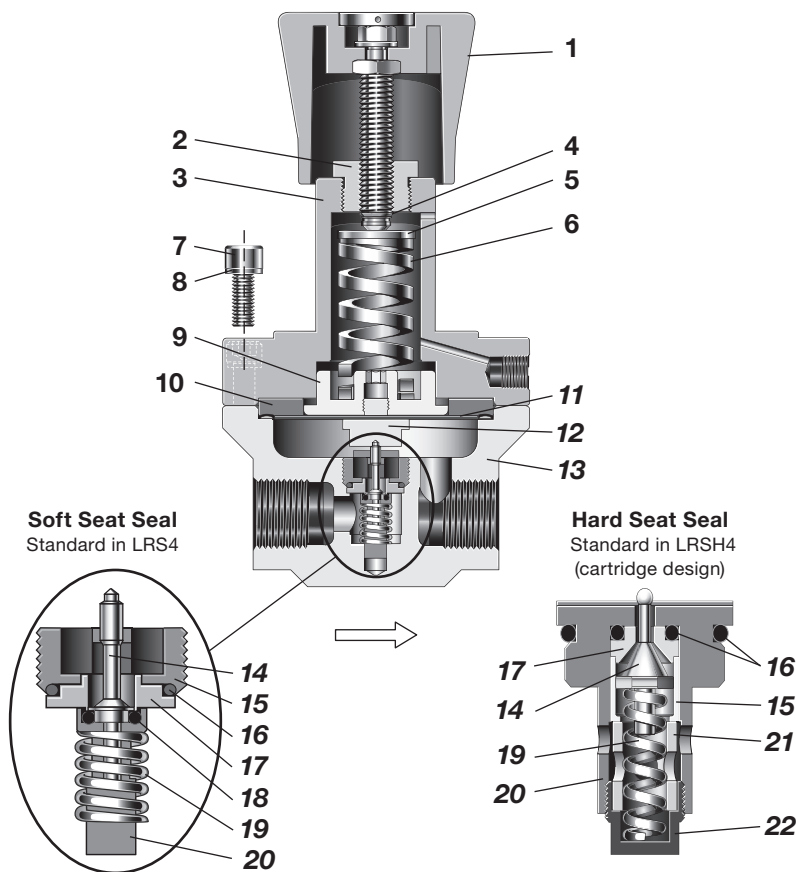
### Technical Data

Series	Maximum Inlet Pressure psig (bar)	Maximum Outlet Control Pressure psig (bar)	Sensing Type	Temperature Range °F (°C)	Flow Coefficient (C <sub>v</sub> )	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)	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)			See <b>Pressure-Temperature Ratings</b> , page 7.	0.10	0.087 (2.2)			

See pages 17 to 18 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 sales and service center.

### LRS4 Series

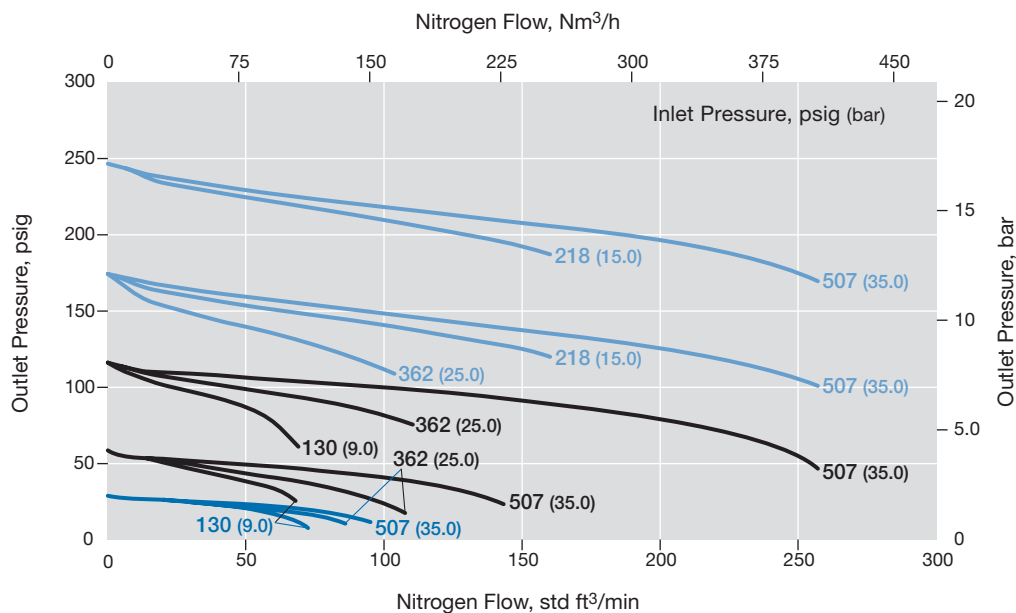
**Flow Coefficient: 0.73**

**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

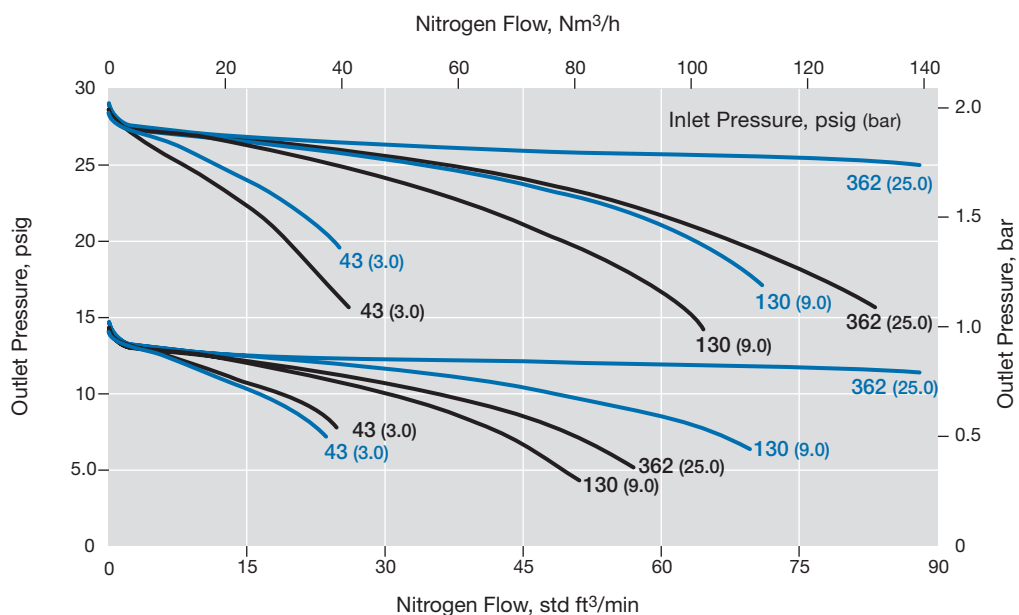
**Flow Coefficient: 0.73**

**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 sales and service center.

### LRS4 Series with Optional 316L SS Diaphragm

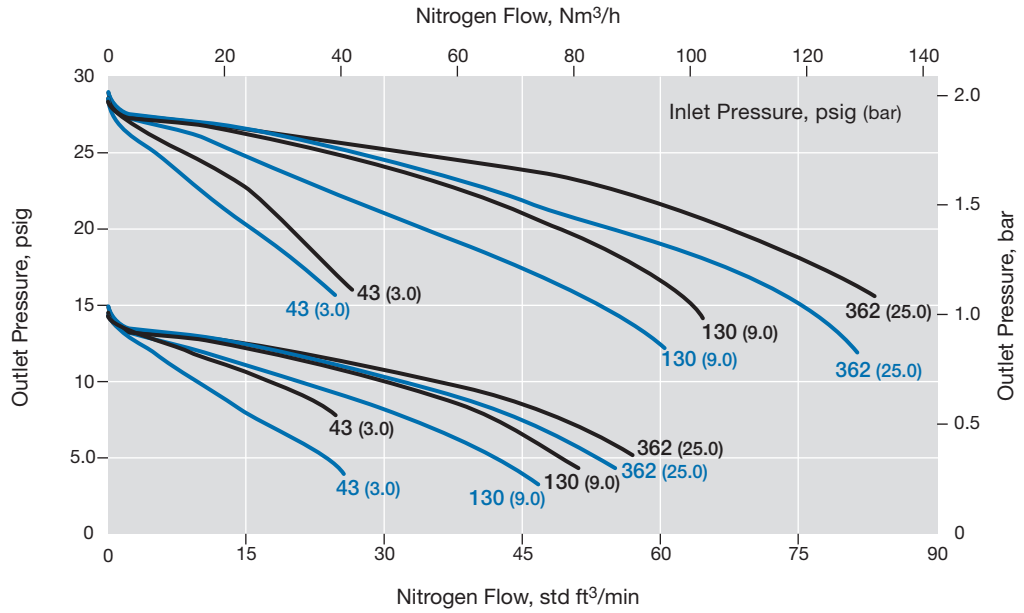
**Flow Coefficient: 0.73**

**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



### LRS4 Series

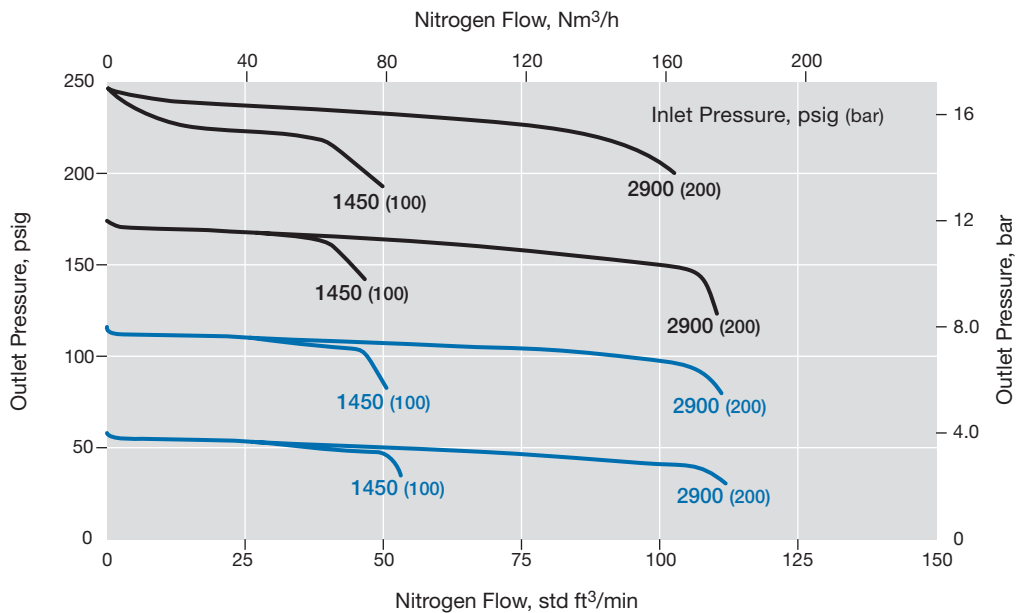
**Flow Coefficient: 0.10**

**Maximum Inlet Pressure: 5800 psig (400 bar)**

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

#### Pressure Control Range

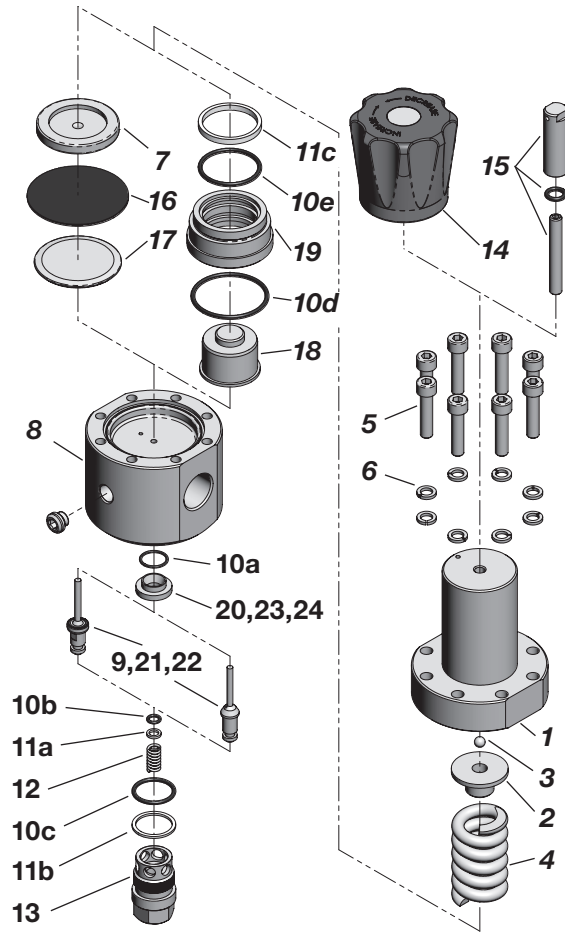
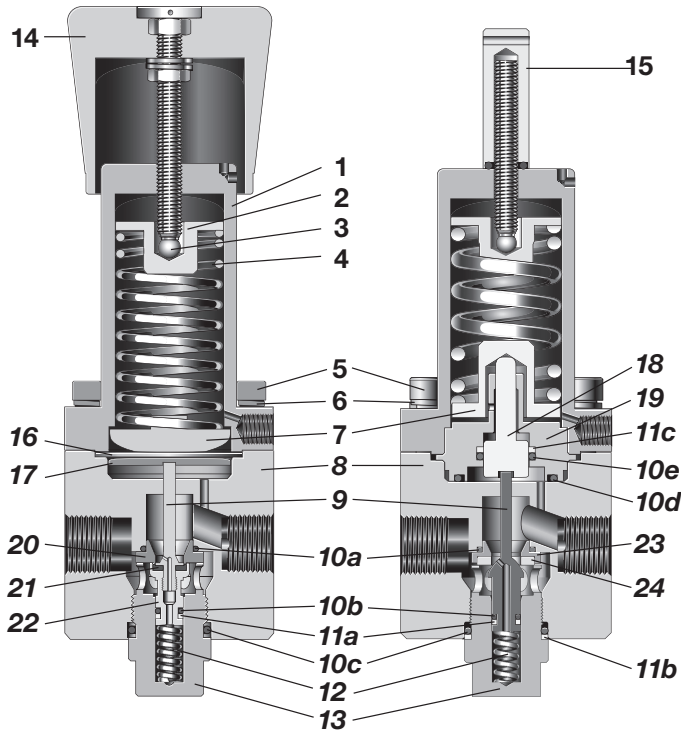
- 0 to 290 psig (0 to 20.0 bar)
- 0 to 130 psig (0 to 9.0 bar)





## 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 Regulators—RD Series

These pressure-reducing, dome-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.

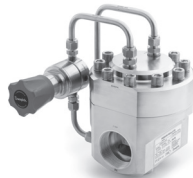
These regulators are available with a choice of threaded end connections from 1/4 to 2 in., and with flange end connections from 2 to 4 in.

### Features

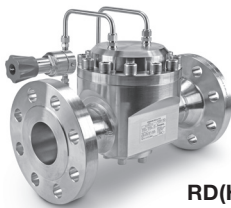
- Dome-loaded pressure control
- Diaphragm sensing design except RD2 series
- 316L stainless steel materials of construction for corrosion resistance
- Maximum inlet pressure ratings:  
1015 to 5800 psig (70.0 to 400 bar)
- Outlet pressure control ranges:  
Up to 0 to 5800 psig (0 to 400 bar)



RD2



RD(H)20, 25



RD(H)30, 40



LPRD25, 30, 40

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.

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.

**⚠ Improper installation of gauges in NPT threaded ports can result in galling issues.**

To order gauge ports without factory plugs installed, contact your authorized Swagelok sales and service center.

