



VERIFLO

ISO 9001 Certified

Veriflo Division

Instrument/Analyzer Digest

Regulators, Valves & Flow Controllers

Catalog 4500

Revised, August 2000



Parker
Instrumentation



VERIFLO
ISO 9001 Certified

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The Division



Veriflo Division is a leading manufacturer of precision valves, regulators and transducers for the control and application of liquids and gases used in chemical and petrochemical industries as well as in the fabrication of semiconductor ICs.

A leading manufacturer of precision valves and regulators

The Instrumentation Group of Parker Hannifin specializes in high quality, critical flow components for worldwide process instrumentation, ultra-high-purity, medical, analytical and biopharmaceutical applications.

The Instrumentation Group has ten manufacturing plants and over 300 authorized distributor locations worldwide to provide local inventory and technical support. Key markets for the Instrumentation Group include: Chemical Process, Power Generation, Oil and Gas Exploration, Semiconductor Manufacturing, Biomedical, and Analytical Equipment.

Veriflo has been responding to industry change through innovative engineering and manufacturing for more than 85 years. Veriflo's ISO 9001 registration at its Richmond, California plant in May 1995 and its ISO 9002 certification at its Carson City, Nevada facility in July 1996 confirm the division's commitment to quality and excellence as recognized by the international community.

In an effort to meet growing global industry demands, Veriflo recently expanded its manufacturing capacity and implemented a Continuous Flow Manufacturing philosophy. Part of Veriflo's overall physical expansion included the addition of two state-of-the-art Class 10 Clean Rooms at its Richmond, California, semiconductor component manufacturing facility.

Veriflo's proven leadership is deeply rooted in customer service and the ability to develop high-quality products for the various global markets it serves.

Veriflo's technical superiority is supported by patents allowing the division to deliver innovative state-

Veriflo's proven leadership is deeply rooted in customer service

of-the-art products to its customers. Veriflo has manufacturing facilities in Richmond, California, Carson City, Nevada, and Belleville, New Jersey that produce products for the following applications:

- *Instrument/Analyzer*
- *Pharmaceutical*
- *Semiconductor/High Purity*

Note: For more information on Veriflo Division visit its web site (www.veriflo.com). For more information on Parker Hannifin Corporation and the Instrumentation Group visit Parker's web site (www.parker.com).





OPERATING CONDITIONS

Maximum inlet: 4000 psig (276 barg)
 Outlet : 1-10 psig (.7 barg), 1-30 psig (2 barg), 1-60 psig (4 barg),
 2-100 psig (7 barg), 2-250 psig (17 barg)

FLOW CAPACITY

Standard: C_v .06
 Optional: C_v .02, .15 (Semi Flow Coefficient Test # F-32-0998)

INTERNAL VOLUME

8.1 cc

TEMPERATURE

PCTFE: -40°F to 150°F (-40°C to 66°C)
 PEEK™: -40°F to 275°F (-40°C to 135°C)
 Vespel®: -40°F to 500°F (-40°C to 260°C)

**IR6000 Series Two Stage Regulator
 Internally Threadless Design**

The **NEW** IR6000 Series is an internally threadless pressure regulator designed for pressure reducing instrument/analyzer applications including cylinder and calibration gases.

The IR6000 is a high pressure regulator that can be ordered with a variety of options to meet a range of system design requirements.

- Unique patented compression member loads the seat to the body without requiring a threaded nozzle
- Selection of seat materials for media compatibility and temperature applications
- Meets NACE standard MR0175
- Compression member for low internal volume
- Fully swept design
- Internally threadless seat design to promote long seat life
- Convuluted, Hastelloy C-22® diaphragm provides high corrosion resistance and increases cycle life



OPERATING CONDITIONS

Maximum inlet: 4000 psig (276 barg)
 Outlet : 1-10 psig (.7 barg), 1-30 psig (2 barg), 1-60 psig (4 barg),
 2-100 psig (7 barg), 2-250 psig (17 barg), 5-500 psig (35 barg)

