

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

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

### Features

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

### Technical Data

#### Maximum Inlet Pressure

- 3600 psig (248 bar)

#### Pressure Control Ranges

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

#### Flow Coefficient ( $C_v$ )

- 1.0

See page 44 for flow graphs.

### Supply-Pressure Effect

| Flow Coefficient ( $C_v$ ) | Pressure Control Range  |                               |
|----------------------------|-------------------------|-------------------------------|
|                            | Up to 50 psig (3.4 bar) | 100 psig (6.8 bar) and Higher |
| 1.0                        | 0.3                     | 0.4                           |

### Maximum Operating Temperature

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

### Weight

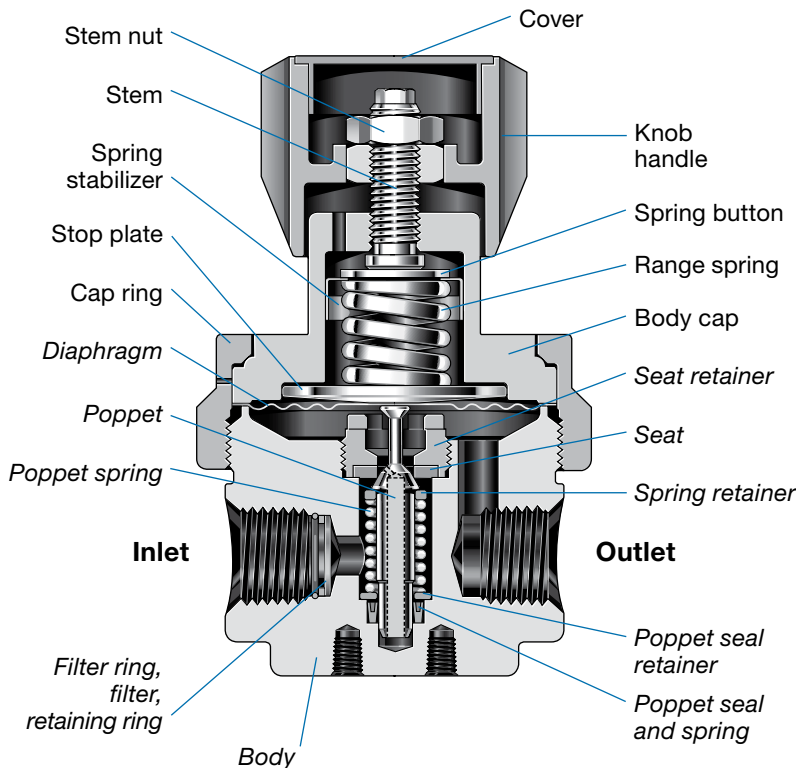
- 4.4 lb (2.0 kg)

### Ports

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



### Materials of Construction



| Component  | Material   |
|--|--|
| Knob handle, cover   | Nylon with 316 SS insert   |
| Spring button  | 316 SS (0 to 250 psig range)<br>Zinc-plated steel (all other ranges)   |
| Spring stabilizer <sup>①</sup>   | 301 SS   |
| Range spring   | 316 SS (0 to 10 and 0 to 25 psig control ranges)<br>Zinc-plated steel (0 to 50 through 0 to 250 psig control ranges) |
| Stem, stem nut, cap ring, stop plate, body cap, panel nuts <sup>②</sup>            | 316 SS   |
| Nonwetted lubricant  | Hydrocarbon-based  |
| Body, spring retainer, seat retainer, filter, retaining ring, poppet seal retainer | 316 SS   |
| Seat   | <i>PCTFE or PEEK</i>   |
| Diaphragm <sup>③</sup>   | <i>Alloy X-750</i>   |
| Poppet   | <i>S17400 SS</i>   |
| Poppet spring  | 302 SS   |
| Poppet seal, filter ring   | <i>PTFE</i>  |
| Poppet seal spring   | <i>Elgiloy®</i>  |
| Wetted lubricant   | <i>PTFE-based</i>  |

Wetted components listed in *italics*.