## Pressure-Reducing, Dome-Loaded Regulators—RD 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

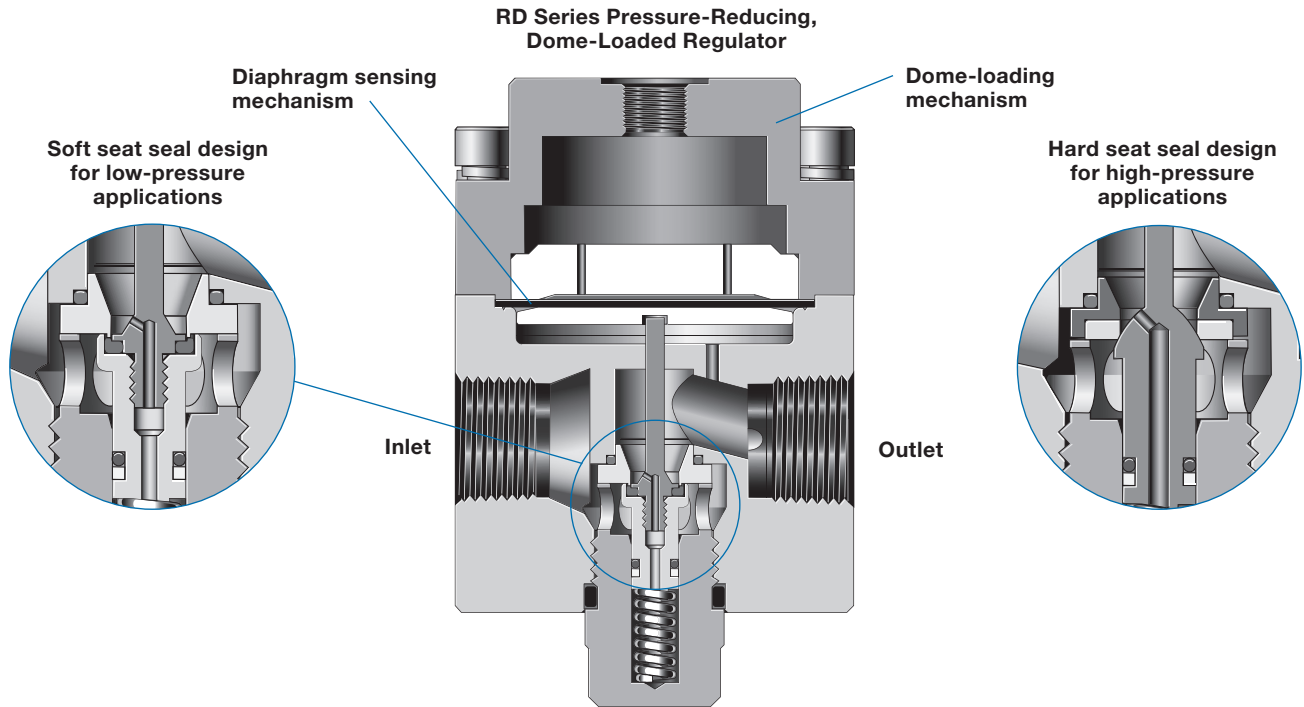
Seat Material	PCTFE	PEEK	Fluorocarbon FKM, Nitrile, EPDM, FFKM
Temperature °F (°C)	Maximum Inlet Pressure / Working Pressure psig (bar)		
-49 to -40 (-45 to -40)	—	—	1015 (70.0)
-40 to 95 (-40 to 35)	5 800 (400)	5 800 (400)	
149 (65)	3987 (275)		
176 (80)	1812 (125)		

### Technical Data—Performance

Series	Maximum Inlet Pressure <sup>①</sup> psig (bar)	Maximum Outlet Control Pressure <sup>①</sup> psig (bar)	Flow Coefficient (C <sub>v</sub> )	Sensing Type	Flow Data on Page
RD2	5800 (400)	5800 (400)	0.05	Piston	25
RD20	1015 (70.0)	1015 (70.0)	13	Diaphragm	29, 30
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		

① Regulator pressure rating may be limited by connection type.

## Pressure-Reducing, Dome-Loaded Regulators—RD 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)	24
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)	28
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)	28
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)	36
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)	36
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	46
LPRD25	1.25 (32.0)	2 1/2 in. EN or ASME flanges				46
LPRD30	1.65 (42.0)	3 in. EN or ASME flanges				46
LPRD40	2.36 (60.0)	4 in. EN or ASME flanges				46

## 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

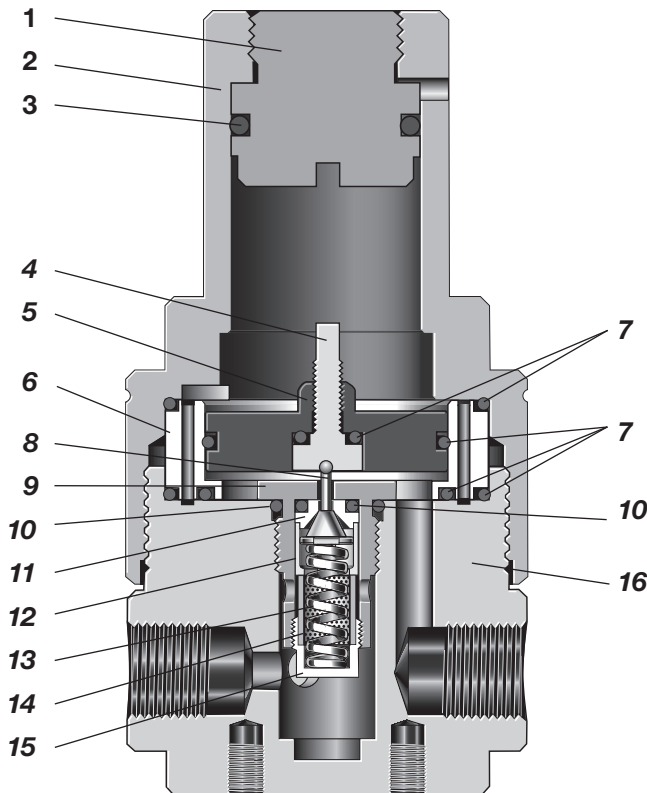


### Technical Data

Series	Maximum Inlet Pressure psig (bar)	Maximum Outlet Control Pressure psig (bar)	Sensing Type	Temperature Range °F (°C)	Flow Coefficient (C <sub>v</sub> )	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 <b>Pressure-Temperature Ratings</b> , page 22.	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 25 to 26 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 sales and service center.

### RD2 Series

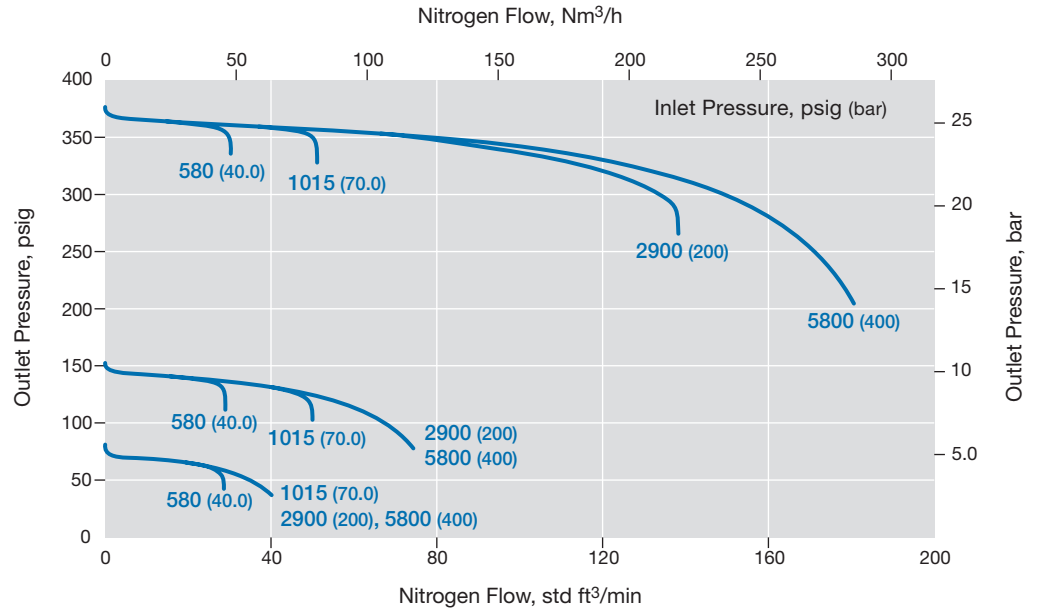
**Flow Coefficient: 0.05**

**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

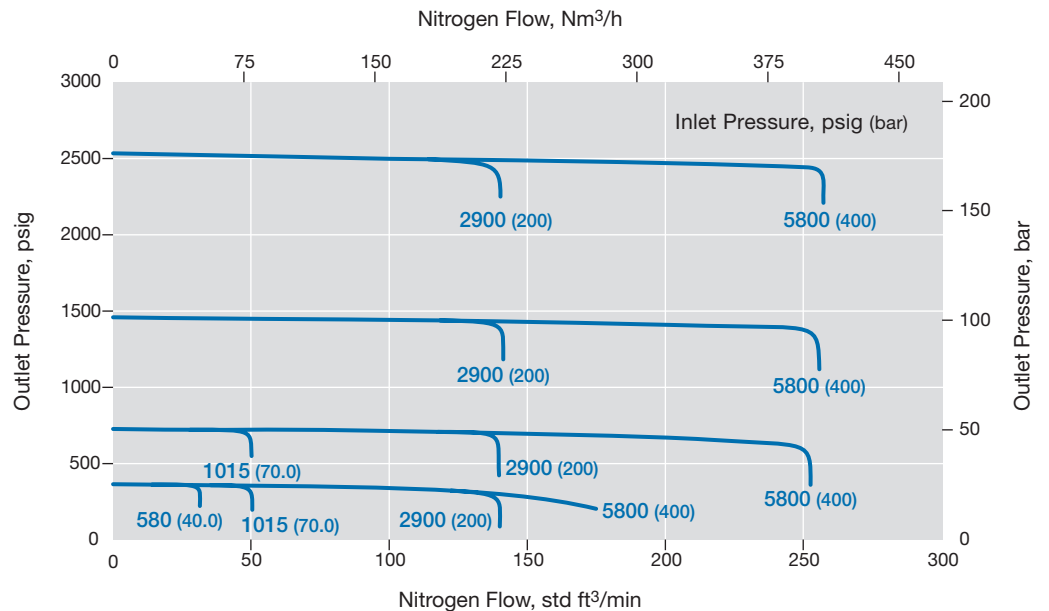
**Flow Coefficient: 0.05**

**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 sales and service center.

### RD2 Series

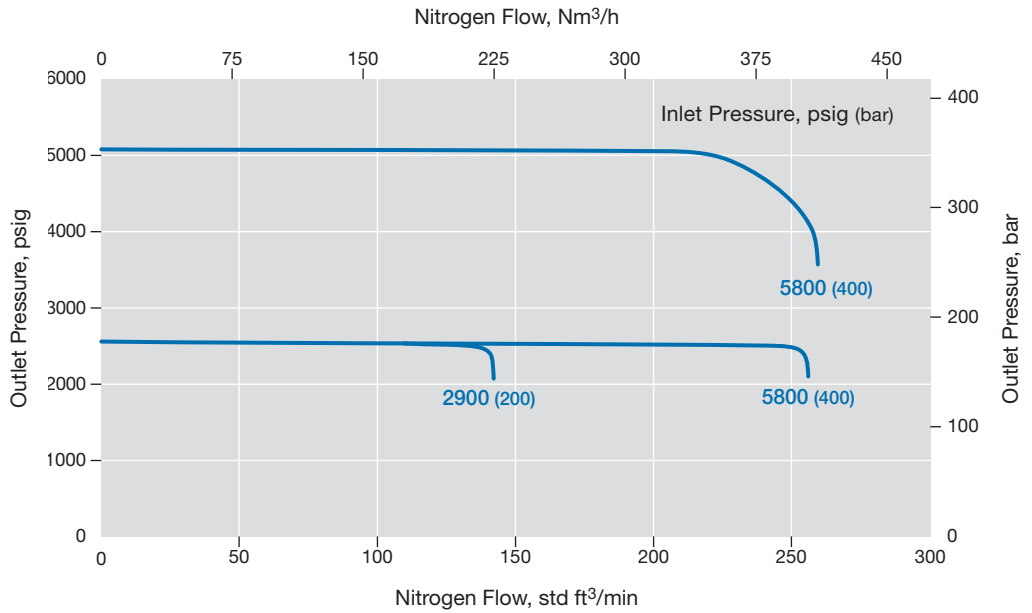
**Flow Coefficient: 0.05**

**Maximum Inlet Pressure: 5800 psig (400 bar)**

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

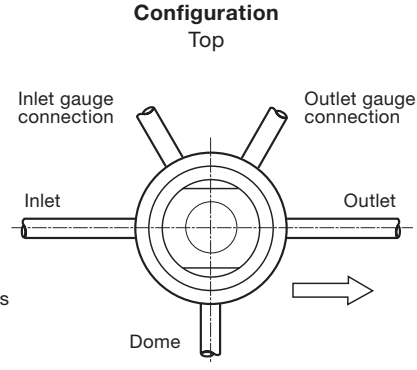
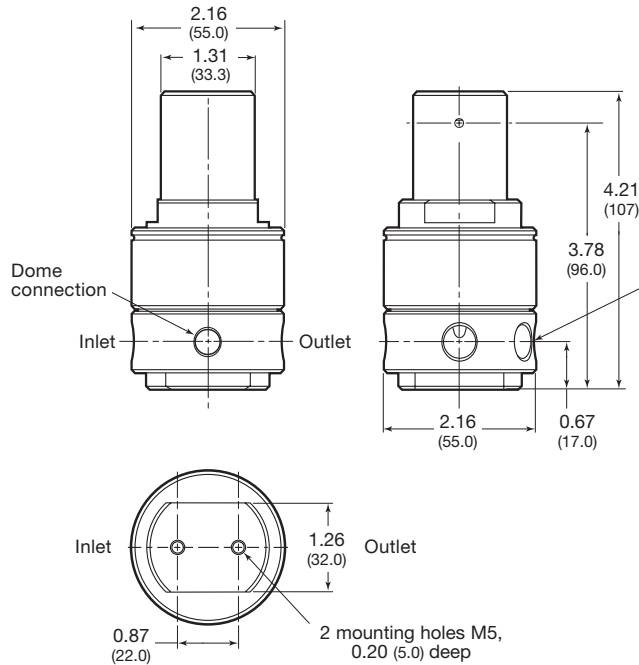
#### Pressure Control Range

— 0 to 5800 psig (0 to 400 bar)



## Dimensions

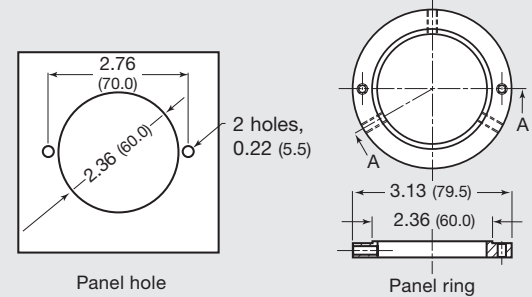
Dimensions, in inches (millimeters), are for reference only and are subject to change.



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** **RD**   **2** **N2** - **02**   **3** - **V**   **4** **V**   **5** **K**   **6** - **7** **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

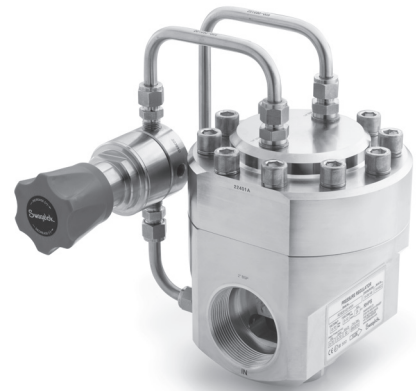
## Integral Pilot-Operated, Dome-Loaded Pressure-Reducing Regulators—RD(H)20 and RD(H)25 Series

### 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) to pilot regulator for improved performance
  - EF to pilot regulator limited to 290 psig (20.0 bar)
- NACE MR0175/ISO 15156-compliant models
- Special cleaning to ASTM G93 Level C



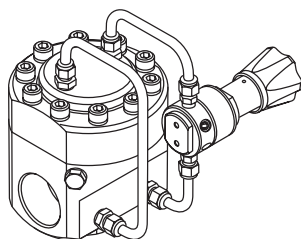
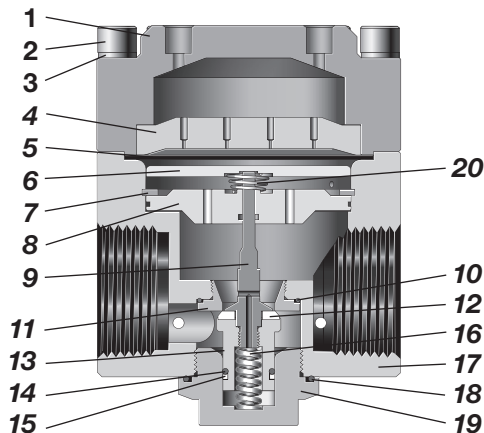
### Technical Data

Series	Maximum Inlet Pressure psig (bar)	Maximum Outlet Control Pressure psig (bar)	Sensing Type	Temperature Range °F (C°)	Flow Coefficient (C <sub>v</sub> )	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)	Diaphragm	-49 to 176 (-45 to 80) See <b>Pressure-Temperature Ratings</b> , page 22.	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)	RDH: 2900 (200)							

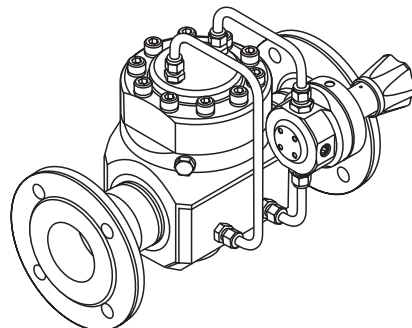
See pages 29 to 34 for flow data.

