

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

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

Features

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

Technical Data

Maximum Inlet Pressure

- Equal to pressure control range

Pressure Control Ranges

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

Flow Coefficient (C_v)

- 0.20
- See page 49 for flow graphs.

Maximum Operating Temperature

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

Weight

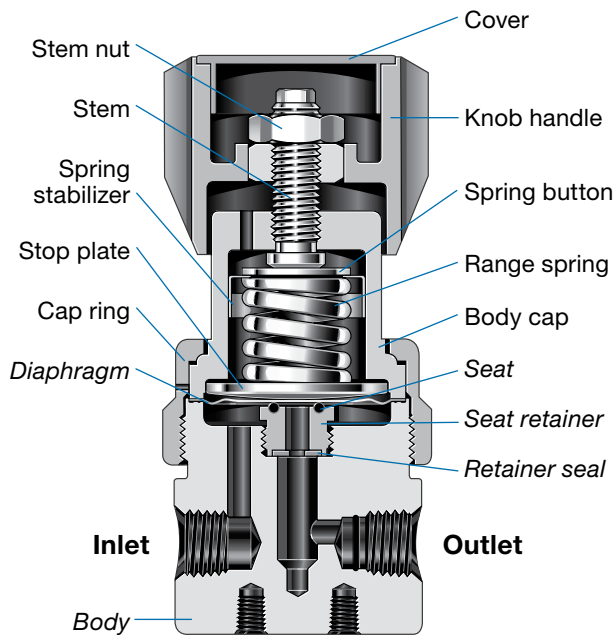
- 2.4 lb (1.1 kg)

Ports

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



Materials of Construction



Component	316 SS	Brass CW721R
	Material	
Knob handle, cover	Nylon with 316 SS insert	
Spring button	316 SS (0 to 500 psig range) Zinc-plated steel (all other ranges)	
Spring stabilizer ^①	301 SS	
Range spring	316 SS (0 to 10 through 0 to 50 psig control ranges) Zinc-plated steel (0 to 100 through 0 to 500 psig control ranges)	
Stem, stem nut, cap ring, stop plate, body cap, panel nuts ^②	316 SS	
VCR nuts ^②	316 SS	—
Nonwetted lubricant	Hydrocarbon-based	
Seat retainer	316 SS	
Retainer seal	PCTFE or PEEK	
Seat	Fluorocarbon FKM or Kalrez	
Diaphragm ^③	Alloy X-750	
Body	316 SS	Brass CW721R
Tube butt weld ports, ^② VCR gland ports ^②	316L SS	—
Wetted lubricant	PTFE-based	

Wetted components listed in *italics*.

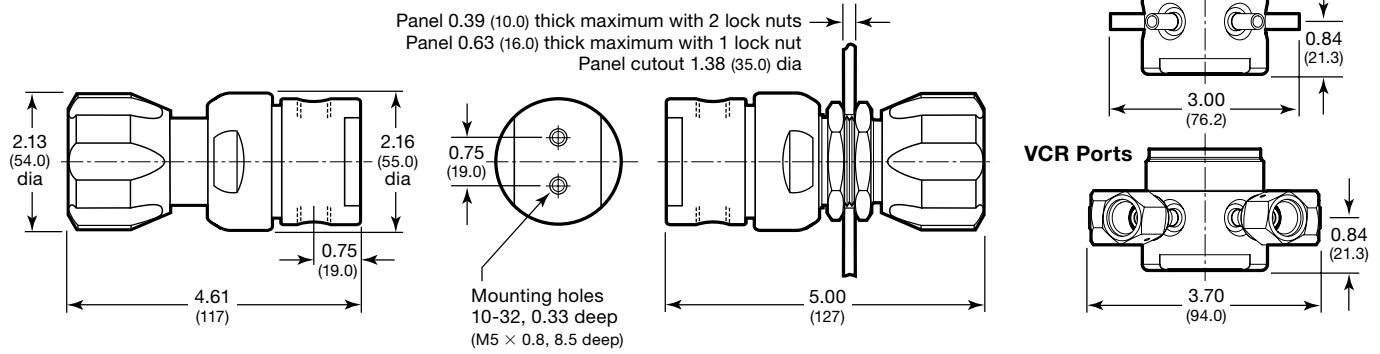
① Not included in regulators with 0 to 500 psig (0 to 34.4 bar) control range.

