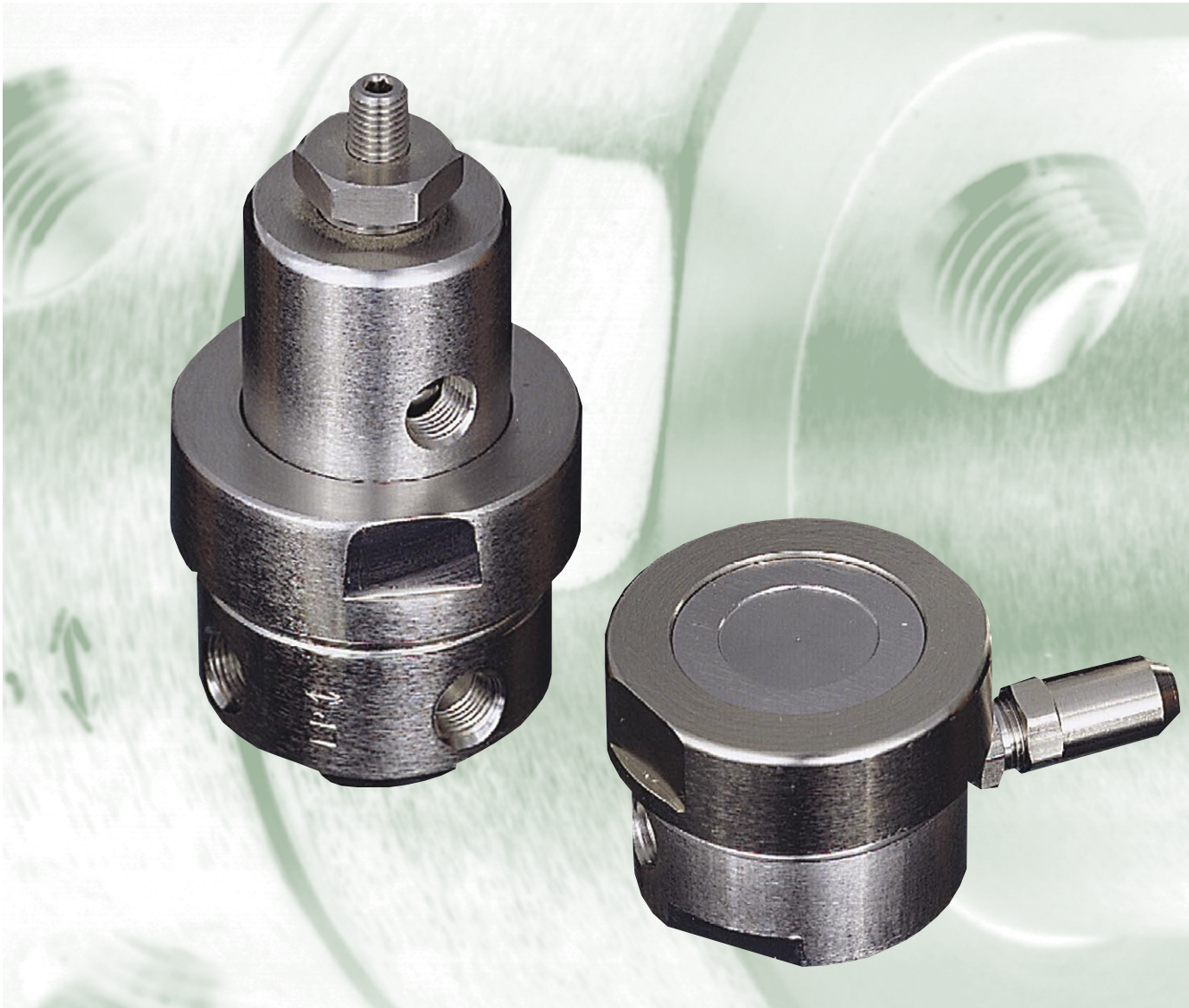




# **Flow Controllers**

*Instrument / Analyzer Products*

*Catalog 4513/USA  
April 2005*





## Veriflo A Leading Manufacturer of Precision Valves, Regulators & Surface Mount Components

Veriflo Division, Parker Hannifin Corporation is a leading manufacturer of precision valves, regulators and surface mount components for the control and application of liquids and gases used in the fabrication of semiconductors, as well as in the chemical and petrochemical industries.

