

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

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

Features

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

Technical Data

Maximum Inlet Pressure

- 10 000 psig (689 bar)

Pressure Control Ranges

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

Flow Coefficient (C_v)

- 0.06
See page 47 for flow graphs.
- 0.25 also available

Supply-Pressure Effect

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

Maximum Operating Temperature

- 212°F (100°C)

Weight

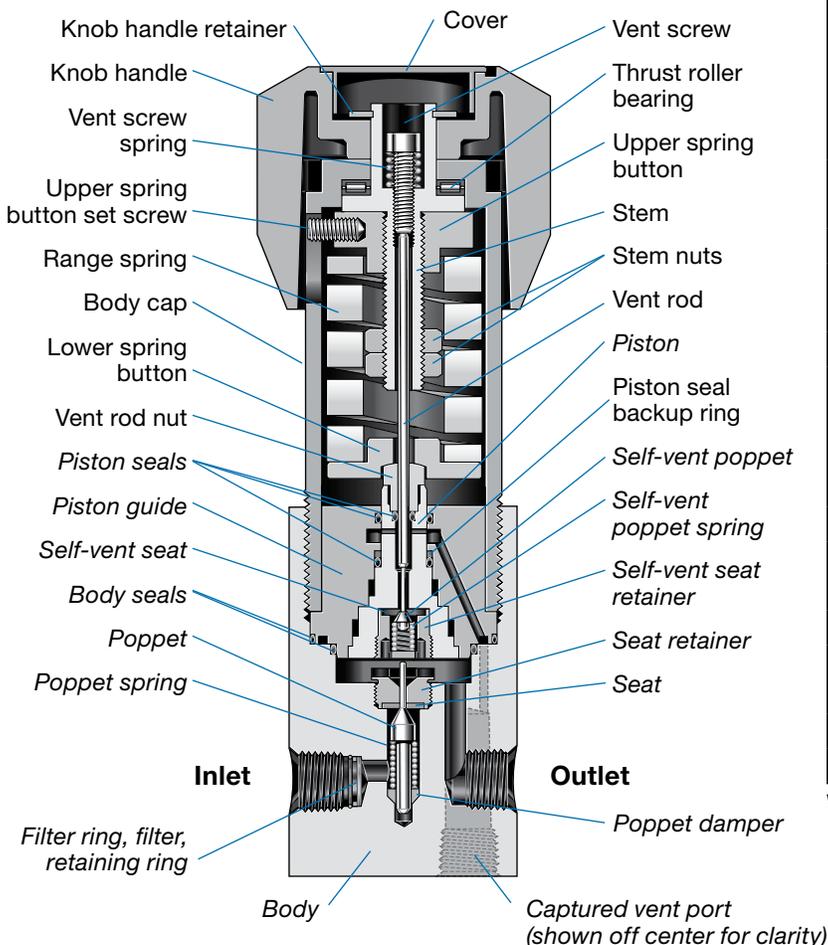
- 6.1 lb (2.75 kg)



Ports

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

Materials of Construction

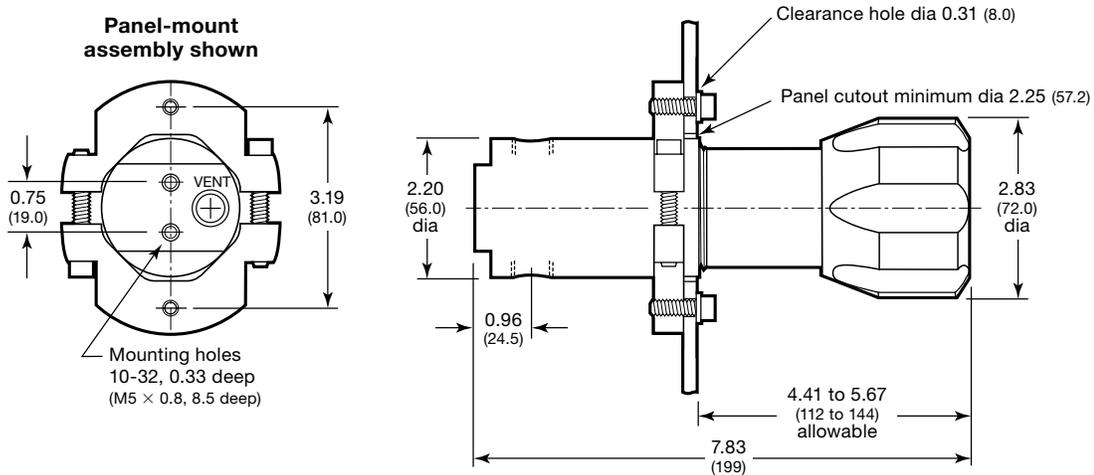


Component	Material
Knob handle, cover	Nylon with 316 SS insert
Spring buttons, upper spring button set screw, knob handle retainer, vent screw, stem nuts, vent rod nut, body cap	316 SS
Vent screw spring	302 SS
Vent rod	431 SS
Stem	CZ114 bronze
Thrust roller bearing	Hardened carbon steel
Range spring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

Wetted components listed in italics.

Dimensions

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



Ordering Information

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

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

4 Body Material

1 = 316 SS

A = 316 SS, ASTM G93 Level E-cleaned

5 Pressure Control Range

J = 0 to 500 psig (0 to 34.4 bar)

K = 0 to 750 psig (0 to 51.6 bar)

T = 10 to 1500 psig (0.68 to 103 bar)

U = 15 to 2500 psig (1.0 to 172 bar)

V = 25 to 3600 psig (1.7 to 248 bar)

W = 50 to 6000 psig (3.4 to 413 bar)^①

X = 100 to 10 000 psig (6.8 to 689 bar)^①

^① Not available for regulators assembled with isolation valves.

6 Maximum Inlet Pressure

X = 10 000 psig (689 bar)

7 Port Configuration

A, B, C, F, M

See *Port Configurations*, page 52.

8 Ports

4 = 1/4 in. female NPT

9 Seat, Seal Material

C = PEEK, fluorocarbon FKM

J = 316 SS, fluorocarbon FKM^①

^① Not suitable for gas service.

10 Flow Coefficient (C_v)

2 = 0.06

6 = 0.25

11 Sensing Mechanism, Vent

U = 316 SS piston, self and captured vent

12 Handle, Mounting

2 = Knob

6 = Knob, panel mount

For knob handle color options, see page 56.

13 Isolation Valves

0 = No valves

For isolation valve options, see page 54.

14 Cylinder Connections

0 = No connections

15 Gauges

0 = No gauges

For inlet and outlet gauge options, see page 54.

16 Options

0 = No options

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*.

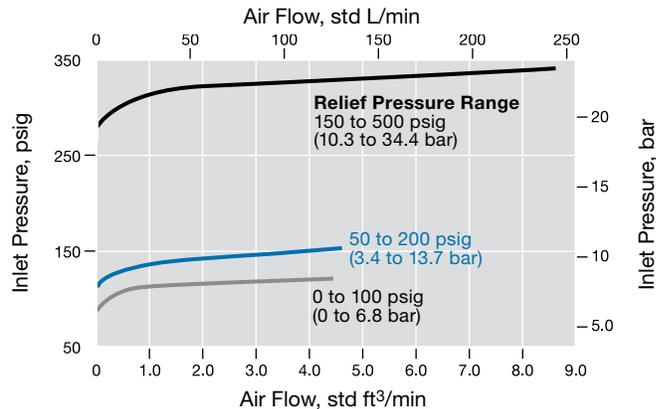
Testing

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 = 0.20^②
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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