

# Back Pressure Regulators Manual Adjusted and Dome-loaded

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### For Your Safety

It is solely the responsibility of the system designer and user to select products suitable for their specific application requirements and to ensure proper installation, operation, and maintenance of these products. When selecting products, the total system design must be considered to ensure safe, trouble-free performance. Material compatibility, product ratings and application details should be considered in the selection. Improper selection or use of products described herein can cause personal injury or property damage.

Contact your authorized Atkomatic sales and service representative for information about additional sizes and special alloys.

### **SAFETY WARNING:**

Circle Seal products are designed for installation only by professional suitably qualified licensed system installers experienced in the applications and environments for which the products are intended. These products are intended for integration into a system. Where these products are to be used with flammable or hazardous media, precautions must be taken by the system designer and installer to ensure the safety of persons and property. Flammable or hazardous media pose risks associated with fire or explosion, as well as burning, poisoning or other injury or death to persons and/ or destruction of property. The system designer and installer must provide for the capture and control of such substances from any vents in the product(s). The system installer must not permit any leakage or uncontrolled escape of hazardous or flammable substances. The system operator must be trained to follow appropriate precautions and must inspect and maintain the system and its components including the product(s) and at regular intervals in accordance with timescales recommended by the supplier to prevent unacceptable wear or failure.

## ĆIRCOR **Circle Seal Controls**

## **PVRB** Series

Ultra-sensitive Back Pressure Regulator Inlet & Outlet to 60 psig



### **Features**

- Low pressure control
- Full range capability
- Compatible with corrosive and non-corrosive gases & liquids
- Ultra-sensitive pressure regulator

### **Applications**

- Chromatography
- Process stream sampling
- Bubbling operations
- Medical instrumentation
- Research laboratories
- Instrument calibration

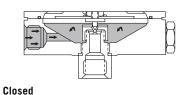
### **Technical Data**

Polyvinyl chloride
PVRB2 & PVRB3: Polyvinyl chloride
<ul> <li>PVRB4 &amp; PVRB5: Aluminum alloy</li> </ul>
Kel-F®
PTFE
Delrin®
1/4" NPT female
Maximum control pressure: 60 psig (4 BAR)
0° F to +125° F (-18° C to +52° C)
Cv = 0.011 maximum
Orifice diameter = 0.025"
PVRB2 & PVRB3: 14 oz
PVRB4 & PVRB5: 1.5 lbs
Bubble-tight
Less than 1/2 psi

Note: Proper filtration is recommended to prevent damage to sealing surfaces.

## **PVRB** Series

### How it Works



With the unit spring load adjusted to the desired regulated "set" pressure, a dead-tight seal is affected against the applied upstream pressure.

#### Regulating

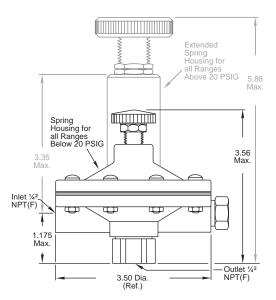
When the upstream process pressure (applied on the diaphragm) increases, an opposing force is generated which, through the diaphragm plate, acts against the "set" spring load.

As the increasing upstream pressure level reaches the "set" pressure, the poppet is gradually lifted off its seat. A consequent decrease in upstream pressure is experienced when the flowing fluid is relieved to the downstream side of the process at a faster rate than the upstream pressure can supply.

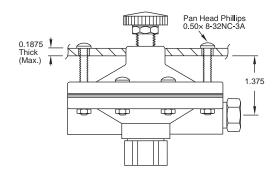
With decreasing upstream pressure, the spring force starts the poppet moving toward its closed position, thus maintaining the desired "set" pressure level within a narrow band.

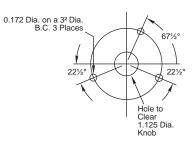
When the upstream pressure has decreased to a level just below "crack", the adjusting spring load again creates a tight seal between the poppet and the sharp edge of the valve seat.