FLOW CAPACITY

Standard: C_v .06
 Optional: C_v .02, .15 (Semi Flow Coefficient Test # F-32-0998)

INTERNAL VOLUME

4.0 cc

TEMPERATURE

PCTFE: -40°F to 150°F (-40°C to 66°C)
 *PEEK™: -40°F to 275°F (-40°C to 135°C)
 *Vespel®: -40°F to 500°F (-40°C to 260°C)

*Temperature ranges are not available in Brass body

**IR4000 Series High Pressure Regulator
 Internally Threadless Design**

The **NEW** IR4000 Series is an internally threadless pressure regulator designed for instrument/analyzer and semiconductor applications.

Industrial applications include gas management in refineries and process analyzer systems. Semiconductor applications for use on general purpose gas management (Air, Condensed Dry Air (CDA), and Plant Nitrogen).

The IR4000 is a high pressure regulator that can be ordered with a variety of options to meet a range of system design requirements.

- Unique patented compression member loads the seat to the body without requiring a threaded nozzle
- Selection of seat materials for media compatibility and temperature applications
- Meets NACE standard MR0175
- Compression member for low internal volume
- Fully swept design
- Internally threadless seat design to promote long seat life
- Convuluted, Hastelloy C-22® diaphragm provides high corrosion resistance and increases cycle life



NPR4000 Series Negative Pressure Regulator

Parker Hannifin Corporation's Veriflo Division introduces the NPR4000 regulator for applications involving negative delivery pressures with low pressure gas sources.

This new regulator is specifically designed to regulate negative pressures down to -26 inHg vacuum (100 Torr). Typical applications include the delivery of low pressure gases from liquid sources such as WF₆, BCL₃.

- Internal threadless design
- Consistently maintains outlet set point
- Fluid media: corrosive and non-corrosive gases
- Metal-to-metal, diaphragm-to-body seal with Viton® O-ring backup

OPERATING CONDITIONS

Maximum inlet: 250 psig (17 barg)
 Outlet: 100 torr to 10 psig (-26 in Hg to .7 barg)

FLOW CAPACITY

Standard: C_v .06
 Optional: C_v .02, .15 (Semi Flow Coefficient Test # F-32-0998)

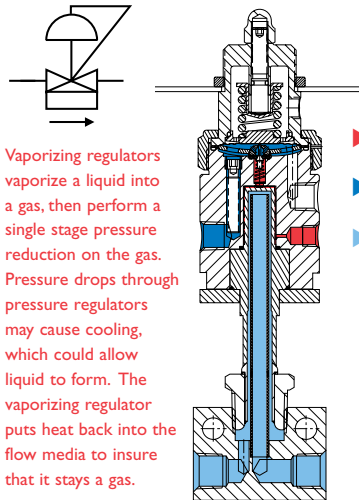
INTERNAL VOLUME

4.0 cc

TEMPERATURE

PCTFE: -40°F to 150°F (-40°C to 66°C)

Vaporizing Regulator



Vaporizing regulators vaporize a liquid into a gas, then perform a single stage pressure reduction on the gas. Pressure drops through pressure regulators may cause cooling, which could allow liquid to form. The vaporizing regulator puts heat back into the flow media to insure that it stays a gas.

- ▶ Inlet Pressure Supply
- ▶ Vapor Outlet Pressure
- ▶ Steam Supply

OPERATING CONDITIONS

Max Inlet Pressure : 3500 psig (241 barg)
 Outlet pressure: 1-10 psig (.07-.7 barg), 1-30 psig (.07-2 barg),
 1-60 psig (.07-4 barg), 2-100 psig (.14-7 barg), 3-250 psig (.2-17 barg),
 5-500 psig (.3-34.5 barg)

FLOW CAPACITY

C_v 0.06 Nominal

INTERNAL VOLUME

High Pressure Inlet 0.57 cc

TEMPERATURE

40°F to 500°F (-40°C to 260°C)

AVR3 and AVR4 Series Pressure Reducing Regulator Electrically and Steam Heated Design

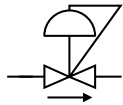


The **NEW** AVR3 and AVR4 Series steam and electrically heated vaporizing pressure reducing regulators are designed to heat and/or vaporize a gas or liquid sample before entering an analyzer system. The design allows easy cleaning of the heating element.