Veriflo has maintained industry leadership over the past 95 years through innovative engineering, manufacturing and by placing a premium on quality customer care.

The division maintains two state-of-the-art Class 10 Clean Rooms at its Richmond, CA, facility and has adopted a corporate wide "Lean Manufacturing" philosophy, which is delivering greater value to the customer by eliminating wasteful steps through continuous improvement activities.

Veriflo Division's two manufacturing facilities develop and manufacture applications for the Semiconductor/High Purity and Instrument/Analyzer industries.



### **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 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 in the "Offer of Sale."



## Placing a Premium on Quality Customer Care

With the focus of maintaining the highest industry standards, Veriflo Division has achieved an ISO 9001 registration at both its Richmond, CA, manufacturing plant and at its Carson City, NV, facility. This certification confirms Veriflo's commitment to quality and excellence as recognized by the international community.

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

Parker's Instrumentation Group has ten manufacturing plants and over 300 authorized distributor locations around the world 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.



## Visit Us on the Web

For further information on Veriflo Division and or its product line [visit the division web site at www.veriflo.com](http://www.veriflo.com). For more information on Parker Hannifin Corporation [visit the corporation's web site at www.parker.com](http://www.parker.com).



Hastelloy C-22® is a registered trademark of Haynes International, Inc.  
Kalrez® is a registered trademark of the DuPont Company.  
Tefzel® is a registered trademark of the DuPont Company.  
Elgiloy® is a registered trademark of Elgiloy Corp.

## Low Flow Controller

Parker Hannifin Corporation's Veriflo Division presents the SC420 Series low flow controller. The SC420 is manufactured for precise flow control of corrosive and non-corrosive gases at extremely low flow rates.



### Features

- ▶ Corrosion resistant.
- ▶ Precise control at extremely low flows.
- ▶ Tamper-proof and Panel Mount options available.
- ▶ O<sub>2</sub> Cleaned.
- ▶ Repeatability: Flow is stable within  $\pm 2\%$  of the flow value under the following conditions:
  1. Reference pressure varies no more than  $\pm 1\%$ .
  2. The difference between inlet and outlet pressure is a minimum on 10 psig.
  3. Ambient temperature varies no more than  $\pm 10^\circ\text{F}$ .

## Materials of Construction

### Stainless Steel

#### Wetted

Body .....	316L Stainless Steel
Seat .....	316 Stainless Steel
Seals.....	PTFE and Fluorocarbon
Diaphragm Plate.....	316L Stainless Steel
Diaphragm.....	PCTFE
Range Spring .....	17-7PH Stainless Steel
Filter.....	Stainless Steel

### Brass

#### Wetted

Body .....	Brass
Seat .....	Brass
Seal .....	Fluorocarbon
Diaphragm Plate.....	Aluminum
Diaphragm.....	PCTFE
Range Spring .....	17-7PH Stainless Steel
Filter.....	Stainless Steel

### Non-Wetted

Cap .....	Aluminum
Cap Nut .....	Brass Nickel Plated

### Micrometering Valve

#### Wetted

Body .....	Stainless Steel
Washer .....	Stainless Steel
Valve Stem .....	Stainless Steel
O-Ring .....	PTFE
Gasket .....	Silver

### Operating Conditions

Inlet Pressure .....	150 psig (10 barg)
Temperature .....	-40°F to 150°F (-40°C to 66°C)

### Functional Performance

Flow range: Ratio of maximum to minimum is 100 to 1 for any given inlet pressure.