### **Dimensions**

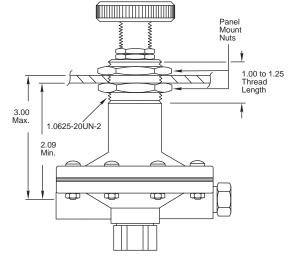


### Panel Mounting for PVRB2 & PVRB3





### Panel Mounting for PVRB4 & PVRB5



### **PVRB Series**

#### How to Order K/ PVRB 3 M PM **REPAIR KIT**— **OPTIONS** Blank None PRESSURE RANGE -ΡM Panel mount 2 2 to 6 psig **3** 6 to 20 psig TRIM MATERIAL 4 20 to 40 psig Blank 316 stainless steel 5 40 to 60 psig Μ **MONEL®**

Note: if this regulator is to be used in oxygen service, specify "GENERAL OXYGEN SERVICE" when ordering or furnish the factory a copy of the special requirements.

Please consult your Circle Seal Controls distributor, representative, or the factory for information on special connections, operating pressures and temperature ranges.





**BP-3 Series\*** 

Adjustable Back Pressure Regulators



The BP-3 Series is designed for either liquid or gas service in instrumentation systems. Similar in design to pressure reducing control regulators which regulate outlet pressures, back pressure regulators control the inlet pressure. The many features of this regulator, particularly its precise throttling action, make it ideal for this type of application. In low flow or closed systems, overpressures often are released by pressure relief valves. This type of relief is on-off with no throttling control. In contrast to relief valves, the back pressure control regulator with is throttling action substantially improves system pressure regulation.

\* Replaces the BPR7A and BPR8A Series.

### **Applications**

 Analytical instrumentation Pilot plants Specialty gas systems Compressors Pump bypass Process vessel protection

### **Features & Specifications**

- Only 316L stainless steel and PTFE in flow stream
- 316L stainless steel construction
- Operating temperatures of -40° F to +500° F (-40° C to +260° C)
- Bubble-tight shutoff
- Gas or liquid service
- Adjustable pressure control ranges of 0–6 psig, 0-10 psig, 0-25 psig, 0-50 psig, 0-100 psig, 0-250 psig, 0-500 psig, 0-750 psig, and
- 0-1,000 psig
- Cv flow coefficient is 0.2

### **Options**

- Wetted materials of construction: brass, MONEL<sup>®</sup> HASTELLOY®, titanium
- Extra ports
- Panel mount (requires a 1<sup>3</sup>/<sub>"</sub> mounting hole)
- High purity connections (tube stubs, metal face seals, etc.)
- Pressure gauges
- Optional Cv's: 0.03, 0.05, 0.06, 0.12, 0.24, 0.3, 0.095, 0.025, 0.04, 0.005, and 0.01

