



Air Preparation Units

Parker-Watts Precision and Electronic
Proportional Regulators

Catalog 0307

aerospace
climate control
electromechanical
filtration
fluid & gas handling
hydraulics
pneumatics
process control
sealing & shielding



ENGINEERING YOUR SUCCESS.

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⚠ WARNING

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS AND/OR SYSTEMS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

This document and other information from Parker Hannifin Corporation, its subsidiaries and authorized distributors provide product and/or system options for further investigation by users having technical expertise. It is important that you analyze all aspects of your application including consequences of any failure, and review the information concerning the product or system in the current product catalog. Due to the variety of operating conditions and applications for these products or systems, the user, through its own analysis and testing, is solely responsible for making the final selection of the products and systems and assuring that all performance, safety and warning requirements of the application are met.

The products described herein, including without limitation, product features, specifications, designs, availability and pricing, are subject to change by Parker Hannifin Corporation and its subsidiaries at any time without notice.

Offer of Sale

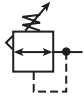
The items described in this document are hereby offered for sale by Parker Hannifin Corporation, its subsidiaries or its authorized distributors. This offer and its acceptance are governed by the provisions stated on the separate page of this document entitled "Offer of Sale".





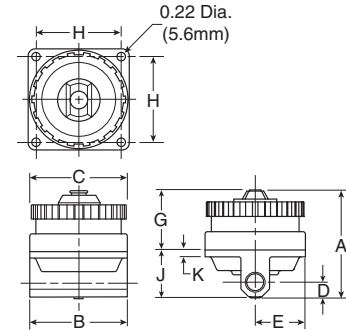
51R Dial Regulator – Relieving	2-3	P3RA102 Standard High Precision Regulator	18-19
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51R Dial Regulator – Relieving



Features

- Pressure Reference Indicating Dial Face
- Non-rising, Pressure-adjustment Knob
- Self-relieving
- Full Pressure Adjustment in Less than One Full Turn
- Recommended for Pilot-air Applications
- Flow Capacity: 1/4" – 0.7 SCFM[§]



Port Size	Standard Pressure 5 to 160 PSIG (0,34 to 11 bar)	Low Pressure 2 to 40 PSIG (0,14 to 3 bar)
1/4"	51R126RA	51R125RA

51R Regulator Dimensions				
A	B	C	D	E
2.80 (71)	2.60 (66)	2.60 (66)	0.40 (10)	1.30 (33)
G	H	J	K	
1.56 (39.6)	2.20 (56)	1.25 (31.8)	.18 (4.6)	

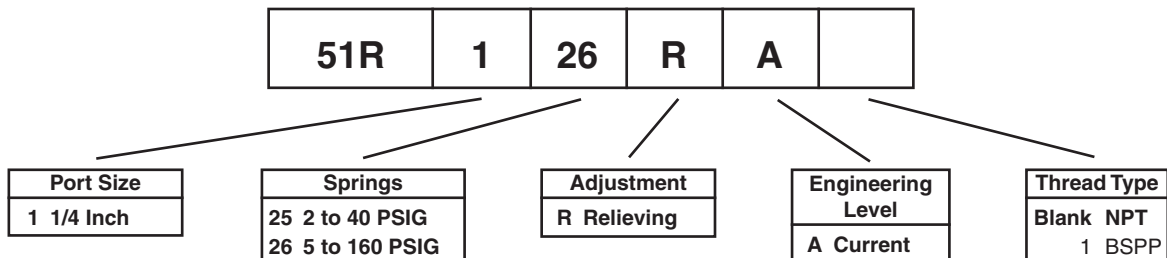
Bold Items are Most Popular.

For other models refer to ordering information below.

§ SCFM = Standard cubic feet per minute at 100 PSIG inlet, 90 PSIG no flow secondary setting, and 25 PSIG pressure drop.

inches
(mm)

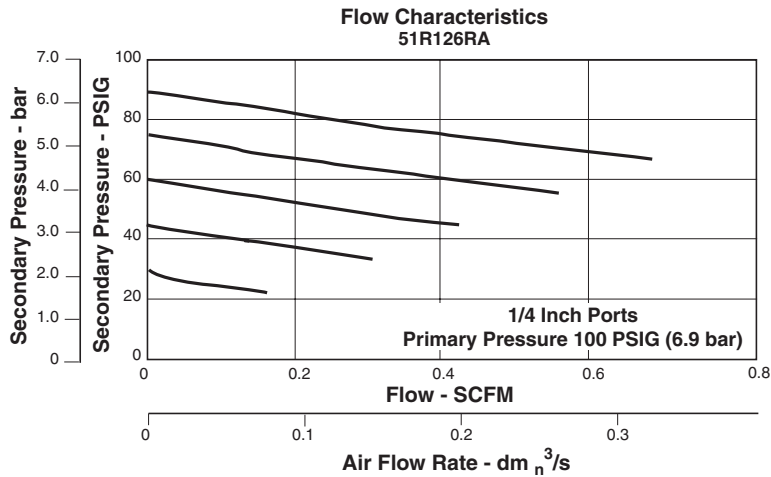
Ordering Information



BOLD ITEMS ARE MOST POPULAR.



Technical Information



⚠ WARNING
Product rupture can cause serious injury.
Do not connect regulator to bottled gas.
Do not exceed maximum primary pressure rating.

⚠ CAUTION:
REGULATOR PRESSURE ADJUSTMENT – The working range of knob adjustment is designed to permit outlet pressures within their full range. Pressure adjustment beyond this range is also possible because the knob is not a limiting device. This is a common characteristic of most industrial regulators, and limiting devices may be obtained only by special design. For best performance, regulated pressure should always be set by increasing the pressure up to the desired setting.

51R Regulator Kits & Accessories

- Adjustment Dial Knob RRP-16-024-80
- O-ring, Repair Kit GRP-95-260
- Piston and Bonnet Repair Kit RRP-95-765-80
- Spring, Regulation, Belleville Washer
 - 2 to 40 PSIG (276 kPa) RRP-95-906-80
 - 5 to 160 PSIG (1103 kPa) RRP-95-905-80
- Tamper Resistant Kit RRP-95-585-80
- Valve, Pilot with O-ring and Valve Spring RRP-96-934-80

Specifications

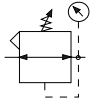
- Adjusting Range Pressure 2 to 40 PSIG (14 to 276 kPa)
5 to 160 PSIG (34 to 1103 kPa)
- Bleed Rate 0.05 SCFM
- Maximum Operating Temperature 150°F (65.5°C)
- Maximum Supply Pressure 300 PSIG (2068 kPa)
- Port Threads 1/4"
- Weight 1.3 lb. (0.5 kg)

Materials of Construction

- Body Zinc
- Bonnet Zinc / Brass
- Piston Acetal
- Seals Nitrile
- Springs Steel
- Valve Assembly Brass / Nitrile / Acetal

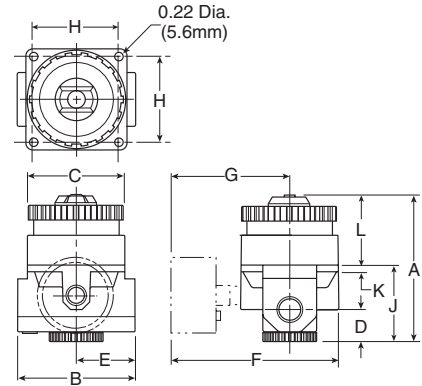


52R Dial Regulator – Relieving



Features

- Balanced Poppet Design
- Non-rising, Pressure-adjusting Dial
- High-relief Flow (3/16" Relief Orifice)
- Two 1/4" Gauge Ports
- Piston Operated
- Flow Capacity: 1/4" – 117 SCFM[§]
 3/8" – 180 SCFM[§]
 1/2" – 195 SCFM[§]
 3/4" – 220 SCFM[§]



Port Size	High Flow 5 to 160 PSIG (0,34 to 11 bar)	Low Pressure 2 to 40 PSIG (0,14 to 3 bar)
1/4"	52R126RA	52R125RA
3/8"	52R226RA	52R225RA
1/2"	52R326RA	52R325RA
3/4"	52R426RA	52R425RA

52R Regulator Dimensions				
A	B	C	D	E
4.10 (104)	3.20 (81)	2.60 (66)	0.95 (24)	1.60 (71)
F	G	H	J	K
4.30 (109)	2.70 (69)	2.20 (56)	2.08 (52.8)	.18 (4.6)
L				
2.07 (52.6)				

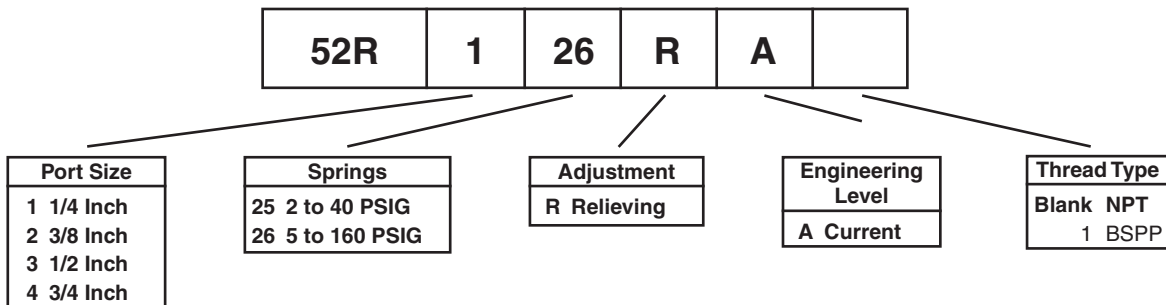
Bold Items are Most Popular.

For other models refer to ordering information below.

§ SCFM = Standard cubic feet per minute at 100 PSIG inlet, (1/4, 1/2 & 3/4) 90 PSIG, (3/8) 80 PSIG no flow secondary setting, and 25 PSIG pressure drop.

inches
(mm)

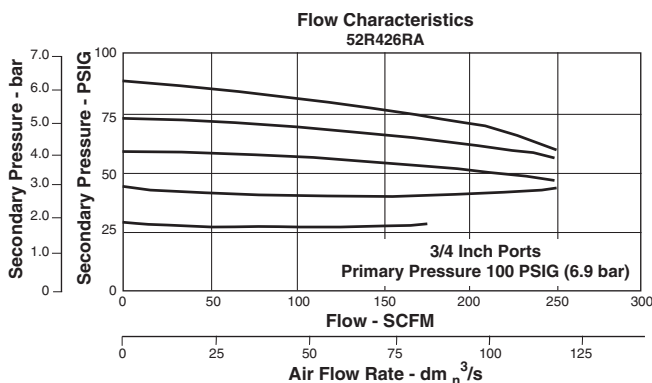
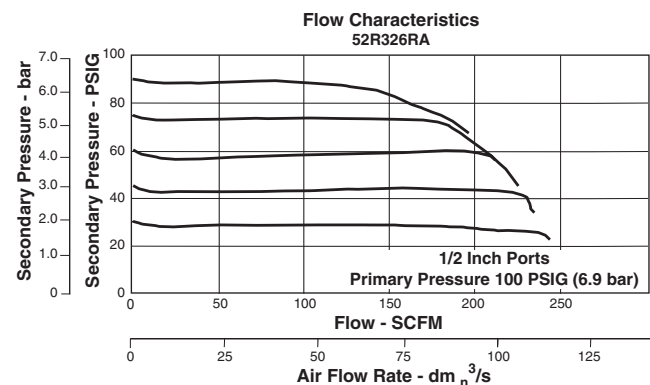
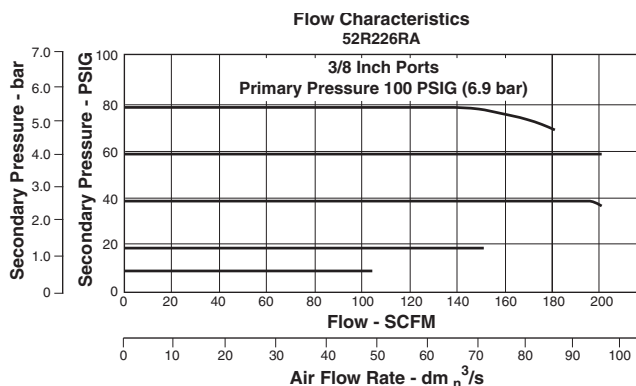
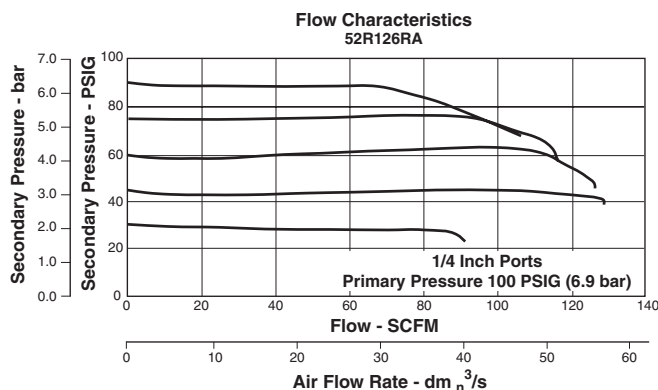
Ordering Information



BOLD ITEMS ARE MOST POPULAR.



Technical Information



⚠ WARNING
 Product rupture can cause serious injury.
 Do not connect regulator to bottled gas.
 Do not exceed maximum primary pressure rating.

⚠ CAUTION:
REGULATOR PRESSURE ADJUSTMENT – The working range of knob adjustment is designed to permit outlet pressures within their full range. Pressure adjustment beyond this range is also possible because the knob is not a limiting device. This is a common characteristic of most industrial regulators, and limiting devices may be obtained only by special design. For best performance, regulated pressure should always be set by increasing the pressure up to the desired setting.

52R Regulator Kits & Accessories

Adjustment Dial Knob	RRP-16-024-80
O-ring, Repair Kit	GRP-95-260-80
Piston Bottom and O-ring Seal	RRP-95-192-80
Pistons and Bonnet Repair Kit	RRP-95-766-80
Spring, Regulation, Belleville Washer	
2 to 40 PSIG Range	RRP-95-906-80
5 to 160 PSIG Range	RRP-95-905-80
Tamper Resistant Kit	RRP-95-585-80
Valve, Main with U-Cup Seal & Bottom Plug	RRP-95-914-80
Valve, Main with U-Cup Seal	RRP-95-151-80
Valve, Pilot with O-ring and Valve Spring	RRP-96-934-80

Specifications

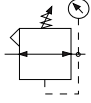
Adjusting Range Pressure	2 to 40 PSIG (14 to 276 kPa) 5 to 160 PSIG (34 to 1103 kPa)
Bleed Rate	0.05 SCFM
Gauge Ports	Two Ports 1/4" (Can be used as additional High Flow 1/4 Inch Outlet Ports)
Maximum Operating Temperature	150°F (65.5°C)
Maximum Supply Pressure	300 PSIG (2068 kPa)
Port Threads	1/4", 3/8", 1/2", 3/4"
Weight	2.3 lb. (1.04 kg)

Materials of Construction

Body	Zinc
Bonnet	Zinc / Brass
Piston	Acetal
Seals	Nitrile
Springs	Steel
Valve Assembly	Brass / Nitrile / Acetal

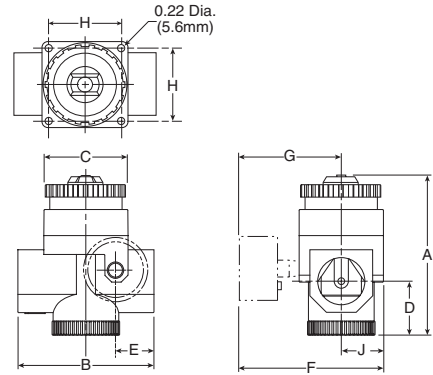


53R Dial Regulator – Relieving



Features

- Balanced Poppet Design
- Non-rising, Pressure-adjusting Dial.
- High-relief Flow (3/16" Relief Orifice)
- Two 1/4" Gauge Ports
- Piston Operated.
- Flow Capacity: 3/4" – 400 SCFM[§]
 1" – 650 SCFM[§]
 1-1/4" – 700 SCFM[§]



Port Size	High Flow 5 to 160 PSIG (0.34 to 11 bar)	Low Pressure 2 to 40 PSIG (0.14 to 3 bar)
3/4"	53R426RA	53R425RA
1"	53R526RA	53R525RA
1-1/4"	53R626RA	53R625RA

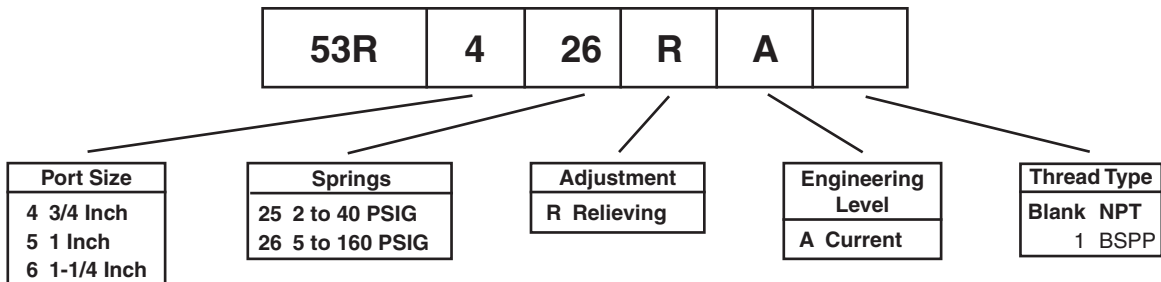
53R Regulator Dimensions				
A	B	C	D	E
5.20 (132)	4.30 (109)	2.60 (66)	1.70 (43)	1.23 (31)
F	G	H	J	
4.30 (109)	3.00 (76)	2.20 (56)	1.21 (33)	

Bold Items are Most Popular.
 For other models refer to ordering information below.

§ SCFM = Standard cubic feet per minute at 100 PSIG inlet, 90 PSIG no flow secondary setting, and 10 PSIG pressure drop.

inches
(mm)

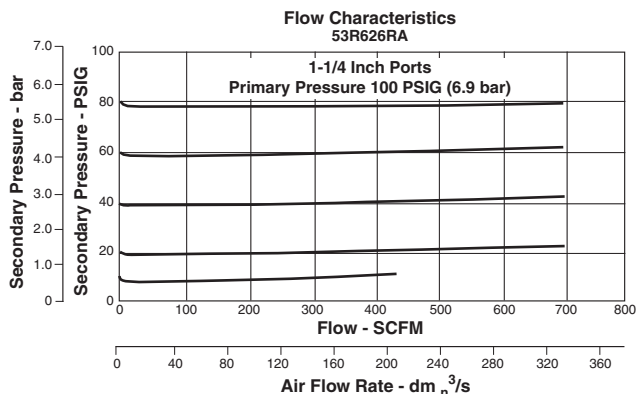
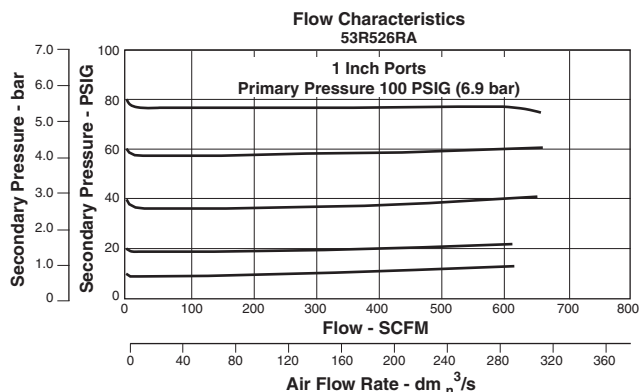
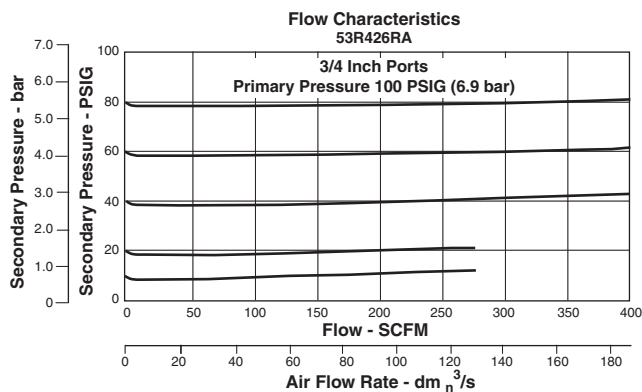
Ordering Information



BOLD ITEMS ARE MOST POPULAR.



Technical Information



⚠ WARNING
Product rupture can cause serious injury.
Do not connect regulator to bottled gas.
Do not exceed maximum primary pressure rating.

⚠ CAUTION:
REGULATOR PRESSURE ADJUSTMENT – The working range of knob adjustment is designed to permit outlet pressures within their full range. Pressure adjustment beyond this range is also possible because the knob is not a limiting device. This is a common characteristic of most industrial regulators, and limiting devices may be obtained only by special design. For best performance, regulated pressure should always be set by increasing the pressure up to the desired setting.

53R Regulator Kits & Accessories

- Adjustment Dial Knob RRP-16-024-80
- O-ring, Repair Kit GRP-95-261-80
- Piston, Bottom and O-ring Seal RRP-95-192-80
- Pistons and Bonnet Repair Kit RRP-95-766-80
- Spring, Regulation, Belleville Washer
 - 2 to 40 PSIG Range RRP-95-906-80
 - 5 to 160 PSIG Range RRP-95-905-80
- Tamper Resistant Kit RRP-95-585-80
- Valve, Main with O-ring Seal RRP-95-152-80
- Valve, Pilot with O-ring and Valve Spring RRP-96-935-80

Specifications

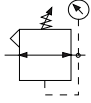
- Adjusting Range Pressure 2 to 40 PSIG (14 to 276 kPa)
5 to 160 PSIG (34 to 1103 kPa)
- Bleed Rate 0.05 SCFM
- Gauge Ports Two Ports 1/4"
(Can be used as additional High Flow 1/4 Inch Outlet Ports)
- Maximum Operating Temperature 150°F (65.5°C)
- Maximum Supply Pressure 300 PSIG (2068 kPa)
- Port Threads 3/4", 1", 1-1/4"
- Weight 4.0 lb. (1.8 kg)

Materials of Construction

- Body Zinc
- Bonnet Zinc / Brass
- Piston Acetal
- Seals Nitrile
- Springs Steel
- Valve Assembly Brass / Nitrile / Acetal

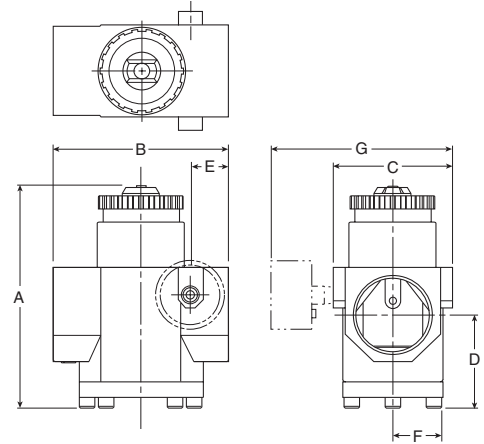


54R Dial Regulator – Relieving



Features

- Balanced Poppet Design
- Non-rising, Pressure-adjusting Dial
- High-relief Flow (3/16" Relief Orifice)
- Two 1/4" Gauge Ports
- Piston Operated
- Flow Capacity: 1-1/2" – 1,600 SCFM[§]
 2" – 1,600 SCFM[§].