Supply Pressure Effect.....	0.6 psig (0.03 barg)	per 100 psig (6.80 barg)
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#### Flow Control:

Fine.....	to 1000 scc/min. (see chart)
Extra Fine .....	to 500 scc/min. (see chart)

### Standard Connections

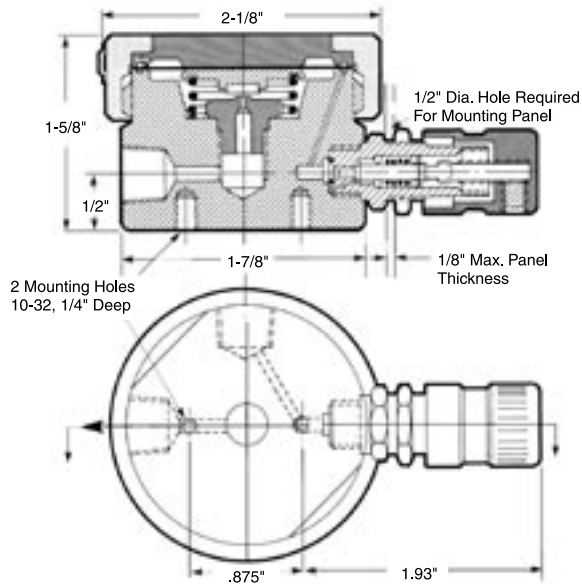
1/8 NPT female

### Approximate Weight

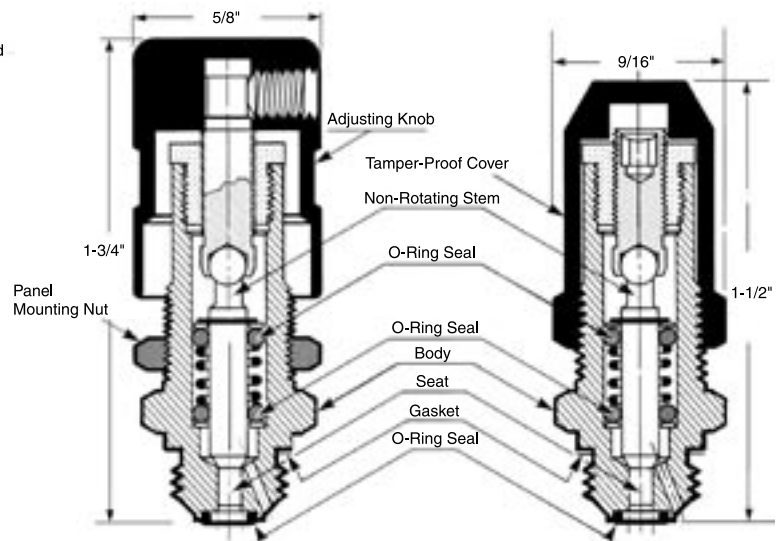
Stainless Steel.....	1.5 lbs
Brass .....	1 lb



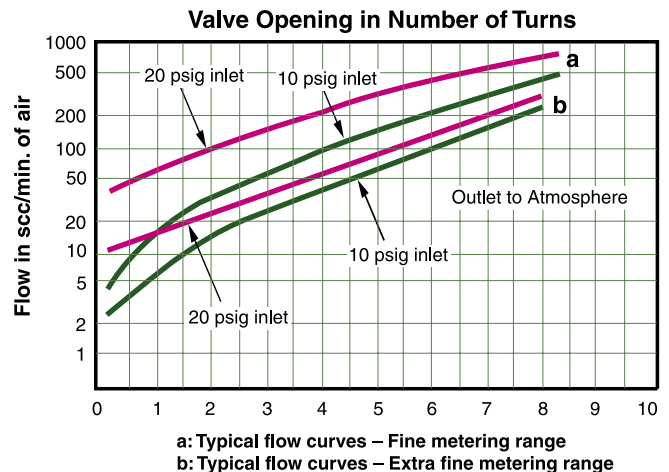
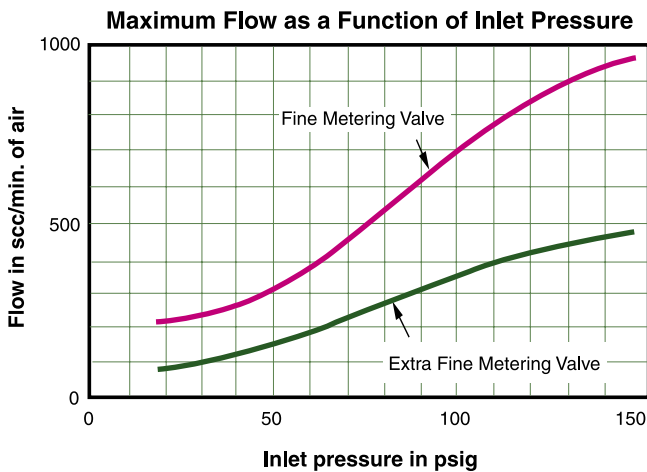
## Dimensional Data