### **BP-3 Series**

### How to Order

BP3 – <u>1 A 1 1 I</u>	<u>5 G 1 1 1 C</u>
<pre>BODY MATERIALS 1 316L stainless steel 2 Brass 4 MONEL® 5 HASTELLOY® B 6 HASTELLOY® C 7 Titanium PORT CONFIGURATION A Standard (one inlet &amp; one outlet port) For more port configurations, see page 13. PROCESS PORT TYPES 1 ¼″ FNPT (¼″ FNPT gauge ports) (standard) 2 ¼″ tube (¼″ tube gauge ports) 3 ¼″ sch 80 pipe (¼″ FNPT gauge ports) 4 ¾″ FNPT (¼″ FNPT gauge ports) 6 ½″ tube (¼″ tube gauge ports) 8 ¼″ internal VCR (¼″ tube gauge ports) 8 ↓4″ iso 7-Rc taper internal (¼″ FNPT gauge ports) 8 ↓4″ iso 7-Rc taper internal (¼″ FNPT gauge ports) 8 ↓4″ iso 7-Rc taper internal (¼″ FNPT gauge ports) 8 ↓4″ iso 7-Rc taper internal (¼″ FNPT gauge ports) 8 ↓4″ iso 7-Rc taper internal (¼″ FNPT gauge ports) 8 ↓4″ iso 7-Rc taper internal (¼″ FNPT gauge ports) 8 ↓4″ internal VCR (¼″ tube gauge ports) 9 ↓4″ iso 7-Rc taper internal (¼″ FNPT gauge ports) 9 ↓4″ iso 7-Rc taper internal (¼″ FNPT gauge ports) 9 ↓4″ iso 7-Rc taper internal (¼″ FNPT gauge ports) 9 ↓4″ iso 7-Rc taper internal (¼″ FNPT gauge ports) 9 ↓4″ iso 7-Rc taper internal (¼″ FNPT gauge ports) 9 ↓4″ iso 7-Rc taper internal (¼″ FNPT gauge ports) 9 ↓4″ iso 7-Rc taper internal (¼″ FNPT gauge ports) 9 ↓4″ iso 7-Rc taper internal (¼″ FNPT gauge ports) 9 ↓4″ iso 7-Rc taper internal (¼″ FNPT gauge ports) 9 ↓4″ iso 7-Rc taper internal (¼″ FNP</pre>	CAP ASSEMBLY  I Standard  A Panel mount  Tamper-proof  F Tamper-proof, panel mount  G Metal knob  H ¼" FNPT dome-loaded  L BP-6 top works, stainless steel  DIAPHRAGM FACING/BACKING MATERIAL  I PTFE/stainless steel  DIAPHRAGM FACING/BACKING MATERIAL  I PTFE/stainless steel  DIAPHRAGM FACING/BACKING MATERIAL  I PTFE/stainless steel  F Viton®/stainless steel  F TFE/INCONEL®  F TFE/HASTELLOY® B  F TFE/HASTELLOY® C  A PTFE/tantalum  DIAPHRAGM TYPE  I Standard diaphragm  Vacuum assist spring, standard diaphragm  CONTROL RANGE  B 0–6 psig  C 0–10 psig  J 0–250 psig  C 0–100 psig  K 0–1,000 psig*  G 0–100 psig  K 0–1,000 psig*  C 0–100 psig  C 0–100 psi
<ul> <li>C Polyimide (metal knob is standard)</li> <li>D Viton<sup>®</sup></li> <li>I High-density PTFE</li> <li>K Kalrez<sup>®</sup></li> <li>Q PEEK<sup>™</sup></li> </ul>	FLOW COEFFICIENT (CV)         1       0.03       7       0.30         2       0.05       A       0.095         3       0.06       C       0.025         4       0.12       E       0.04         5       0.2<(standard)
Maximum Temperature & Control Pressures Maximum	<b>6</b> 0.24 <b>J</b> 0.01

	waximum		
Seat Material	Temperature	@	Maximum Control Range
Viton®	250° F (121° C)	@	250 psig (1.72 MPa)
Kalrez®	300° F (148° C)	@	250 psig (1.72 MPa)
High-density PTFE	200° F (93° C)	@	500 psig (3.44 MPa)
Polyimide	500° F (260° C)	@	1,000 psig (6.89 MPa)
PEEK™	500° F (260° C)	@	1,000 psig (6.89 MPa)

Note: Temperatures in excess of 175° F (80° C) require the use of a metal knob or the tamper-proof option.

Tefzel® is a registered trademark of the DuPont Company.

Kalrez<sup>®</sup> and Viton<sup>®</sup> are registered trademarks of DuPont Dow Elastomers. PEEK™ is a trademark of Victrex PLC.

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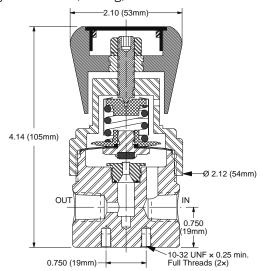
#### \* Polyimide, PEEK™, or Kel-F<sup>®</sup> actuators are

recommended for these pressure ranges.

*†* Must use BP-6 top works

### **Outline & Mounting Dimensions**

Weight = 1.9 lbs (0.86kg)



**BP-60 Series\*** 

CIRCOR

High Pressure Back Pressure Regulator



The BP-60 Series is the counterpart of the PR-50 pressure reducing series for systems that are higher in pressure and low to moderate flows. This regulator has a diaphragm for maximum sensitivity in providing relief • 316L stainless steel or brass (alloy 360) body at high pressures. The PTFE stainless seat assembly provides good shutoff in most applications. For economy purposes, the cap assembly and knob are of aluminum construction as in the PR-50 companion unit. Good sensitivity and a wide selection of control ranges make this regulator an excellent selection in many research and pilot plant facilities.

\* Replaces the BPR9A Series.