- Ultra Low internal volume
- Standard Hastelloy C22® diaphragm for superior strength and corrosion resistance
- Convoluted diaphragm provides outlet pressure stability with changes in flow
- Integral diaphragm stop provides additional safety measure
- Meets NACE standard MR0175
- CSA approved, Cenelec certified (Pending)
- Field serviceable heat transfer element

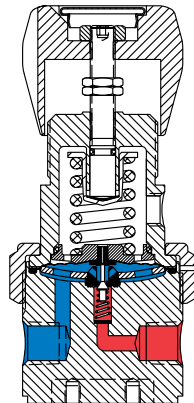
Pressure Reducing Regulators

Single Stage



▶ Outlet
▶ Inlet

This device is used to reduce a high pressure, supply pressure or inlet pressure in one stage to a low pressure. The low pressure side may also be called: low pressure, reduced pressure, control pressure, delivery pressure, downstream side or outlet pressure. Single stage regulators generally are preferred where there is little inlet pressure variability or where some outlet pressure variability is acceptable (see supply pressure effect specification on our product literature).



HFR900 Series High Flow Pressure Regulator

OPERATING CONDITIONS

Inlet: 500, 200 psig (35, 14 barg)
Outlet: 1-30, 2-75, 5-150 psig
(.06-2, .1-6, .3-10 barg)

FLOW CAPACITY

$C_v = 0.85$

INTERNAL VOLUME

38 cc

TEMPERATURE

-40°F to 150°F (-40°C to 66°C)

- 316L Stainless steel construction
- High flow



MIR700 Series Compact Single Stage Regulator

OPERATING CONDITIONS

Inlet: 3000 psig (207 barg)
Outlet: 0-15, 30, 100, 200 psig
(1, 2, 7, 14 barg)

FLOW CAPACITY

$C_v = .02$

INTERNAL VOLUME

3.9 cc

TEMPERATURE

-40°F to 150°F (-40°C to 66°C)

- Brass or 316L Stainless Steel construction
- Compact size



APR3 Series Pressure Reducing Regulator

OPERATING CONDITIONS

Inlet: 3500 psig (241 barg)
Outlet: 0-5, 30, 60, 100
(0.3, 2, 4, 7 barg)

FLOW CAPACITY

$C_v = 0.02$, (optional .2)

INTERNAL VOLUME

13.8 cc

TEMPERATURE

-40°F to 150°F (-40°C to 66°C)

- 316L stainless steel or Hastelloy®
- Standard Hastelloy C22® diaphragm
- Oversized diaphragm provides more pressure sensitive adjustments



959TDR Series High Pressure Tied Diaphragm Regulator

OPERATING CONDITIONS

Inlet: 3500 psig (241 barg)
Outlet: 0-30, 100 psig (2, 7 barg) or
subatmospheric to 30 psig (NPR only)

FLOW CAPACITY

$C_v = .04$

INTERNAL VOLUME

4.0 cc (6.19cc)

TEMPERATURE

-40°F to 150°F (-40°C to 66°C)

- 316L Stainless Steel construction
- Tied diaphragm regulator
- True metal-to-metal diaphragm seal assures high leak integrity



APR6 Series Pressure Reducing Regulator

OPERATING CONDITIONS

Inlet: 6000 psig (414 barg)
Outlet: 0-1000, 2000, 3000 and 6000
psig (69, 138, 207, 414 barg)

FLOW CAPACITY

$C_v = 0.05$

TEMPERATURE

-40°F to 150°F (-40°C to 66°C)