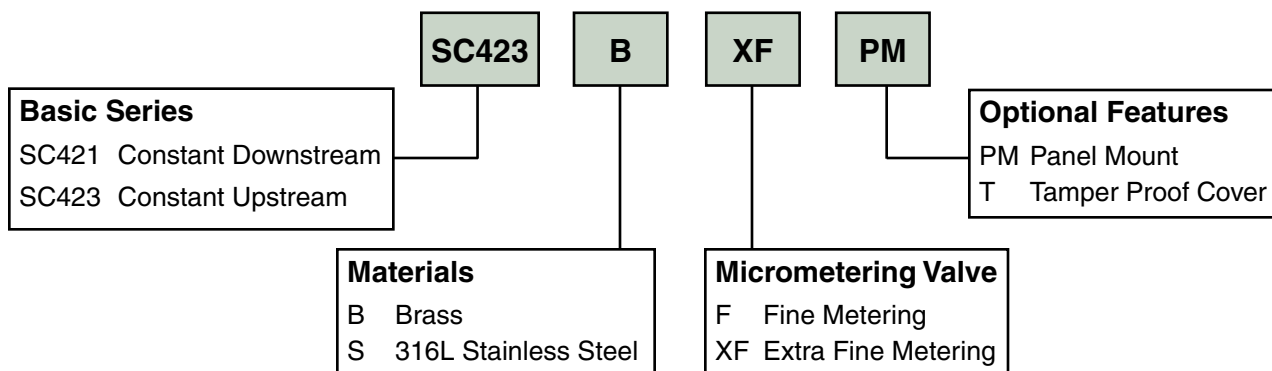
## Micrometering Cartridges



## Flow Curves



## Ordering Information



## Precision Low Flow Control

Parker Hannifin Corporation's Veriflo Division presents the SC423XL. The SC423XL is a unique device which supplies a constant flow with a self correcting action to compensate for changes in downstream pressure.

The SC423XL was designed for air and analyzer sampling systems which require very low flow rates (less than 10 sccm). Connected to a vacuum cylinder, the SC423XL provides consistent flow control despite changes in the vacuum.



### Features

- ▶ Rugged Design.
- ▶ Reliable Precision Flow Control as low as 1 sccm.
- ▶ Adjustable Flows.
- ▶ Hastelloy C-22® Diaphragms.
- ▶ Stable flows as vacuum pressure changes from 28 in Hg to 5 in Hg.
- ▶ Stable flows over a wide temperature band.
- ▶ Color coded orifices.
- ▶ Special CFC Free Cleaning.
- ▶ Tamper Proof.
- ▶ O<sub>2</sub> Cleaned.