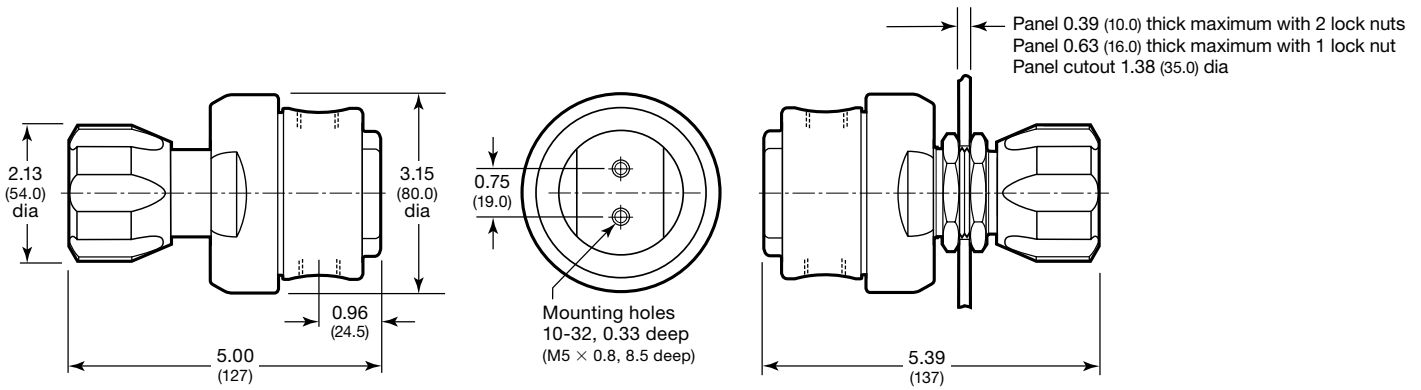
① Not included in regulators with 0 to 250 psig (0 to 17.2 bar) control range.

② Not shown.

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

## Dimensions

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



## Ordering Information

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

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

### 4 Body Material

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

### 5 Pressure Control Range

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

### 6 Maximum Inlet Pressure<sup>①</sup>

- F = 100 psig (6.8 bar)
- J = 500 psig (34.4 bar)
- L = 1000 psig (68.9 bar)
- R = 3600 psig (248 bar)

<sup>①</sup> For better resolution and control, select a pressure that closely matches system pressure.

### 7 Port Configuration

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

### 8 Ports

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

### 9 Seat Material

- 1 = PCTFE
- 2 = PEEK

### 10 Flow Coefficient (C<sub>v</sub>)

- 8 = 1.0

### 11 Sensing Mechanism, Vent

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

### 12 Handle, Mounting

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

For knob handle color options, see page 56.

### 13 Isolation and Relief Valves

- 0 = No valves
- For isolation and relief valve options, see page 54.

### 14 Cylinder Connections

- 0 = No connections

### 15 Gauges

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

### 16 Options

- 0 = No options

## Port Configurations

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

### Port Configuration Symbols

- Inlet
- Filtered inlet
- Outlet
- $G_i$  Inlet gauge
- $G_o$  Outlet gauge
- R Relief valve
- $G_o/R$  Outlet gauge or relief valve

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

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

## Pressure-Reducing Regulators

### Right-to-Left Flow

|               |   |   |   |   |   |   |   |
|---------------|---|---|---|---|---|---|---|
| Configuration |   |   |   |   |   |   |   |
| Designator    | A | C | E | F | H | L | K |

### Left-to-Right Flow

|               |   |   |   |   |   |
|---------------|---|---|---|---|---|
| Configuration |   |   |   |   |   |
| Designator    | A | B | E | M | N |

## Back-Pressure Regulators

### Right-to-Left Flow

|               |   |   |   |
|---------------|---|---|---|
| Configuration |   |   |   |
| Designator    | A | D | V |

### Left-to-Right Flow

|               |   |   |
|---------------|---|---|
| Configuration |   |   |
| Designator    | A | G |

## MPC Port Configurations

### Pressure Reducing

|               |   |   |
|---------------|---|---|
| Configuration |   |   |
| Designator    | 5 | 6 |

### Back Pressure

|               |   |   |
|---------------|---|---|
| Configuration |   |   |
| Designator    | 7 | 8 |

## Options and Accessories

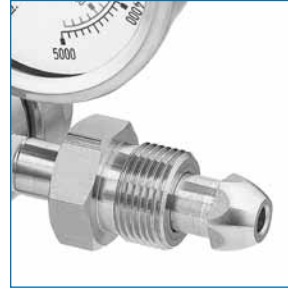
Regulator accessories are available separately or mounted on Swagelok regulators. Some accessories limit regulator pressure or temperature ratings. Additional materials, options, and accessories are available. Contact your authorized Swagelok representative for more information.