Port Size	High Flow 5 to 160 PSIG (0.34 to 11 bar)	Low Pressure 2 to 40 PSIG (0.14 to 2.8 bar)
1-1/2"	54R726RA	54R725RA
2"	54R826RA	54R825RA

54R Regulator Dimensions				
A	B	C	D	E
6.80 (173)	5.30 (135)	32.60 (90)	2.80 (71)	1.15 (29)
F	G			
1.80 (489)	5.30 (135)			

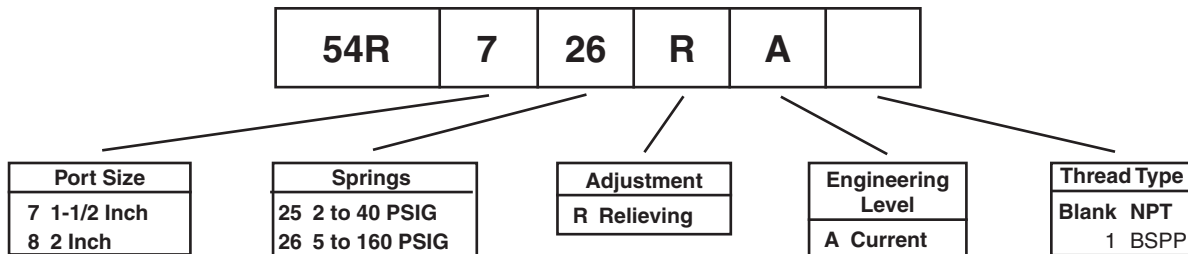
Bold Items are Most Popular.

For other models refer to ordering information below.

§ SCFM = Standard cubic feet per minute at 100 PSIG inlet, 90 PSIG no flow secondary setting, and 10 PSIG pressure drop

inches
(mm)

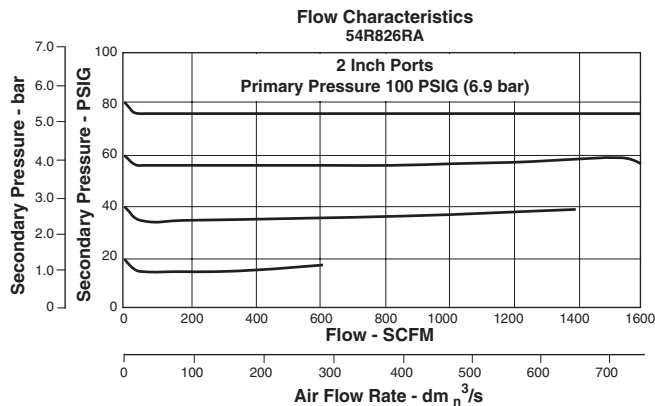
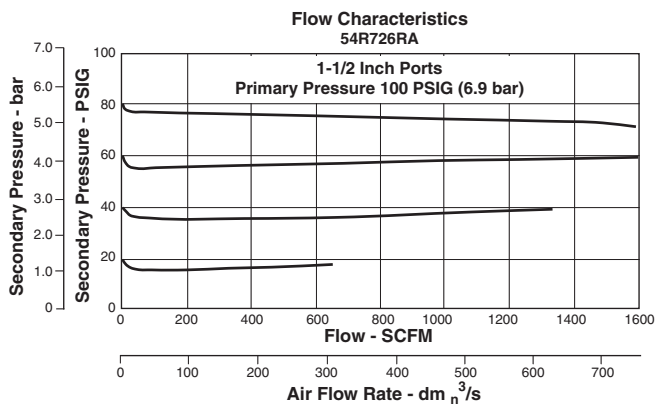
Ordering Information



BOLD ITEMS ARE MOST POPULAR.



Technical Information



⚠ WARNING

**Product rupture can cause serious injury.
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Do not exceed maximum primary pressure rating.**

⚠ CAUTION:

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54R Regulator Kits & Accessories

- Adjustment Dial Knob RRP-16-024-80
- O-ring, Repair Kit GRP-95-262-80
- Piston, Bottom and O-ring Seal RRP-95-192-80
- Pistons and Bonnet Repair Kit RRP-95-766-80
- Spring, Regulation, Belleville Washer
 - 2 to 40 PSIG Range RRP-95-906-80
 - 5 to 160 PSIG Range RRP-95-905-80
- Spring, Main Valve RRP-95-024-80
- Tamper Resistant Kit RRP-95-585-80
- Valve, Main with O-ring Seal RRP-95-153-80
- Valve, Pilot with O-ring and Valve Spring RRP-96-935-80

Specifications

- Adjusting Range Pressure 2 to 40 PSIG (14 to 276 kPa)
5 to 160 PSIG (34 to 1103 kPa)
- Bleed Rate 0.05 SCFM
- Gauge Ports Two Ports 1/4"
(Can be used as additional High Flow 1/4 Inch Outlet Ports)
- Maximum Operating Temperature 150°F (65.5°C)
- Maximum Supply Pressure 300 PSIG (2068 kPa)
- Port Threads 1-1/2", 2"
- Weight 9 lb. (4.1 kg)

Materials of Construction

- Body Zinc
- Bonnet Zinc / Brass
- Piston Zinc
- Seals Nitrile
- Springs Steel
- Valve Assembly Brass / Nitrile / Acetal

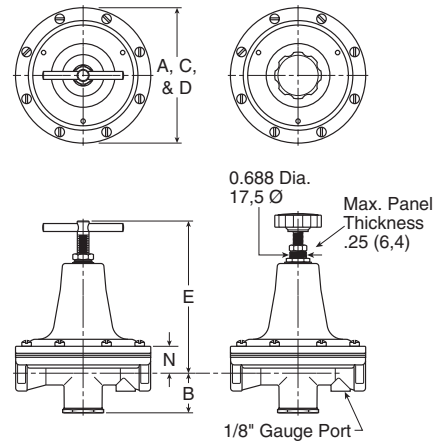


R216 Precision Regulators



Features

- High Flow Performance Featuring Rugged Design for the Most Demanding Applications
- Ideal for Those Installations Calling for Constant Pressure with Wide Variation in Flow
- Diaphragm Operated with Large Surface Area and Aspirator for Quick and Precise Regulation
- Heavy Duty Tee Handle Adjustment
- Panel Mount Version Available
- High Flow: 1/4" & 3/8" - 40 SCFM[§]



Port Size	NPT Relieving	BSPP Relieving
Tee Handle, Without Gauge 0-20 PSIG Reduced Pressure		
1/4"	R216-02F	R216G02F
3/8"	R216-03F	R216G03F
Hand Wheel Knob, Without Gauge 0-20 PSIG Reduced Pressure		
1/4"	R216-02FP	R216G02FP
3/8"	R216-03FP	R216G03FP

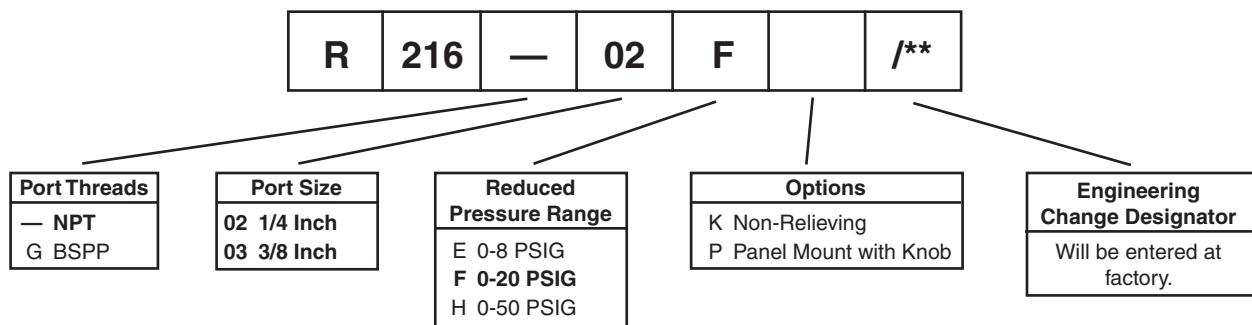
R216 Regulator Dimensions					
A	B	C	D	E	N
R216-02F, R216-03F					
4.25 (108)	1.24 (31.6)	4.25 (108)	4.25 (108)	4.78 (121)	0.85 (21.5)
R216-02FP, R216-03FP					
4.25 (108)	1.24 (31.6)	4.25 (108)	4.25 (108)	4.78 (121)	0.85 (21.5)

inches
(mm)

Bold Items are Most Popular.
For other models refer to ordering information below.

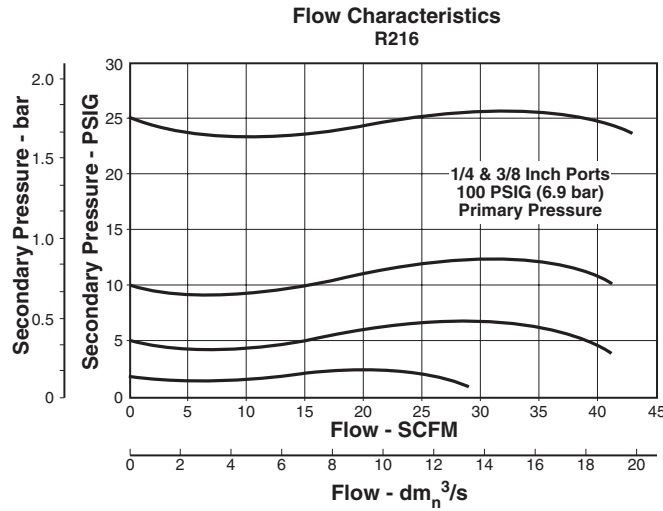
§ SCFM = Standard cubic feet per minute at 100 PSIG inlet, 75 PSIG no flow secondary setting, and 20 PSIG pressure drop.

Ordering Information



BOLD ITEMS ARE MOST POPULAR.

Technical Information



⚠ WARNING

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R216 Regulator Kits & Accessories

- Round Plastic Knob 118Y51
- Panel Mount Conversion Kit
(Spring Cage, Knob, Hardware) 4206
- Repair Kits –
 - Non-Relieving Diaphragm,
Valve Assembly (1/4", 3/8")RK216KY
 - Relieving Diaphragm,
Valve Assembly (1/4", 3/8") RK216Y

Specifications

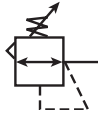
- Gauge Port (1) 1/8 Inch
- Port Threads 1/4, 3/8 Inch
- Reduced Pressure Range 0.5 to 20 PSIG (0.03 to 1.4 bar)
- Supply Pressure 300 PSIG Maximum (20.4 bar)
- Temperature Rating 40°F to 125°F (4.4°C to 52°C)
- Weight 2.2 lb. (1.00 kg) / Unit
18 lb. (8.16 kg) / 8-Unit Master Pack

Materials of Construction

- Body, Spring CageZinc
- Bottom Plug Brass
- Seals Buna N

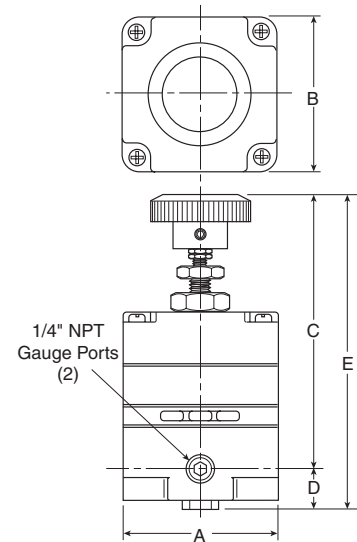


R210 / R220 High Precision Regulator



Features

- Accurate Pressure Regulation
Controls Output Pressure to within 0.1% Accuracy
- Multi-Stage Regulation for Maximum Control and Stability
- Two Full Flow Gauge Ports
- Super Sensitive Relief. Downstream Pressure Buildup, Down to 0.005 PSIG Above the Set Pressure, is Automatically Vented through Internal Relief Valve
- R220 has High Exhaust Relief Capacity



R210 / R220 Regulator Dimensions

A	B	C	D	E
2.10 (53)	2.16 (54)	3.82 (97)	0.53 (13.5)	4.35 (110)

inches
(mm)

The R210 / R220 are high precision, multi-stage pressure regulators. This pressure controller provides the highest level of regulation accuracy and repeatability available and is ideal for applications that call for the utmost in control and maximum stability under variable operating conditions. A stainless steel measuring capsule is used as a sensing element to activate the high gain servo balanced control mechanism in which the main valve is controlled by a pilot valve. This allows for greater accuracy and eliminates many of the problems associated with conventional regulators using range springs and diaphragms.

Applications

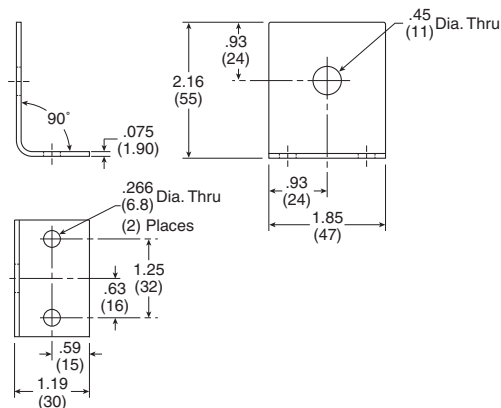
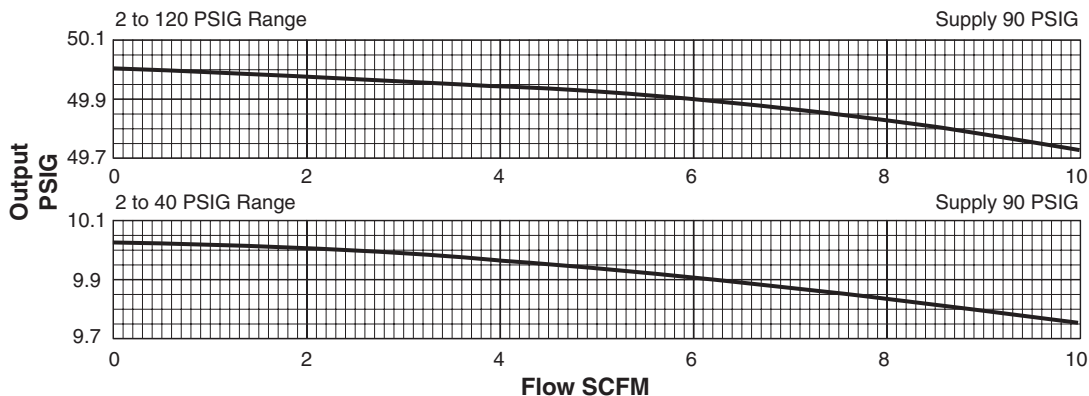
The R210 and R220 regulators are well suited for any process that requires very precise regulation of air pressure in pipes and vessels. These regulators are often used, but not limited to the following applications:

- Air Gauging
- Gas Mixing
- Calibration Standards
- Air Hoists
- Web Tensioning
- Gate Actuators
- Roll Loading
- Valve Operators
- Cylinder Loading

Ordering Information

		Reduced Pressure Range (PSIG)		
Relieving		2 to 40	2 to 120	2 to 120 High Relief
In / Out Ports	1/4"	R210-02A	R210-02C	R220-02C

Technical Information



Mounting Bracket: 446-707-045

WARNING
 Product rupture can cause serious injury.
 Do not connect regulator to bottled gas.
 Do not exceed maximum primary pressure rating.

CAUTION:
REGULATOR PRESSURE ADJUSTMENT – The working range of knob adjustment is designed to permit outlet pressures within their full range. Pressure adjustment beyond this range is also possible because the knob is not a limiting device. This is a common characteristic of most industrial regulators, and limiting devices may be obtained only by special design. For best performance, regulated pressure should always be set by increasing the pressure up to the desired setting.

R210 / R220 Regulator Kits & Accessories

Mounting Bracket Kits –

- Pipe Mounting (Pair)..... SA200YW57
- Right Angle Mounting 446-707-045

Service Kits –

- 2-40 PSIG..... RKR210A*
- 2-120 PSIG..... RKR210C*
- 2-120 PSIG (High Relieving) RKR220C*

* Parts in Kit: Diaphragms, Gasket, Bleed Orifice

Specifications

Constant Bleed Rate Less than 0.08 SCFM (0.15m³/hr)
 (Equals Bleed Rate plus other consumption)

Total Air Consumption 6 SCFM (0.21m³/hr.)

Effect of Supply Pressure Variation of 25 PSIG (1.7 bar) on Outlet:
 Less than 0.005 PSIG (0.0003 bar)

Exhaust (Relief) Capacity –

- At 5 PSIG (0.34 bar) above 20 PSIG (1.38 bar) Setpoint
- Standard Model** 3 SCFM (3.4m³/hr)
- High-Relief Model** 11 SCFM (17m³/hr)

Flow Capacity –

- At 100 PSIG (6.89 bar) Supply,
- 20 PSIG (1.38 bar) Outlet..... 14 SCFM (25m³/hr)

Gauge Ports 1/4" NPTF
 (Can be used as additional full flow 1/4" outlet ports)

Operating Pressure Range:	PSIG	bar
PRIMARY – Maximum	150	10.34
SECONDARY – Spring Pressure		
40 PSIG		
Minimum	2	0.14
Maximum	40	2.76
120 PSIG		
Minimum	2	0.14
Maximum	120	8.27

Operating Temperature Range -18°C * to 65°C (0°F* to 150°F)
 * Temperatures below 0°C (32°F) require moisture free air.

Repeatability / Sensitivity 0.005 PSIG (0.0003 bar)
 Inches of Water Column = 1/8"

Weight 1.4 lb (0.64 kg)

Materials of Construction

- Adjusting Stem & Capsule** Stainless Steel
- Body** Zinc
- Control Knob** Plastic
- Diaphragm(s)** Buna-N
- Seals** Buna-N
- Springs** Stainless Steel
- Valve Poppet** Stainless Steel

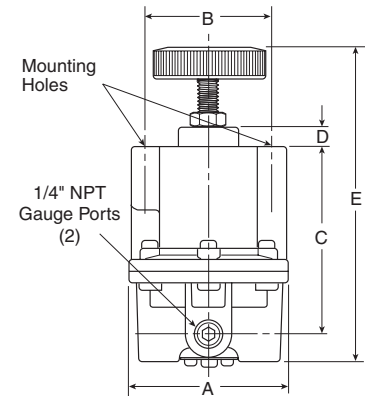


R230 High Flow Precision Regulator



Features

- Adjusting Knob.
- Diaphragm Design for Good Repeatability, Response and Sensitivity
- Balanced Poppet
- Two Full Flow Gauge Ports
- Precise Regulation. Will Sense a Decrease in Downstream Pressure as Small as 1/4" of Water Column (0.010 PSIG)
- High Flow Capacity. Flows of 80 SCFM Attainable with Minimal Drop
- Stable Output. Dampening Action of Aspiration Tube makes Regulator Insensitive to Changes in Flow
- On-line Maintenance. Can be Serviced Without Removal of Air Line



The R230 is designed for applications that require high flow capacity and accurate process control. A poppet valve which is balanced by utilizing a rolling diaphragm, insures a constant output pressure even during wide supply pressure variations. Stability of regulated pressure is maintained under varying flow conditions through the use of an aspirator tube which adjusts the air supply in accordance with the flow velocity.

Applications

The R230 regulators are an ideal choice for any application that calls for accurately maintained output pressure under high flow conditions. This includes, but is not limited to such applications as:

- Test Equipment
- Gas Mixing
 - Valve Operators
 - Positioning Cylinders
 - Laboratory Equipment
 - Web Tensioning
 - Clutch & Brake Controls
 - Roll Loading
 - Test Panels
 - Actuators

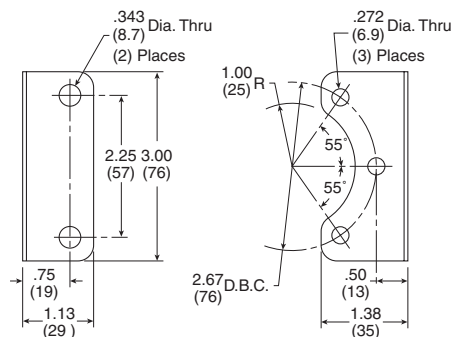
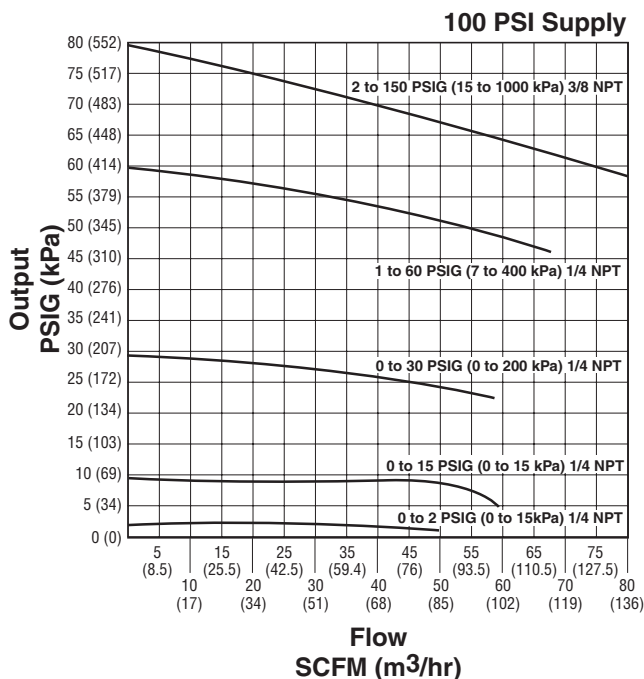
R230 Regulator Dimensions				
A	B	C	D	E
3.00 (76)	2.25 (57)	3.40 (86)	0.38 (10)	6.06 (154)

inches
(mm)

Ordering Information

Relieving	Port Size	Reduced Pressure Range (PSIG)			
		0 to 2	0 to 30	0 to 60	0 to 150
In / Out Ports	1/4"	R230-02E	R230-02B	R230-02C	R230-02D
	3/8"	N/A	R230-03B	R230-03C	R230-03D

Technical Information



Mounting Bracket: 446-707-025

WARNING
 Product rupture can cause serious injury.
 Do not connect regulator to bottled gas.
 Do not exceed maximum primary pressure rating.