### Materials of Construction

#### Wetted

Body .....	316L Stainless Steel
Seat .....	Fluorocarbon
Seals .....	Fluorocarbon
Piston.....	316L Stainless Steel
Diaphragm .....	Hastelloy C-22®
Inlet Fitting.....	316 Stainless Steel
Outlet Fitting.....	316 Stainless Steel

#### Non-wetted

Cap .....	316L Stainless Steel
Filter.....	Sintered Hastelloy
Cap Nut .....	316 Stainless Steel
Retaining Ring .....	Stainless Steel
O-Ring .....	Fluorocarbon
Plug .....	Stainless Steel

### Operating Conditions

Inlet pressure.....	Atmospheric
Outlet pressure .....	Vacuum
Flow .....	As low as 1 sccm (See Flow Curve)

### Functional Performance

Design Leak Rate: (outboard).....	1x10 <sup>-6</sup> scc/sec He
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### Temperature Range

-40°F to 200°F (-40°C to 94°C)

### Standard Configurations

1/4" NPT Female .....	Inlet and Outlet
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### Connections

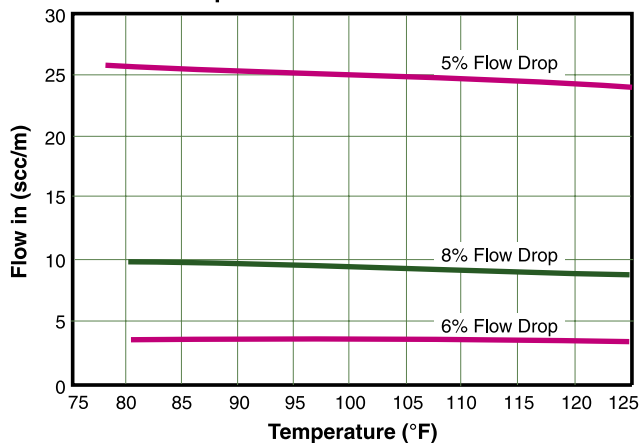
Inlet (Atmosphere) .....	1/4" NPT x 1/4" Compression Fitting
Outlet (Vacuum).....	1/4" NPT X 1/4" Tube Adapter

### Approximate Weight

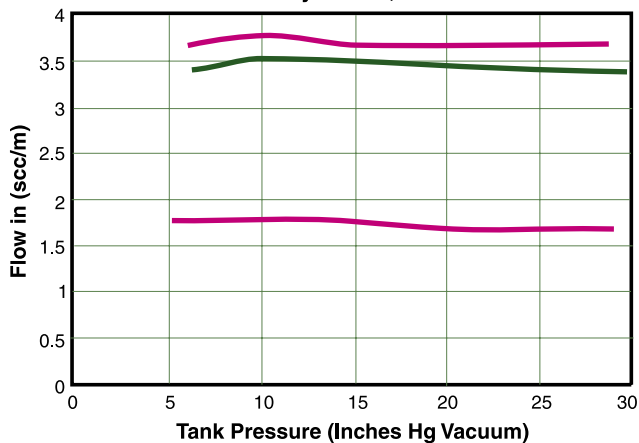
1.75 lbs. (.80 kg)