### 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
<i>Wetted lubricants: Silicone-based and synthetic hydrocarbon-based</i>	

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 sales and service center.

### RD20 Series

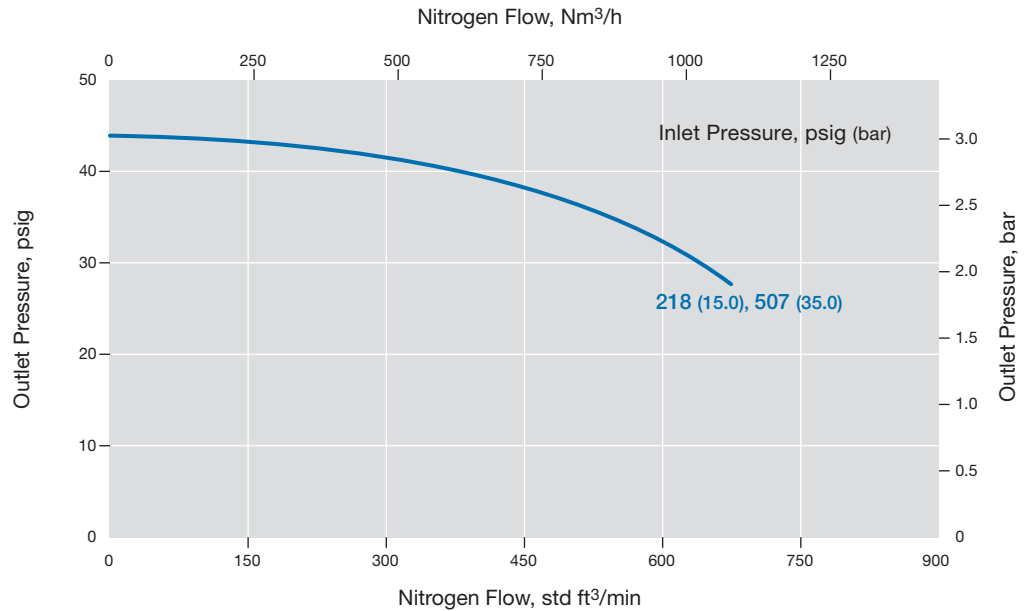
**Flow Coefficient: 13**

**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)**

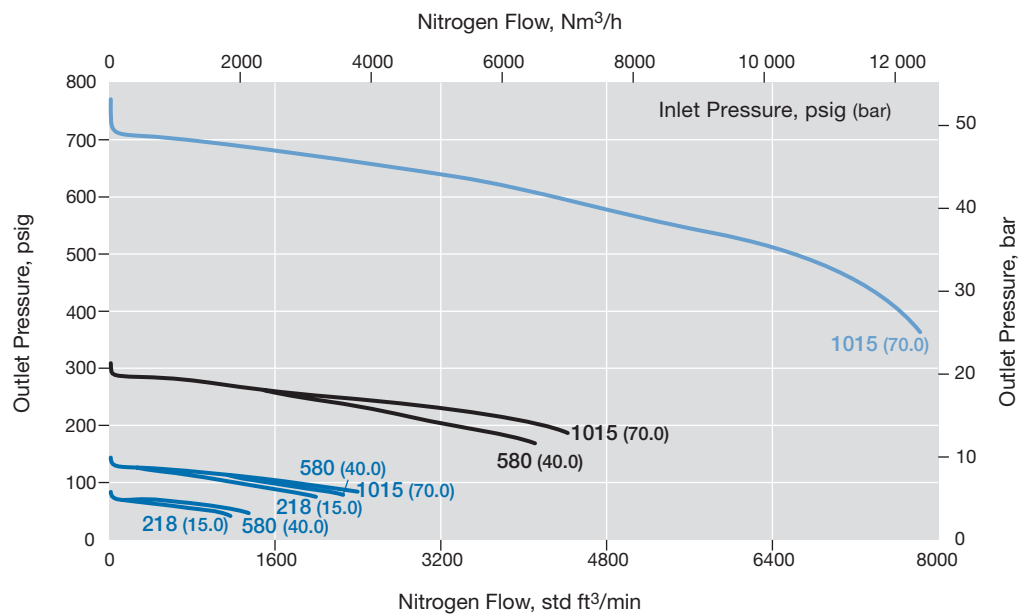
**Outlet Pressure Control Range: 0 to 1015 psig (0 to 70.0 bar)**

#### 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 sales and service center.

#### RDH20 Series

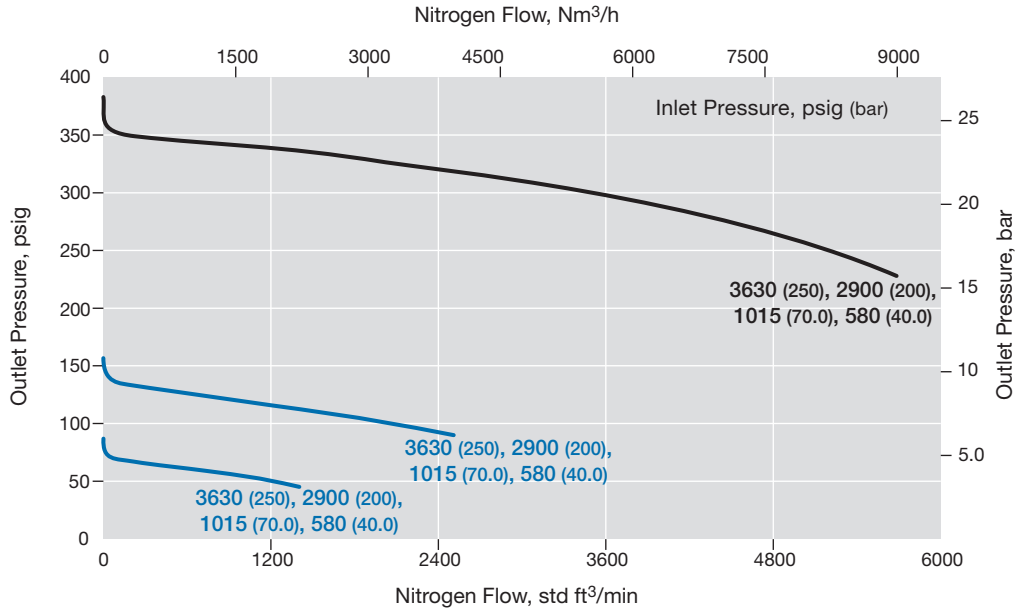
**Flow Coefficient: 13**

**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

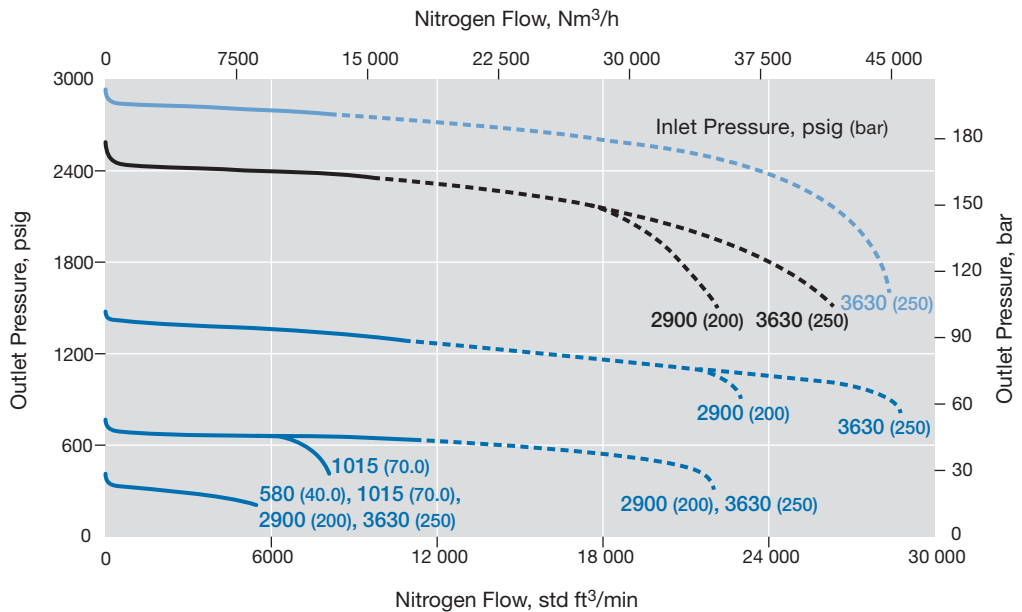
**Flow Coefficient: 13**

**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 sales and service center.

### RD20-EFP Series

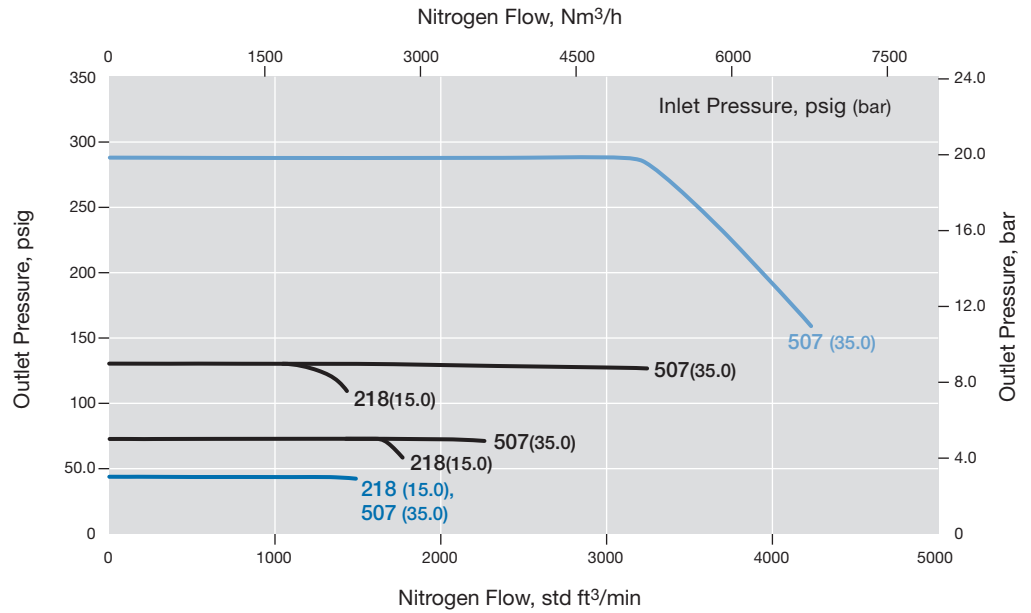
**Flow Coefficient: 13**

**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 sales and service center.

### RD25 Series

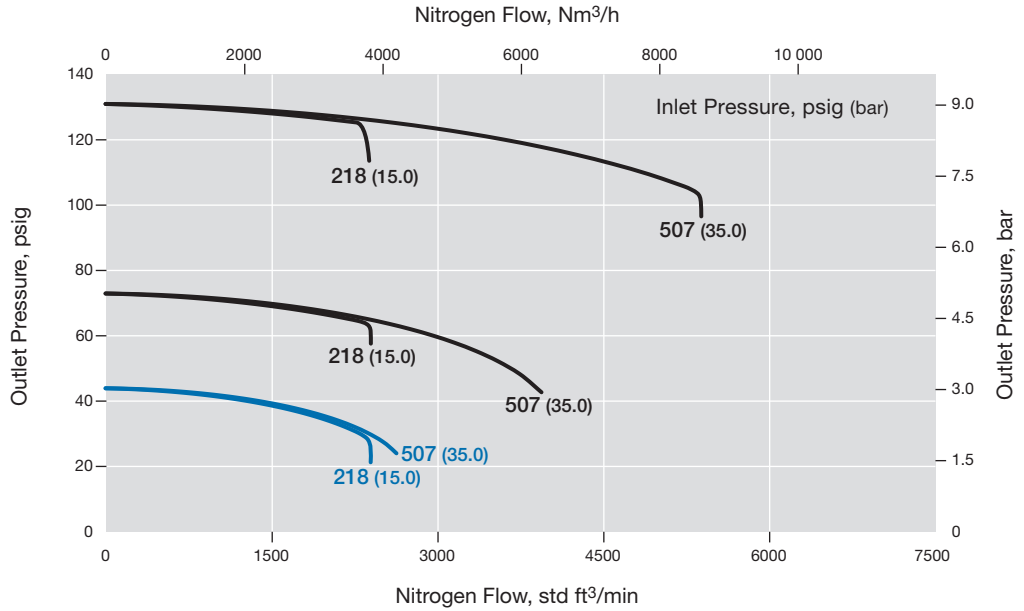
**Flow Coefficient: 21**

**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 sales and service center.

### RDH25 Series

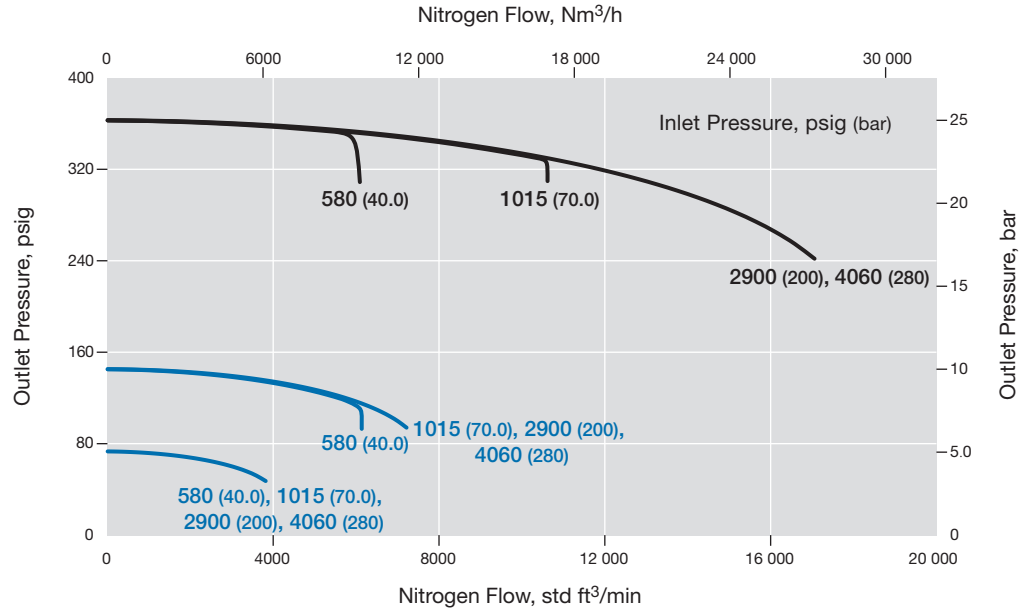
**Flow Coefficient: 21**

**Maximum Inlet Pressure: 4060 psig (280 bar)**

**Outlet Pressure Control Range: 0 to 362 psig (0 to 25.0 bar)**

**Pressure Control Range**

- 0 to 362 psig (0 to 25.0 bar)
- 0 to 145 psig (0 to 10.0 bar)