CAUTION:
REGULATOR PRESSURE ADJUSTMENT – The working range of knob adjustment is designed to permit outlet pressures within their full range. Pressure adjustment beyond this range is also possible because the knob is not a limiting device. This is a common characteristic of most industrial regulators, and limiting devices may be obtained only by special design. For best performance, regulated pressure should always be set by increasing the pressure up to the desired setting.

R230 Regulator Kits & Accessories

- Mounting Bracket Kit 446-707-025
- Service Kits – Relieving
 - 0 to 2 PSIG RKR230E*
 - 0 to 30 PSIG RKR230B*
 - 0 to 60 PSIG RKR230C*
 - 0 to 150 PSIG RKR230D*
- * Parts in Kit: Diaphragm, Poppet, O-ring

Specifications

- Constant Bleed Rate** 1.0 to 12.5 SCFH
 (Depending upon output pressure)
- Gauge Ports** Two Ports 1/4"
 (Can be used as additional Full Flow 1/4 Inch Outlet Ports)
- Effect of Supply Pressure Variation** –
 Less than 0.1 PSIG for 100 PSIG (6.89 bar) change
- Exhaust (Relief) Capacity** –
 4 SCFM with downstream pressure 5 PSIG above set pressure. ...
 Exhaust commences at 0.01 PSIG above set pressure.
- Flow Capacity** –
 At 100 PSIG (6.89 bar) Supply,
 80 PSIG (5.5 bar) Outlet 80 SCFM (37.8 dm³/s)
- Operating Temperature Range** -40°C to 71°C
 (-40°F to 160°F)

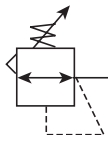
- Operating Pressure Range** –
PRIMARY – Maximum **PSIG** 250 **bar** 17
- Port Threads** 1/4"
- Exhaust (Relief) Capacity** 4.0 SCFM
 (Downstream pressure 5 PSI above set pressure)
- Repeatability / Sensitivity** ±0.010 PSIG (±0.00068 bar)
 Inches of Water Column = 1/4"
- Response** 250 ms
 The valve will open to full flow and fill a volume of 1250 cm³
- Weight** 1 lb. 10 oz. (0.74 kg)

Materials of Construction

- Adjusting Stem & Spring** Steel
- Biased Spring** Stainless Steel
- Body, Bonnet** Aluminum
- Control Knob** Plastic
- Diaphragm** Buna-N Elastomer and Polyester Fabric
- Seals** Buna-N
- Valve Poppet** Brass
- Valve Poppet Seat** Buna-N

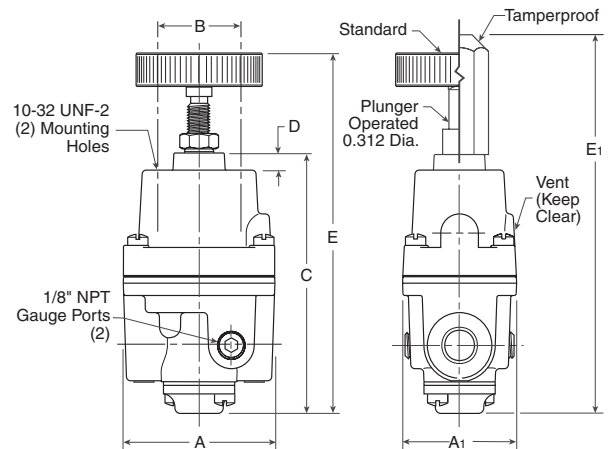


P3RA302 Regulator – Compact High Precision



Features

- Control sensitivity of .250" (.63 cm) water column variation allows use in precision applications.
- A compensating diaphragm lets the regulator remain unaffected by supply pressure changes.
- Flow of up to 40 SCFM with 100 PSIG supply allows use in applications with high flow requirements.
- An aspirator tube compensates downstream pressure droop under flow conditions.
- A separate Control Chamber isolates the diaphragm from the main flow to eliminate hunting and buzzing.
- Unit construction lets you service the Regulator without removing it from the line.



P3RA302 Regulator Dimensions		
A 2.25 (57.3)	A1 1.70 (43.1)	B 1.25 (31.8)
C 3.81 (96.7)	D 0.25 (6.4)	E 5.22 (132.6)
E1 5.56 (141.1)		

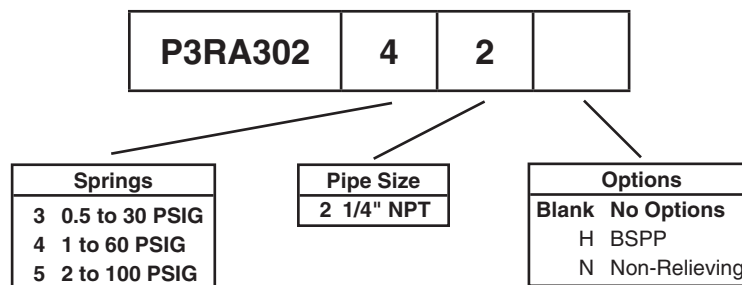
Inches (mm)

The P3RA302 Regulator is designed for applications that require high capacity and accurate process control in a small package. A poppet valve which is balanced by utilizing a convoluted diaphragm, insures a constant output pressure even during wide supply pressure variations. Stability of regulated pressure is maintained under varying flow conditions through the use of an aspirator tube which adjusts the air supply in accordance with the flow velocity.

⚠ WARNING

**Product rupture can cause serious injury.
 Do not connect regulator to bottled gas.
 Do not exceed maximum primary pressure rating.**

Ordering Information

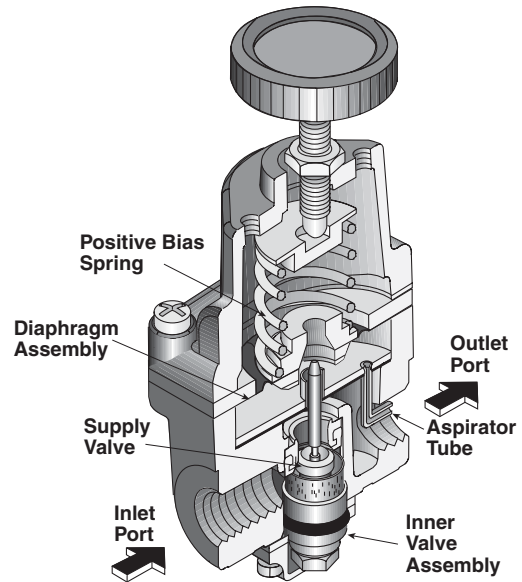
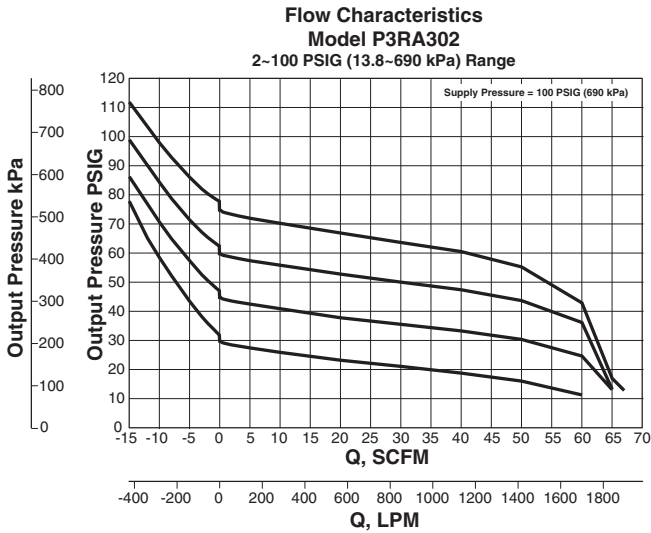


Note: Other Spring Ranges, Port Sizes, and Options Available.
 Please Consult Factory

BOLD ITEMS ARE MOST POPULAR.



Technical Information



Operating Principles

The P3RA302 Regulator uses the force balance principal to control the movement of the valve assembly which in turn controls the output pressure. When the regulator is adjusted for a specific set point, the downward force of the Positive Bias Spring causes the Diaphragm Assembly to move downward. The Supply Valve opens and allows air to pass to the Outlet Port. As the set point is reached, the downward force exerted by the Positive Bias spring is balanced by the upward force of the downstream pressure acting on the bottom of the Diaphragm Assembly. The resultant force moves the supply Valve upward to reduce the flow of air to the Outlet Port. Outlet pressure is maintained as a result of balance between forces acting on the top and bottom of the Diaphragm Assembly.

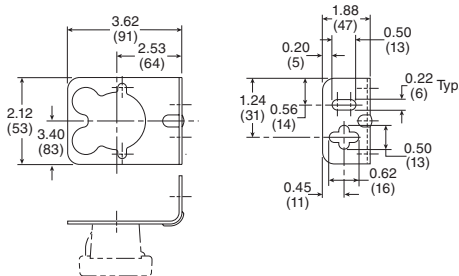
P3RA302 Kits and Accessories

Service Kits

- 1/2 to 30, 1 to 60, & 2 to 100 PSIG,
Nitrile, Standard..... PS16116-13
- 1/2 to 30, 1 to 60, & 2 to 100 PSIG,
Nitrile, Non-relieving PS16116-14

Tamper Resistant Kit..... PS12163

Mounting Bracket Kit.....PS417BP



Specifications

Supply Pressure..... 250 PSIG, (17.0 bar), (1700 kPa) Maximum

Flow Capacity –

40 SCFM (68 m³/HR) @ 100 PSIG, (7.0 bar), (700 kPa) Supply and 20 PSIG, (1.5 bar), (150 kPa) Setpoint

Exhaust Capacity –

2.0 SCFM (3.4 m³/HR) where Downstream Pressure is 5 PSIG, (.35 bar), (35 kPa) above 20 PSIG, (1.5 bar), (150 kPa) Setpoint

Supply Pressure Effect –

Less than 0.2 PSIG, (.014 bar), (.14 kPa) for 100 PSIG, (7.0 bar), (700 kPa) change in Supply Pressure

Sensitivity..... .250" (.010 PSIG) (.64 cm) Water Column

Ambient Temperature-40°F to +200°F, (-40°C to 93°C)

Hazardous Locations –

Acceptable for use in Zones 1 and 2 for Gas Atmosphere:
Groups IIA and IIB and Zones 21 and 22 for Dust Atmospheres

Materials of Construction

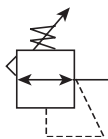
Body and Housing Aluminum

Diaphragms..... Nitrile on Dacron

Trim..... Brass

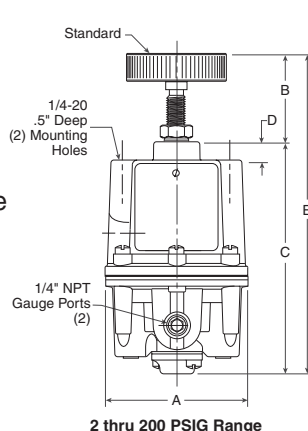


P3RA102 Regulator – Standard High Precision

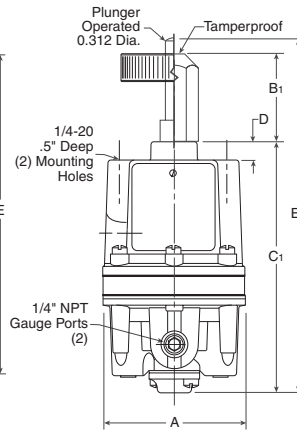


Features

- Control sensitivity of .125" (.32 cm) water column allows use in precision processes.
- Pressure balanced supply valve prevents supply pressure changes from affecting the setpoint.
- Optional check valve permits dumping of downstream pressure when supply is opened to atmosphere.
- Separate control chamber isolates the diaphragm from the main flow to eliminate hunting and buzzing.
- An aspirator tube compensates downstream pressure droop under flow conditions.



2 thru 200 PSIG Range



300 & 400 PSIG Range

P3RA102 Regulator Dimensions		
A	B	B₁
3.00 (76.2)	2.22 (56.5)	2.13 (53.9)
C	C₁	D
4.42 (111.9)	4.78 (121.6)	0.38 (9.4)
E	E₁	
6.63 (168.5)	7.28 (184.9)	

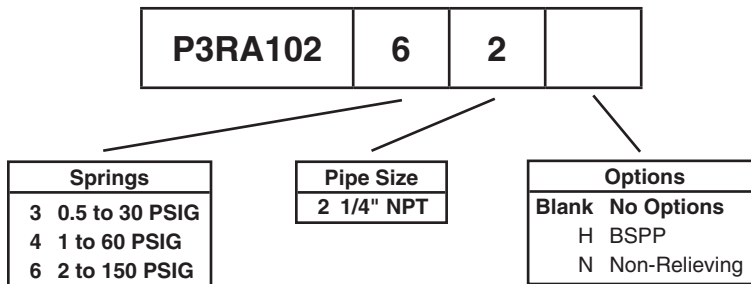
Inches (mm)

The P3RA102 Regulator is designed for applications that require high capacity and accurate process control. A poppet valve which is balanced by utilizing a rolling diaphragm, insures a constant output pressure even during wide supply pressure variations. Stability of regulated pressure is maintained under varying flow conditions through the use of an aspirator tube which adjusts the air supply in accordance with the flow velocity.

⚠ WARNING

**Product rupture can cause serious injury.
 Do not connect regulator to bottled gas.
 Do not exceed maximum primary pressure rating.**

Ordering Information

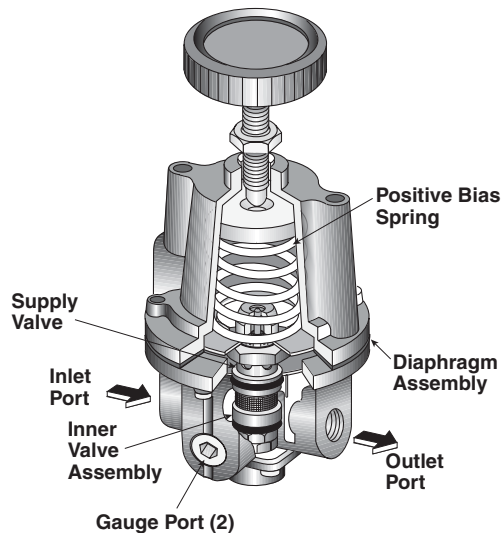
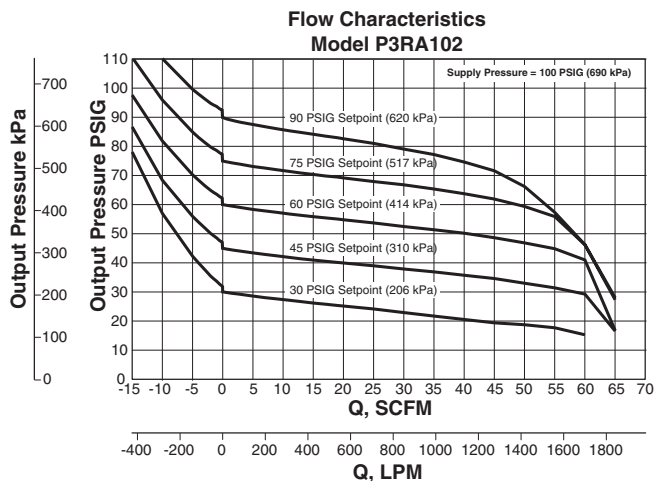


Note: Other Spring Ranges, Port Sizes, and Options Available.
 Please Consult Factory

BOLD ITEMS ARE MOST POPULAR.



Technical Information



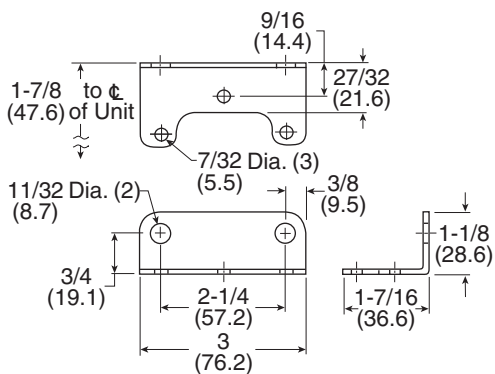
Operating Principles

The P3RA102 Series regulator use the force balance principal to control the movement of the Valve Assembly that controls the output pressure. When the regulator is adjusted for a specific set point, the downward force of the Positive Bias Spring moves the Diaphragm Assembly downward. The Supply Valve opens and allows air to pass to the Outlet Port. As the set point is reached, the downward force exerted by the Positive Bias Spring is balanced by the force of the downstream pressure that acts on the Diaphragm Assembly. The resultant force moves the Supply Valve upward to reduce the flow of air to the Outlet Port.

Outlet pressure is maintained as a result of balance between forces acting on the top and bottom of the Diaphragm Assembly.

P3RA102 Kits & Accessories

Mounting Bracket Kit –
 Zinc Plated Steel..... PS09921



Service Kits
 0 to 200 PSIG, Relieving..... PS12125-1
 0 to 200 PSIG, Non-relieving PS12125-4
Tamper Resistant Kit..... PS12165

Specifications

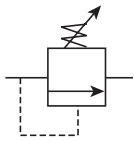
Supply Pressure..... 500 PSIG, (35.0 bar), (3500 kPa) Maximum
Flow Capacity –
 40 SCFM (68 m³/HR) @ 100 PSIG, (7.0 bar), (700 kPa) Supply and 20 PSIG, (1.5 bar), (150 kPa) Setpoint
Exhaust Capacity –
 5.5 SCFM (9.35 m³/HR) where Downstream Pressure is 5 PSIG, (.35 bar), (35 kPa) above 20 PSIG, (1.5 bar), (150 kPa) Setpoint
Supply Pressure Effect –
 Less than 0.1 PSIG, (.007 bar), (.7 kPa) for 100 PSIG, (7.0 bar), (700 kPa) change in Supply Pressure
Sensitivity..... .125" (.005 PSIG) (.32 cm) Water Column
Ambient Temperature -40°F to +200°F, (-40°C to 93°C)
Hazardous Locations –
 Acceptable for use in Zones 1 and 2 for Gas Atmosphere:
 Groups IIA and IIB and Zones 21 and 22 for Dust Atmospheres

Materials of Construction

Body and Housing Aluminum
Diaphragms..... Buna N on Dacron (Standard Unit Only)
Trim..... Brass, Zinc Plated Steel

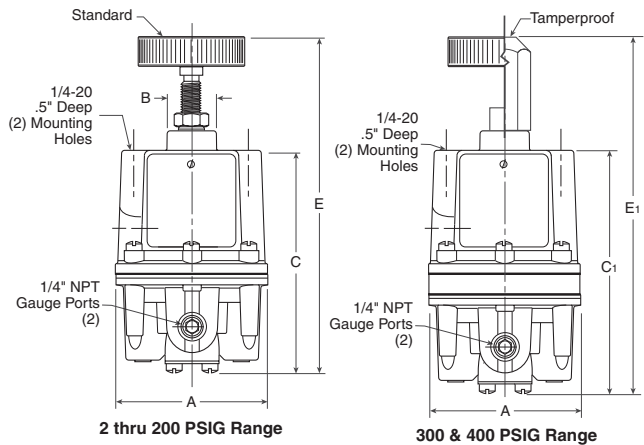


P3RA102BP Relief Valve – High Precision



Features

- Control sensitivity of .125" (.32 cm) water column allows use in precision applications.
- A separate Control Chamber and Aspirator Tube isolate the diaphragm from the main flow to eliminate hunting and buzzing.
- Unit construction lets you service the P3RA102BP without removing it from the line.
- Mounting Bracket is available.



A	B	C
3.00 (76.2)	0.97 (24.6)	4.19 (106.4)
C ₁	E	E ₁
4.56 (115.9)	6.31 (160.3)	6.75 (171.4)

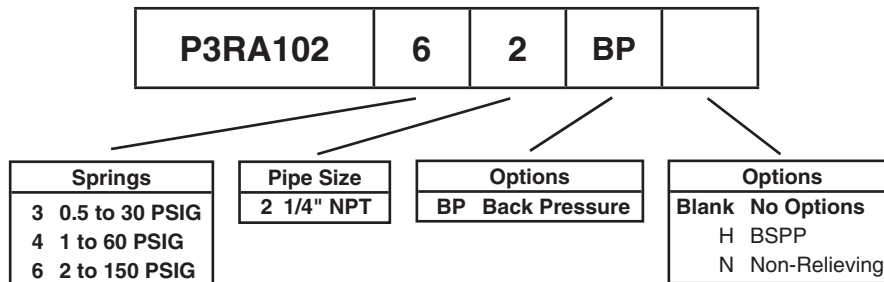
Inches (mm)

The P3RA102BP is a high capacity relief valve that relieves excess pressure in a pneumatic system.

The P3RA102BP provides greater accuracy than standard relief valves over a narrow pressure range. The P3RA102BP is an excellent choice for a wide range of precision applications.

⚠ WARNING
Product rupture can cause serious injury. Do not connect regulator to bottled gas. Do not exceed maximum primary pressure rating.

Ordering Information

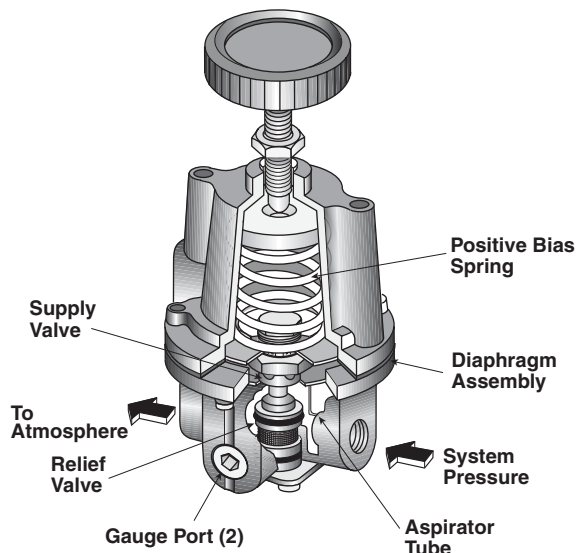
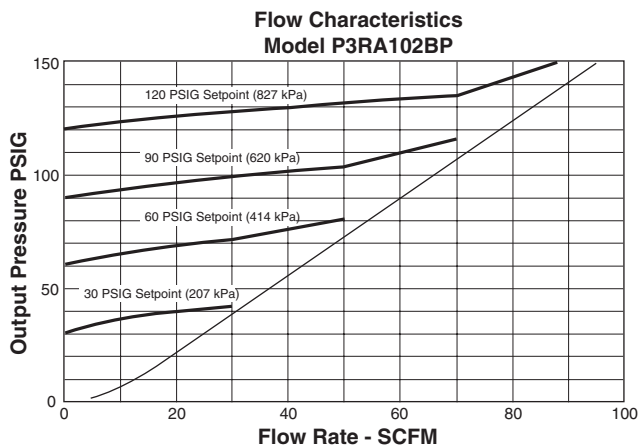


Note: Other Spring Ranges, Port Sizes, and Options Available.
 Please Consult Factory

BOLD ITEMS ARE MOST POPULAR.