- Brass or 316L Stainless Steel construction
- 6000 psig service

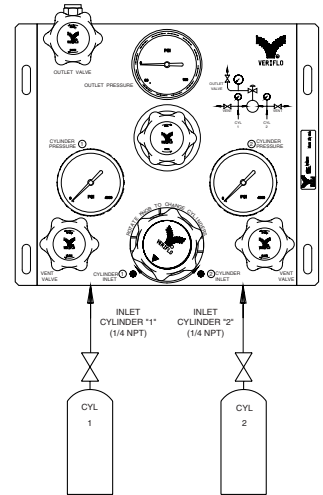
Pressure Reducing Regulators



ChangeOver System with Alarm Package

Continuous Gas and Fluid Management with Alarm Package

Veriflo's ChangeOver System is a compact turnkey module designed for continuous gas and fluid management. The ChangeOver System combines the IR Series pressure reducing regulator with the NOVA Series diaphragm valves to create a compact gas delivery system for continuous gas or fluid applications



The Alarm Package for the ChangeOver System is

designed to give users both an audible and a visual indication of when it is time to change out cylinders. The alarm package is equipped with four channels to allow for the connection of multiple ChangeOver Systems.

The alarm signal is activated when either cylinder has dropped below a preset pressure. The signal is activated through two pressure switches which are located on each inlet valve.

OPERATING CONDITIONS

Inlet pressure: 3,000 psig (204 barg) maximum
 Outlet pressure: 100, 150, 200, 250 psig (7, 10, 3, 14, 17 barg)

FLOW CAPACITY

$C_v = .02$

TEMPERATURE

-40°F to 150°F (-40°C to 66°C)

- 316L Stainless Steel and Brass construction
- Convoluted diaphragm provides outlet pressure stability with changes in flow
- Quick changeover control enhances safety



HPR800 Series Pressure Regulator

OPERATING CONDITIONS

Inlet: 5000 psig (344 barg) @ 70°F (21°C)
 Outlet: 10-800, 20-1500, 50-2500 psig (.6-55, 1.3-103, 3.3-172 barg)

FLOW CAPACITY

$C_v = .02$

INTERNAL VOLUME

6.5 cc

TEMPERATURE

-40°F to 150°F (-40°C to 66°C)

- Brass or 316L Stainless Steel construction
- Suitable for gas cylinder applications



HIR100 Series Pressure Regulator

OPERATING CONDITIONS

Inlet: 3000 psig (207 barg)
 Outlet: 1-15, 30, 2-75 and 5-150 psig (.07-1, .07-2, .14-5, .34-10 barg)

FLOW CAPACITY

$C_v = 0.131$

INTERNAL VOLUME

9.30 cc

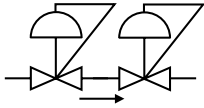
TEMPERATURE

-40°F to 150°F (-40°C to 66°C)

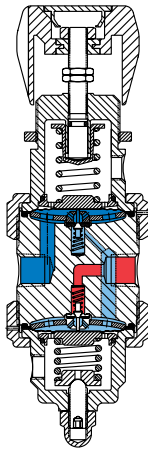
- Brass or 316L Stainless Steel construction
- Excellent low pressure setability
- Large diaphragm area for minimal pressure drop

Pressure Reducing Regulators

Two Stage



This device reduces an inlet pressure to an outlet pressure in two stages. The design is two single-stage regulators in series in one body. This device is preferred where there is a potential for large inlet pressure variations. Gas cylinders are the most common example of this application.



- ▶ Supply Pressure
- ▶ Medium Pressure
- ▶ Outlet Pressure



735TDR Series Two Stage Tied Diaphragm Regulator

OPERATING CONDITIONS

Inlet: 3500 psig (241 barg)
Outlet: 0-30, 100
(2, 7 barg) adjustable

FLOW CAPACITY

$C_v = .04$

INTERNAL VOLUME

7.3 cc

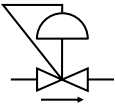
TEMPERATURE

-40°F to 150°F (-40°C to 66°C)

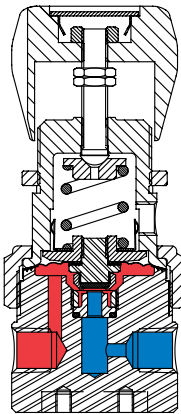
- 316L Stainless Steel construction
- Two-stage tied diaphragm regulator
- Adjustment range spring may be replaced without breaking the diaphragm seal to the body and exposing the wetted area to contamination
- True metal-to-metal diaphragm seal assures high leak integrity
- For gas cylinder applications

Back Pressure Regulators

Back Pressure Regulator



In contrast to controlling downstream pressure with a pressure reducing regulator, the back pressure regulator is used to control upstream or back pressure. This device operates like a sensitive, externally adjustable relief valve.