### RDH25 Series

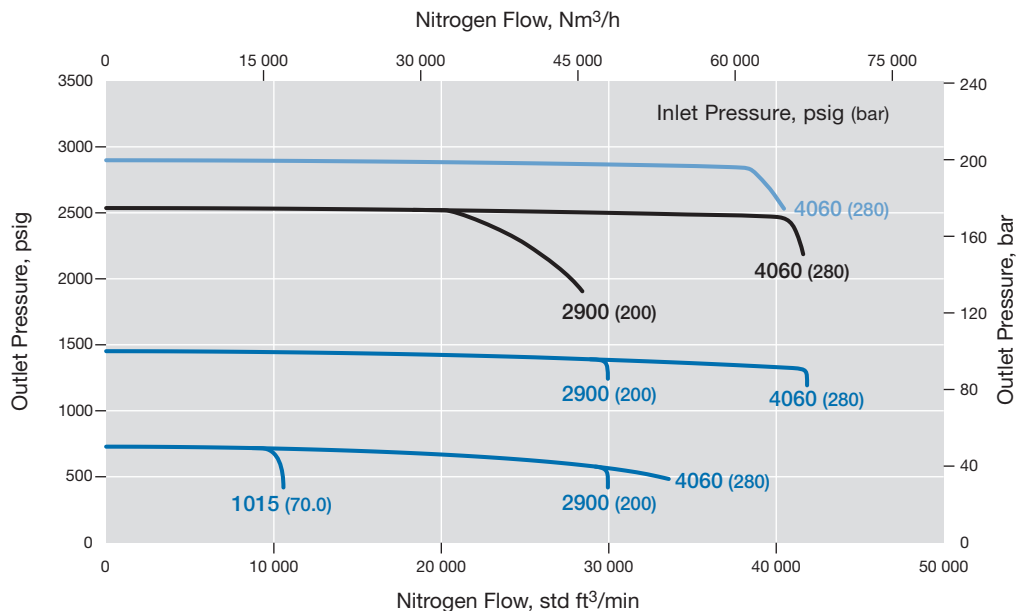
**Flow Coefficient: 21**

**Maximum Inlet Pressure: 4060 psig (280 bar)**

**Outlet Pressure Control Range: 0 to 2900 psig (0 to 200 bar)**

**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 sales and service center.

### RD25-EFP Series

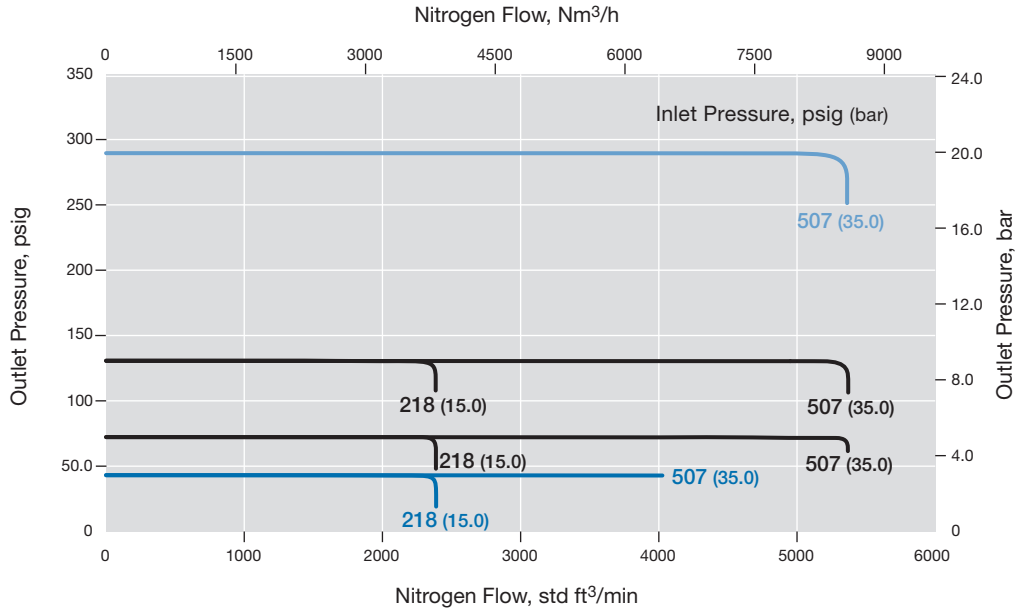
**Flow Coefficient: 21**

**Maximum Inlet Pressure: 507 psig (35.0 bar)**

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

#### Pressure Control Range

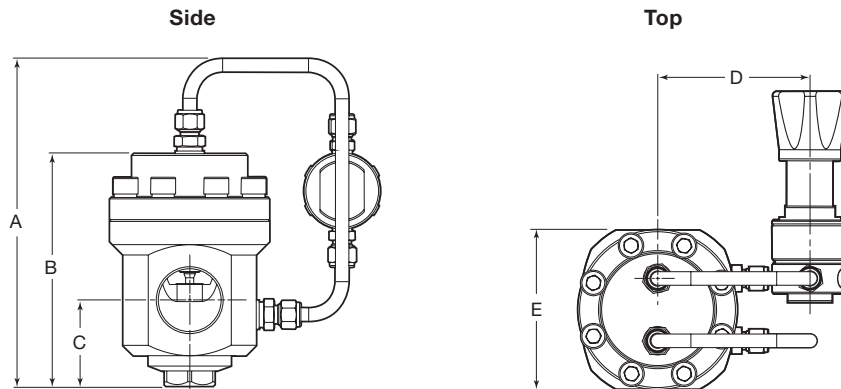
- 0 to 290 psig (0 to 20.0 bar)
- 0 to 130 psig (0 to 9.0 bar)
- 0 to 43.0 psig (0 to 3.0 bar)



## 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)



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 - EFP**

### 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 thread<sup>①</sup>

**N** = Female NPT<sup>①</sup>

**FA** = ASME B16.5 flange

**FD** = EN 1092 (DIN) flange

<sup>①</sup> 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

**EFP** = External feedback to pilot regulator, limited to 290 psig (20.0 bar)

**N** = NACE MR0175/ISO 15156

**G93** = ASTM G93 Level C-cleaned

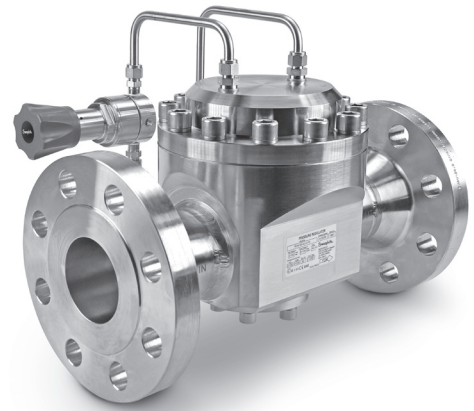
## Integral Pilot-Operated, Dome-Loaded Pressure-Reducing Regulators—RD(H)30 and RD(H)40 Series

### 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) to pilot regulator for improved performance
  - EF to pilot regulator limited to 290 psig (20.0 bar)
- NACE MR0175/ISO 15156-compliant models
- Special cleaning to ASTM G93 Level C

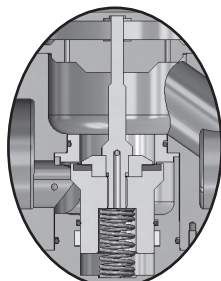
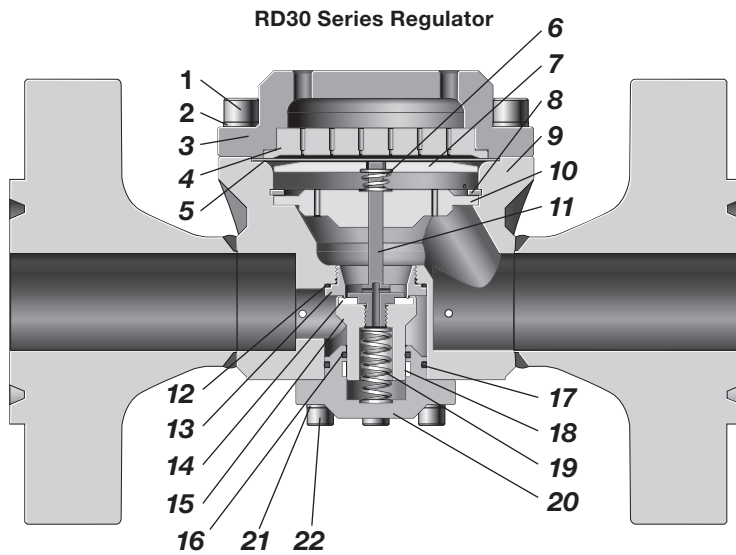


### Technical Data

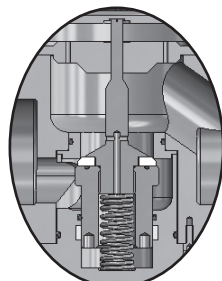
Series	Maximum Inlet Pressure psig (bar)	Maximum Outlet Control Pressure psig (bar)	Sensing Type	Temperature Range °F (°C)	Flow Coefficient (C <sub>v</sub> )	Seat Diameter in. (mm)	Inlet and Outlet Connections	Gauge / Dome Connection	Weight (With Class 150 Flanges) lb (kg)
RD	1015 (70.0) (507 [35.0] with LRS4 pilot regulator)	1015 (70.0)	Diaphragm	-49 to 176 (-45 to 80) See <b>Pressure-Temperature Ratings</b> , page 22.	RD(H)30: 36	RD(H)30: 1.65 (42.0)	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)
RDH	4060 (280)	2900 (200)			RD(H)40: 73	RD(H)40: 2.36 (60.0)			RD(H)40: 183 (83)

See pages 37 to 44 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 sales and service center.