Technical Information



Operating Principles

The P3RA102BP Regulator uses the force balance principle to open the Relief Valve and vent system pressure when the set point is exceeded.

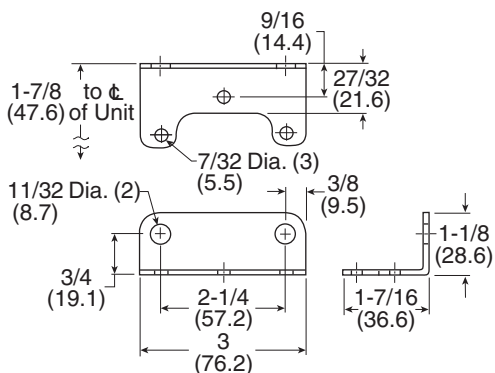
Downstream pressure is transmitted through the Aspirator Tube to the bottom of the Diaphragm Assembly. When you adjust the range screw for a specific set point, the Positive Bias Spring compresses and exerts a force on the top of the Diaphragm Assembly. As long as the pressure acting on the bottom of the Diaphragm Assembly produces a force less than the spring force acting on the top of the Diaphragm Assembly, the Relief Valve remains closed. When system pressure increases, the force on the bottom of the Diaphragm Assembly increases until it reaches the set point. When system pressure increases beyond the set point, the assembly moves upward, lifting the Relief Valve from its seat and vents the downstream air.

If downstream pressure decreases below the set point, the assembly moves downward closing the Relief Valve.

P3RA102BP Kits & Accessories

Mounting Bracket Kit –

Zinc Plated Steel PS09921



Service Kits

0 to 200 PSIG, Standard PS12127-1

Tamper Resistant Kit PS12165

Specifications

Set Point Range	System Pressure (Maximum)
2-200 PSIG (0.15-14 bar) (15-1400 kPa)	300 PSIG (21.0 bar) (2100 kPa)
300-400 PSIG (21-28 bar) (2100-2800 kPa)	500 PSIG (35.0 bar) (3500 kPa)

Flow Capacity (SCFM) –

40 (68 m³/HR) @ 100 PSIG, (7.0 bar), (700 kPa) System Pressure

Sensitivity125" (.005 PSIG) (.32 cm) Water Column

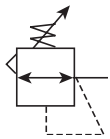
Ambient Temperature -40°F to +200°F, (-40°C to +93°C)

Materials of Construction

Body and Housing Aluminum
Trim Zinc Plated Steel, Brass
Nozzle Nitrile on Dacron

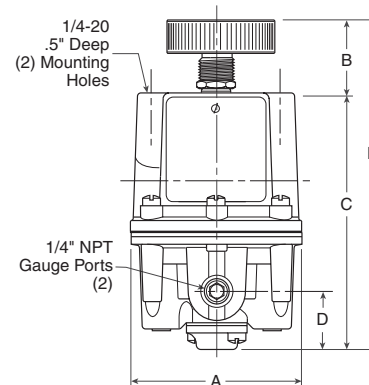


P3RA171 Vacuum Regulator – High Precision



Features

- Control sensitivity of .125" (.32 cm) water column allows use in precision applications.
- Balanced supply valve minimizes effects of vacuum variation.
- Aspirator tube compensates for downstream pressure droop under flow conditions.
- Separate control chamber isolates the diaphragm from the main flow to eliminate hunting and buzzing.
- Construction allows servicing without removing from the line.



P3RA171 Regulator Dimensions		
A	B	C
3.00 (76.2)	1.13 (28.7)	4.83 (122.6)
D	E	
1.00 (25.4)	5.96 (151.3)	

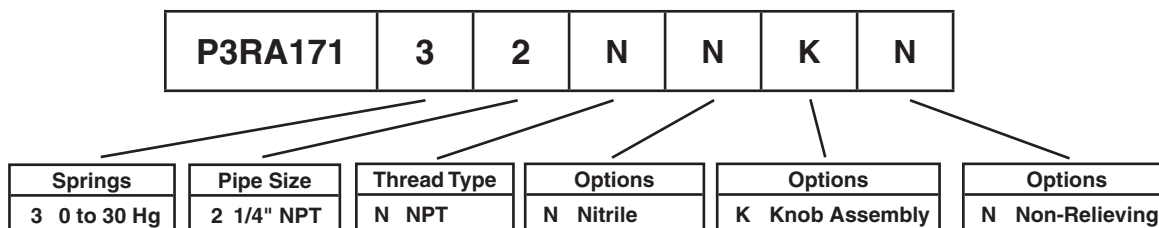
Inches (mm)

The P3RA171 is a high accuracy vacuum regulator that provides uniform vacuum regulation independent of vacuum supply changes and flow demand.

This unit has a diaphragm assembly with three springs to provide a more balanced loading of the diaphragm.

⚠ WARNING
Product rupture can cause serious injury. Do not connect regulator to bottled gas. Do not exceed maximum primary pressure rating.

Ordering Information

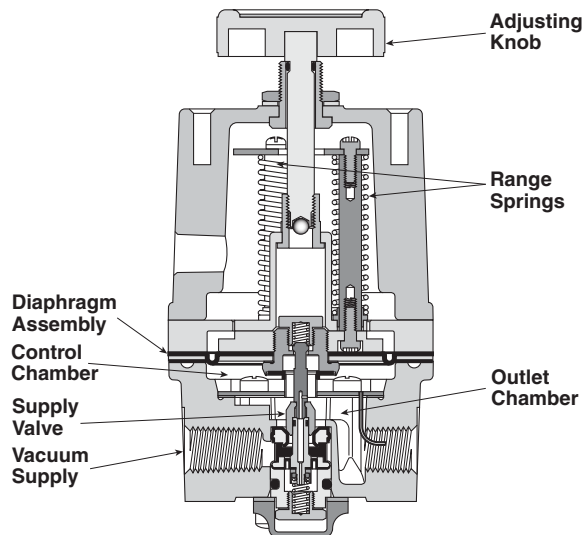
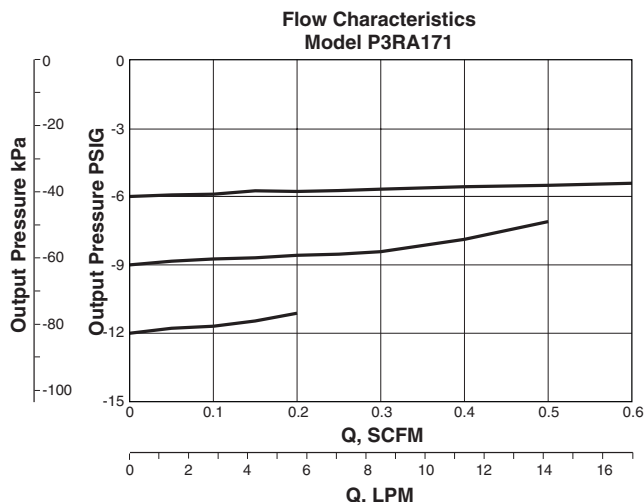


Note: Other Spring Ranges, Port Sizes, and Options Available.
 Please Consult Factory

BOLD ITEMS ARE MOST POPULAR.



Technical Information



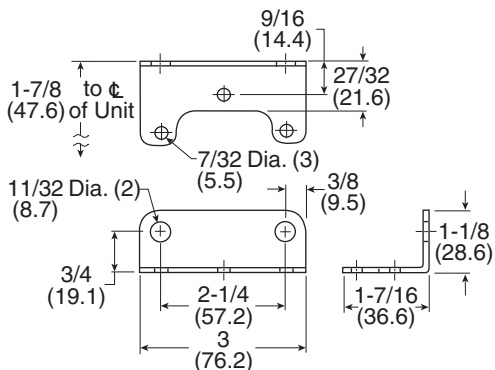
Operating Principles

The Model P3RA171 Series vacuum regulator uses the force balance principle to control the movement of the Valve Assembly that controls output vacuum.

When the regulator is adjusted for a specific set point, the upward force of the Range Springs moves the Diaphragm Assembly upward. The Supply Valve opens and allows air to pass to the inlet port. As the set point is reached, the upward force exerted by the Range Springs is balanced by the force of the vacuum that pulls downward on the Diaphragm Assembly. The resultant force moves the Supply Valve downward to reduce the flow of air to the inlet port. Outlet vacuum is maintained as a result of balance between forces acting on the top and bottom of the Diaphragm Assembly.

P3RA171 Kits and Accessories

Mounting Bracket PS09921



Service Kits

(Includes Diaphragm Assy, Valve Assy, Seat Assy & Gasket) –
 0-30" Hg, Nitrile, Nonrelieving PS20966-9
 Tamper Resistant Kit PS20967-1

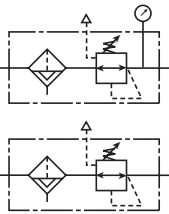
Specifications

Vacuum Supply (Max)29.92 Hg (760 torr)
 Flow Capacity3 SCFM @ 650 torr Supply, 250 torr Setpoint
 Sensitivity125" (.005 PSIG) (.32 cm) Water Column
 Ambient Temperature -40°F to +200°F, (-40°C to +93°C)
 Vacuum Supply Effect –
 Less than 1 torr for 100 torr (.04 Hg for 3.94 Hg) Change in
 Vacuum Supply

Materials of Construction

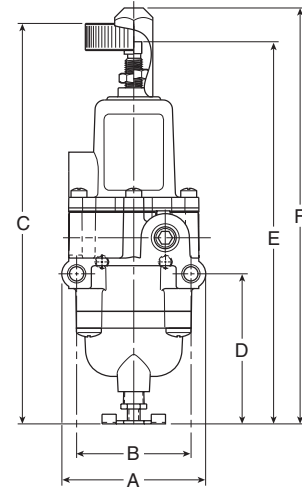
Body and Housing Aluminum
 Trim Zinc Plated Steel, Brass
 Elastomers Nitrile

P3EA632 Filter / Regulator – Precision



Features

- The no-brass construction is well suited to harsh environments.
- Internal and external epoxy finish for superior corrosion resistance.
- Non-bleed design to reduce consumption.
- Integral Relief Valve.
- A Gauge Port provides convenient pressure gauge mounting.
- The standard 5-micron filter minimizes internal contamination.
- The Filter Dripwell contains a Drain Plug to easily drain trapped liquids.
- Standard Tapped Exhaust.
- Soft Relief Seat minimizes air loss.

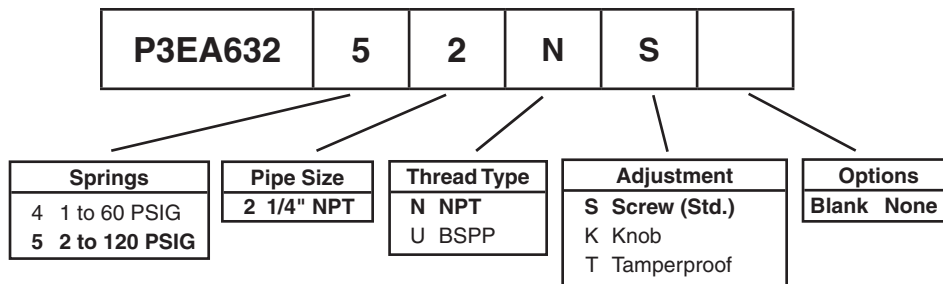


P3EA632 Regulator Dimensions		
A	B	C
2.83 (71.9)	2.25 (57.2)	7.88 (200)
D	E	F
2.96 (75)	7.52 (191)	8.19 (208)

Inches (mm)

⚠ WARNING
Product rupture can cause serious injury. Do not connect regulator to bottled gas. Do not exceed maximum primary pressure rating.

Ordering Information

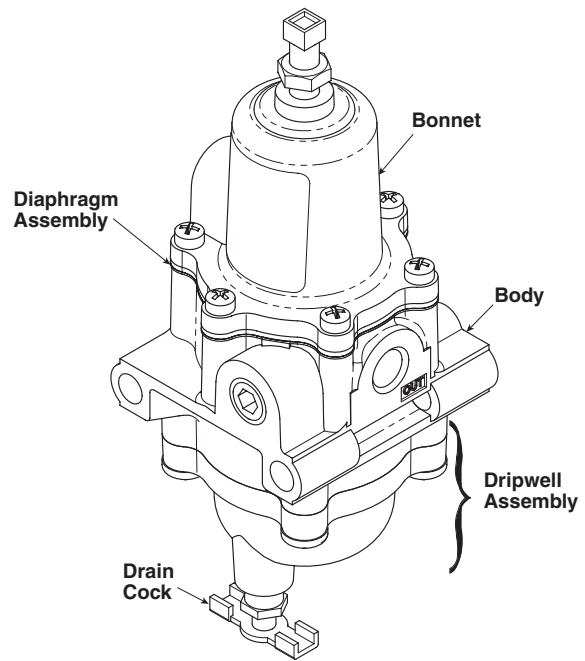
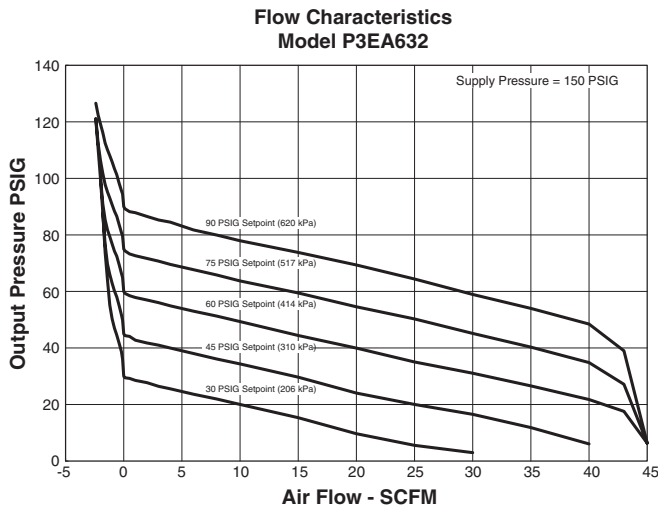


Note: Other Spring Ranges, Port Sizes, and Options Available.
 Please Consult Factory

BOLD ITEMS ARE MOST POPULAR.



Technical Information



Operating Principles

When you turn the Adjustment Screw to a specific setpoint, the Spring exerts a downward force against the top of the Diaphragm Assembly. This downward force opens the Supply Valve. Output pressure flows through the Outlet Port and the passage to the Control Chamber where it creates an upward force on the bottom of the Diaphragm Assembly.

When the setpoint is reached, the force of the Spring that acts on the top of the Diaphragm Assembly balances with the force of output pressure that acts on the bottom of the Diaphragm Assembly and closes the Supply Valve.

When the output pressure increases above the setpoint, the Diaphragm Assembly moves upward to close the Supply Valve and open the Exhaust Valve. Output pressure flows through the Exhaust Valve and out of the Exhaust Vent on the side of the unit until it reaches the setpoint.

P3EA632 Kits & Accessories

Service Kits

- 1 to 60, 2 to 120 PSIG PS19968-NR
- Tamper Resistant Kit..... PS12165

Specifications

- Supply Pressure**250 PSIG, (17 bar), (1700 kPa) Maximum
- Flow Capacity (SCFM)**25 (42.5 m³/HR) @ 100 psig, (7 bar), (700 kPa) supply and 20 PSIG, (1.5 bar), (150 kPa) setpoint
- Exhaust Capacity (SCFM)**0.8 (1.36 m³/HR) where downstream pressure is 5 PSIG, (.35 bar), (35 kPa) above 20 PSIG, (1.5 bar), (150 kPa) setpoint. (0.8 SCFM for 120 # unit)

- Maximum Supply Pressure**250 PSIG, (14 bar), (1400 kPa)
- Consumption**Undetectable
- Supply Pressure Effect** Less than 1.25 PSIG, (.09 bar), (9 kPa) change for 100 psig, (7.0 bar), (700 kPa) change in supply pressure (1.90 psig for 120 # unit)
- Sensitivity** 1.0" (.036 PSIG) (2.54 cm) Water Column
- Temperature Range**-10° F to + 160° F, (-23° C to + 71° C)

Materials of Construction

- Body and Housing**..... Epoxy Coated Aluminum
- Trim** Stainless Steel, Nickel Plated Steel
- Elastomers** Nitrile

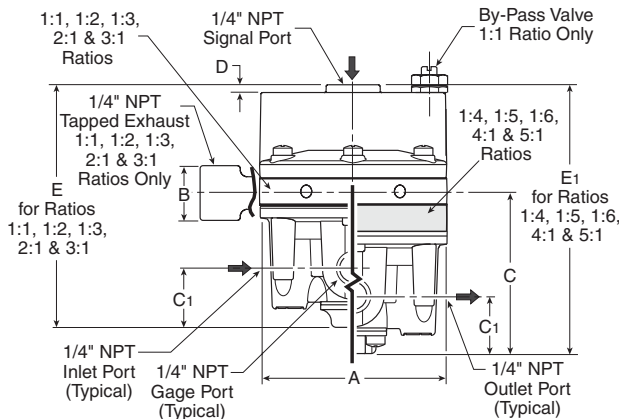


P3BA208 Pneumatic Input Signal Amplifier – Precision



Features

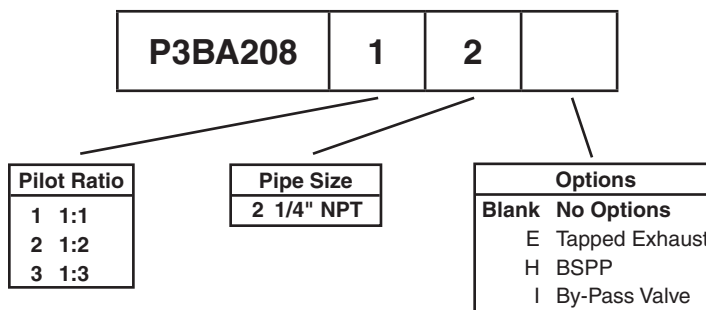
- The P3BA208 uses a pneumatic input signal to accurately control output pressure based on a predetermined ratio.
- A balanced Supply Valve minimizes the effects of supply pressure variation.
- An Aspirator Tube compensates downstream pressure droop under flowing conditions.
- A separate Control Chamber isolates the diaphragm from the main flow to eliminate hunting and buzzing.
- Unit construction allows servicing without removal.
- Mounting Bracket available.



P3BA208 Regulator Dimensions		
A	B	C
3.00 (76.2)	.94 (23.8)	2.13 (53.9)
C1	D	E
.94 (23.8)	.13 (3.2)	3.88 (98.3)
E1		
4.31 (109.5)		

Inches (mm)

Ordering Information

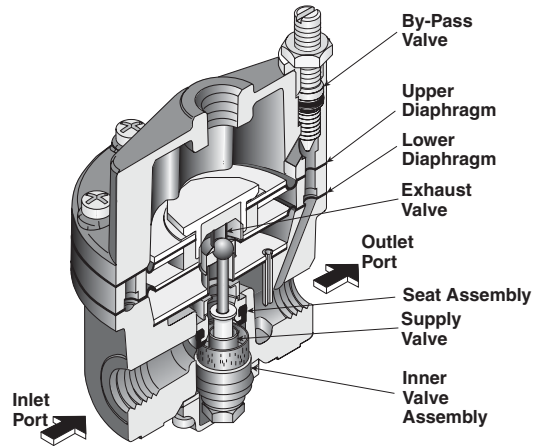
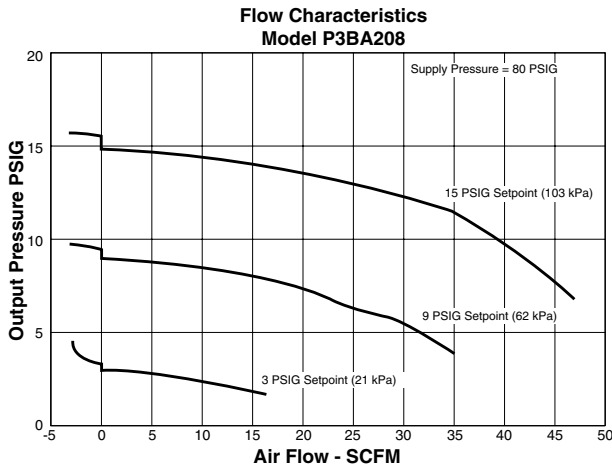


Note: Other Spring Ranges, Port Sizes, and Options Available.
 Please Consult Factory

BOLD ITEMS ARE MOST POPULAR.



Technical Information



Materials of Construction

Body and Housing Aluminum
 Diaphragm Nitrile on Dacron Fabric
 Trim Zinc Plated Steel, Brass

Operating Principles

The P3BA208 Input Signal Amplifier is a pneumatic device capable of high flow and exhaust capacity. This device uses a force balance system to control the movement of the supply and exhaust valves.

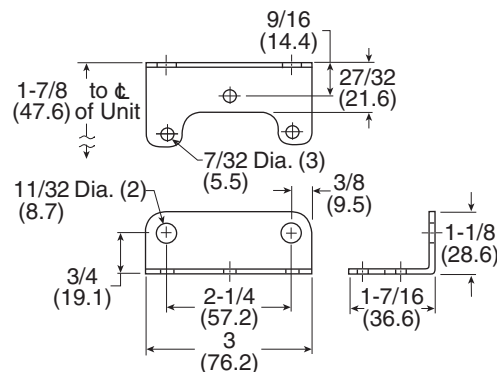
At set point, the force due to signal pressure that acts on the top of the Upper Diaphragm balances with the force due to output pressure acting on the bottom of the Lower Diaphragm.