② Not shown.

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

Dimensions

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



Ordering Information

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

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

4 Body Material

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

5 Pressure Control Range

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

6 Maximum Inlet Pressure

- 0 = Not applicable (equal to pressure control range)

7 Port Configuration

A, D, G, V

See *Port Configurations*, page 52.

8 Ports

- 4 = 1/4 in. female NPT
- T = 1/4 in. × 0.035 in. tube butt weld^①
- V = 1/4 in. VCR gland, no nuts^{①②}
- X = 1/4 in. rotatable female VCR fitting^①
- Y = 1/4 in. rotatable male VCR fitting^①

^① Available only with 316 SS body material in A port configuration. Not available ASTM G93 Level E-cleaned.
^② For use with VCR split-nuts, which can be ordered separately. See the Swagelok *VCR Metal Gasket Face Seal Fittings* catalog, MS-01-24.

9 Seat, Seal Material

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

10 Flow Coefficient (C_v)

- 5 = 0.20

11 Sensing Mechanism, Vent

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

12 Handle, Mounting

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

For knob handle color options, see page 56.

13 Valves

- 0 = No valves

14 Cylinder Connections

- 0 = No connections

15 Gauges

- 0 = No gauges

For inlet gauge options, see page 54.

16 Options

- 0 = No options

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

^① KCP and KCB series regulators are assembled with M model gauges.

^② Not available for KCP and KCB series regulators.

Isolation Valves

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



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

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

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

Options and Accessories

Kenmac Adjustable Regulator Relief Valves (KVV Series)

- Provide nonsafety-related pressure protection for Swagelok regulators



Technical Data

Relief Pressure Ranges

- Based on the regulator control range

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

Maximum Operating Temperature

- 392°F (200°C)

Weight

- 0.26 lb (0.12 kg)

Ports

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

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*.

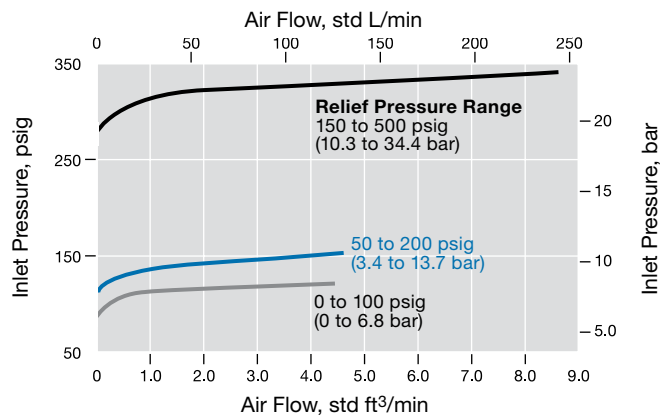
Testing

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 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.

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)^①

^① Not available with MPC platform port configuration.

6 Maximum Inlet Pressure

0 = Not applicable

7 Port Configuration

0 = Not applicable

8 Ports (Filter Size)

KPR Series

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

KBP Series

0 = Not applicable

KCP Series

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

9 Seat, Seal Material

KPR Series

1 = PCTFE
2 = PEEK

KBP and KCP Series

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

10 Flow Coefficient (C_v)

1 = 0.02
2 = 0.06
5 = 0.20^{①②}
7 = 0.50^①

^① Not available for KCP series with MPC platform port configuration.

^② Required for KBP series.

11 Sensing Mechanism, Vent

KPR Series

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

KBP Series

A = Alloy X-750 diaphragm, all models

KCP Series

P = 316 SS piston

12 Handle, Mounting

0 = Not applicable

Additional Products

Filters

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

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

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 or contact your authorized Swagelok representative.

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Elgiloy—TM Elgiloy Limited Partnership
Kalrez—TM DuPont
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