#### RD30 Series

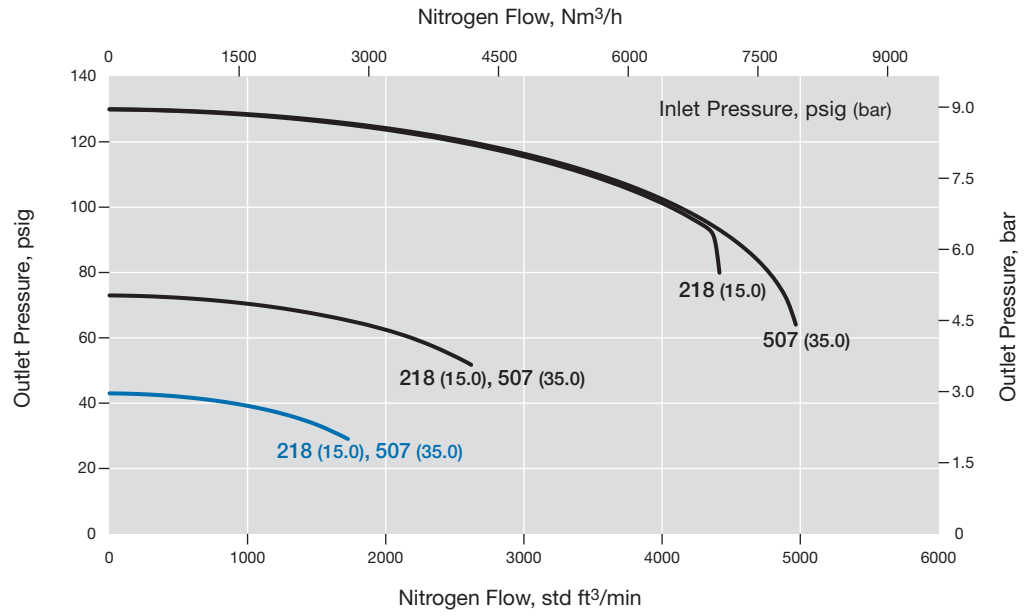
**Flow Coefficient: 36**

**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

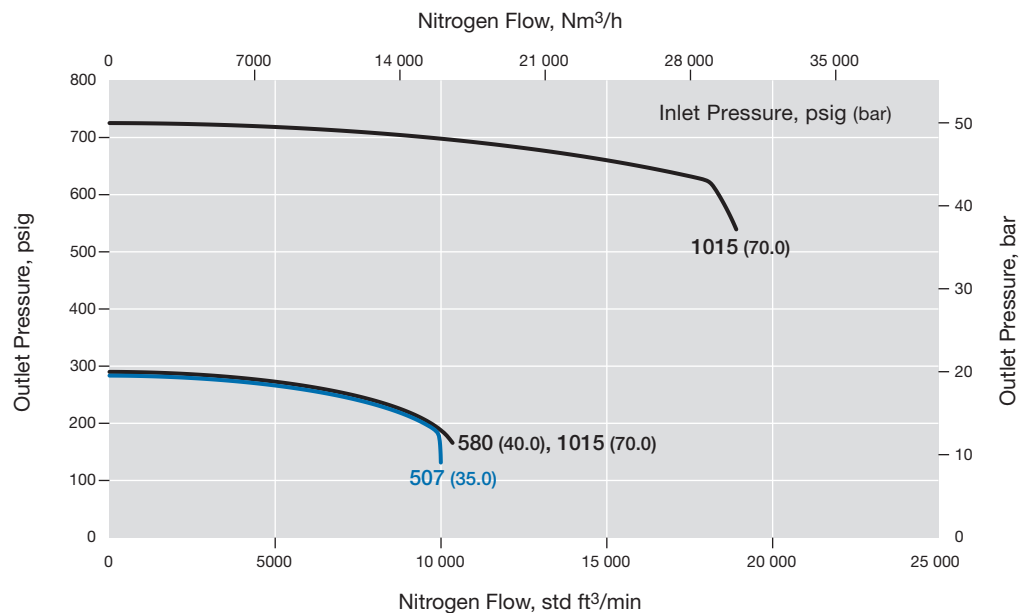
**Flow Coefficient: 36**

**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 sales and service center.

### RDH30 Series

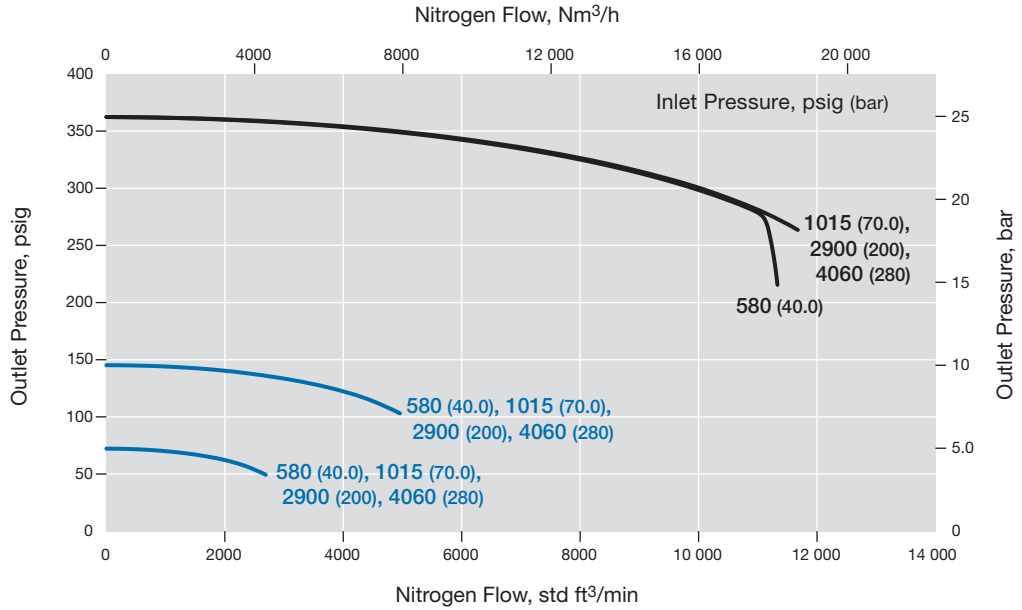
**Flow Coefficient: 36**

**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

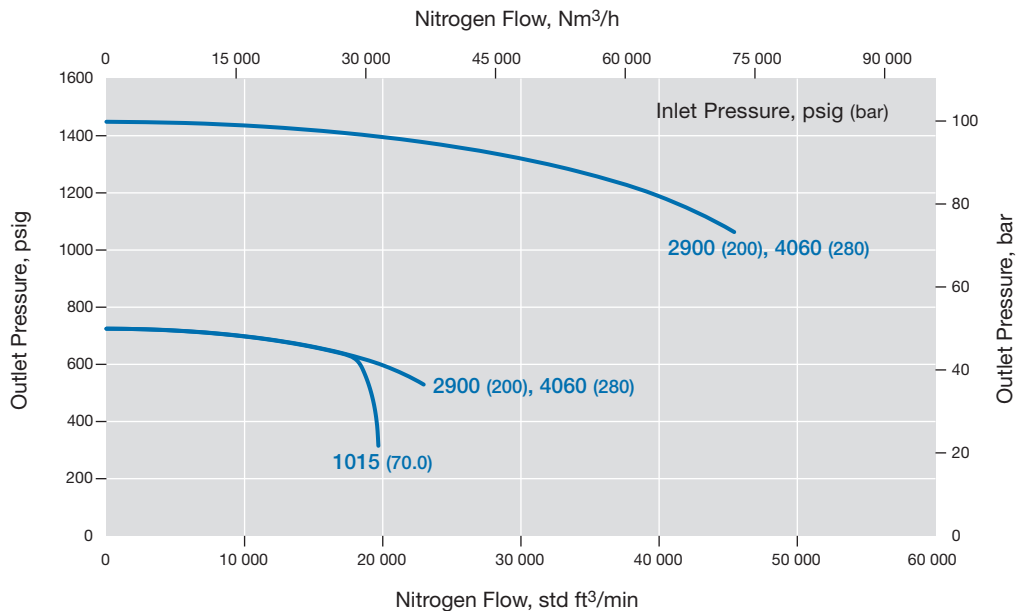
**Flow Coefficient: 36**

**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 sales and service center.

### RDH30 Series

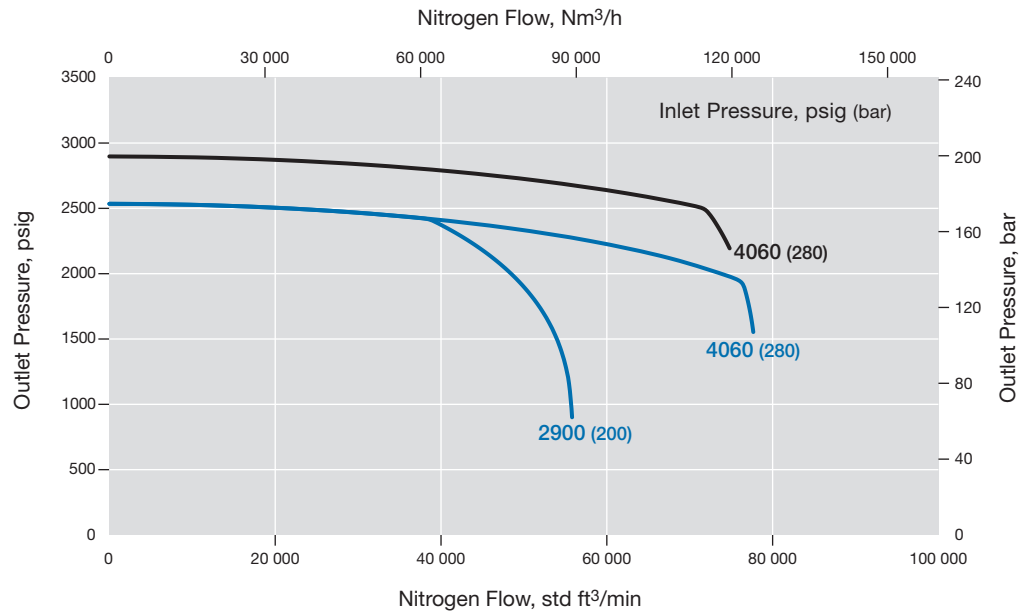
**Flow Coefficient: 36**

**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 sales and service center.

### RD30-EFP Series

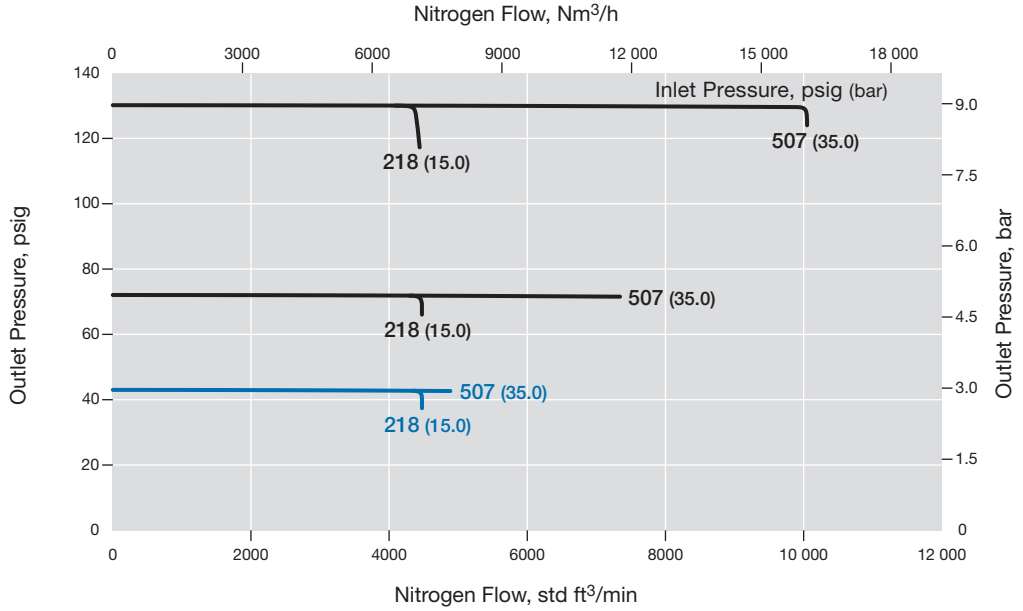
**Flow Coefficient: 36**

**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

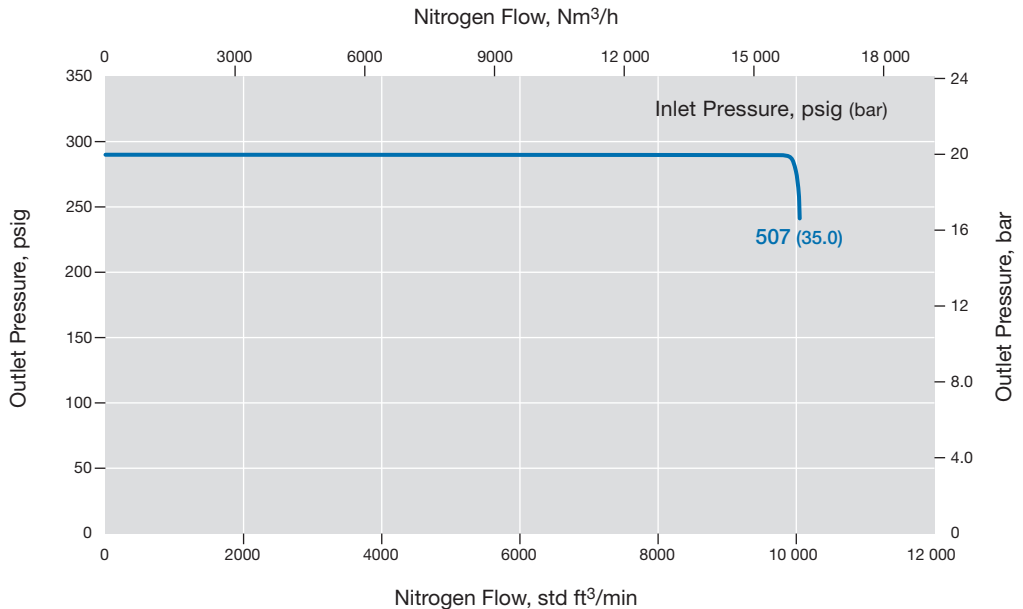
**Flow Coefficient: 36**

**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 sales and service center.

#### RD40 Series

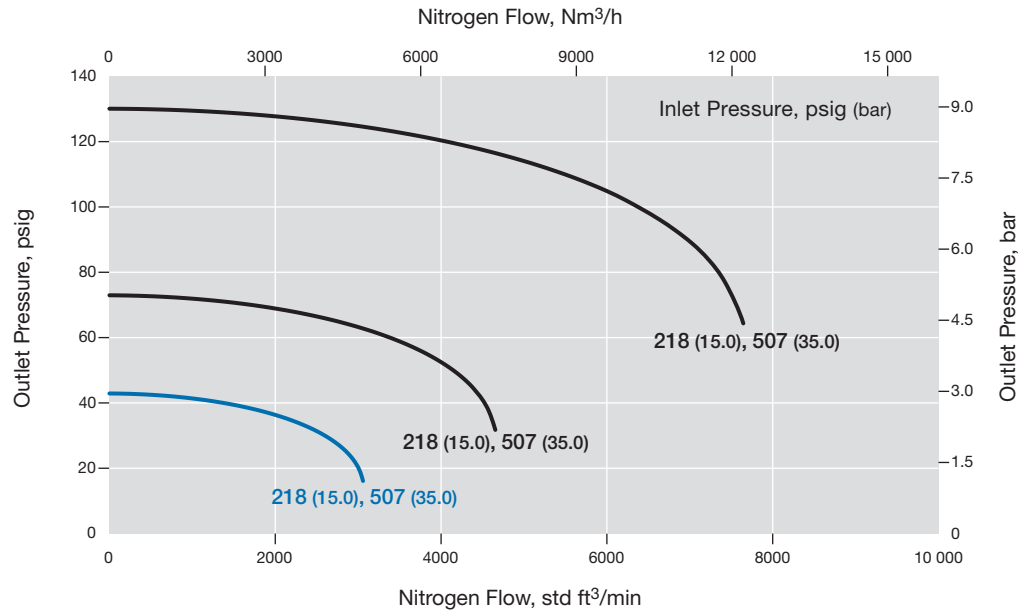
**Flow Coefficient: 73**

**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

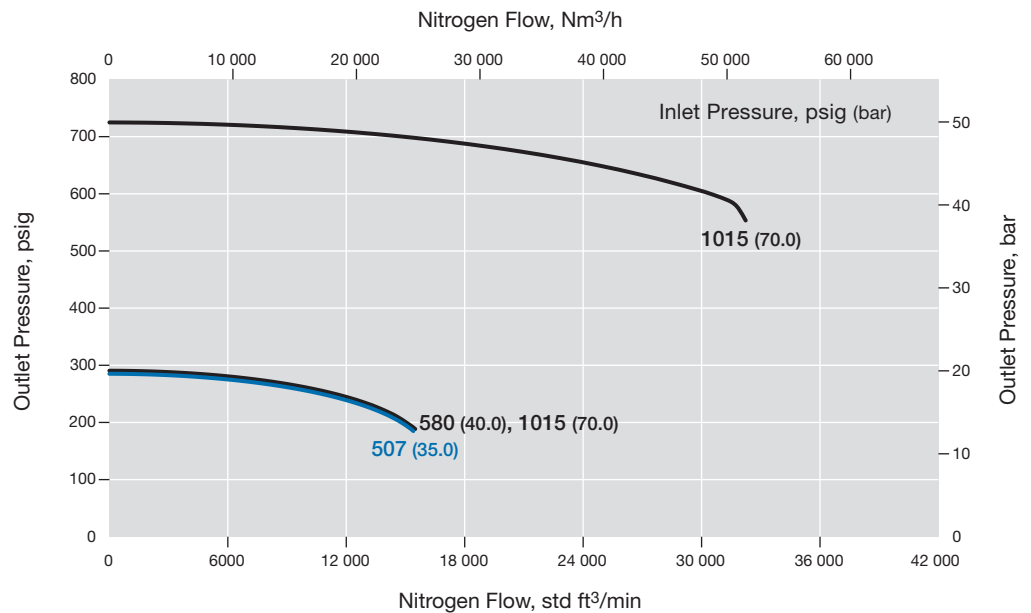
**Flow Coefficient: 73**

**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 sales and service center.

#### RDH40 Series

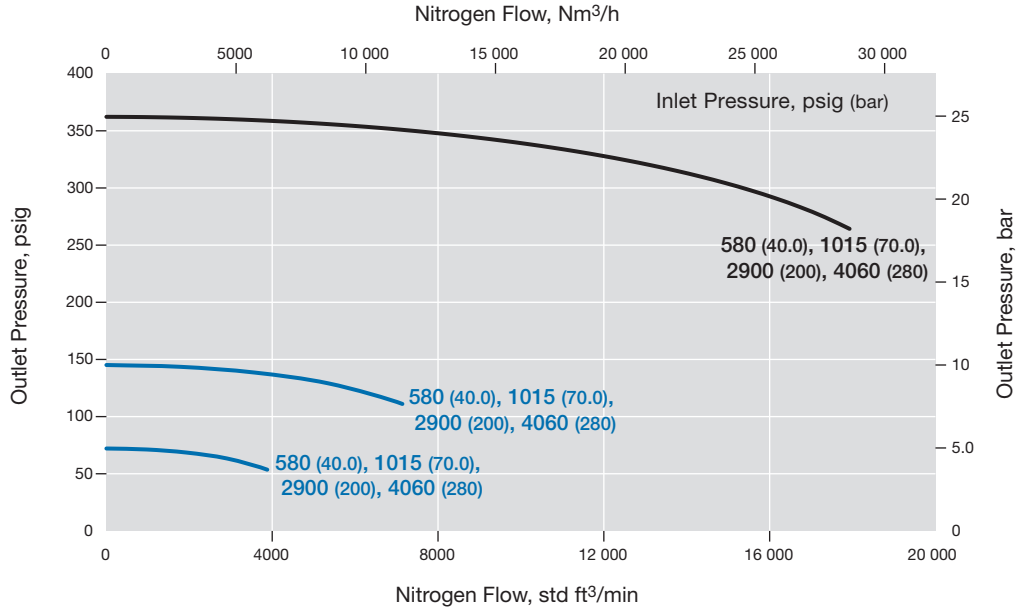
**Flow Coefficient: 73**

**Maximum Inlet Pressure: 4060 psig (280 bar)**

**Outlet Pressure Control Range: 0 to 362 psig (0 to 25.0 bar)**

**Pressure Control Range**

- 0 to 362 psig (0 to 25.0 bar)
- 0 to 145 psig (0 to 10.0 bar)



#### RDH40 Series

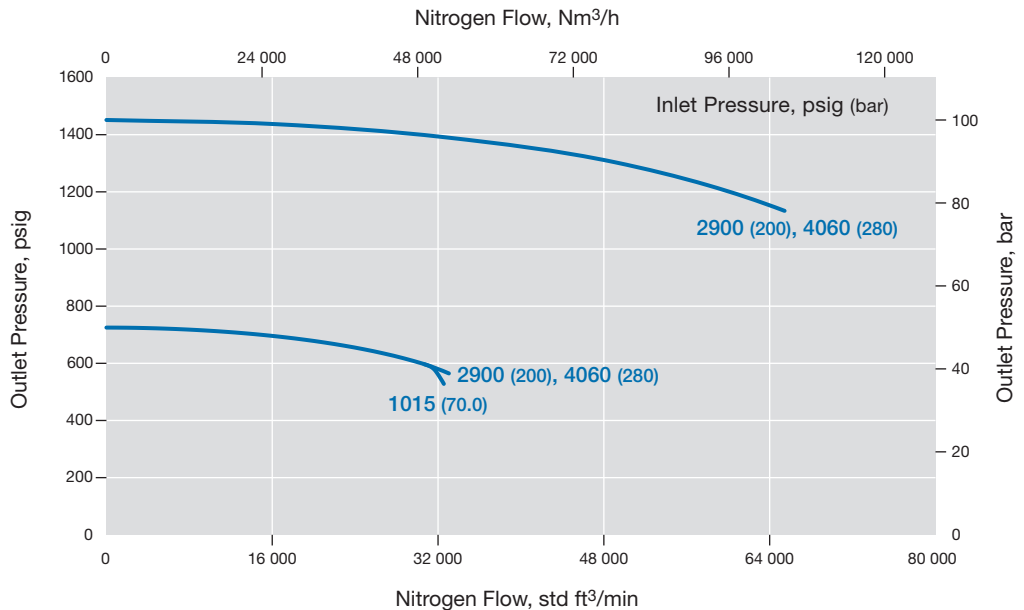
**Flow Coefficient: 73**

**Maximum Inlet Pressure: 4060 psig (280 bar)**

**Outlet Pressure Control Range: 0 to 1450 psig (0 to 100 bar)**

**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 sales and service center.

### RDH40 Series

**Flow Coefficient: 73**

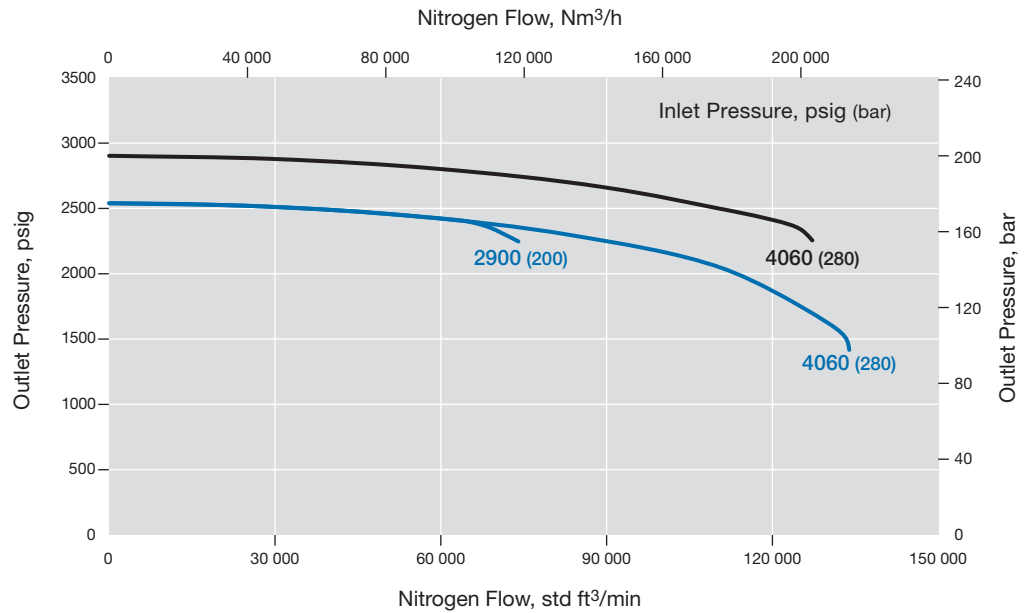
**Maximum Inlet Pressure: 4060 psig (280 bar)**