Specifications

Ratio	Signal:Output		
	1:1	1:2	1:3
Maximum Output Pressure, PSIG (bar)	150 (10.0)	150 (10.0)	150 (10.0)
Maximum Supply Pressure, PSIG (bar)	250 (17.0)	250 (17.0)	250 (17.0)
Flow Capacity SCFM, (m³/HR) 100 PSIG, (7.0 bar) Supply, 20 PSIG, (1.5 bar) Output.	45 (76.5)	45 (76.5)	45 (76.5)
Exhaust Capacity SCFM, (m³/HR) Downstream Pressure 5 PSIG, (.35 bar) Above Output Pressure Set Point of 20 PSIG, (1.5 bar).	11 (18.7)	11 (18.7)	11 (18.7)
Sensitivity (Water Column)	.250" (.64 cm)	.500" (1.27 cm)	.750" (1.9 cm)
Ratio Accuracy % of 100 PSIG, (7.0 bar) Output Span	1.0	1.0	1.0
% of Output Span with (7.0 bar) Input Span	—	—	—
Supply Pressure Effect, PSIG (bar) for change of 100 PSIG, (7.0 bar).	0.10 (.007)	0.20 (.014)	0.30 (.021)
Ambient Temperature, °F (°C)	-40 to +200 (-40 to +93)		

P3BA208 Kits and Accessories

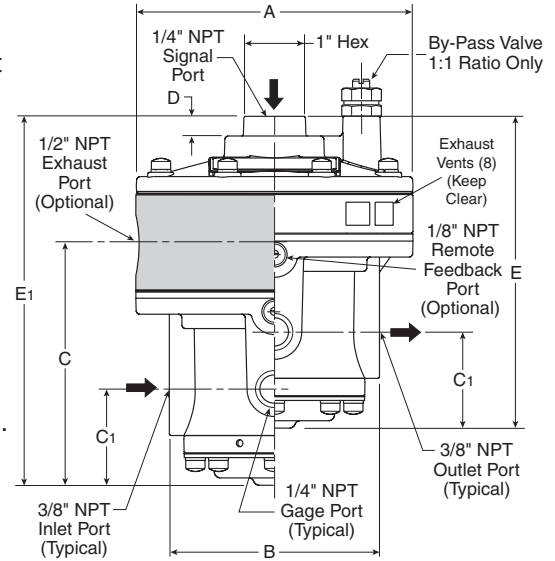
Mounting Bracket PS09921
Service Kits
 1:1 Ratio PS19513-11
 1:1 Ratio w/ By-Pass Valve PS19513-11I
 1:2 Ratio PS19513-12
 1:3 Ratio PS19513-13



P3BA45 Pneumatic Input Signal Amplifier – Precision

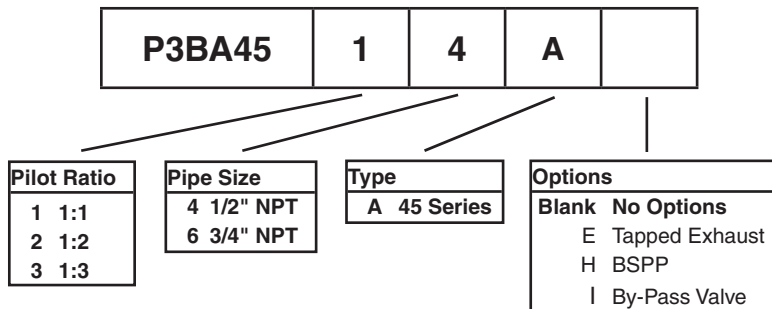
Features

- Five signal to output ratios meet most control element requirements.
- Control sensitivity of water column allows use in precision applications.
- Large Supply and Exhaust Valves provide high forward and exhaust flows.
- Soft Supply and Exhaust Valve seats minimize air consumption.
- A balanced Supply Valve minimizes the effect of supply pressure variation.
- An Aspirator Tube compensates downstream pressure drop under flow conditions.
- A separate Control Chamber isolates the diaphragm from the main flow to eliminate hunting and buzzing.
- Optional remote feedback port minimizes pressure drop at final control element under flow conditions.
- Unit construction lets you service the P3BA45 without removing it from the line.



P3BA45 Regulator Dimensions		
A	B	C
4.50 (114.3)	3.41 (86.5)	3.86 (98)
C₁	D	E
1.56 (39.6)	.31 (7.9)	5.07 (128.8)
E₁		
5.83 (148.2)		

Inches (mm)



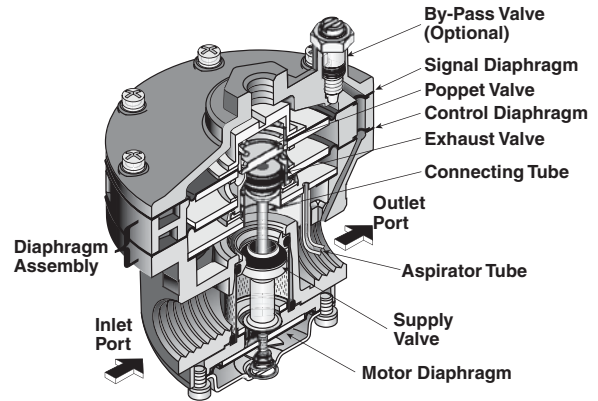
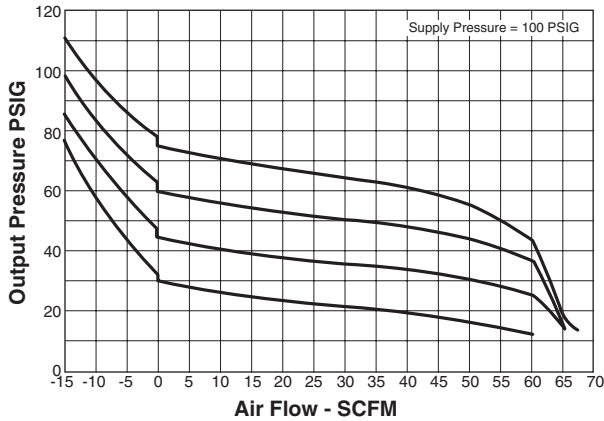
Note: Other Spring Ranges, Port Sizes, and Options Available.
 Please Consult Factory

BOLD ITEMS ARE MOST POPULAR.



Technical Information

**Flow Characteristics
Model P3BA45**



Operating Principles

When signal pressure on the top of the Signal Diaphragm creates a downward force on the Diaphragm Assembly, the Supply Valve opens. Output pressure flows through the Outlet Port and the Aspirator Tube to the Control Chamber to create an upward force on the bottom of the Control Diaphragm. When the setpoint is reached, the force of the signal pressure that acts on the top of the Signal Diaphragm balances with the force of the output pressure that acts on the bottom of the Control Diaphragm to close the Supply Valve.

When the output pressure increases above the signal pressure, the Diaphragm Assembly moves upward to close the Supply Valve and open the Exhaust Valve. Because the Poppet Valve is closed, pressure flows down the Connecting Tube to the bottom of the Motor Diaphragm. This pressure keeps the Supply Valve tightly closed while in the exhaust mode. The Poppet Valve opens and excess output pressure exhausts through the vent in the side of the unit until it reaches the setpoint.

Materials of Construction

- Body and Housing Aluminum
- Diaphragm Nitrile on Dacron Fabric
- Trim Zinc Plated Steel, Brass

Specifications

Ratio	Signal:Output		
	1:1	1:2	1:3
Maximum Output Pressure, PSIG (bar)	150 (10.0)	150 (10.0)	150 (10.0)
Maximum Supply Pressure, PSIG (bar)	250 (17.0)	250 (17.0)	250 (17.0)
Flow Capacity SCFM, (m³/HR) 100 PSIG, (7.0 bar) Supply, 20 PSIG, (1.5 bar) Output	150 (255)	150 (255)	150 (255)
Exhaust Capacity SCFM, (m³/HR) Downstream Pressure 5 PSIG, (.35 bar) Above 20 PSIG, (1.5 bar) Setpoint	40 (62.5)	40 (62.5)	40 (62.5)
Sensitivity (water column)	1.0" (2.54 cm)	2.0" (5.08 cm)	3.0" (7.62 cm)
Ratio Accuracy % of 100 PSIG, (7.0 bar) Output Span	3.0	3.0	3.0
% of Output Span with 100 PSIG (7.0 bar) Input Span	—	—	—
Supply Pressure Effect, PSIG (bar) for change of 100 PSIG, [7.0 bar], (700 kPa).	0.10 (.007)	0.20 (.014)	0.30 (.021)
Ambient Temperature, °F (°C)	-40 to +200 (-40 to +93)		
Hazardous Locations	Acceptable for use in Zones 1 and 2 for gas atmosphere; Groups IIA and IIB and Zones 21 and 22 for dust atmospheres.		

P3BA45 Kits and Accessories

Service Kits

- 1:1 Ratio PS19549-1
- 1:1 Ratio w/ Tapped Exhaust PS19549-1E
- 1:3 Ratio PS19549-3
- 1:2 Ratio PS19549-2
- 1:1 w/ Tapped Exhaust, I Option PS19549-20E

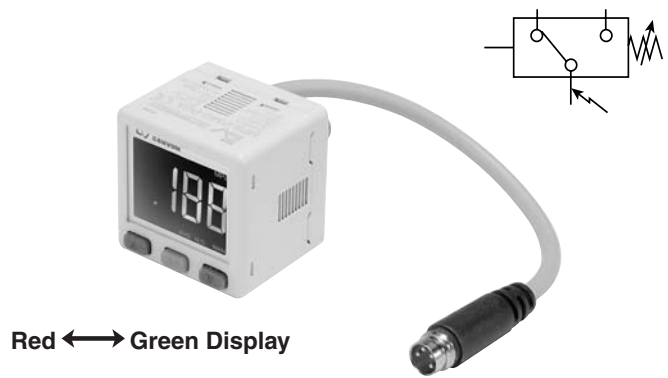


Features

- Sensor output:
 - 1 NPN or PNP Open collector
 - Transistor output, 30VDC, 125mA with
 - Analog output, 4 to 20mA
- Output response time less than 2.0 milliseconds
- RoHS
- Air and non-corrosive gases
- Sensor face includes icons to show sensor programming status

Programming options

Outputs change N.O. / N.C.	✓
Units of measure change	✓
Hysteresis mode	✓
Window comparator mode	✓
Auto teach mode	✓
Output response time	✓
Lockout option	✓
Password lockout	—
Max. value display	✓
Min. value display	✓
Zero reset	✓
Red / Green LED display options	✓
Error output mode	✓



MPS-34 Sensor only ordering numbers

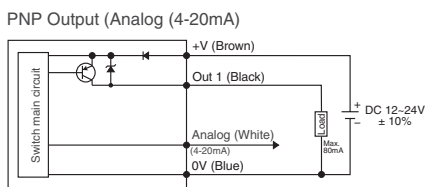
P3RA171 with MPS-V34N-PCI

Pressure range	Electrical output	Electrical connection	Part number	Part number
0-30 inHg	(1) PNP with (1) 4-20ma	M8, 4 Pin	1/8 NPSF male MPS-V34N-PCI	1/8 BSPP male MPS-V34G-PCI
0-145 PSI	(1) PNP with (1) 4-20ma	M8, 4 Pin	MPS-P34N-PCI	MPS-P34G-PCI

MPS-34 Accessories

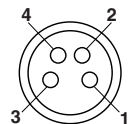
Description	Part number
Panel mounting bracket Note : Add "H" in suffix of Sensor Only Part Number to include with sensor	MPS-ACCH9
Surface mounting bracket Note : Add "K" in suffix of Sensor Only Part Number to include with sensor	MPS-ACCK10
Example: MPS-P34N-PCIK, includes sensor MPS-P34N-PCI with bracket MPS-ACCK10	
M8, 4-Pin, 2 meter cable	CB-M8-4P-2M-PUR
M8, 4-Pin, 5 meter cable	CB-M8-4P-5M-PUR

Internal circuit for open collector and analog output wiring



Sensor pin out with analog output

- Pin #**
- 1 Brown: 24VDC
 - 2 White: 4 to 20mA
 - 3 Blue: 0VDC
 - 4 Black: PNP Open Collector Output 1



Most popular.

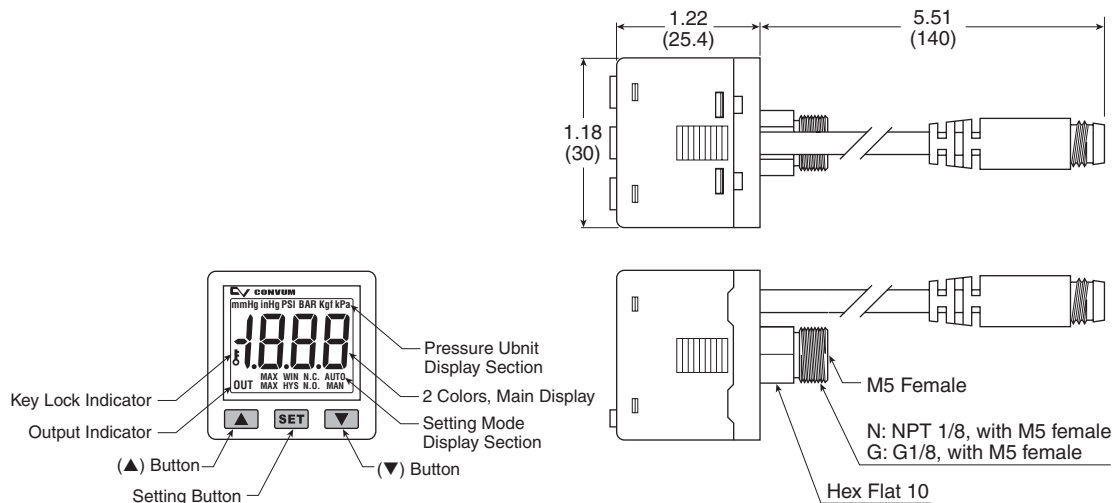


Specifications

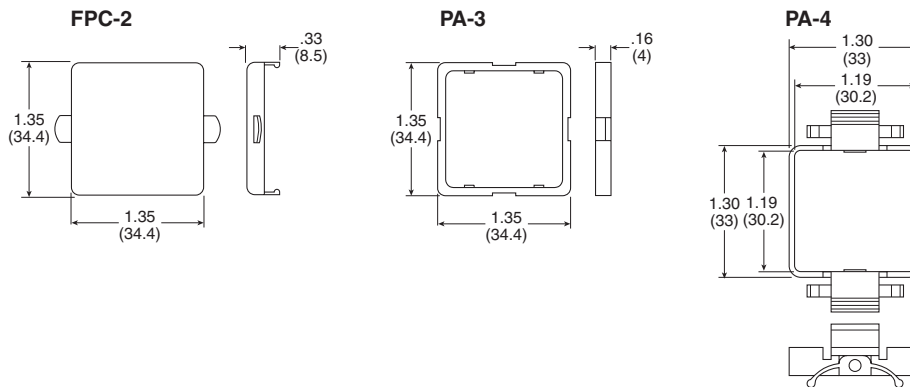
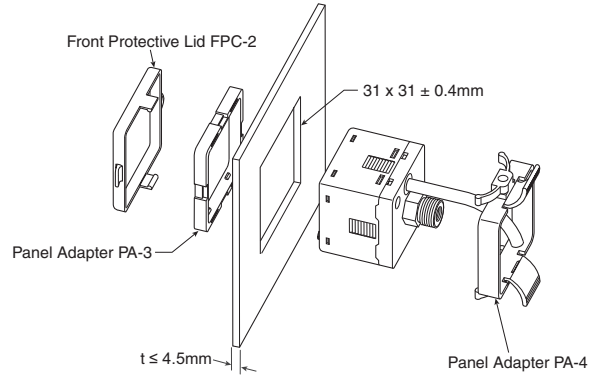
	Vacuum (V)	Positive (P)
Pressure range	-101.3 to 0 kPa (-14.5 to 0 PSI)	-0.1 to 1 Mpa (0 to 145 PSI)
Proof pressure	0.3 Mpa (44PSI)	1.5 Mpa (218 PSI)
Display resolution , Units of measure	0.1, kPa	1, kPa
	0.001, kgf/cm ²	0.01, kgf/cm ²
	0.001, bar	0.01, bar
	0.01, PSI	0.1, PSI
	0.01, inHg	-
	1, mmHg	-
Media	Air & non-corrosive gases	
Pressure port	(N) 1/8" NPT male, (G) 1/8 BSPP male both with M5 female port	
Operating temperature	32 to 122°F (0 to 50°C)	
Storage temperature	-4 to 140°F (-20 to 60°C)	
Humidity	35 to 85% RH (no condensation)	
Electrical connection	(C) 4-pin, M8 connector on 150mm lead wire	
Power supply	12 to 24VDC ±10%, Ripple (P-P) 10% or less	
Display	3 + 1/2 digit, 2 color, 7-segment RED / GREEN LED	
Display refresh	Timing update : 0.1 ~ 3 sec. (Factory Set Unit: 0.1 sec.)	
Switch output	Output signal, PNP, Normally open or closed, LED indicator, 125 mA max. output load	
Output modes	Hysteresis or Window Comparator	
Response time	≤ 2.5ms (chattering-proof function: 24ms, 250ms, 500ms, 1000ms and 1500ms selections)	
Repeatability	± 0.2% of F.S. ± 1 digit	
Output current	Output current 4 to 20mA; Linearity ±1.0% of F.S.; Maximum load impedance 300Ω at power supply of 12V; 600Ω at power supply of 12V; Minimum load impedance 50Ω	
Thermal error	32 to 122°F (0 to 50°C) 25°C (77°C) + 2% of F.S. or less at range of 32 to 122°F (0 to 50°C)	
General protection	IP40, CE marked, EMC-EN61000-6-2: 2001	
Current consumption	45mA (with no load)	
Vibration resistance	10 to 150Hz, Double amplitude 1.5mm, XYZ, 2 hrs.	
Shock resistance	980 m/s ² (about 10G), 3 times/each directions X, Y, Z	
Noise Resistance	Vp-p400V, 10 ms, 0.5μs noise simulator	
Material	Housing: ABS (gray) , Pressure port: Zinc die-cast, Diaphragm: Silicone	
Mass	1.45 oz. (45g) with M8 connector	

Dimensions

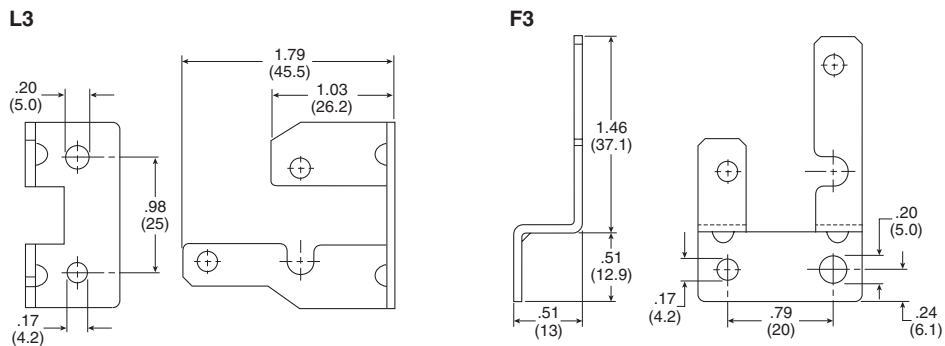
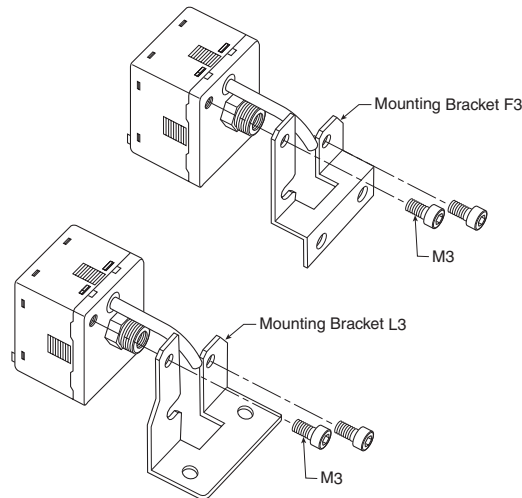
1/8" Male



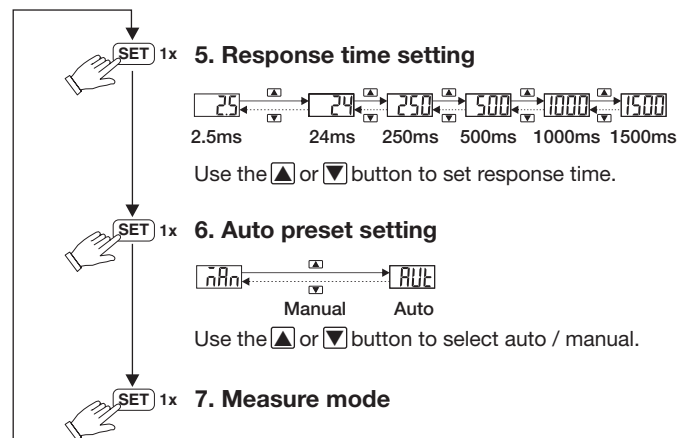
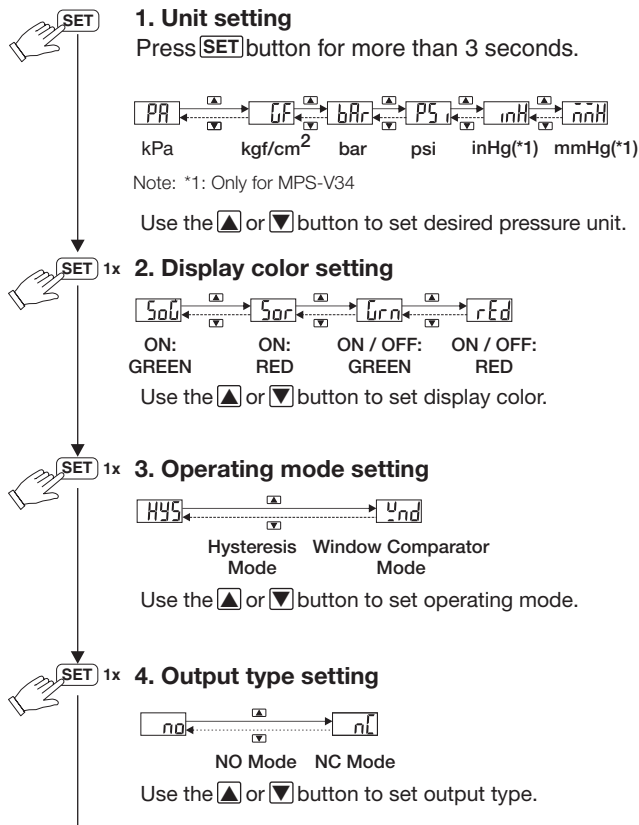
MPS-ACCH9
Panel mounting
bracket



MPS-ACCK10
L3 & F3 mounting
brackets and
screws included



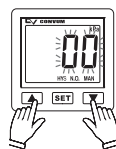
Initial setting mode



Zero point setting / the max. & min. display mode

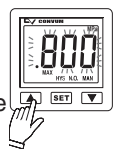
Zero setting:

- press the ▼▲ button at the same time until the "00" is shown. Release the button to end zero setting.



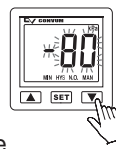
The max. value display mode:

- Press ▲ button 2 seconds to enter the max. value mode, pressure sensor will detect the max. value and keep max. value displayed.
- Press ▲ button 2 seconds to return to measure mode display.

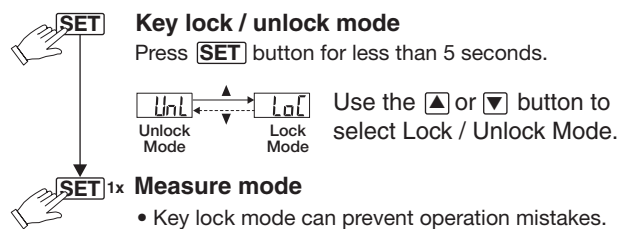


The min. value display mode:

- Press ▼ button 2 seconds to enter the min. value mode, pressure sensor will detect the min. value and keep min. value displayed.
- Press ▼ button 2 seconds to return to measure mode display.