### **Applications**

- Pilot plants
- Anayltical instrumentation
- Compressors
- Pump bypass
- Pressure vessel protection
- Hyrostatic testing

### Maximum Temperature & Control Pressures

### Nylon Diaphragm Backing

	Maximum				Maximum		
Seat Material	Temperature	@	Maximum Control Range	Seat Material	Temperature	@	Maximum Control Range
Tefzel®	175° F (80° C)	@	1,000 psig (6.89 MPa)	Tefzel®	175° F (80° C)	@	2,000 psig (13.79 MPa)
PTFE	175° F (80° C)	@	1,000 psig (6.89 MPa)	PTFE	175° F (93° C)	@	2,000 psig (13.79 MPa)
Polyimide	175° F (80° C)	@	2,000 psig (13.79 MPa)	Polyimide	350° F (176° C)	@	2,000 psig (13.79 MPa)
PEEK™	175° F (80° C)	@	2,000 psig (13.79 MPa)	PEEK™	350° F (176° C)	@	2,000 psig (13.79 MPa)

### Features & Specifications

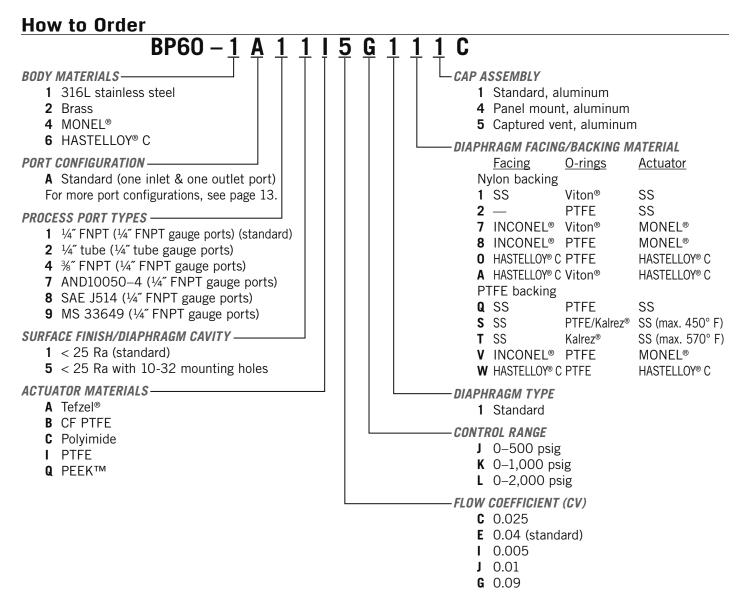
- Adjustable pressure control ranges of 0-500 psig, 0-1,000 psig and 0-2,000 psig
  - construction
- Designed for moderate flow applications with standard Cv flow coefficient of 0.04
- Diaphragm sensing with nylon, PTFE, or stainless steel diaphragm
- Operating temperatures of -40° F to +350° F (-40° C to +176° C)
- Bubble-tight shutoff
- Inlet/outlet connections ¼″ FNPT

#### Options

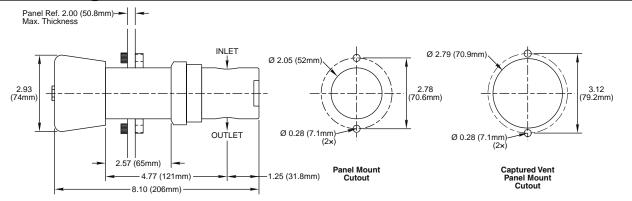
- Option Cv's available: 0.025, 0.005, 0.01
- Panel mounting
- ¾″ FNPT, AND10050-4, SAE J514 or MS33649 connections
- MONEL<sup>®</sup> and HASTELLOY<sup>®</sup> C body construction

PTFE Diaphragm Backing					
Seat Material	Maximum Temperature	@	Maximum Control Range		
Tefzel®	175° F (80° C)	@	2,000 psig (13.79 MPa)		
PTFE	175° F (93° C)	@	2,000 psig (13.79 MPa)		
Polyimide	350° F (176° C)	@	2,000 psig (13.79 MPa)		

### **BP-60 Series**



### **Outline & Mounting Dimensions**



Tefzel® is a registered trademark of the DuPont Company. Kalrez® and Viton® are registered trademarks of DuPont Dow Elastomers. PEEK™ is a trademark of Victrex PLC. INCONEL® and MONEL® are registered trademarks of Special Metals Corporation. HASTELLOY® is a registered trademark of Haynes International, Inc.