**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)



### 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 sales and service center.

#### RD40-EFP Series

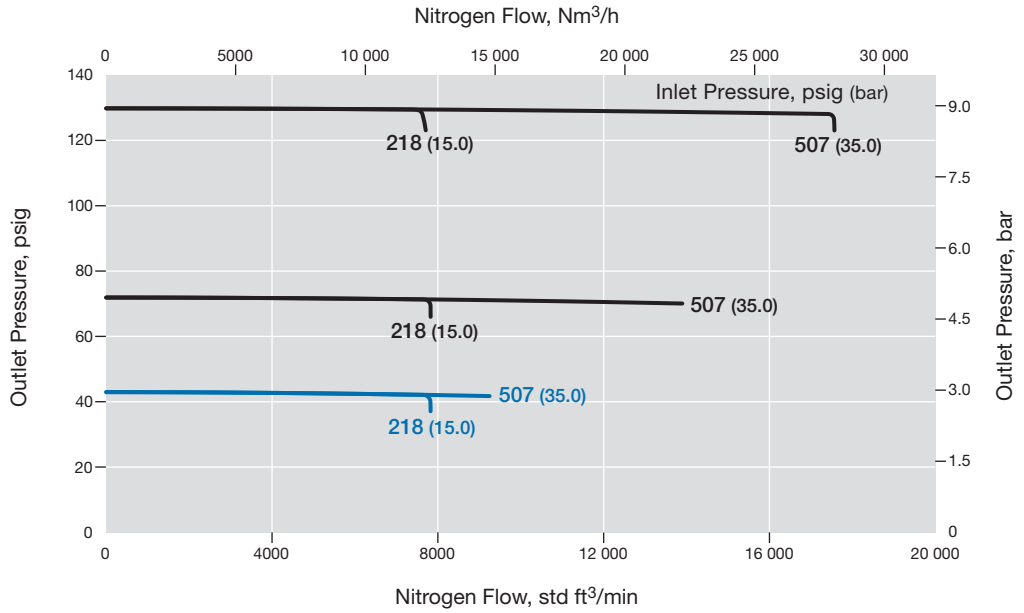
**Flow Coefficient: 73**

**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

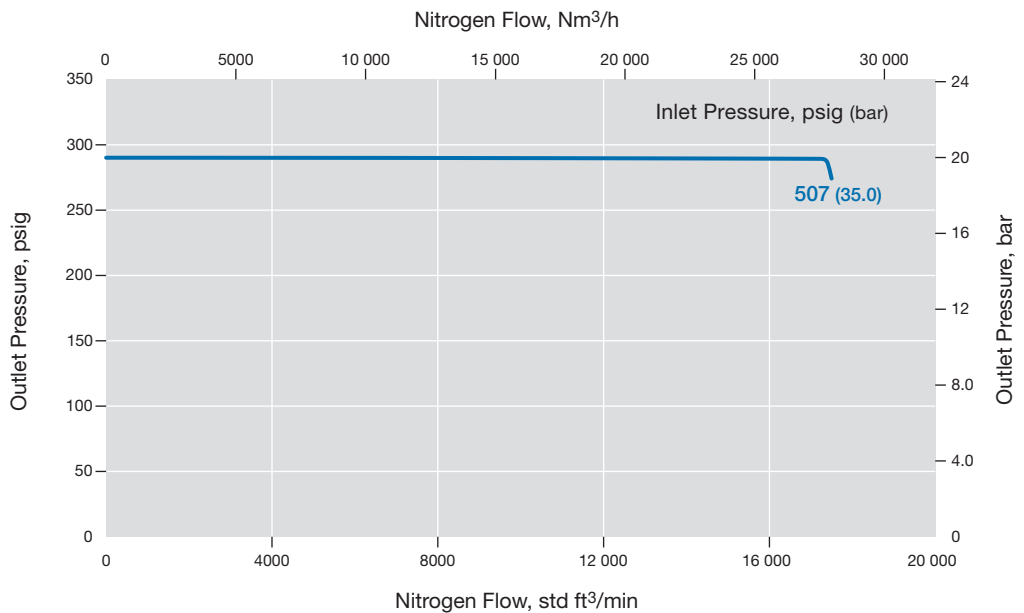
**Flow Coefficient: 73**

**Maximum Inlet Pressure: 507 psig (35.0 bar)**

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

**Pressure Control Range**

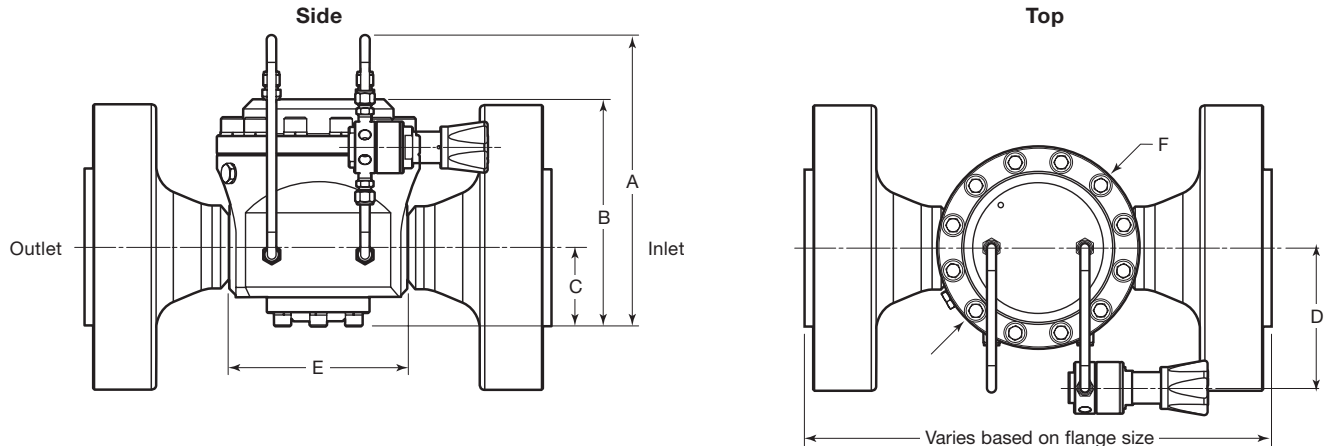
- 0 to 290 psig (0 to 20.0 bar)



## 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 - EFP**

### 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

**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

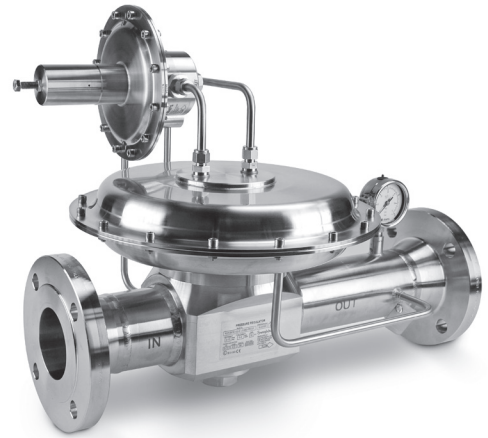
## Integral Pilot-Operated, Dome-Loaded Pressure-Reducing Regulators, High Sensitivity—LPRD20, LPRD25, LPRD30, LPRD40 Series

### 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

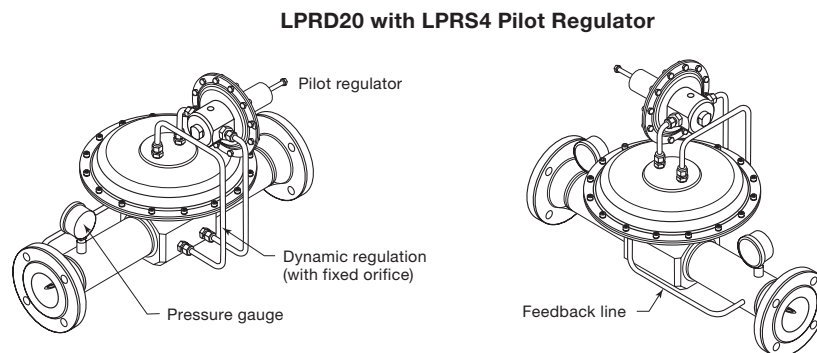
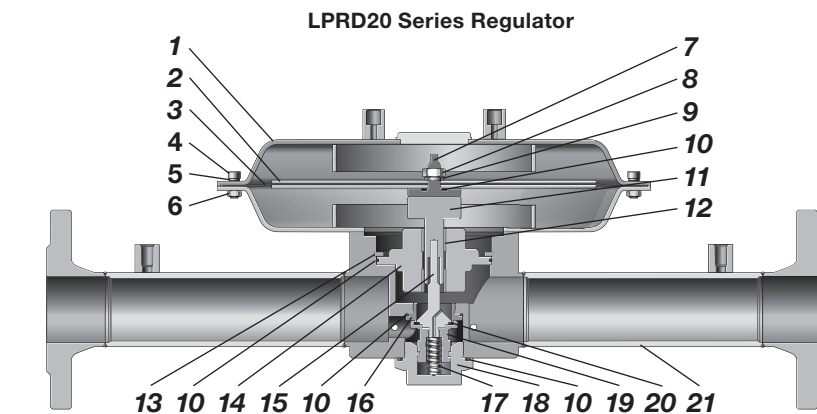
- Special cleaning to ASTM G93 Level C



### Technical Data

Series	Maximum Inlet Pressure psig (bar)	Maximum Outlet Control Pressure psig (bar)	Sensing Type	Temperature Range °F (C°)	Flow Coefficient (C <sub>v</sub> )	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 <b>Pressure-Temperature Ratings</b> , page 7.	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



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.

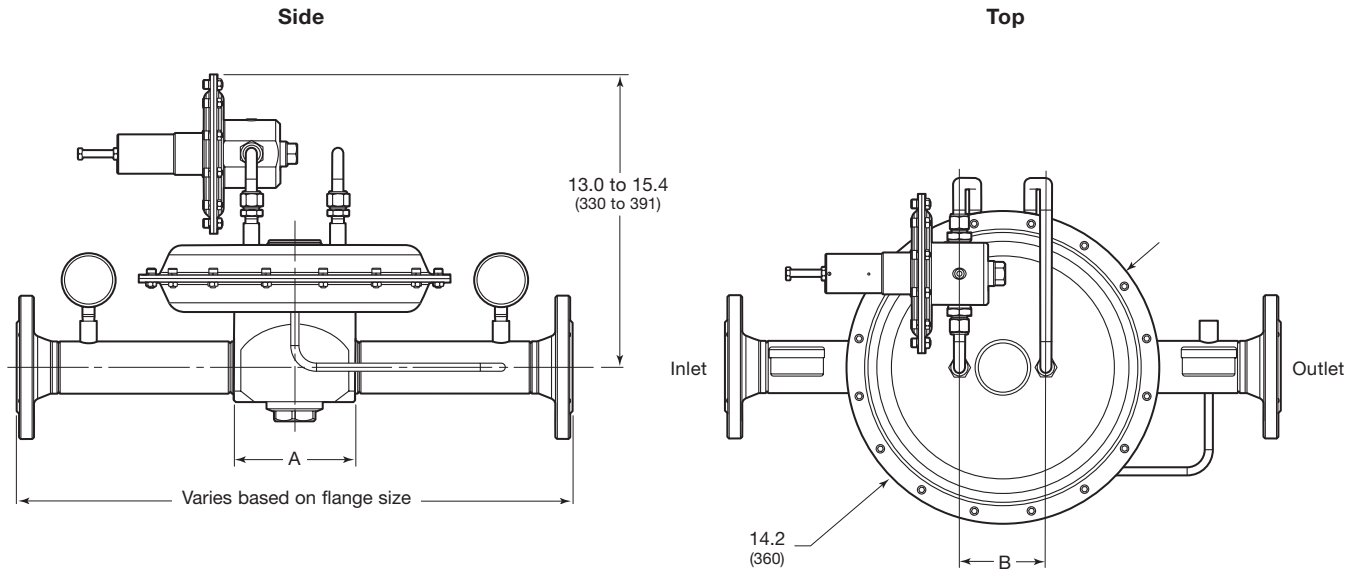
## Flow Data

For flow curve information, contact your authorized Swagelok sales and service center.

## 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)



## 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

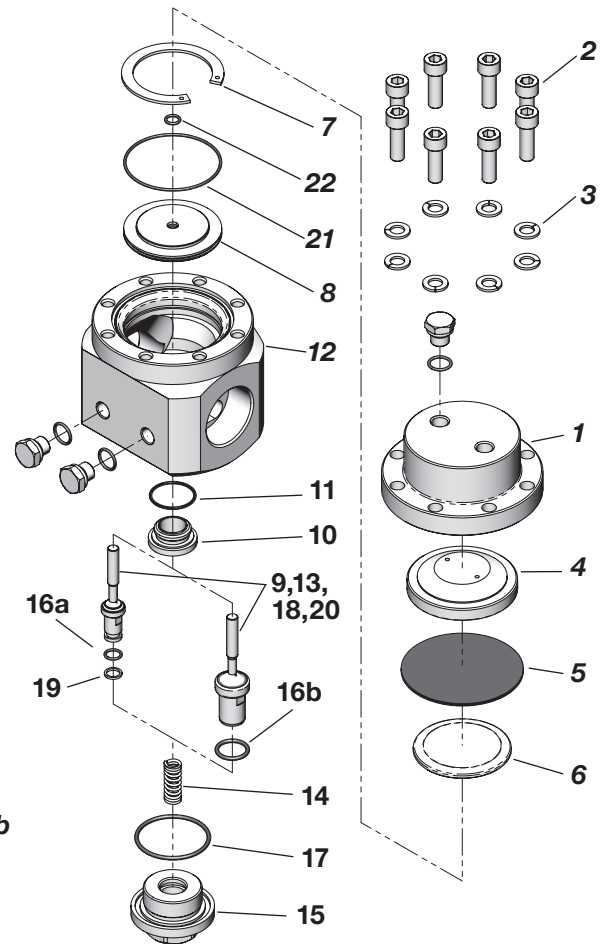
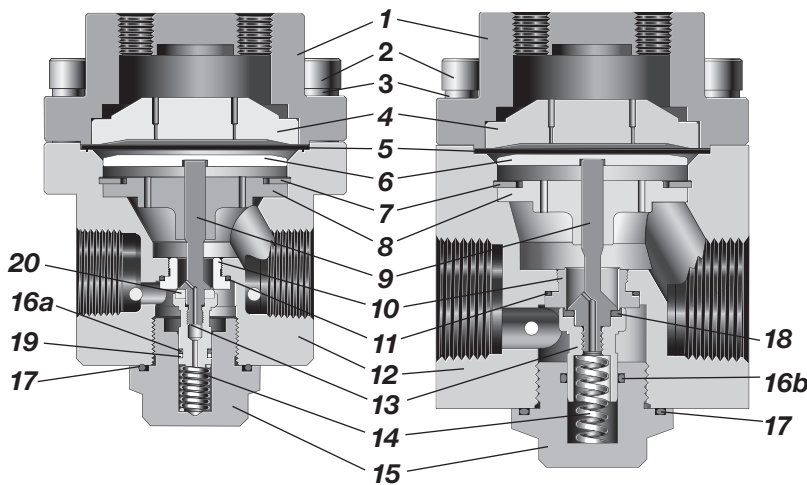
**V** = Fluorocarbon FKM  
**N** = Nitrile  
**E** = EPDM  
**L** = Low temperature Nitrile

### 11 Options

**G93** = ASTM G93 Level C-cleaned

## 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.

**⚠ Improper installation of gauges in NPT threaded ports can result in galling issues.**

To order gauge ports without factory plugs installed, please have your sales and service center contact Swagelok technical service.