- ▶ Control Pressure
- ▶ Outlet Pressure



(Shown with Optional Aluminum knob)

ABPI Series Back Pressure Regulator

OPERATING CONDITIONS

Control Pressure: 0-25, 50, 100,
250, 500 psig (0-1.7, 3.5, 7, 17.2,
35 barg)

FLOW CAPACITY

$C_v = 0.3$ (optional 0.1 and 0.06)

INTERNAL VOLUME

5.9 cc

TEMPERATURE

Flow Media: -40°F to 400°F
(-40°C to 204°C)

- 316L Stainless Steel, Monel® or Hastelloy C-22® construction
- Low internal volume
- Meets NACE standard MR0175
- Atmospheric corrosion resistant



BPR50 Series Back Pressure Regulator

OPERATING CONDITIONS

Control Pressure:
100-1200 and 200-2000 psig
(6.8-8.3 barg and 13.8-38 barg)

FLOW CAPACITY

$C_v = 0.45$

INTERNAL VOLUME

5 cc

TEMPERATURE

-40°F to 150°F (-40°C to 66°C)

- 316L Stainless Steel
- 2000 psig service



ABP3 Series Back Pressure Regulator

OPERATING CONDITIONS

Control Pressure:
0-5, 30, 60 psig (0-.3, 2, 4 barg)

FLOW CAPACITY

$C_v = 0.3$ (optional 0.1 and 0.06)

INTERNAL VOLUME

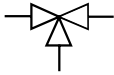
13.8 cc

TEMPERATURE

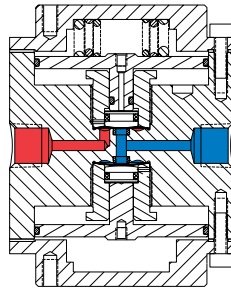
Flow Media: -40°F to 150°F
(-40°C to 66°C)

- 316L Stainless Steel
- Large diaphragm for extra sensitivity

3Way Diaphragm Valve



These are on/off devices with no packing, o-rings or bellows in the flow stream. Available in Air Operated or Manual actuation. The 3-Way's metal-to-metal seal of the Elgiloy® diaphragm to the Stainless Steel body achieves outstanding seal integrity to atmosphere. This eliminates stem leakage and prevents contamination of the sample stream.



▶ Inlet

▶ Outlet



Nova 3Way AOP
Air Operated Diaphragm Valve

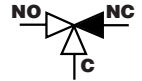
OPERATING PRESSURE
Vacuum to 500 psig (34.5 barg)

FLOW CAPACITY
 $C_v = .15$ (Typical)

INTERNAL VOLUME
2.11 cc

TEMPERATURE
-40°F to 150°F (-40°C to 66°C)
PCTFE (formerly Kel-F 81®)
-40°F to 250°F (-40°C to 121°C)

VespeI®



- Compact size
- High cycle life
- Diaphragm is only moving part in wetted area



Nova 3Way Manual
3Way Manual Diaphragm Valve

OPERATING PRESSURE
Vacuum to 3500 psig (241 barg)

FLOW CAPACITY
 $C_v = 0.15$ (Typical)

INTERNAL VOLUME
2.11 cc

TEMPERATURE
-40°F to 150°F (-40°C to 66°C)
PCTFE (formerly Kel-F 81®)
-40°F to 250°F (-40°C to 121°C)

VespeI®

- Compact size
- High cycle life
- Diaphragm is only moving part in wetted area



Nova 3Way Block & Bleed
Block & Bleed Diaphragm Valve

OPERATING PRESSURE
Vacuum to 80 psig (5.5 barg)