## **BPR30** Series

Corrosion Resistant Back Pressure Regulator 160 to 2,500 psig



### Features

- Positive shutoff at zero flow
- Compatible with corrosive or
- non-corrosive media
- Full range capability
- Unique design prevents clogging
- Tee handle for fast & precise control

### **Applications**

- Compressors
- Pump bypass
- Hydrostatic testing
- Water descaling systems
- Pressure vessel protection
- Reverse osmosis systems

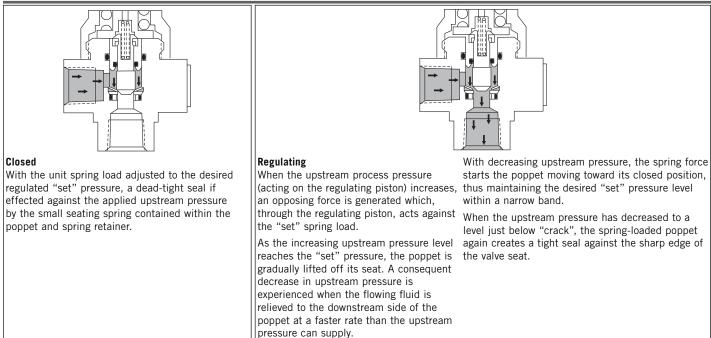
### **Technical Data**

Body Construction Materials	Brass or 316 stainless steel
Seal Materials	Ethylene propylene, Neoprene, PTFE or Viton®
Seat Material	Kel-F <sup>®</sup>
Frim Material	Stainless steel exposed to line fluids
Port Sizes	1/4" or 1/2" NPT female
Weight	2.75 lbs
Pressure Ratings	160 to 2,500 psig (11 to 172 BAR)
Temperature Range	-65° F to +250° F (-54° C to +121° C)
Flow Capacity	Cv = 0.25

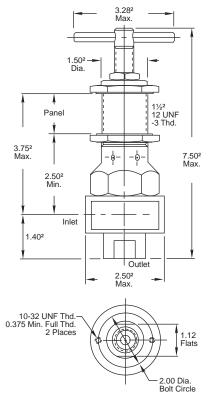
Note: Proper filtration is recommended to prevent damage to sealing surfaces.

## **BPR30 Series**

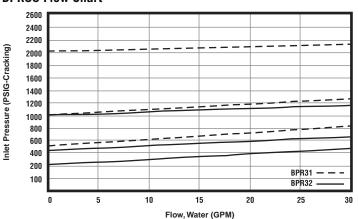
### How it Works



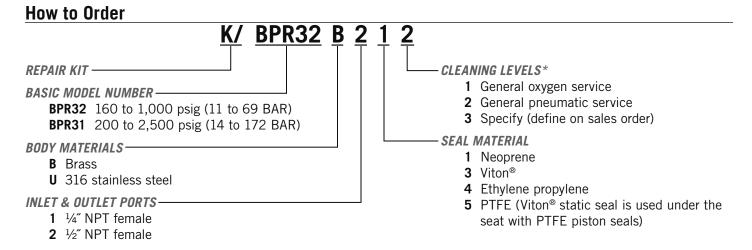
### **Dimensions & Flow Curves**



### **BPR30 Flow Chart**



## **BPR30 Series**



These units are not intended for applications where the exhaust connection will see buildup of downstream pressure. If this regulator is to be used in oxygen service, Vespel<sup>®</sup> SP-21 seat and Viton<sup>®</sup> seal are used and specify "General Oxygen Service" when ordering. Temperature range:  $-20^{\circ}$  F to  $+250^{\circ}$  F.

*Viton<sup>®</sup> static seal is used under the seat with PTFE piston seals.* 

Please consult your Circle Seal Controls distributor, representative, or the factory for information on special connections, operating pressures and temperature ranges.

*Viton® is a registered trademark of DuPont Dow Elastomers. Kel-F® is a registered trademark of 3M Company.* 

## **BP-66 Series\***

CIRCOR

High Pressure Back Pressure Regulator (10,000 psig)



The BP-66 Series is the counterpart of the PR-57 pressure reducing series for systems that are higher in pressure and low to moderate flows. This regulator has piston sensing to provide relief at high pressures. The Polyimide/stainless steel assembly provides good shutoff in most applications. For economy purposes, the cap assembly and knob are of aluminum construction as in the PR-57 companion unit. Good sensitivity and a selection of control ranges make this regulator an excellent selection in many research and pilot plant facilities.

\* Replaces the BPR1xA Series.