## Cylinder Connections

- Available in a variety of CGA connections
- Stainless steel construction

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



## Cylinder Gases and Connections

| Gas                  | CGA Connection | Connection Designator |
|----------------------|----------------|-----------------------|
| Air, industrial      | 590            | H                     |
| Ammonia, anhydrous   | 660            | J                     |
| Argon                | 580            | G                     |
| Carbon dioxide       | 320            | B                     |
| Carbon monoxide      | 350            | D                     |
| Chlorine             | 660            | J                     |
| Ethane               | 350            | D                     |
| Ethylene             | 350            | D                     |
| Helium               | 580            | G                     |
| Hydrogen             | 350            | D                     |
| Hydrogen chloride    | 330            | C                     |
| Hydrogen sulfide     | 330            | C                     |
| Krypton              | 580            | G                     |
| Methane, natural gas | 350            | D                     |
| Methyl chloride      | 660            | J                     |
| Methyl mercaptan     | 330            | C                     |
| Neon                 | 580            | G                     |
| Nitric oxide         | 660            | J                     |
| Nitrogen             | 580            | G                     |
| Nitrogen dioxide     | 660            | J                     |
| Oxygen               | 540            | F <sup>①</sup>        |
| Phosgene             | 660            | J                     |
| Refrigerant-14       | 580            | G                     |
| Refrigerant-22       | 660            | J                     |
| Sulfur dioxide       | 660            | J                     |
| Sulfur hexafluoride  | 590            | H                     |
| Xenon                | 580            | G                     |

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

These cylinder connections are rated to 3000 psig (206 bar) maximum, so the maximum inlet pressure designator **P** must be used in the ordering number when a regulator is assembled with a cylinder connection. See the ordering information for each regulator for details.

DIN, BS, and JIS cylinder connections are also available. Contact your authorized Swagelok representative for more information.

## Options and Accessories



### Pressure Gauges

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



See the Swagelok *Pressure Gauges, Industrial and Process* catalog, MS-02-170, for more information.

### Cleaning

Gauges assembled to ASTM G93 Level E or SC-11—cleaned regulators are cleaned in accordance with ASME B40.1 level IV.

### Ordering Information

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

| Gauge Scale<br>primary unit<br>(secondary unit) | Gauge Designator |            |             | Gauge Model <sup>①</sup> |
|---|------------------|------------|-------------|--------------------------|
|   | Inlet and Outlet | Inlet Only | Outlet Only |                          |
| psig (bar)<br>(North America only) <sup>②</sup> | 1                | A          | G           | C                        |
| psig (bar)                                      | 3                | C          | J           | B                        |
| psig (kPa)                                      | 5                | E          | L           | C                        |
| bar (psig)                                      | 2                | B          | H           | B                        |
| MPa   | 4                | D          | K           | B                        |

<sup>①</sup> KCP and KCB series regulators are assembled with M model gauges.

<sup>②</sup> Not available for KCP and KCB series regulators.

### Isolation Valves

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



See the Swagelok *Integral-Bonnet Needle Valves* catalog, MS-01-164, for more information.

### Isolation Valve and Relief Valve Ordering Information

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

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

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

<sup>①</sup> Not available on KPR, KCY, KCM, KLF, and KHF series regulators, because a relief valve is needed to protect the diaphragm sensing mechanism.

<sup>②</sup> Includes male NPT to Swagelok tube adapter fitting (required for regulators with 1/8 and 1/2 in. female NPT ports).

## Options and Accessories

### Kenmac Adjustable Regulator Relief Valves (KVV Series)

- Provide nonsafety-related pressure protection for Swagelok regulators



#### Technical Data

##### Relief Pressure Ranges

- Based on the regulator control range

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

##### Maximum Operating Temperature

- 392°F (200°C)

##### Weight

- 0.26 lb (0.12 kg)

##### Ports

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

#### Materials of Construction

| Component   | Material         |
|---|------------------|
| <i>Body, poppet, spring button, adjusting screw</i> | 316 SS           |
| <i>Seal</i>   | Fluorocarbon FKM |
| <i>Range spring</i>                                 | 302 SS           |

Wetted components listed in *italics*.