FLOW CAPACITY
 $C_v = 0.15$ (Typical)

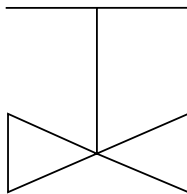
INTERNAL VOLUME
2.11 cc

TEMPERATURE
-40°F to 150°F (-40°C to 66°C)
PCTFE (formerly Kel-F 81®)
-40°F to 250°F (-40°C to 121°C)

VespeI®



- Compact size
- High cycle life
- Diaphragm is only moving part in wetted area



Nova Series
Standard Features - All Models

OPERATING PRESSURE
Vacuum to 3500 psig (241 barg) except NOVA AOP

FLOW CAPACITY
 $C_v = .14$

INTERNAL VOLUME
Less than 1.0 cc

TEMPERATURE
-40°F to 150°F (-40°C to 66°C)

- Clean for O₂ service
- Low internal volume
- 316L Stainless Steel or Brass construction
- Metal to metal diaphragm seal to environment for leak integrity
- No packing, O-rings, springs or bellows in wetted area
- Diaphragm is only moving part in wetted area



NovaAOP
Air Actuated Diaphragm Valve

OPERATING PRESSURES
Vacuum to 250 psig (AOP1 NC, AOP3 NC) or 500 psig (AOP2 NC, AOP NO)

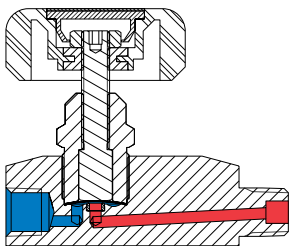
MINIMUM ACTUATION PRESSURE
40 psig min (AOP3 NC) and 65 psig min (AOP1 NC) @ 250 psig line pressure. 75 psig (AOP2 NC) and 50 psig (AOP NO) @ 500 psig line pressure.

- Air operated pressure piston style actuator
- High cycle life
- NC: Normally closed (3 options)
- NO: Normally open

Diaphragm Valve



These are on/off devices with no packing, o-rings or bellows in the flow stream. Available with multiple-turn handwheel, quarter-turn or air-operated actuators. Ideal for eliminating fugitive emissions in instrument systems.



▶ Inlet

▶ Outlet

Nova Handwheel Manual Diaphragm Valve

OPERATING PRESSURE
Vacuum to 3500 psig (241 barg)

FLOW CAPACITY
 $C_v = .14$

INTERNAL VOLUME
Less than 1.0 cc

TEMPERATURE
-40°F to 150°F (-40°C to 66°C)



- Low internal volume
- No O-rings in wetted areas
- Clean O₂ service
- Compact size
- High cycle life



Nova I Indicating Handwheel

OPERATING PRESSURE
Vacuum to 3500 psig (241 barg)

FLOW CAPACITY
 $C_v = .14$

INTERNAL VOLUME
Less than 1.0 cc

TEMPERATURE
-40°F to 150°F (-40°C to 66°C)

- Low internal volume
- No O-rings in wetted areas
- Clean O₂ service
- Compact size
- High cycle life

Nova L Lever Valve

OPERATING PRESSURE
Vacuum to 3500 psig (241 barg)

FLOW CAPACITY
 $C_v = .14$

INTERNAL VOLUME
Less than 1.0 cc

TEMPERATURE
-40°F to 150°F (-40°C to 66°C)



- Low internal volume
- No O-rings in wetted areas
- Clean O₂ service
- Compact size
- High cycle life



944 Series Diaphragm Valves

OPERATING CONDITIONS
944L, 944S, 944I Vacuum to 3500 psig (241 barg)
944 AOP LP: Vacuum to 125 psig (8.6 barg)
944 AOP HP: Vacuum to 3500 psig (241 barg)

FLOW CAPACITY
944L: $C_v = .18$
944 AOP LP: $C_v = .25$
944 AOP HP: $C_v = .25$

INTERNAL VOLUME
2.18 cc

TEMPERATURE
-40°F to 150°F (-40°C to 66°C)