### **Features & Specifications**

- 316L stainless steel construction
- Adjustable pressure control ranges of 0–2,000 psig, 0-4,000 psig, 0-6,000 psig, 0-7,500 psig, and 0-10,000 psig
- Spring-loaded piston sensor
- Gas and liquid service
- Cv flow coefficient: 0.04
- Operating temperature of -40° F to +350° F (-40° C to +176° C)
- 1/4" FNPT connections standard

### **Applications**

- Pilot plants
- Analytical instrumentation
- Compressors
- Pump bypass
- Pressure vessel protection
- Hydrostatic testing

### Options

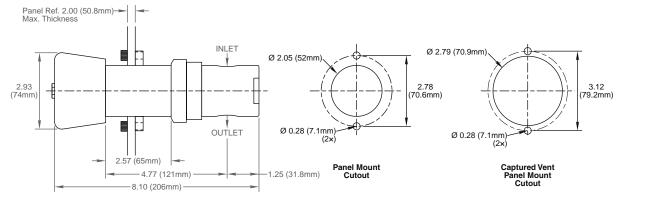
- MONEL<sup>®</sup> and titanium body construction
- Optional Cv's: 0.01 and 0.12
- Panel mounting
- AND10050-4, SAE J514, MS 33649, or ¾" FNPT connections

CIRCOR Circle Seal Controls

## **BP-66 Series**

#### How to Order BP66 – <u>1 A 1 1</u> <u>C E L 1</u> 5 C CAP ASSEMBLY **BODY MATERIALS**-1 316L stainless steel 1 Standard, aluminum 4 MONEL® 4 Panel mount, aluminum 7 Titanium **5** Captured vent, aluminum 6 Captured vent, panel mount, aluminum PORT CONFIGURATION -7 Captured vent, stainless steel A Standard (one inlet & one outlet port) F Stainless steel For more port configurations, see page 13. **PISTON MATERIAL** PROCESS PORT TYPES -5 Stainless steel 1 <sup>1</sup>/<sub>4</sub>" FNPT (<sup>1</sup>/<sub>4</sub>" FNPT gauge ports) **B** MONEL® 2 $\frac{1}{4}$ tube ( $\frac{1}{4}$ tube gauge ports) S Titanium 4 %" FNPT (1/4" FNPT gauge ports) **PISTON TYPE** 6 $\frac{1}{2}$ tube ( $\frac{1}{4}$ tube gauge ports) 7 AND10050–4 (<sup>1</sup>/<sub>4</sub>" FNPT gauge ports) 1 Standard 8 SAE J514 (1/4" FNPT gauge ports) **CONTROL RANGE** 9 MS 33649 (1/4" FNPT gauge ports) L 0-2,000 psig SURFACE FINISH/DIAPHRAGM CAVITY -**№** 0-4,000 psig 1 < 25 Ra (standard) **0** 0–6,000 psig 5 < 25 Ra with 10-32 mounting holes **P** 0–7,500 psig **Q** 0-10,000 psig ACTUATOR MATERIALS-FLOW COEFFICIENT (CV) **C** Polyimide Q PEEK™ **4** 0.12 **E** 0.04 J 0.01

### **Outline & Mounting Dimensions**



### Maximum Temperature & Control Pressures

Seat Material	Maximum Temperature	@	Maximum Control Range
Polyimide	350° F (176° C)	0	10,000 psig (68.9 MPa)
PEEK™	350° F (176° C)	@	10,000 psig (68.9 MPa)

 $PEEK^{TM}$  is a trademark of Victrex PLC.  $MONEL^{\odot}$  is a registered trademark of Special Metals Corporation.

## **BPR21 Series**

ĆIRCOR

High Flow Dome-loaded Back Pressure Regulator 25-6,000 psig



### Features

- Extremely reliable
- · High flow capacity
- Remote control capability
- Large diaphragm provides accuracy & sensitivity
- Compatible with most liquids & gases

#### **Applications**

- System bypass valve
- Pressure vessel protection
- Chemical/petroleum plants
- Industrial controls
- Pumps or compressors
- Heat exchangers