### 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



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

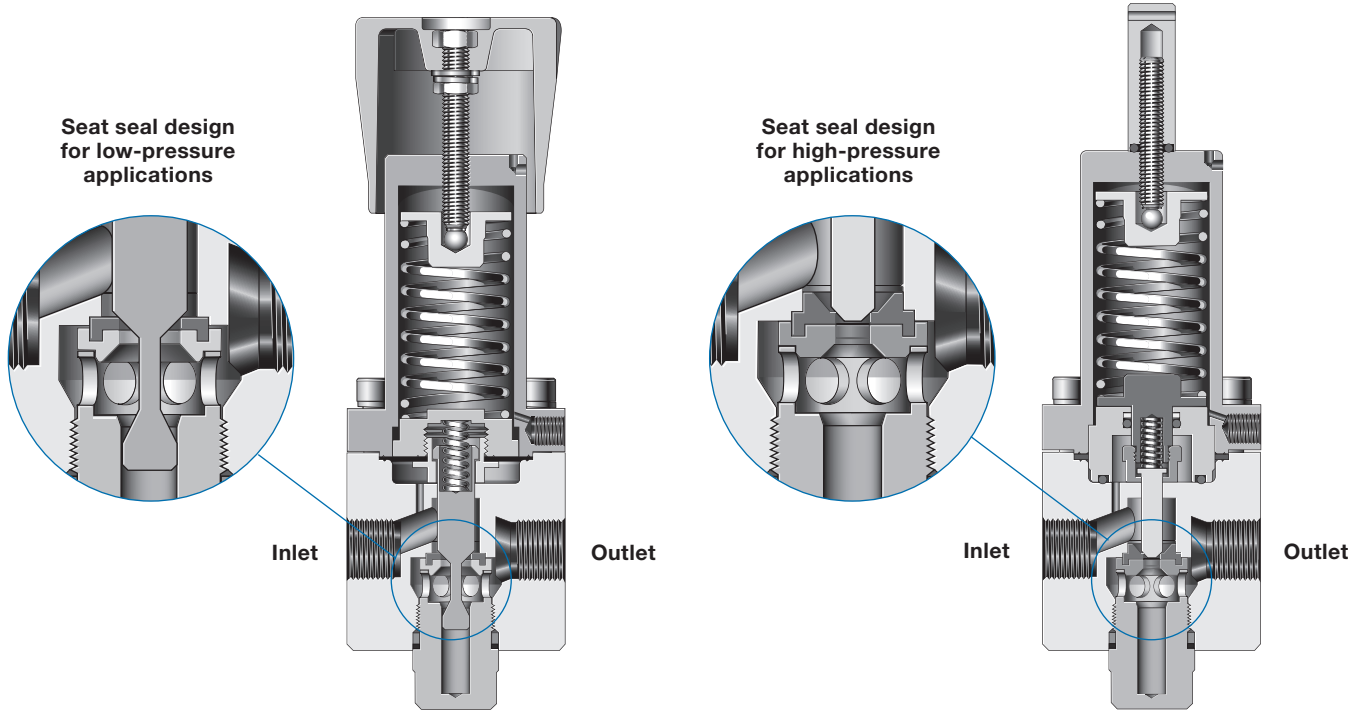
Series	Maximum Inlet Pressure <sup>①</sup> psig (bar)	Maximum Inlet Control Pressure <sup>①</sup> psig (bar)	Flow Coefficient (C <sub>v</sub> )	Sensing Type	Flow Data on Page
BS2	5 800 (400)	5 075 (350)	0.10	Piston	52
BSH2	10 150 (700)	10 150 (700)			
LBS4	507 (35.0)	290 (20.0)	1.3	Diaphragm	56

① Regulator pressure rating may be limited by connection type.

## Back-Pressure, Spring-Loaded Regulators—BS Series

**BS Series Regulator  
with Diaphragm Sensing and  
Standard Knob Handle**

**BSH Series Regulator  
with Piston Sensing and  
Antitamper Option**



### Technical Data—Design

Series	Seat Diameter in. (mm)	Inlet and Outlet Connections	Gauge Connection	Weight (Without Flanges) lb (kg)	More Information on Page
BS2	0.087 (2.2)	1/4 in. NPT	1/4 in. NPT	3.3 (1.5)	51
BSH2					
LBS4	0.31 (8.0)	1/2 in. NPT	1/4 in. NPT	5.7 (2.6)	55

## 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

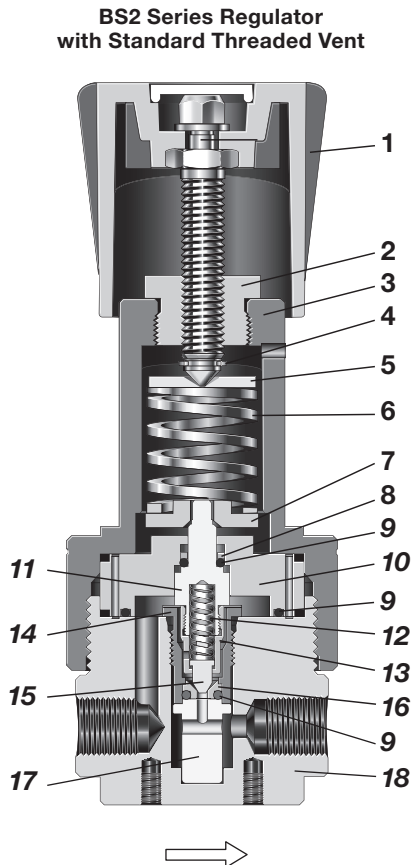


### Technical Data

Series	Maximum Inlet Pressure psig (bar)	Maximum Inlet Control Pressure psig (bar)	Sensing Type	Temperature Range °F (°C)	Flow Coefficient (C <sub>v</sub> )	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 49, for ratings.  
See pages 52 to 53 for flow data.

### Materials of Construction



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	<i>EPDM, FKM, FFKM, or nitrile</i>
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	<i>PCTFE or PEEK</i>
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 sales and service center.

### BS(H)2 Series

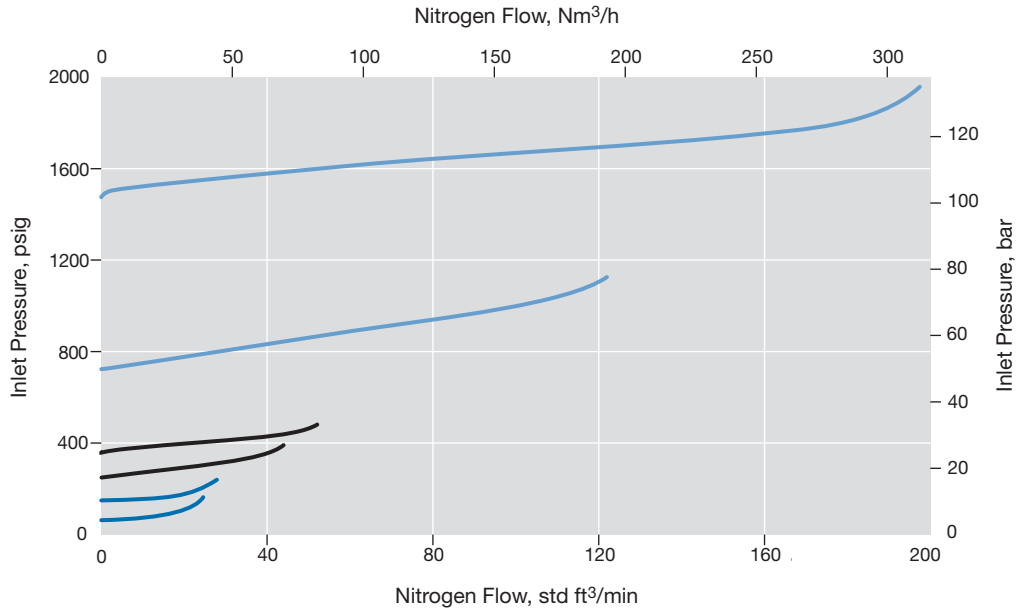
**Flow Coefficient: 0.10**

**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

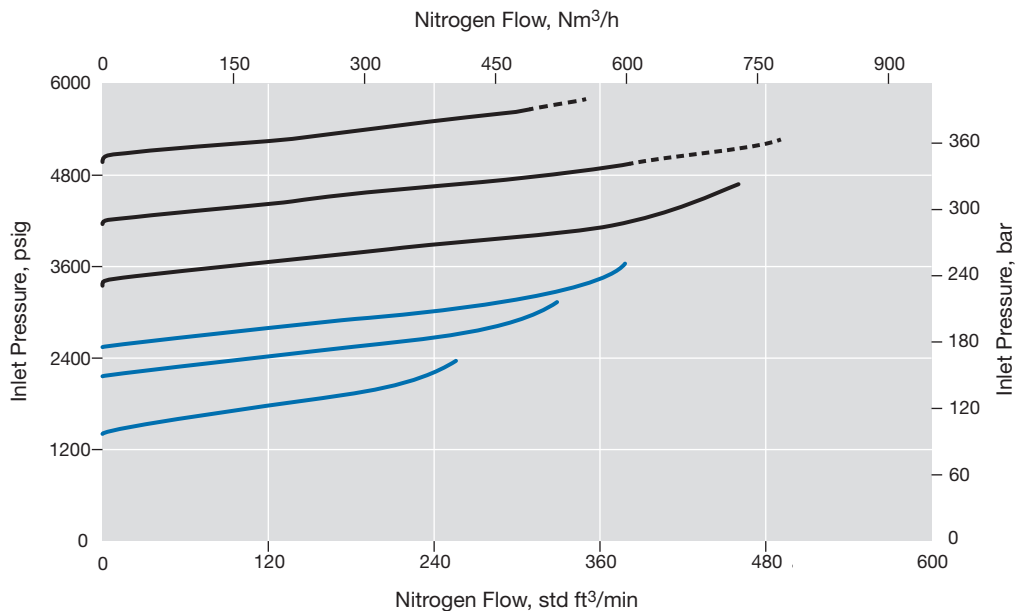
**Flow Coefficient: 0.10**

**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 sales and service center.

### BSH2 Series

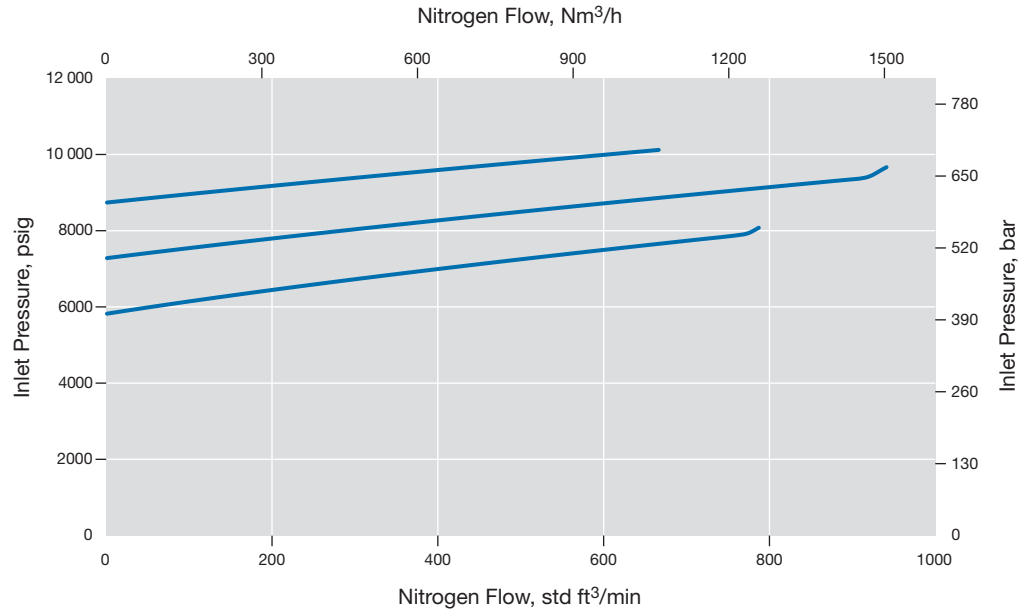
**Flow Coefficient: 0.10**

**Maximum Inlet Pressure: 10 150 psig (700 bar)**

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

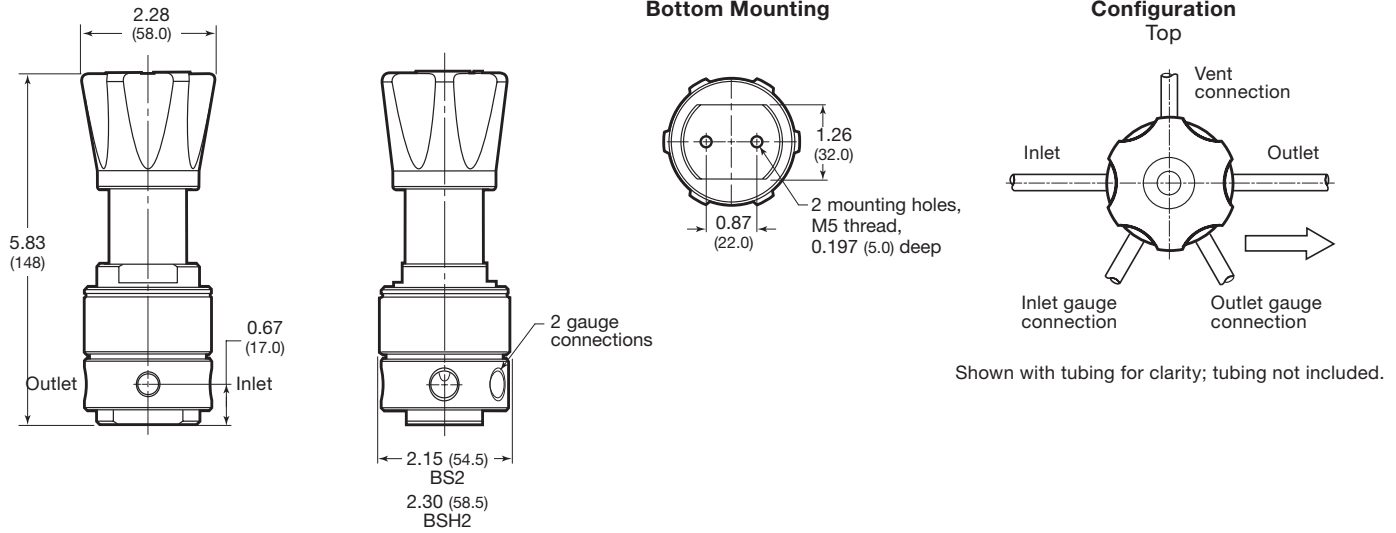
#### Pressure Control Range

— 0 to 10 150 psig (0 to 700 bar)



## Dimensions

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

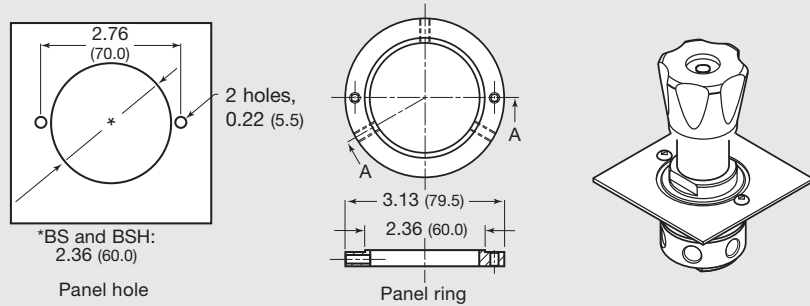


### Panel Mounting Kit

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

## 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

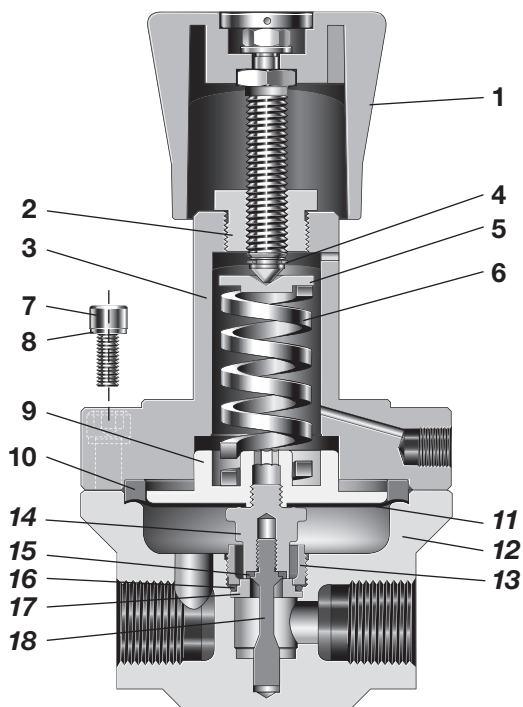
Series	Maximum Inlet Pressure psig (bar)	Maximum Inlet Control Pressure <sup>①</sup> psig (bar)	Sensing Type	Temperature Range °F (°C)	Flow Coefficient (C <sub>v</sub> )	Seat Diameter in. (mm)	Inlet and Outlet Connection	Gauge Connection	Weight lb (kg)
LBS4	507 (35.0)	290 (20.0)	Diaphragm	-49 to 176 (-45 to 80) See <b>Pressure-Temperature Ratings</b> , page 7.	1.3	0.31 (8.0)	1/2 in. NPT	1/4 in. NPT	5.7 (2.6)

See pages 56 and 57 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	<i>PTFE or 316L SS</i>
12 Body	316L SS / A479
13 Seat retainer	
14 Poppet housing	<i>FKM, FFKM, EPDM, or nitrile</i>
15 Seat seal	
16 O-ring	<i>PTFE</i>
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 sales and service center.