- “VeriClean”, Veriflo’s high purity type 316L VAR Stainless Steel
- Unique patented compression member which loads the seal uniformly without the need for threaded components or crimping operations
- Fully field serviceable seat can be replaced without special tools
- NO (normally open) or NC (normally closed) or metering actuators available
- Fully functional under all vacuum conditions

NV55 Series High Flow Diaphragm Valve

OPERATING PRESSURE
Maximum: (AOP) 125 psig (98.6 barg), (Manual) 250 psig (17 barg)
Minimum: Vacuum

FLOW CAPACITY
 $C_v = .55$

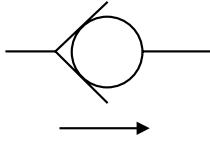
INTERNAL VOLUME
3.15 cc

TEMPERATURE
-40°F to 150°F (-40°C to 66°C)



- Internally threadless
- Ideal for high flow applications
- Fully functional from vacuum to 125 psig for AOP valve and 250 psig for manual valves
- Diaphragm is only moving part in wetted area
- High cycle life (including corrosive service)

Check Valve



VC10 Series
Check Valve

BODY
Brass or 316L Stainless Steel

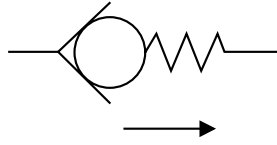
MAXIMUM WORKING PRESSURE
3000 psig (207 barg) Stainless Steel
2000 psig (138 barg) Brass

FLOW CAPACITY
 $C_v = 0.42$

OPERATING TEMPERATURE
-30°F to 550°F (-35°C to 287°C)

- Positive sealing at very Low differential pressure
- Viton® and Kalrez seal options

Relief Valve



VR7 Series
Relief Valve

BODY
Brass or 316L Stainless Steel

ADJUSTABLE RANGES
10-20, 20-100, 100-250,
250-550 psig (.6-1.4, 1.4-6.9,
7-17, 17-34 barg)

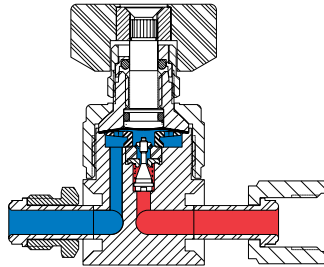
FLOW CAPACITY
 $C_v = 0.37$

OPERATING TEMPERATURE
30°F to 400°F (-35°C to 204°C)

- Choice of seal materials
- HEX body provides wrench flats
- Available with a variety of connection options

Excess Flow Valve

This valve is flow sensitive and will shut off if it senses an increased amount of flow above the specified set point. After shut off, it may be manually reset to continue operation.



▶ Inlet

▶ Outlet

FS190 Series

Excess Flow Shut-off Valve

MAXIMUM INLET PRESSURE
3500 psig (241 barg)

6 AVAILABLE FLOW RANGES
500 cc - 100 LPM

INTERNAL VOLUME
1.86 cc

TEMPERATURE
-10°F to 150°F (-23°C to 66°C)



- 316L Stainless Steel
- A non-attitude sensitive excess flow shut-off valve



928AOP Series
Pressure Reducing Air-Operated Valve

OPERATING CONDITIONS
Inlet: 3500 psig (241 barg)
Outlet: 350 psig (24 barg) with
2000 psig (138 barg) inlet pressure
and 80 psig (5.5 barg) actuator pressure -
Outlet pressure varies with inlet pressure
and actuator pressure

FLOW CAPACITY
 $C_v = .04$

INTERNAL VOLUME
1.54 cc

TEMPERATURE
-40°F to 150°F (-40°C to 66°C)

- Improves systems safety by lowering the inlet pressure to a safer working range



928AOPHP Series
High Pressure Air-Operated Valve

OPERATING CONDITIONS
Inlet: 3500 psig (241 barg)
(for oxygen: 2200 psig (170))
Outlet: Vacuum to 3500 psig (241 barg)

FLOW CAPACITY
 $C_v = .04$

INTERNAL VOLUME
1.54 cc

TEMPERATURE
-40°F to 150°F (-40°C to 66°C)