Key lock / unlock mode



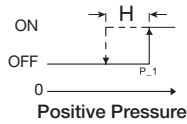
Pressure setting mode

Hysteresis Mode

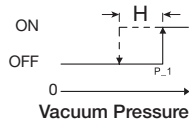
Output Hysteresis value can be preset.

Normal open mode

Positive (MPS-P34)

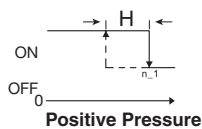


Vacuum (MPS-V34)

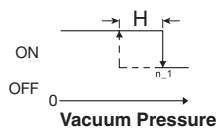


Normal close mode

Positive (MPS-P34)



Vacuum (MPS-V34)



(Note)

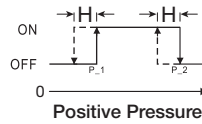
In case hysteresis is set at less than or equal to 2 digits, switch output may chatter if input pressure fluctuates near the set point.

Window comparator Mode

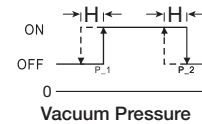
Within pressure setting range, pressure sensor output can be ON or OFF.

Normal open mode

Positive (MPS-P34)

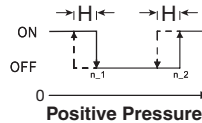


Vacuum (MPS-V34)

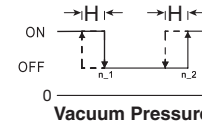


Normal close mode

Positive (MPS-P34)

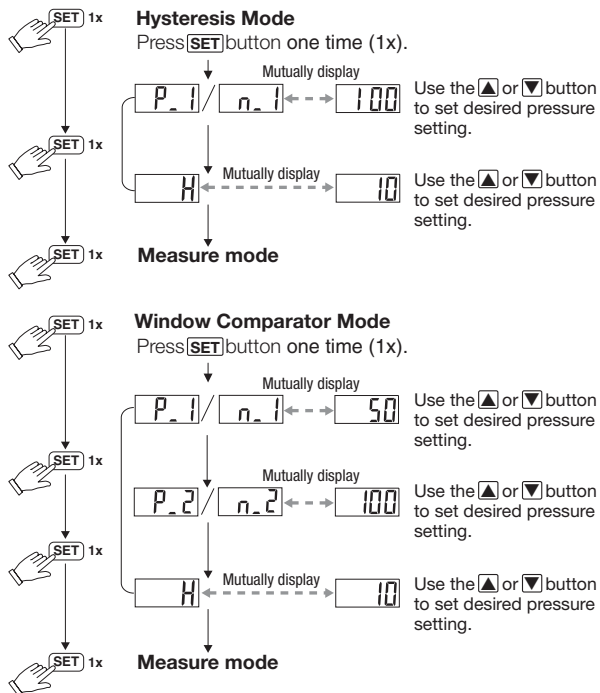


Vacuum (MPS-V34)



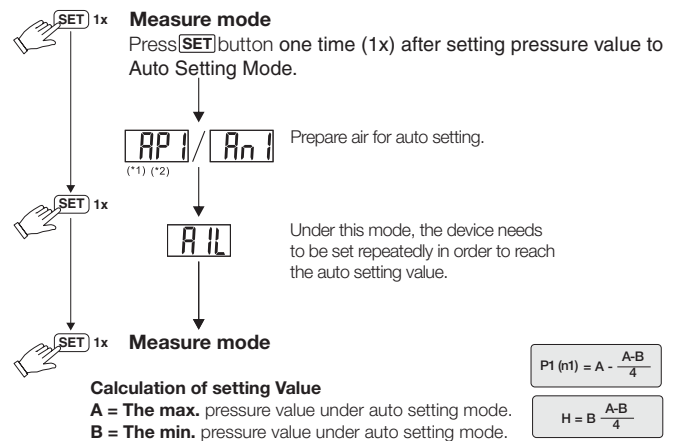
Manual setting mode

The LED shows: (P_* at normal open mode and (n_*) at normal close mode. Pressure setting value is shown normally and will not lead to pressure sensor pause or stop working.

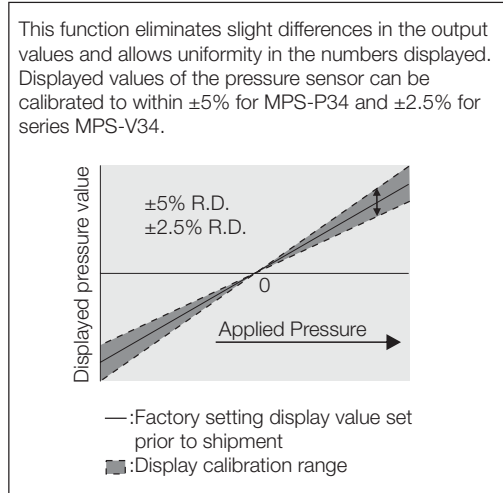
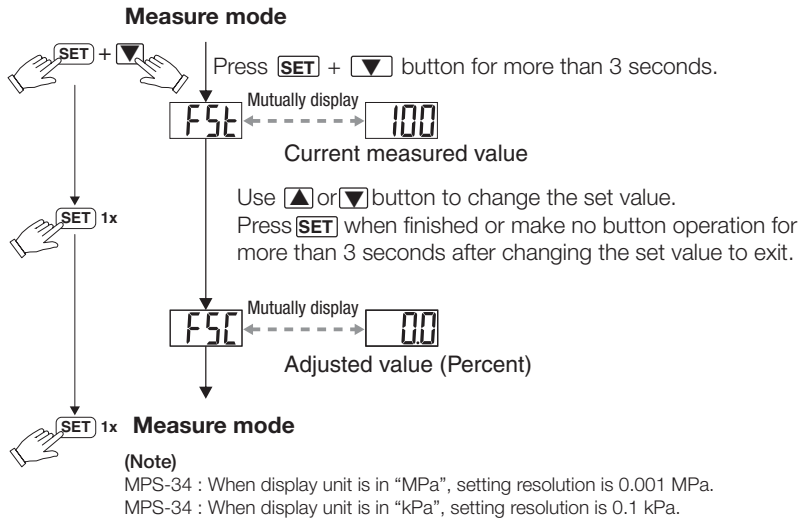


Auto setting mode

- The LED shows: (AP1) at normal open mode and (An1) at normal close mode.
- In case of without need of auto pressure value setting, press ▼+▲ at the same time to enter measure mode.



Fine adjustment mode



Error messages

Error name	Display	Description	Solutions
Excess load current error	<i>oCP</i>	Output load current of 125 mA	Turn off power and check the cause of overload current or lower the current load under 125 mA, then restart
Residual pressure error	<i>oUr</i>	During zero reset, ambient pressure is over $\pm 3\%$ F.S.	Change input pressure to ambient pressure and perform zero reset again
Applied pressure error	<i>HHH</i>	The applied pressure is excess the upper limit of pressure setting	Adjust the pressure within applied pressure range
	<i>LLL</i>	The applied pressure is excess the lower limit of pressure setting	
System Error	<i>Er4</i>	Internal data error	Turn power off and then restart. If error condition remains, please return to factory for inspection
	<i>Er6</i>	Internal system error	
	<i>Er7</i>	Internal data error	
	<i>Er8</i>	Internal system error	

Notes



P31P / P32P Series

Electronic Proportional Regulator

0 to 10 volt, 4 to 20 mA



Proportional Regulator Applications.....	18-19
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Troubleshooting.....	31
Glossary.....	32



Man-Machine Interface

High Visibility LED Display
 Easy to Read Characters
 All Controls on the Same Face

Total Flexibility

User Friendly and Easily Accessible Software Controls
 One Basic Unit Suits All Customer Requirements -
 0-10V Control Signal Standard
 4-20mA Control Signal Software Selectable
 Modular Mounting
 10 bar & 2 bar Version

Special Applications

Clean Line Design
 Suitable for Washdown: IP65
 Forced Exhaust Option Available
 4 Output Signal Versions Available

Compact and Light Weight

40 & 60 mm Body Sizes
 Light Weight Aluminum Bodies

Flexible Mounting Options

Stand-alone or Modular Mounting
 Foot Bracket Mounting
 DIN-Rail Mounting

Energy Saving

Low Watt Power Consumption
 No Unnecessary Loss of Air in Steady State



Outstanding Performance

Very Fast Response Times
 Full Flow Exhaust
 Excellent Linearity
 High Flow

Generic Industries

The new Proportional Regulator is designed to quickly and accurately adjust and maintain a set output pressure.

The unit will operate regardless of flow, in response to an electronic control signal. The media can be compressed air or an inert gas.

Applications for this technology are virtually unlimited; from paint spray control, paper manufacturing and printing to weaving and laser cutting control; in fact anywhere that requires accurate remote pressure control.

Automation

In the field of general automation, the need to control processes or movement via electronic signals is of paramount importance. The Proportional Regulator unit provides the facility to incorporate pressure control into a fully integrated control system.

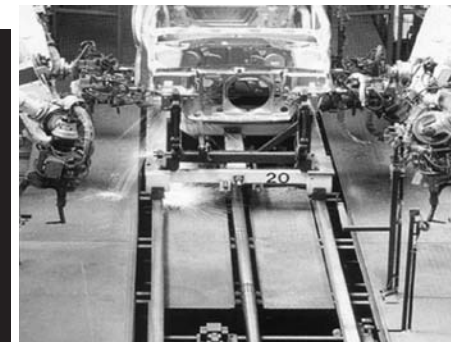
**Packaging and Food**

The Packaging and Food industry provides another ideal area for application of the Electronic Proportional Regulator, where fine control of tension on wrapping foils and paper is required. The degree of control and the ability to manually change parameters makes this unit ideally suited to the varying requirements of this industry.

Automotive

Applications for this innovative product in the Automotive industry can be seen in major manufacturers' "body-in-white" lines.

The control of clamping and welding forces during panel assembly is an ideal application, also accurate control in paint dipping and spraying can be achieved.



Why Proportional Technology?

The Difference Between Open or Closed Circuit Control

Standard pressure regulators go a long way towards meeting customers needs. In most cases these regulators work well in general pneumatic and automation applications. However, sometimes the application calls for more precise pressure control. The effects of time, cycling, input, back pressure or pressure and flow variation can all cause inconsistencies in pneumatic systems. Proportional Regulators are designed to eliminate those inconsistencies.

Open Control Circuit

In a normal pressure regulated control system, the inlet pressure (p_1) is converted into the output pressure (p_2) by the regulator. The set pressure (set value) is usually manually set by adjusting the control knob and in normal circumstances the regulator maintains the output pressure (actual value).

No facility for monitoring the output pressure is provided and there is consequently no way of checking that the set value and the actual value are the same. Also, no account is taken of external influences such as air consumption by the system, which can drastically alter the actual value.

Closed Loop Control Circuit

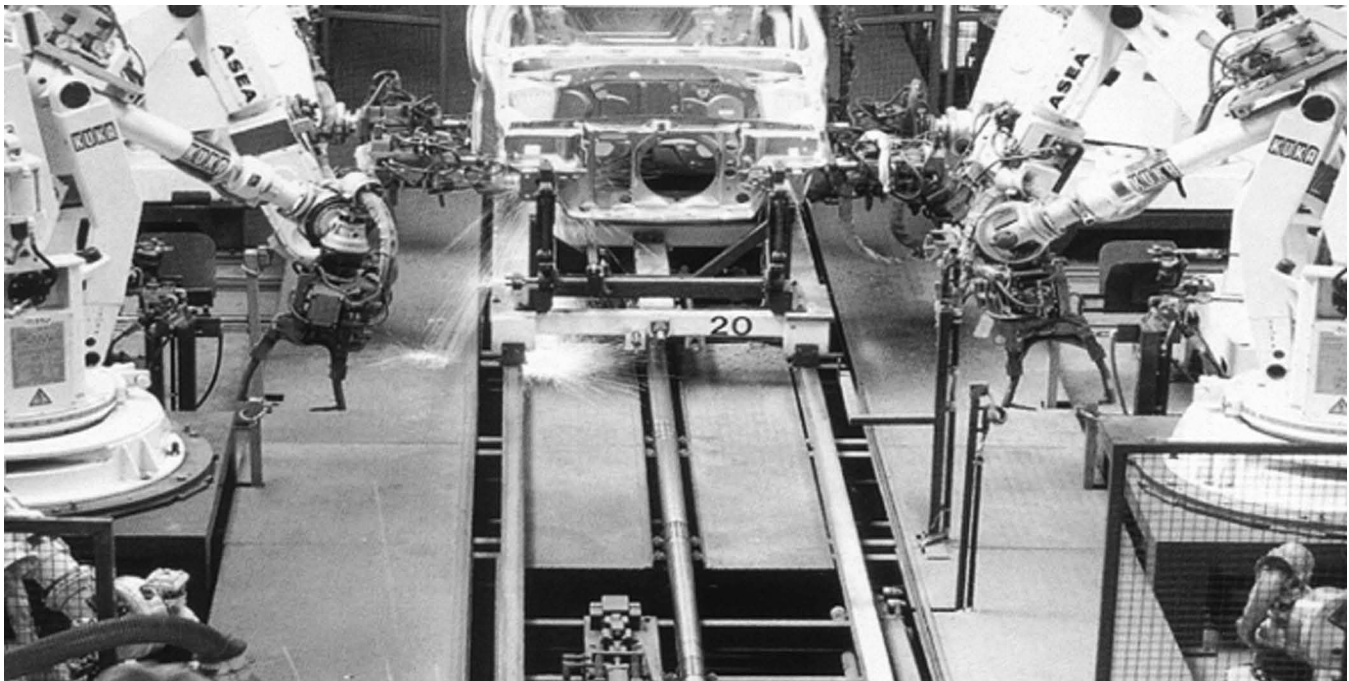
The input signal (Electronic Control Signal) is converted into the output value (P2 Output Pressure). This output value is continuously measured and compared with the input signal. If they are different, the unit adjusts the output value to correspond to the set value, to close the loop.

Proportional Pressure Regulators

The Proportional Regulators provide all the advantages of a closed circuit regulated system. When a set value is defined via the input signal (e.g. 0-10 V), the pressure regulator sets the corresponding output pressure (e.g. 0-150 PSI/0-10 bar). At the same time the integrated pressure sensor measures the actual pressure at the unit's outlet (actual value).

If the electronic regulation system finds that the actual value has deviated from the set value, it immediately corrects the actual value. This is a continuous process ensuring fast, accurate pressure regulation.

Typical Application in Automotive Body in White Welding Pressure Control





P31P Series
Bottom exhaust

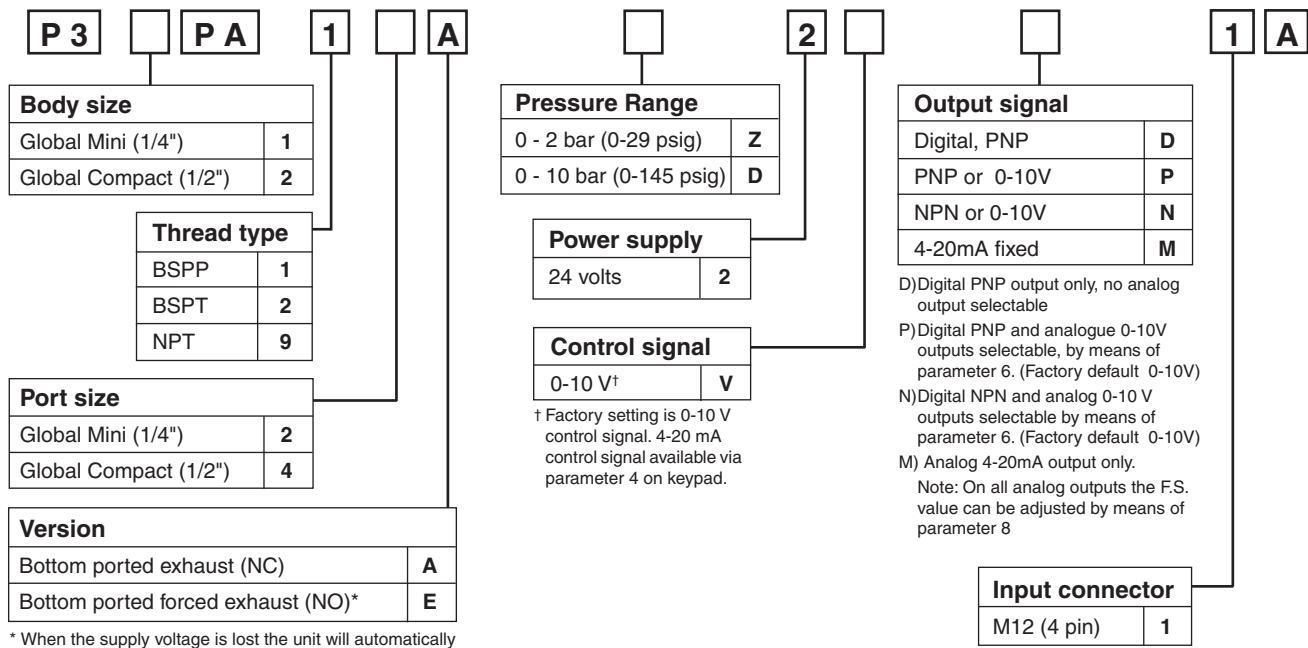


P32P Series
Bottom exhaust

Features

- Very fast response times
- Accurate output pressure
- Micro parameter settings
- Selectable I/O parameters
- Quick, full flow exhaust
- LED display indicates output pressure
- No air consumption in steady state
- Multiple mounting options
- Protection to IP65
- P31P flows to 19 dm³/s (40 scfm)
- P32P flows to 57 dm³/s (120 scfm)

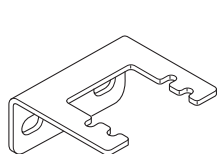
Ordering Information



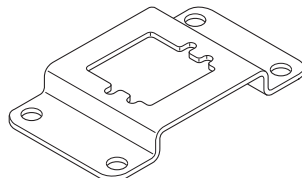
* When the supply voltage is lost the unit will automatically exhaust the regulated pressure to 0 bar (atmospheric pressure)

P31P Mounting Brackets

Order Code	Description
P3HKA00ML	L-Bracket mounting kit
P3HKA00MC	Foot bracket mounting kit



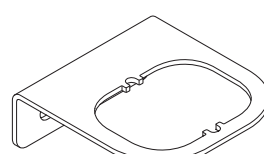
L-Bracket



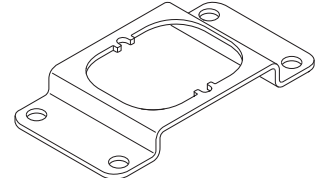
Foot Bracket

P32P Mounting Brackets

Order Code	Description
P3KKA00ML	L-Bracket mounting kit
P3KKA00MC	Foot bracket mounting kit



L-Bracket



Foot Bracket

Cables

Order Code	Description
CB-M12-4P-2M	2 mtr. cable with moulded straight M12x1 connector

Note:

These brackets fit both Proportional Regulators and Combined Soft Start & Dump Valves.



Technical Information

Working media

Compressed air or inert gasses, filtered to Min. 40µ, lubricated or non-lubricated, dried or un-dried, pressure dewpoint 3-5°C.

Operating pressure

Max. Operating Pressure
 2 bar unit.....3 bar (43.5 PSI)
 10 bar unit10.5 bar (152 PSI)
 Min. Operating PressureP2 Pressure + 0.5 bar

Pressure control range

Available in three pressure ranges, 0-2 bar, 0-7 bar or 0-10 bar. Pressure range can be changed through the software at all times. (parameter 19)

Temperature range

32°F to 122°F (0°C to 50°C)

Weight

P31P = 0.291 kg (0.64 lbs)
 P32P = 0.645 kg (1.42 lbs)

Air consumption

No consumption in stable regulated situation.

Display

The regulator is provided with a digital display, indicating the output pressure, either in PSI or bar. The factory setting is as indicated on the label, can be changed through the software at all times (parameter 14).

Supply voltage

24 VDC +/- 10%

Power consumption

Max. 1.1W with unloaded signal outputs

Control signals

The electronic pressure regulator can be externally controlled through an analogue control signal of either 0-10V or 4-20mA. (parameter 4).

Output signals

As soon as the output pressure is within the signal band a signal is given of 24V DC, PNP Ri = 1 kOhm Outside the signal band this connection is 0V.

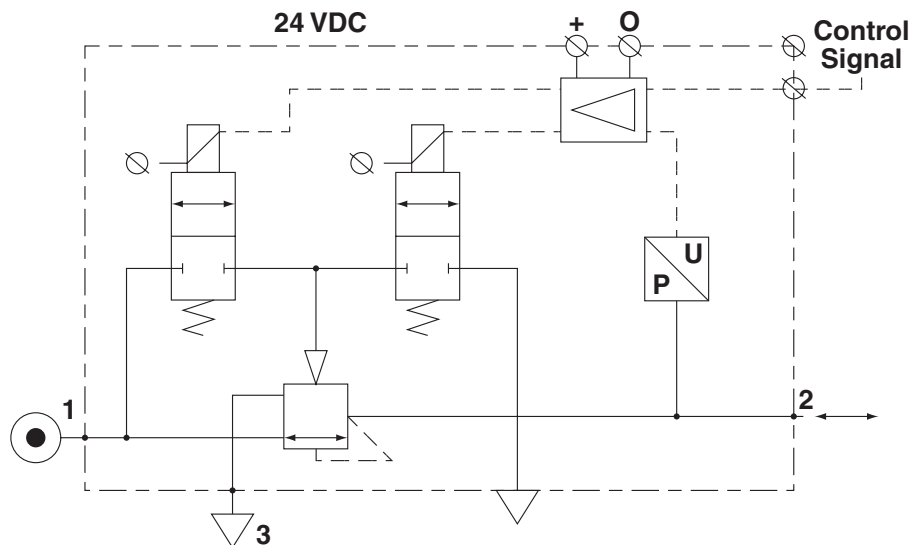
Connections

(In case of output signal (Option D)
 Central M12 connector 4-pole

The electrical connections are as follows:

Pin No.	Function	Color
1	24 V	Supply
2	0 to 10 V	Control Signal Ri = 100k Ω
	4 to 20mA	Control Signal Ri = 500 Ω
3	0 V (GND)	Supply
4	24 V	Alarm Output Signal

Schematic



Technical Information

Dead Band

The dead band is preset at 1.3% of Full Scale*, adjustable via parameter 13.