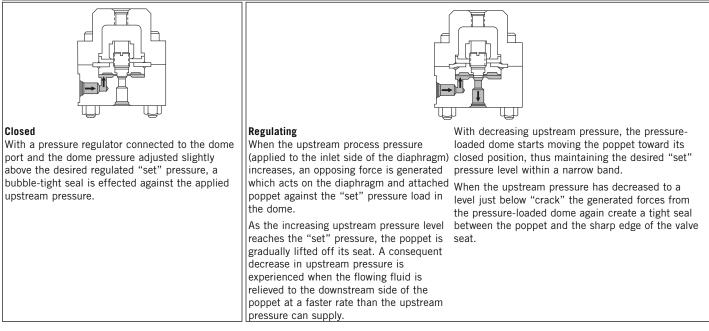
### **Technical Data**

Body Construction Materials	Brass or 316 stainless steel
Seat Materials	HASTELLOY <sup>®</sup> C, Kel-F <sup>®</sup> , KYNAR <sup>®</sup> , Nylatron <sup>®</sup> ,
	Polyimide, stainless steel, or Vespel <sup>®</sup> SP-21
Port Sizes	1/4" NPT female, 3%" NPT female,
	AND10050-4 or AND10050-6
Pressure Ratings	Brass: 25 to 3,500 psig (1.7 to 241 BAR)
	Stainless steel: 25 to 6,000 psig (1.7 to 414 BAR)
Temperature Range	-65° F to +400° F (-54° C to +204° C)
Flow Capacity	Cv = 0.90
	Orifice diameter = 0.23"

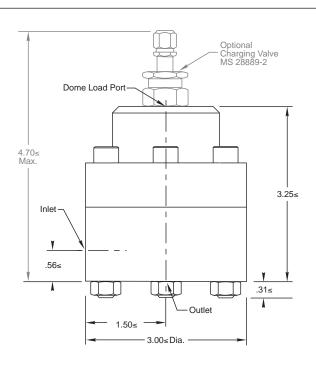
Note: Proper filtration is recommended to prevent damage to sealing surfaces.

## **BPR 21 Series**

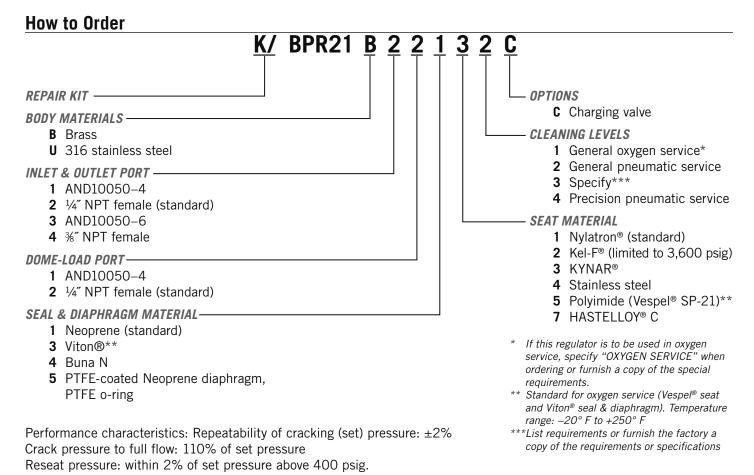
### How it Works



### **Dimensions**



### **BPR 21 Series**



CAUTION: These units are not intended for applications where the exhaust connection will see a buildup of downstream pressure.

Please consult your Circle Seal Controls distributor, representative, or the factory for information on special connections, operating pressures and temperature ranges.

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Notes	

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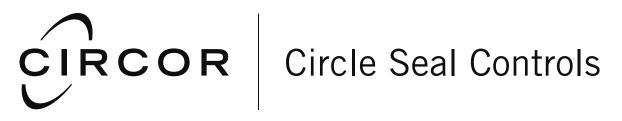
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The Small Bore Instrumentation Specialists



The Circle Seal Controls Brand is just one product offering manufactured and supplied by CIRCOR International (NYSE:CIR).

CIRCOR is a global manufacturer that specializes in developing highly engineered, technically superior small bore instrumentation solutions that consistently deliver benchmark performance, quality & safety for general-to-severe service liquid & gas flow applications.

We specialize in small bore instrumentation products up to 2" that deliver benchmark performance quality & safety; provide the broadest array of superior alloy offerings in the market; decades of proven success in a wide range of industries; a roster of "who's who" customers & projects globally; original "Best Solution" engineering & designs; and are focused on continuous improvement in all aspects of our business.

> 2301 Wardlow Circle Corona, CA 92880 +1-951-270-6200 +1-951-270-6201 (Fax)

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