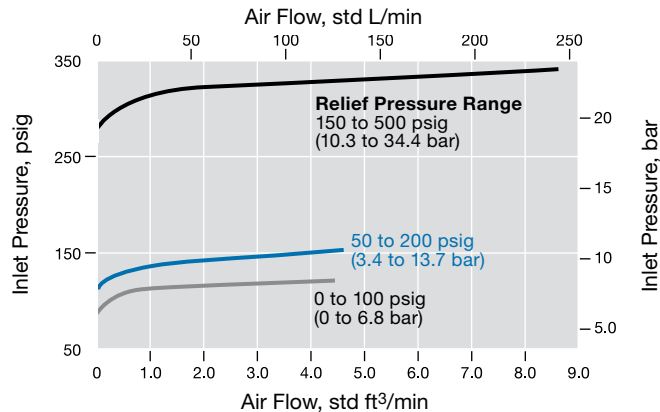
#### Testing

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

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

#### Flow Data

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



#### Ordering Information

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

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

- ⚠ **For valves not actuated for a period of time, initial relief pressure may be higher than the set pressure.**
- ⚠ **Some system applications require relief valves to meet specific safety codes. The system designer and user must determine when such codes apply and whether these relief valves conform to them.**
- ⚠ **Kenmac adjustable regulator relief valves should never be used as ASME Boiler and Pressure Vessel Code safety relief devices.**
- ⚠ **Kenmac adjustable regulator relief valves are not “Safety Accessories” as defined in the Pressure Equipment Directive 97/23/EC.**

## Options and Accessories

### Hoses

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

Hose options, rated to 3000 psig (206 bar), include:

- 3 ft long Swagelok 1/4 in. high-pressure, metal flexible hose (FM series), 1/4 in. female NPT inlet, 1/4 in. male NPT outlet connected to regulator: SS-FM4PM4PF4-36
- 3 ft long Swagelok 1/4 in. PTFE-lined, stainless steel braided hose (TH series), 1/4 in. female NPT inlet, 1/4 in. male NPT outlet connected to regulator: SS-TH4PM4PF4-36

See the **Swagelok Hose and Flexible Tubing catalog, MS-01-180**, for more information.



### Cleaning

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

### Handles

Knob, thumbwheel, and antitamper handles are available.

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



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

Example: KPR1FRF412A20000**BK**

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

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

### Wall Mounting Brackets

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



**KCY Series  
Mounting Bracket**

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



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

### Wall Mounting Bracket Kits

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

## Maintenance Kits

### Filter Replacement Kits

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

Filter replacement kits include:

- five sets of filters, filter rings, and filter retaining rings
- instructions.

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

## Maintenance Kits

### KPR, KCP, AND KBP Series Maintenance Kits

Maintenance kits include:

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

KCY series regulators can be rebuilt with two KPR series maintenance kits.

- The second-stage kit should be configured for the desired pressure control range.
- The first-stage kit should specify designator **J** for the pressure control range and designator **0** for the ports (filter size). All other options should match those of the second-stage kit.

### Maintenance Kits for Other Regulator Series

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

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

### Maintenance Instructions

Maintenance instructions for all Swagelok regulators are available at [swagelok.com](http://swagelok.com).

### Maintenance Tools

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

### Ordering Information

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

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

#### **1 2 3** Regulator Series

**KPR** = KPR  
**KCP** = KCP  
**KBP** = KBP

#### **4** Body Material, Cleaning

**1** = 316 SS and brass  
**C** = 316 SS and brass, SC-11 cleaned

#### **5** Pressure Control Range

##### **KPR and KBP Series**

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

##### **KCP Series**

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

<sup>①</sup> Not available with MPC platform port configuration.

#### **6** Maximum Inlet Pressure

**0** = Not applicable

#### **7** Port Configuration

**0** = Not applicable

#### **8** Ports (Filter Size)

##### **KPR Series**

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

##### **KBP Series**

**0** = Not applicable

##### **KCP Series**

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

#### **9** Seat, Seal Material

##### **KPR Series**

**1** = PCTFE  
**2** = PEEK

##### **KBP and KCP Series**

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

#### **10** Flow Coefficient (C<sub>v</sub>)

**1** = 0.02  
**2** = 0.06  
**5** = 0.20<sup>①②</sup>  
**7** = 0.50<sup>①</sup>

<sup>①</sup> Not available for KCP series with MPC platform port configuration.

<sup>②</sup> Required for KBP series.

#### **11** Sensing Mechanism, Vent

##### **KPR Series**

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

##### **KBP Series**

**A** = Alloy X-750 diaphragm, all models

##### **KCP Series**

**P** = 316 SS piston

#### **12** Handle, Mounting

**0** = Not applicable



## Additional Products

### Filters

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

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

For more information about Swagelok filters, see the *Filters—FW, F, and TF Series* catalog, MS-01-92.



### Transducers

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

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

For more information about Swagelok industrial pressure transducers, see the *Industrial Pressure Transducers* catalog, MS-02-225.



⚠ Swagelok pressure regulators are not “Safety Accessories” as defined in the Pressure Equipment Directive 97/23/EC.

⚠ 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.

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

## Warranty Information

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

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