Accuracy

Linearity: = < 0.3% of Full Scale.*

Proportional Band

The proportional band is preset at 10% of Full Scale.*

Fail Safe Operation

- If the P31P / P32P unit has an "0" or "A" in the 12th digit of the model number
 - When the supply voltage drops, the electronic control reverts to the fail safe mode. The last known output pressure air consumption. The digital display indicates the last known pressure setting.
 - When the supply voltage is reinstated to the correct level, the valve moves from the fail safe mode and the output pressure immediately follows the control signal requirement. The display indicates the actual output pressure.
 - Note: In the event of loss of both power and inlet pressure the unit will exhaust downstream pressure.
- If the P31P / P32P unit has an "E" in the 12th digit of the model number
 - When the supply voltage drops, the electronic control reverts to "Forced Exhaust Mode" and will automatically exhaust the downstream (regulated) pressure.
 - When the supply voltage is reinstated to the correct level the unit will return to normal operation and follows the control signal requirement. The display indicates the actual pressure.
- If the unit has been programmed in manual mode (not with a control signal) the unit will EXHAUST and the regulator will need to be reset when power is applied.

Full Exhaust

Complete exhaust of the regulator is defined as $P2 \leq 1\%$ Full Scale

* Full Scale (F.S.)

For 2 bar (29 psig) versions this will be 2 bar (29 psig), for the 10 bar (145 psig) version full scale will be 10 bar (145 psig).

Degree of Protection

IP65

EU Conformity

CE: standard

EMC: according to directive 89/336/EEC

The new pressure regulator is in accordance with:

EN 61000-6-1:2001 EN 61000-6-2:2001
EN 61000-6-3:2001 EN 61000-6-4:2001

These standards ensure that this unit meets the highest level of EMC protection.

Mounting Position

Preferably vertical, with the cable gland on top.

Materials: P31P & P32P

- Magnet CoreSteel
- Solenoid Valve Poppet FPM
- Solenoid Valve Housing Techno Polymer
- Regulator Body (P31P & P32P versions) Aluminium
- Regulator Top HousingNylon
- Valve HeadBrass & NBR
- Remaining Seals NBR

Advanced Functionality

Pilot valve protection

When the required output pressure can not be achieved because of a lack of input pressure the unit will open fully and will display NoP. Approximately every 10 seconds the unit will retry. The output pressure will then be approximately equal to the inlet pressure. As soon as the input pressure is back on the required level, the normal control function follows.

Safety exhaust

Should the control signal fall below 0.1 volts the valve will automatically dump downstream system pressure .

Input protection

The unit has built-in protection against failure and burnout resulting from incorrect input value, typically:

The 24VDC supply is incorrectly connected to the setpoint input, the display will show 'OL', as an overload indication. The unit will need to be rewired and when correctly connected will operate normally.

The overload indicator 'OL' will also appear should the wrong input value be applied or the wrong input value be programmed: 4 - 20m instead of 0 - 10V. To correct this a different set point value should be input or the unit reprogrammed to correct the set point value acceptance. (via parameter 4).

Response time	P31P	P32P
2 to 4 bar	25 msecs	35 msecs
1 to 6 bar	55 msecs	135 msecs
4 to 2 bar	70 msecs	85 msecs
6 to 1 bar	80 msecs	225 msecs

To fill volume of:

100cm³ - P31P

330cm³ - P32P

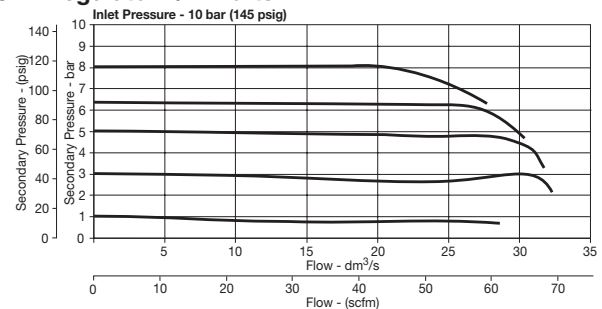
connected to the outlet of the regulator.

Settings

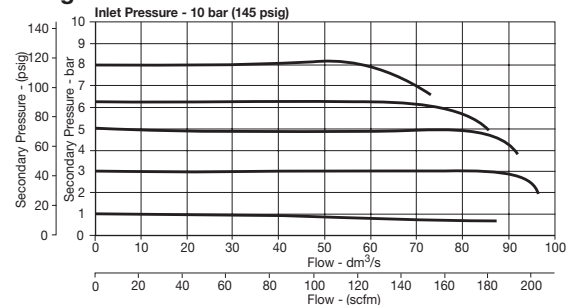
The regulator is pre-set at the factory. If required, adjustments can be made.

Flow Charts

P31P Regulator 1/4" Ports



P32P Regulator 1/2" Ports



How to Change Parameters

Pressing the Accept key “acc” for more than 3 seconds, will activate parameter change mode. The user can then select the parameters by pressing up or down key. (display will show Pxx). When parameter number is correct, pressing accept again will enter parameter number.(display will show parameter value).

Pressing the up or down key will change the parameter itself. (display will flash indicating parameter editing mode). Pressing the accept key will accept the new parameter value. (all digits will flash whilst being accepted).

After releasing all keys , the next parameter number will be presented on the display. (you may step to the next parameter). When no key is pressed, after 3 seconds the display will show the actual output pressure.

When the unit is initially powered up allow approximately 10 seconds for the unit to “boot-up” before changing parameter settings.

Only parameter numbers 0, 4, 6, 8, 9, 14, 18, 19, 20, 12, 13 and 21 are accessible to edit. All other parameters are fixed.

Manual mode:

When keys DOWN and UP are pressed during startup, (connecting to the 24V power supply) manual mode is activated. This means that the user is able to in/decrease the output pressure of the regulator, by pressing the UP or DOWN key. During this action the display will blink, indicating that the manual mode is activated. After powering up again, the unit will revert back to normal mode.















Back to Factory Setting

After start up. (Power is on)

Entering this value in parameter 0 will store the calibrated factory data into the working parameters.

(Default calibration data is used)















Parameter Number 0 – Reset Back to Factory Settings

Step	1	2	3	4	5	
Press 	 3-6 seconds	 or 		 or 		
Until Display Reads			 Flashing Decimal	 Flashing Decimal	 Flashing	
Description	Accesses changeable parameters.	Accesses parameter no. 0.	Displays current parameter value.	Edits parameter. 3 = standard factory settings. If other than 3, use Up or Down Arrow and accept 3	Accepts and saves new parameter setting.	Sequences to next parameter.

Set Control Signal

The unit is factory set for 0-10 V control signal. If 4-20 mA control signal is required, change parameter 4.

Parameter Number 4 – Set Control Signal in Volts or Milliamps

Step	1	2	3	4	5	
Press 	 3-6 seconds	 or 		 or 		
Until Display Reads			 Flashing Decimal	 Flashing Decimal	 Flashing	
Description	Accesses changeable parameters.	Accesses parameter no. 4.	Displays current parameter value. 1 = V 0 = mA	Edits parameter.	Accepts and saves new parameter setting.	Sequences to next parameter.

Set Output Signal

Parameter 6 is used to set the type of output signal to your PLC.

This parameter is used as follows:

Output Signal option “0” = Digital Output – PNP

- Factory set at “0” Non Adjustable

Output Signal option “P” = Digital PNP or Analog 1-10V

- Factory set at “1” for Analog Signal
- Convert to Digital PNP by changing parameter to “0” setting



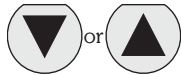

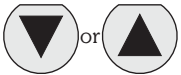







Output Signal option “N” = Digital NPN or Analog 1-10V

- Factory set at “1” Analog Signal
- Convert to Digital NPN by changing parameter to “0”

Output Signal option “M” = Analog 4-20 mA

- Factory set at “2” Non Adjustable

Parameter Number 6 – Set Output Signal

Step	1	2	3	4	5	
Press 	 3-6 seconds					
Until Display Reads			 Flashing Decimal	 Flashing Decimal (Value 0, 1 or 2)	 Flashing	
Description	Accesses changeable parameters.	Accesses parameter no. 6.	Displays current parameter value. 1 = m factory default for P3H with analog options	Edits parameter. 0 = digital (NPN or PNP) 1 = analog 0..10V 2 = analog 4..20 mA	Accepts and saves new parameter setting.	Sequences to next parameter.













Adjust Span Analog Output Signal

Set value is a % of Full Analog range. As an example for a 0-10V output signal, the original factory setting of 100% will give you an adjustment of 0-10V. If you reset Parameter 8 to 50%, the new output range would be 0-5V or 50% of the full range.

In the event that the output signal is to low, in a certain application, you can adjust it by increasing Parameter 8 to a maximum value of 130% of scale.

Note that all values are nominal and that an actual measurement may be required to ensure signal strength.



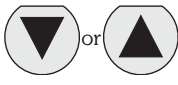

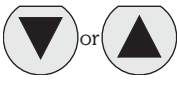







Parameter Number 8 – Adjust Span Analog Output Signal

Step	1	2	3	4	5	
Press 	 3-6 seconds					
Until Display Reads			 Flashing Decimal (For 2 bar versions value = 92)	 Flashing Decimal (Value between 0 and 130)	 Flashing	
Description	Accesses changeable parameters.	Accesses parameter no. 8.	Displays current parameter value.	Edits parameter.	Accepts and saves new parameter setting and implements the new analog signal span.	Sequences to next parameter.

Adjust Digital Display

If necessary, adjustments can be made to the digital display when using an external pressure sensor.



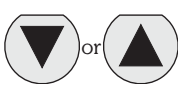

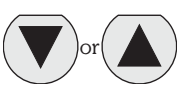







Parameter Number 9 – Adjust Digital Display Value (Pressure Calibration)

Step	1	2	3	4	5	
Press 	 3-6 seconds					
Until Display Reads			 Flashing Decimal	 Flashing Decimal	 Flashing	
Description	Accesses changeable parameters.	Accesses parameter no. 9.	Displays current digital display	Use up or down arrows and accept to adjust the display value if using an external pressure sensor.	Accepts and saves new parameter setting.	Sequences to next parameter.

Set Pressure Scale

Units with NPT port threads are supplied with a factory set psig pressure scale. Use parameter 14 to change scale to bar.



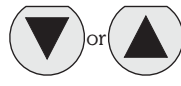

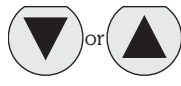







Parameter Number 14 – Set Pressure Scale in psig or bar

Step	1	2	3	4	5	
Press 	 3-6 seconds					
Until Display Reads			 Flashing Decimal	 Flashing Decimal	 Flashing	
Description	Accesses changeable parameters.	Accesses parameter no. 14.	Displays current parameter value. 1 = psig 0 = bar 2 = MPA	Edits parameter.	Accepts and saves new parameter setting.	Sequences to next parameter.

Preset Minimum Pressure

If there is a need for a pre-set Minimum pressure, use parameter 18. (Note: preset pressure is affected by % P19.)

Parameter Number 18 – Set Minimum Preset Pressure

Step	1	2	3	4	5	
Press 	 3-6 seconds					
Until Display Reads			 Flashing Decimal	 Flashing Decimal (value between 0 and 200)	 Flashing	
Description	Accesses changeable parameters.	Accesses parameter no. 18.	Displays current parameter value. Incremental value is: 2 bar unit: $x 2 \text{ mbar} \times \% P19$ 10 bar unit: $x 10 \text{ mbar} \times \% P19$	Edits parameter.	Accepts and saves new parameter setting.	Sequences to next parameter.

Set Pressure Correction



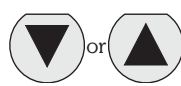

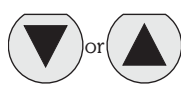







Pressure correction allows the user to set a Maximum pressure as a percentage of secondary pressure F.S.

Example: If F.S. is 10 bar, set parameter 19 to 50 for Maximum preset pressure of 5 bar.

Pressure correction also affects the Minimum preset pressure in parameter 18.

Example: If F.S. is 10 bar and parameter 18 is set to a value of 100 (1 bar), and parameter 19 is set to 50%, then the actual Minimum preset pressure seen is 0.5 bar.

Parameter Number 19 – Set Maximum Preset Pressure



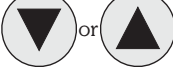

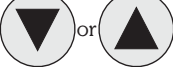







Step	1	2	3	4	5	
Press 	 3-6 seconds					
Until Display Reads			 Flashing Decimal	 Flashing Decimal (value between 0 and 100)	 Flashing	
Description	Accesses changeable parameters.	Accesses parameter no. 19.	Displays current parameter value. Incremental value is: % of F.S.	Edits parameter.	Accepts and saves new parameter setting.	Sequences to next parameter.

Behavior Control

The regulation speed of the pressure regulator can be modified by means of one parameter. (P 20)

The value in this parameter has a range from 0-5. A higher value indicates slower regulation speed, but will be more stable.

Parameter Number 20 – Set Behavior Control

Step	1	2	3	4	5	
Press 	 3-6 seconds					
Until Display Reads			 Flashing Decimal	 Flashing Decimal (value between 0 and 5)	 Flashing	
Description	Accesses changeable parameters.	Accesses parameter no. 20.	Displays current parameter value.	Edits parameter 0 = custom set* 1 = fastest (narrow proportional band) 2 = fast 3 = normal 4 = slow 5 = slowest (proportional band is broad)	Accepts and saves new parameter setting.	Sequences to next parameter.



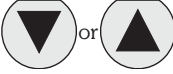

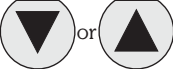







* When the value 0 is entered, you are able to create your own custom settings true parameters 12, 13 and 21.

Fine Settings

Set Proportional Band

Proportional band is used for setting the reaction sensitivity of the regulator. The displayed value is X 10 mbar and has a range between 50 (0.5 bar) and 250 (2.5 bar).



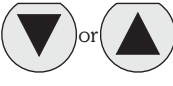

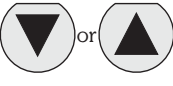



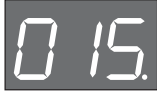


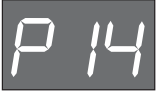
Parameter Number 12 – Set Proportional Band (P20 Must be Set to 0)

Step	1	2	3	4	5	
Press 	 3-6 seconds					
Until Display Reads			 Flashing Decimal	 Flashing Decimal (value between 50 and 250)	 Flashing	
Description	Accesses changeable parameters.	Accesses parameter no. 12.	Displays current parameter value. Incremental value is: x 10 mbar	Edits parameter.	Accepts and saves new parameter setting.	Sequences to next parameter.

Set Deadband



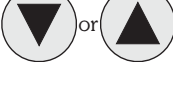

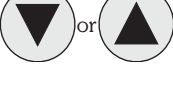







Deadband is the Minimum limit of accuracy at which the regulator is set for normal operation. The displayed value is X 10 mbar and has a range between 4 (40 mbar) and 40 (400 mbar).

Parameter Number 13 – Set Deadband (P20 Must be Set to 0)



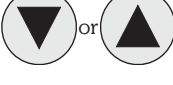




Step	1	2	3	4	5	
Press 	 3-6 seconds					
Until Display Reads			 Flashing Decimal	 Flashing Decimal (value between 4 and 40)	 Flashing	
Description	Accesses changeable parameters.	Accesses parameter no. 13.	Displays current parameter value. Incremental value is x 10 mbar	Edits parameter.	Accepts and saves new parameter setting.	Sequences to next parameter.

Proportional Effect

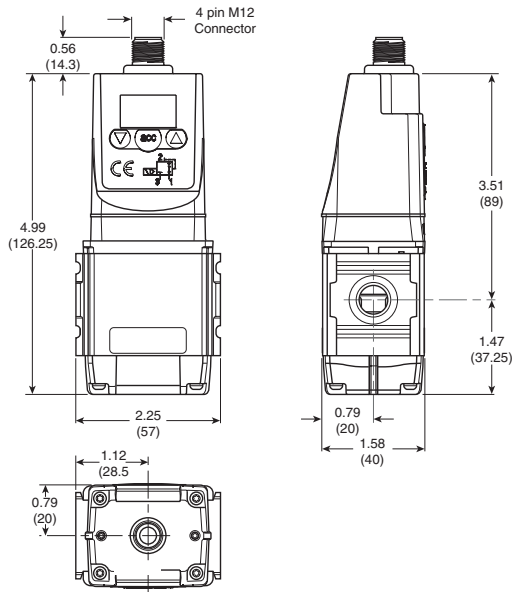
Parameter Number 21 – Set Proportional Effect (P20 Must be Set to 0)

Step	1	2	3	4	5	
Press 	 3-6 seconds					
Until Display Reads			 Flashing Decimal	 Flashing Decimal (value between 5 and 100)	 Flashing	
Description	Accesses changeable parameters.	Accesses parameter no. 21.	Displays current parameter value.	Edits parameter. 5 = fastest regulation 100 = slowest regulation.	Accepts and saves new parameter setting.	Sequences to next parameter.

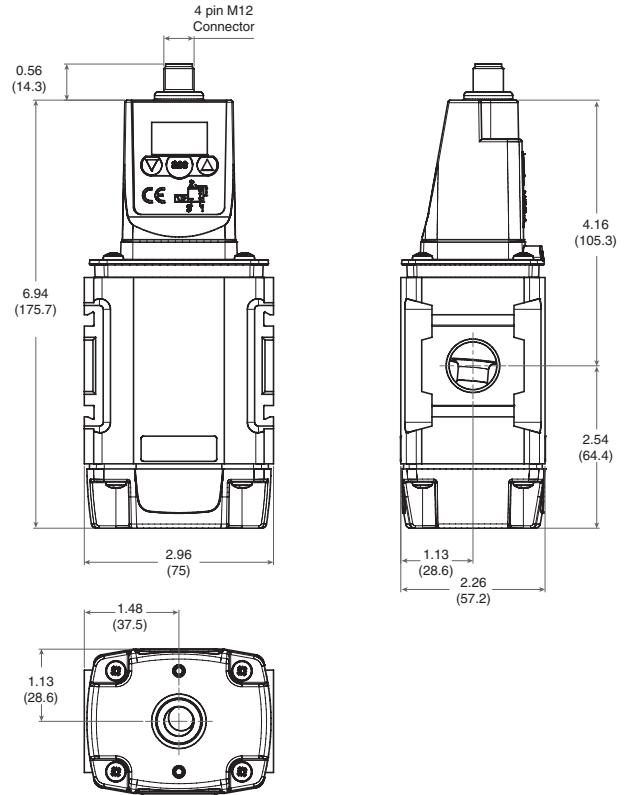
Parameter Number 39 – Displays Current Software Version

Step	1	2	3	
Press 	 3-6 seconds			
Until Display Reads			 Flashing Decimal	
Description	Accesses changeable parameters.	Accesses parameter no. 39.	Displays current parameter value. XXX = current software version	

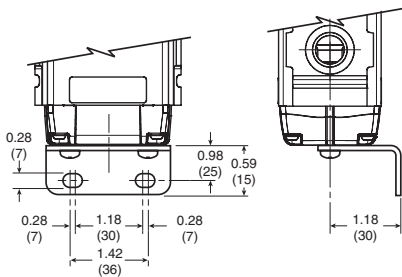
P31P Bottom Exhaust Version



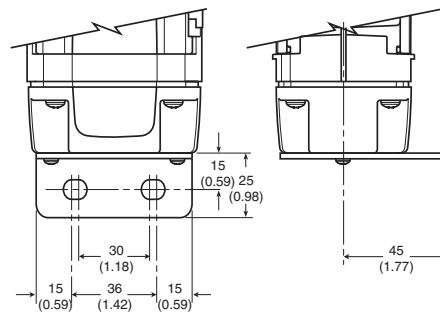
P32P Bottom Exhaust Version



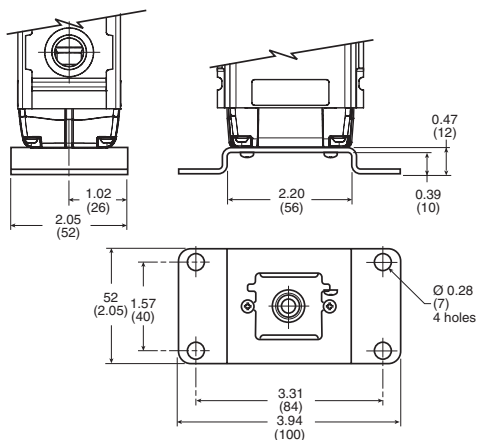
L-Bracket



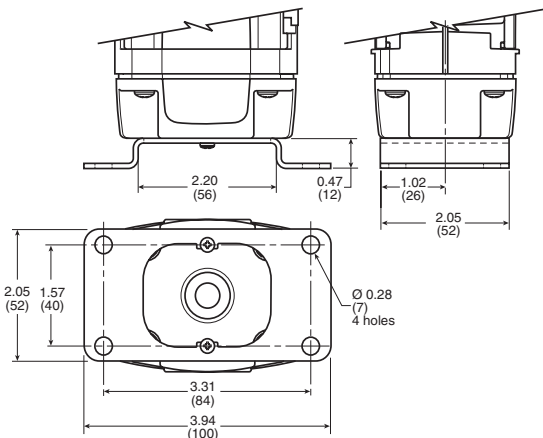
L-Bracket



Foot Bracket



Foot Bracket



Dimensions are in mm (Inches)



Problem	Possible Reason	Solution
Display will not light up	No 24 volts power supply	Check if the wiring is connected according to the schematic wiring diagram
Unit will not, or not correctly respond to given setpoint	Wrong current applied (I.e. Volt instead of mA or mA instead of Volt Setpoint signal is not stable enough	Change setpoint current or re configure the setpoint current through the software by changing parameter 4 Check wiring if the setpoint signal lead is connected to the right pin within the male M12 connector (should be pin 2) Stabilize setpoint signal input
Display shows NoP.	Unit detects that required output pressure is higher than the supplied pressure No inlet pressure at all	Adjust the inlet pressure to a higher value, preferably 0,5 bar higher than requested output pressure Give lower setpoint value which corresponds to a output pressure lower than the inlet pressure Connect port 1 to the supply pressure
Unit behavior is not considered normal	Faulty settings made in the parameters	Reset the unit to factory settings by using the green key function under parameter 0
Desired pressure can not be reached	Setpoint value to low Pre-set pressure limit has been changed to a lower max. outlet pressure Supply pressure is to low	Increase setpoint value Change max. outlet pressure back to required pressure by changing parameter 19 Increase supply pressure
Secondary side stays pressurized	Setpoint value is higher than 0,1 Volt Pre-set pressure has been enabled to a certain pressure	Lower your setpoint value, preferably to 0 Volts Reset parameter 18 to 0
Display shows unrealistic value	Display maybe configured in the wrong value (bar instead of psi)	Check through parameter 14, if the display value is set on either psi or bar, if necessary change it to the required setting
Unit response time too slow or too quick	Volume behind the unit is either too big or too small	Adjust the regulating speed of the unit through parameter 20
Unit gives too much overshoot	Relation between volume and response me is out of balance	Adjust response time to a higher value through parameter 20, to achieve more accurate behavior
Unit is adjusting/regulating constantly	Air leakage in the system behind the unit Constant changing volume behind the unit "Deadband "area is set too small	Resolve leakage Unit needs to regulate to keep required pressure at the same level Try to minimize the volume changes Enlarge deadband setting through parameter 13 in the software (parameter 20 has to be set to 0 before changing parameter 13)
Can not enter software through touchpad	Unit is currently working/processing Activating time is too short	Make sure that the unit is in steady state while activating the software Hold the accept button for at least 3 seconds
Display indicates 'OL'	Wiring not according to diagram (24 volt connected on the setpoint connection pin) Wrong setpoint value given in relation to programmed setpoint value acceptance	Rewire so that on the setpoint connection pin will be either 0-10v or 4-20mA Change over setpoint value to either V or mA or Reprogram the unit to the correct setpoint value via parameter 4
Any other problem	Please consult factory	

Glossary

Hysteresis – The mechanical limits of accuracy of the unit. The regulator cannot be adjusted within the inherent mechanical limits of the design.