### LBS4 Series

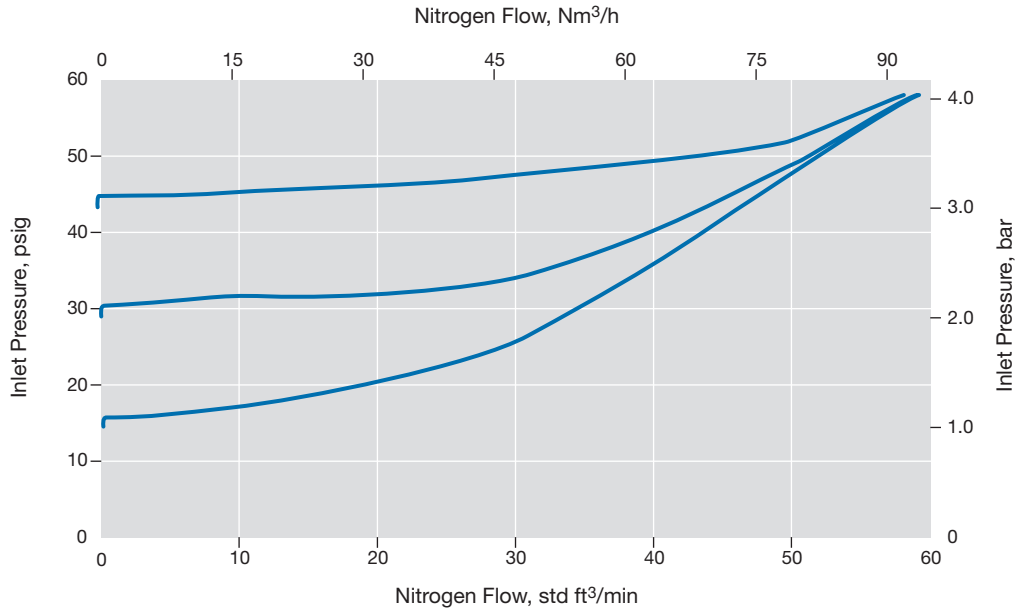
**Flow Coefficient: 1.3**

**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**

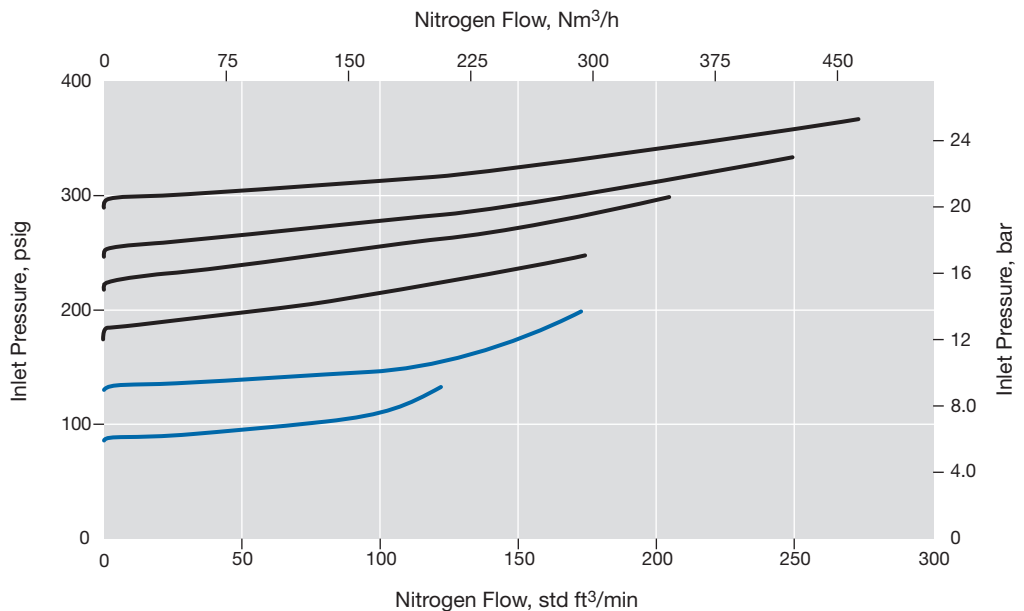
**Maximum Inlet Pressure: 507 psig (35.0 bar)**

**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 sales and service center.

### LBS4 Series

**Flow Coefficient: 1.3**

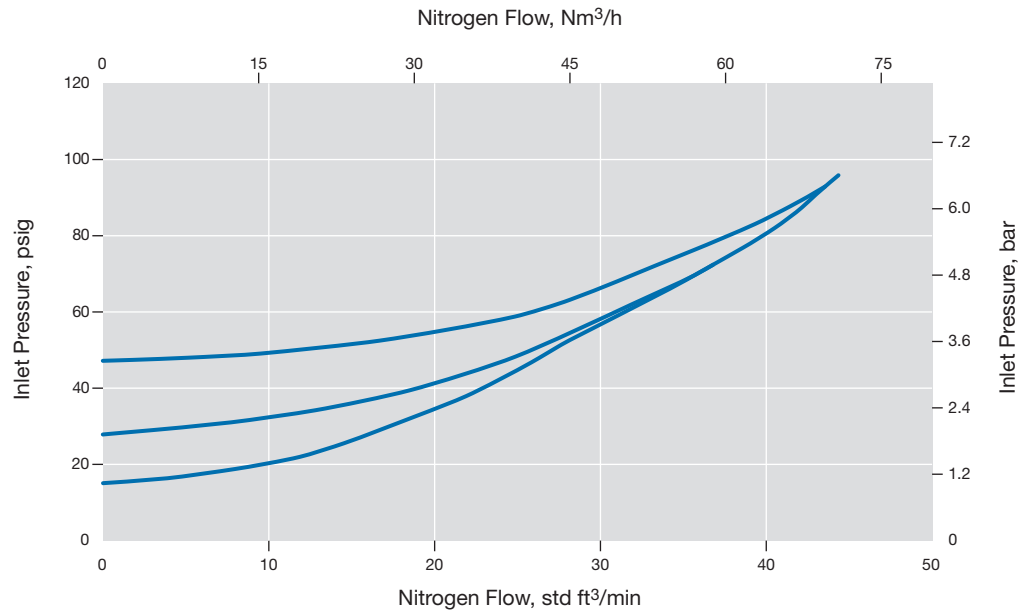
**Maximum Inlet Pressure: 507 psig (35.0 bar)**

**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 Diaphragm



### LBS4 Series

**Flow Coefficient: 1.3**

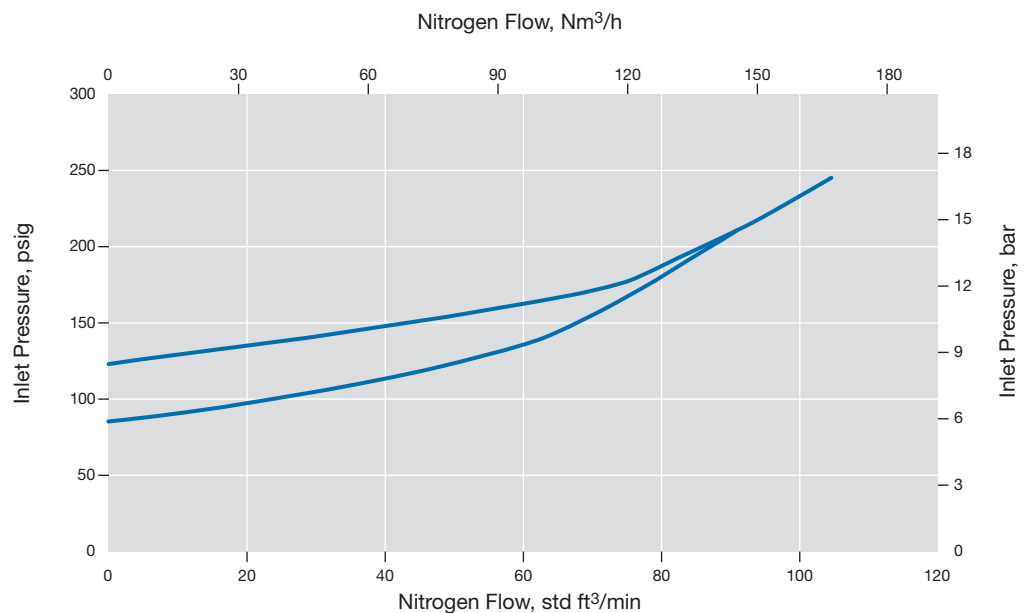
**Maximum Inlet Pressure: 507 psig (35.0 bar)**

**Inlet Pressure Control Range: 0 to 130 psig (0 to 9.0 bar)**

#### Pressure Control Range

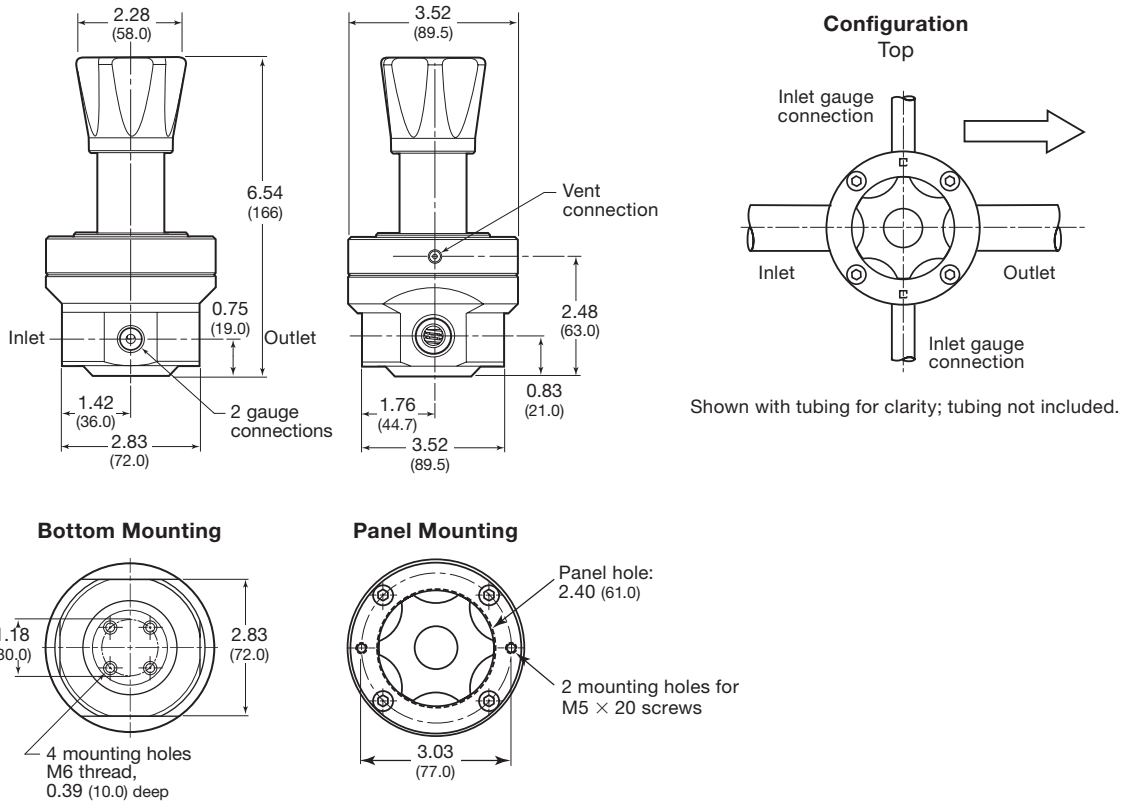
— 0 to 130 psig (0 to 9.0 bar)

Optional 316L SS Diaphragm



### Dimensions

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



### 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
- N** = Nitrile
- E** = EPDM
- V** = Fluorocarbon FKM

**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

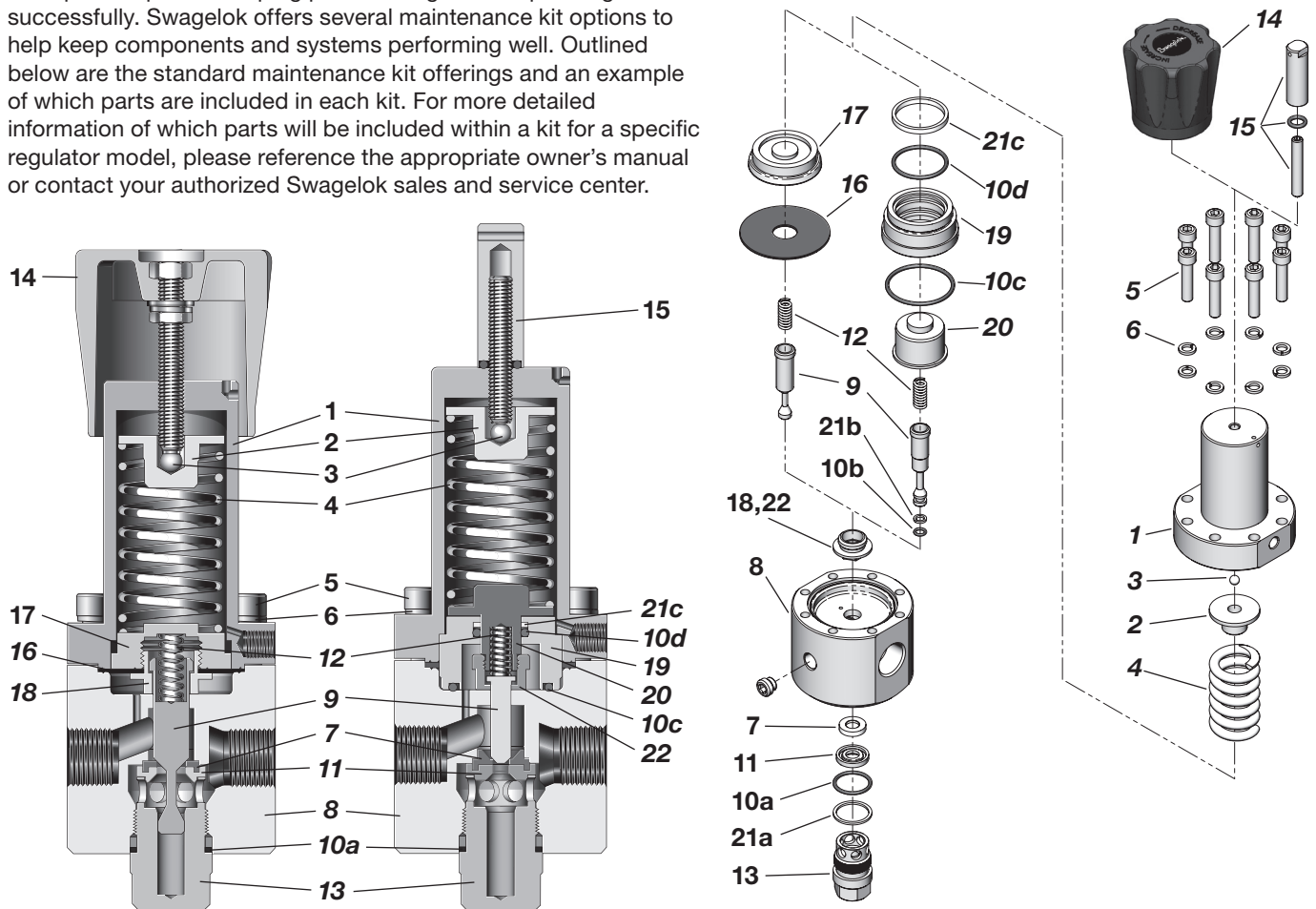
**6 Diaphragm**

- T** = PTFE<sup>①</sup>
- 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
- N** = Nitrile
- E** = EPDM
- V** = Fluorocarbon FKM

<sup>①</sup> Not available with Low temperature Nitrile option

## 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 Swagelok process pressure regulators, refer to *Process Pressure Regulators catalog*, [MS-02-492](#).



- 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.**

### Safe Product Selection

**When selecting a product, the total system design must be considered to ensure safe, trouble-free performance. Function, material compatibility, adequate ratings, proper installation, operation, and maintenance are the responsibilities of the system designer and user.**

### ⚠ WARNING

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

## Warranty Information

Swagelok products are backed by The Swagelok Limited Lifetime Warranty. For a copy, visit [swagelok.com](http://swagelok.com) or contact your authorized Swagelok representative.