Dead Band – The minimum limit of accuracy at which the regulator is set for normal operation. This band must be equal to, or exceed, the inherent design limits of the regulator or the hysteresis band.

Proportional Band – The band used for setting reaction sensitivity of the regulator. The regulator senses the excursion from the set pressure and adjusts response in relation to the degree of excursion beyond the dead band. This band must exceed the dead band of the unit.

Proportional Effect – The speed at which the unit approaches P2 (secondary pressure).

Sensitivity – The smallest change in the control signal, or feedback signal, to cause a change in regulated output pressure.

Repeatability – a measurement of how consistently the unit can reproduce an output pressure in relation to a specific set pressure.

Linearity – A measure of how closely the relationship of output pressure vs. the control signal deviates from a straight line function.

PNP Output – Referred to as a “Sourcing” open collector transistor output where the voltage sources towards 24VDC when activated.

NPN Output – Referred to as a “Sinking” open collector transistor output. The output sinks towards 0VDC when activated.

Safety Guide For Selecting And Using Pneumatic Division Products And Related Accessories

WARNING:

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF PNEUMATIC DIVISION PRODUCTS, ASSEMBLIES OR RELATED ITEMS (“PRODUCTS”) CAN CAUSE DEATH, PERSONAL INJURY, AND PROPERTY DAMAGE. POSSIBLE CONSEQUENCES OF FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THESE PRODUCTS INCLUDE BUT ARE NOT LIMITED TO:

- Unintended or mistimed cycling or motion of machine members or failure to cycle
- Work pieces or component parts being thrown off at high speeds.
- Failure of a device to function properly for example, failure to clamp or unclamp an associated item or device.
- Explosion
- Suddenly moving or falling objects.
- Release of toxic or otherwise injurious liquids or gasses.

Before selecting or using any of these Products, it is important that you read and follow the instructions below.

1. GENERAL INSTRUCTIONS

- 1.1. Scope:** This safety guide is designed to cover general guidelines on the installation, use, and maintenance of Pneumatic Division Valves, FRLs (Filters, Pressure Regulators, and Lubricators), Vacuum products and related accessory components.
- 1.2. Fail-Safe:** Valves, FRLs, Vacuum products and their related components can and do fail without warning for many reasons. Design all systems and equipment in a fail-safe mode, so that failure of associated valves, FRLs or Vacuum products will not endanger persons or property.
- 1.3. Relevant International Standards:** For a good guide to the application of a broad spectrum of pneumatic fluid power devices see: ISO 4414:1998, Pneumatic Fluid Power – General Rules Relating to Systems. See www.iso.org for ordering information.
- 1.4. Distribution:** Provide a copy of this safety guide to each person that is responsible for selection, installation, or use of Valves, FRLs or Vacuum products. Do not select, or use Parker valves, FRLs or vacuum products without thoroughly reading and understanding this safety guide as well as the specific Parker publications for the products considered or selected.
- 1.5. User Responsibility:** Due to the wide variety of operating conditions and applications for valves, FRLs, and vacuum products Parker and its distributors do not represent or warrant that any particular valve, FRL or vacuum product is suitable for any specific end use system. This safety guide does not analyze all technical parameters that must be considered in selecting a product. The user, through its own analysis and testing, is solely responsible for:
 - Making the final selection of the appropriate valve, FRL, Vacuum component, or accessory.
 - Assuring that all user's performance, endurance, maintenance, safety, and warning requirements are met and that the application presents no health or safety hazards.
 - Complying with all existing warning labels and / or providing all appropriate health and safety warnings on the equipment on which the valves, FRLs or Vacuum products are used; and,
 - Assuring compliance with all applicable government and industry standards.
- 1.6. Safety Devices:** Safety devices should not be removed, or defeated.
- 1.7. Warning Labels:** Warning labels should not be removed, painted over or otherwise obscured.
- 1.8. Additional Questions:** Call the appropriate Parker technical service department if you have any questions or require any additional information. See the Parker publication for the product being considered or used, or call 1-800-CPARKER, or go to www.parker.com, for telephone numbers of the appropriate technical service department.

2. PRODUCT SELECTION INSTRUCTIONS

- 2.1. Flow Rate:** The flow rate requirements of a system are frequently the primary consideration when designing any pneumatic system. System components need to be able to provide adequate flow and pressure for the desired application.
- 2.2. Pressure Rating:** Never exceed the rated pressure of a product. Consult product labeling, Pneumatic Division catalogs or the instruction sheets supplied for maximum pressure ratings.
- 2.3. Temperature Rating:** Never exceed the temperature rating of a product. Excessive heat can shorten the life expectancy of a product and result in complete product failure.
- 2.4. Environment:** Many environmental conditions can affect the integrity and suitability of a product for a given application. Pneumatic Division products are designed for use in general purpose industrial applications. If these products are to be used in unusual circumstances such as direct sunlight and/or corrosive or caustic environments, such use can shorten the useful life and lead to premature failure of a product.
- 2.5. Lubrication and Compressor Carryover:** Some modern synthetic oils can and will attack nitrile seals. If there is any possibility of synthetic oils or greases migrating into the pneumatic components check for compatibility with the seal materials used. Consult the factory or product literature for materials of construction.
- 2.6. Polycarbonate Bowls and Sight Glasses:** To avoid potential polycarbonate bowl failures:
 - Do not locate polycarbonate bowls or sight glasses in areas where they could be subject to direct sunlight, impact blow, or temperatures outside of the rated range.
 - Do not expose or clean polycarbonate bowls with detergents, chlorinated hydro-carbons, ketones, esters or certain alcohols.
 - Do not use polycarbonate bowls or sight glasses in air systems where compressors are lubricated with fire resistant fluids such as phosphate ester and di-ester lubricants.

Safety Guide

2.7. Chemical Compatibility: For more information on plastic component chemical compatibility see Pneumatic Division technical bulletins Tec-3, Tec-4, and Tec-5

2.8. Product Rupture: Product rupture can cause death, serious personal injury, and property damage.

- Do not connect pressure regulators or other Pneumatic Division products to bottled gas cylinders.
- Do not exceed the maximum primary pressure rating of any pressure regulator or any system component.
- Consult product labeling or product literature for pressure rating limitations.

3. PRODUCT ASSEMBLY AND INSTALLATION INSTRUCTIONS

3.1. Component Inspection: Prior to assembly or installation a careful examination of the valves, FRLs or vacuum products must be performed. All components must be checked for correct style, size, and catalog number. DO NOT use any component that displays any signs of nonconformance.

3.2. Installation Instructions: Parker published Installation Instructions must be followed for installation of Parker valves, FRLs and vacuum components. These instructions are provided with every Parker valve or FRL sold, or by calling 1-800-CPARKER, or at www.parker.com.

3.3. Air Supply: The air supply or control medium supplied to Valves, FRLs and Vacuum components must be moisture-free if ambient temperature can drop below freezing

4. VALVE AND FRL MAINTENANCE AND REPLACEMENT INSTRUCTIONS

4.1. Maintenance: Even with proper selection and installation, valve, FRL and vacuum products service life may be significantly reduced without a continuing maintenance program. The severity of the application, risk potential from a component failure, and experience with any known failures in the application or in similar applications should determine the frequency of inspections and the servicing or replacement of Pneumatic Division products so that products are replaced before any failure occurs. A maintenance program must be established and followed by the user and, at minimum, must include instructions 4.2 through 4.10.

4.2. Installation and Service Instructions: Before attempting to service or replace any worn or damaged parts consult the appropriate Service Bulletin for the valve or FRL in question for the appropriate practices to service the unit in question. These Service and Installation Instructions are provided with every Parker valve and FRL sold, or are available by calling 1-800-CPARKER, or by accessing the Parker web site at www.parker.com.

4.3. Lockout / Tagout Procedures: Be sure to follow all required lockout and tagout procedures when servicing equipment. For more information see: OSHA Standard – 29 CFR, Part 1910.147, Appendix A, The Control of Hazardous Energy – (Lockout / Tagout)

4.4. Visual Inspection: Any of the following conditions requires immediate system shut down and replacement of worn or damaged components:

- Air leakage: Look and listen to see if there are any signs of visual damage to any of the components in the system. Leakage is an indication of worn or damaged components.
- Damaged or degraded components: Look to see if there are any visible signs of wear or component degradation.
- Kinked, crushed, or damaged hoses. Kinked hoses can result in restricted air flow and lead to unpredictable system behavior.
- Any observed improper system or component function: Immediately shut down the system and correct malfunction.
- Excessive dirt build-up: Dirt and clutter can mask potentially hazardous situations.

Caution: Leak detection solutions should be rinsed off after use.

4.5. Routine Maintenance Issues:

- Remove excessive dirt, grime and clutter from work areas.
- Make sure all required guards and shields are in place.

4.6. Functional Test: Before initiating automatic operation, operate the system manually to make sure all required functions operate properly and safely.

4.7. Service or Replacement Intervals: It is the user's responsibility to establish appropriate service intervals. Valves, FRLs and vacuum products contain components that age, harden, wear, and otherwise deteriorate over time. Environmental conditions can significantly accelerate this process. Valves, FRLs and vacuum components need to be serviced or replaced on routine intervals. Service intervals need to be established based on:

- Previous performance experiences.
- Government and / or industrial standards.
- When failures could result in unacceptable down time, equipment damage or personal injury risk.

4.8. Servicing or Replacing of any Worn or Damaged Parts: To avoid unpredictable system behavior that can cause death, personal injury and property damage:

- Follow all government, state and local safety and servicing practices prior to service including but not limited to all OSHA Lockout Tagout procedures (OSHA Standard – 29 CFR, Part 1910.147, Appendix A, The Control of Hazardous Energy – Lockout / Tagout).
- Disconnect electrical supply (when necessary) before installation, servicing, or conversion.
- Disconnect air supply and depressurize all air lines connected to system and Pneumatic Division products before installation, service, or conversion.
- Installation, servicing, and / or conversion of these products must be performed by knowledgeable personnel who understand how pneumatic products are to be applied.
- After installation, servicing, or conversions air and electrical supplies (when necessary) should be connected and the product tested for proper function and leakage. If audible leakage is present, or if the product does not operate properly, do not put product or system into use.
- Warnings and specifications on the product should not be covered or painted over. If masking is not possible, contact your local representative for replacement labels.

4.9. Putting Serviced System Back into Operation: Follow the guidelines above and all relevant Installation and Maintenance Instructions supplied with the valve FRL or vacuum component to insure proper function of the system.

Offer of Sale

The items described in this document and other documents and descriptions provided by Parker Hannifin Corporation, its subsidiaries and its authorized distributors ("Seller") are hereby offered for sale at prices to be established by Seller. This offer and its acceptance by any customer ("Buyer") shall be governed by all of the following Terms and Conditions. Buyer's order for any item described in its document, when communicated to Seller verbally, or in writing, shall constitute acceptance of this offer. All goods or work described will be referred to as "Products".

- 1. Terms and Conditions.** Seller's willingness to offer Products, or accept an order for Products, to or from Buyer is subject to these Terms and Conditions or any newer version of the terms and conditions found on-line at www.parker.com/saleterms/. Seller objects to any contrary or additional terms or conditions of Buyer's order or any other document issued by Buyer.
- 2. Price Adjustments; Payments.** Prices stated on Seller's quote or other documentation offered by Seller are valid for 30 days, and do not include any sales, use, or other taxes unless specifically stated. Unless otherwise specified by Seller, all prices are F.C.A. Seller's facility (INCOTERMS 2010). Payment is subject to credit approval and is due 30 days from the date of invoice or such other term as required by Seller's Credit Department, after which Buyer shall pay interest on any unpaid invoices at the rate of 1.5% per month or the maximum allowable rate under applicable law.
- 3. Delivery Dates; Title and Risk; Shipment.** All delivery dates are approximate and Seller shall not be responsible for any damages resulting from any delay. Regardless of the manner of shipment, title to any products and risk of loss or damage shall pass to Buyer upon placement of the products with the shipment carrier at Seller's facility. Unless otherwise stated, Seller may exercise its judgment in choosing the carrier and means of delivery. No deferral of shipment at Buyers' request beyond the respective dates indicated will be made except on terms that will indemnify, defend and hold Seller harmless against all loss and additional expense. Buyer shall be responsible for any additional shipping charges incurred by Seller due to Buyer's acts or omissions.
- 4. Warranty.** Seller warrants that the Products sold hereunder shall be free from defects in material or workmanship for a period of twelve months from the date of delivery to Buyer or 2,000 hours of normal use, whichever occurs first. The prices charged for Seller's products are based upon the exclusive limited warranty stated above, and upon the following disclaimer: **DISCLAIMER OF WARRANTY: THIS WARRANTY COMPRISES THE SOLE AND ENTIRE WARRANTY PERTAINING TO PRODUCTS PROVIDED HEREUNDER. SELLER DISCLAIMS ALL OTHER WARRANTIES, EXPRESS AND IMPLIED, INCLUDING DESIGN, MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.**
- 5. Claims; Commencement of Actions.** Buyer shall promptly inspect all Products upon delivery. No claims for shortages will be allowed unless reported to the Seller within 10 days of delivery. No other claims against Seller will be allowed unless asserted in writing within 30 days after delivery. Buyer shall notify Seller of any alleged breach of warranty within 30 days after the date the defect is or should have been discovered by Buyer. Any action based upon breach of this agreement or upon any other claim arising out of this sale (other than an action by Seller for an amount due on any invoice) must be commenced within 12 months from the date of the breach without regard to the date breach is discovered.
- 6. LIMITATION OF LIABILITY.** UPON NOTIFICATION, SELLER WILL, AT ITS OPTION, REPAIR OR REPLACE A DEFECTIVE PRODUCT, OR REFUND THE PURCHASE PRICE. **IN NO EVENT SHALL SELLER BE LIABLE TO BUYER FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF, OR AS THE RESULT OF, THE SALE, DELIVERY, NON-DELIVERY, SERVICING, USE OR LOSS OF USE OF THE PRODUCTS OR ANY PART THEREOF, OR FOR ANY CHARGES OR EXPENSES OF ANY NATURE INCURRED WITHOUT SELLER'S WRITTEN CONSENT, EVEN IF SELLER HAS BEEN NEGLIGENT, WHETHER IN CONTRACT, TORT OR OTHER LEGAL THEORY. IN NO EVENT SHALL SELLER'S LIABILITY UNDER ANY CLAIM MADE BY BUYER EXCEED THE PURCHASE PRICE OF THE PRODUCTS.**
- 7. User Responsibility.** The user, through its own analysis and testing, is solely responsible for making the final selection of the system and Product and assuring that all performance, endurance, maintenance, safety and warning requirements of the application are met. The user must analyze all aspects of the application and follow applicable industry standards and Product information. If Seller provides Product or system options, the user is responsible for determining that such data and specifications are suitable and sufficient for all applications and reasonably foreseeable uses of the Products or systems.
- 8. Loss to Buyer's Property.** Any designs, tools, patterns, materials, drawings, confidential information or equipment furnished by Buyer or any other items which become Buyer's property, may be considered obsolete and may be destroyed by Seller after two consecutive years have elapsed without Buyer ordering the items manufactured using such property. Seller shall not be responsible for any loss or damage to such property while it is in Seller's possession or control.
- 9. Special Tooling.** A tooling charge may be imposed for any special tooling, including without limitation, dies, fixtures, molds and patterns, acquired to manufacture Products. Such special tooling shall be and remain Seller's property notwithstanding payment of any charges by Buyer. In no event will Buyer acquire any interest in apparatus belonging to Seller which is utilized in the manufacture of the Products, even if such apparatus has been specially converted or adapted for such manufacture and notwithstanding any charges paid by Buyer. Unless otherwise agreed, Seller shall have the right to alter, discard or otherwise dispose of any special tooling or other property in its sole discretion at any time.
- 10. Buyer's Obligation; Rights of Seller.** To secure payment of all sums due or otherwise, Seller shall retain a security interest in the goods delivered and this agreement shall be deemed a Security Agreement under the Uniform Commercial Code. Buyer authorizes Seller as its attorney to execute and file on Buyer's behalf all documents Seller deems necessary to perfect its security interest.
- 11. Improper use and Indemnity.** Buyer shall indemnify, defend, and hold Seller harmless from any claim, liability, damages, lawsuits, and costs (including attorney fees), whether for personal injury, property damage, patent, trademark or copyright

infringement or any other claim, brought by or incurred by Buyer, Buyer's employees, or any other person, arising out of: (a) improper selection, improper application or other misuse of Products purchased by Buyer from Seller; (b) any act or omission, negligent or otherwise, of Buyer; (c) Seller's use of patterns, plans, drawings, or specifications furnished by Buyer to manufacture Product; or (d) Buyer's failure to comply with these terms and conditions. Seller shall not indemnify Buyer under any circumstance except as otherwise provided.

- 12. Cancellations and Changes.** Orders shall not be subject to cancellation or change by Buyer for any reason, except with Seller's written consent and upon terms that will indemnify, defend and hold Seller harmless against all direct, incidental and consequential loss or damage. Seller may change product features, specifications, designs and availability with notice to Buyer.
- 13. Limitation on Assignment.** Buyer may not assign its rights or obligations under this agreement without the prior written consent of Seller.
- 14. Force Majeure.** Seller does not assume the risk and shall not be liable for delay or failure to perform any of Seller's obligations by reason of circumstances beyond the reasonable control of Seller (hereinafter "Events of Force Majeure") Events of Force Majeure shall include without limitation: accidents, strikes or labor disputes, acts of any government or government agency, acts of nature, delays or failures in delivery from carriers or suppliers, shortages of materials, or any other cause beyond Seller's reasonable control.
- 15. Waiver and Severability.** Failure to enforce any provision of this agreement will not waive that provision nor will any such failure prejudice Seller's right to enforce that provision in the future. Invalidation of any provision of this agreement by legislation or other rule of law shall not invalidate any other provision herein. The remaining provisions of this agreement will remain in full force and effect.
- 16. Termination.** Seller may terminate this agreement for any reason and at any time by giving Buyer thirty (30) days written notice of termination. Seller may immediately terminate this agreement, in writing, if Buyer: (a) commits a breach of any provision of this agreement (b) appointments a trustee, receiver or custodian for all or any part of Buyer's property (c) files a petition for relief in bankruptcy on its own behalf, or by a third party (d) makes an assignment for the benefit of creditors, or (e) the dissolves or liquidates all or a majority of its assets.
- 17. Governing Law.** This agreement and the sale and delivery of all Products hereunder shall be deemed to have taken place in and shall be governed and construed in accordance with the laws of the State of Ohio, as applicable to contracts executed and wholly performed therein and without regard to conflicts of laws principles. Buyer irrevocably agrees and consents to the exclusive jurisdiction and venue of the courts of Cuyahoga County, Ohio with respect to any dispute, controversy or claim arising out of or relating to this agreement.
- 18. Indemnity for Infringement of Intellectual Property Rights.** Seller shall have no liability for infringement of any patents, trademarks, copyrights, trade dress, trade secrets or similar rights except as provided in this Section. Seller will defend and indemnify Buyer against allegations of infringement of U.S. patents, U.S. trademarks, copyrights, trade dress and trade secrets ("Intellectual Property Rights"). Seller will defend at its expense and will pay the cost of any settlement or damages awarded in an action brought against Buyer based on an allegation that a Product sold pursuant to this Agreement infringes the Intellectual Property Rights of a third party. Seller's obligation to defend and indemnify Buyer is contingent on Buyer notifying Seller within ten (10) days after Buyer becomes aware of such allegations of infringement, and Seller having sole control over the defense of any allegations or actions including all negotiations for settlement or compromise. If a Product is subject to a claim that it infringes the Intellectual Property Rights of a third party, Seller may, at its sole expense and option, procure for Buyer the right to continue using the Product, replace or modify the Product so as to make it noninfringing, or offer to accept return of the Product and return the purchase price less a reasonable allowance for depreciation. Notwithstanding the foregoing, Seller shall have no liability for claims of infringement based on information provided by Buyer, or directed to Products delivered hereunder for which the designs are specified in whole or part by Buyer, or infringements resulting from the modification, combination or use in a system of any Product sold hereunder. The foregoing provisions of this Section shall constitute Seller's sole and exclusive liability and Buyer's sole and exclusive remedy for infringement of Intellectual Property Rights.
- 19. Entire Agreement.** This agreement contains the entire agreement between the Buyer and Seller and constitutes the final, complete and exclusive expression of the terms of sale. All prior or contemporaneous written or oral agreements or negotiations with respect to the subject matter are herein merged.
- 20. Compliance with Law, U. K. Bribery Act and U.S. Foreign Corrupt Practices Act.** Buyer agrees to comply with all applicable laws and regulations, including both those of the United Kingdom and the United States of America, and of the country or countries of the Territory in which the Buyer may operate, including without limitation the U. K. Bribery Act, the U.S. Foreign Corrupt Practices Act ("FCPA") and the U.S. Anti-Kickback Act (the "Anti-Kickback Act"), and agrees to indemnify and hold harmless Seller from the consequences of any violation of such provisions by Buyer, its employees or agents. Buyer acknowledges that they are familiar with the provisions of the U. K. Bribery Act, the FCPA and the Anti-Kickback Act, and certifies that Buyer will adhere to the requirements thereof. In particular, Buyer represents and agrees that Buyer shall not make any payment or give anything of value, directly or indirectly to any governmental official, any foreign political party or official thereof, any candidate for foreign political office, or any commercial entity or person, for the purpose of influencing such person to purchase products or otherwise benefit the business of Seller.

02/12





Parker Hannifin Corporation
Pneumatic Division
8676 E. M89
P.O. Box 901
Richland, MI 49083 USA
Tel: 269 629 5000
Fax: 269 629 5385

Applications Engineering
Phone: 877 321 4PDN Option #2
E-mail: pdnapps@parker.com
Customer Support
Phone: 877 321 4PDN Option #1
E-mail: pdncustsvc@parker.com
Web site: www.parker.com/watts