# Flow Curves

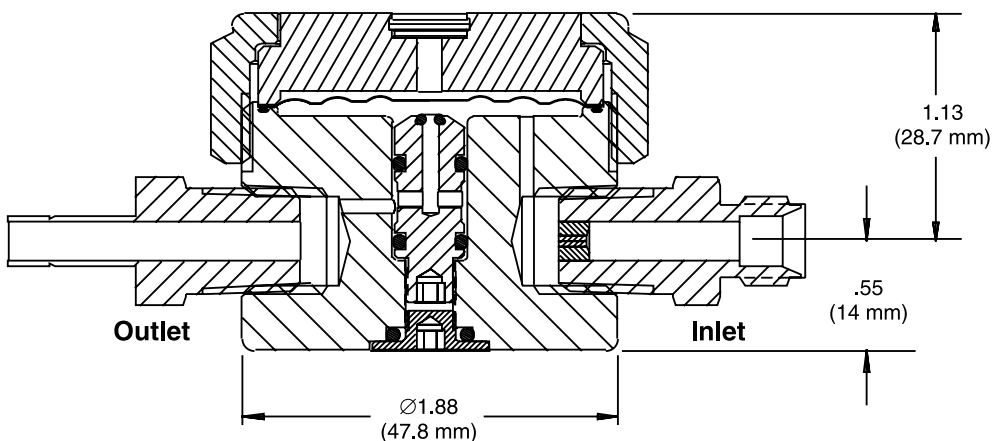
Temperature Effect on Flow Rate



Flow Stability Curve, .0012 Orifice



# Dimensional Data



# Ordering Information

<b>SC423XL</b>	<b>S</b>	<b>24</b>	<b>4T</b>	<b>4TS</b>												
<b>Basic Series</b> SC423XL	<b>Material</b> S 316L Stainless Steel		<b>Inlet Connection</b> 4T 1/4" Compression Fitting (includes Flow Restrictor)	<b>Outlet Connection</b> X No Connections 4TS 1/4" Tube Fitting												
<table border="1"> <thead> <tr> <th colspan="2">Sample Time / Flow Rate</th> </tr> <tr> <th>Hours</th> <th>Flow Rate</th> </tr> </thead> <tbody> <tr> <td>3</td> <td>= 27.1 - 27.7 sccm (Yellow)</td> </tr> <tr> <td>8</td> <td>= 10.0 - 10.4 sccm (Green)</td> </tr> <tr> <td>12</td> <td>= 6.5 - 6.9 sccm (Blue)</td> </tr> <tr> <td>24</td> <td>= 3.1 - 3.4 sccm (Red)</td> </tr> </tbody> </table>					Sample Time / Flow Rate		Hours	Flow Rate	3	= 27.1 - 27.7 sccm (Yellow)	8	= 10.0 - 10.4 sccm (Green)	12	= 6.5 - 6.9 sccm (Blue)	24	= 3.1 - 3.4 sccm (Red)
Sample Time / Flow Rate																
Hours	Flow Rate															
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8	= 10.0 - 10.4 sccm (Green)															
12	= 6.5 - 6.9 sccm (Blue)															
24	= 3.1 - 3.4 sccm (Red)															

## Liquid Flow Controller

Parker Hannifin Corporation's Veriflo Division presents the LC221S Liquid Flow Controller. The LC221S is designed to control a constant downstream pressure. This is accomplished by maintaining a constant pressure differential across the unit's flow restrictor (customer supplied).

The LC221S is ideally suited for applications in liquid chromatography, chemical injection, sampling systems, research labs and purge flows to instrumentation.



### Features

- ▶ Constant liquid flow with varying downstream pressure.
- ▶ Stable flow with upstream pressure variations.
- ▶ Wide flow range: less than 0.1 sccm to 1 slpm.
- ▶ Wide pressure range: 200 to 4000 psig (14 to 275 barg).
- ▶ Flow trimming adjustment: 2-1/2 to 1 with preselected flow restrictor (user supplied).
- ▶ Corrosion resistant.
- ▶ O<sub>2</sub> cleaned.
- ▶ Repeatability: Flow is stable within ±0.5% of flow value under the following conditions:
  1. Ambient temperature varies no more than 1°F.
  2. Inlet pressure does not vary by more than 100 psig.
  3. Downstream pressure does not vary by more than 15% of established value.

## Specifications

### Materials of Construction

#### Wetted

Body .....	316L Stainless Steel
Seat .....	PTFE
Diaphragm .....	316L Stainless Steel
Seals:	
LC221S .....	PTFE
LC221SK .....	Kalrez®
Gaskets .....	PTFE
Screen .....	316 Stainless Steel

#### Nonwetted

Cap .....	Stainless Steel
Cap Nut .....	Stainless Steel
Stem .....	Stainless Steel
Bushing .....	Stainless Steel

### Operating Conditions

Maximum Inlet Pressure .....	4000 psig (275 barg)
Maximum Downstream Pressure .....	3800 psig (262 barg)
Operating Temperature .....	-20°F to 200°F (-29°C to 94°C)
Operating Differential Pressure .....	100 psig maximum (7 barg)

### Functional Performance

Flow Range .....	Less than 0.1 sccm to 1 slpm established by flow restrictor (user supplied)
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### Internal Volume

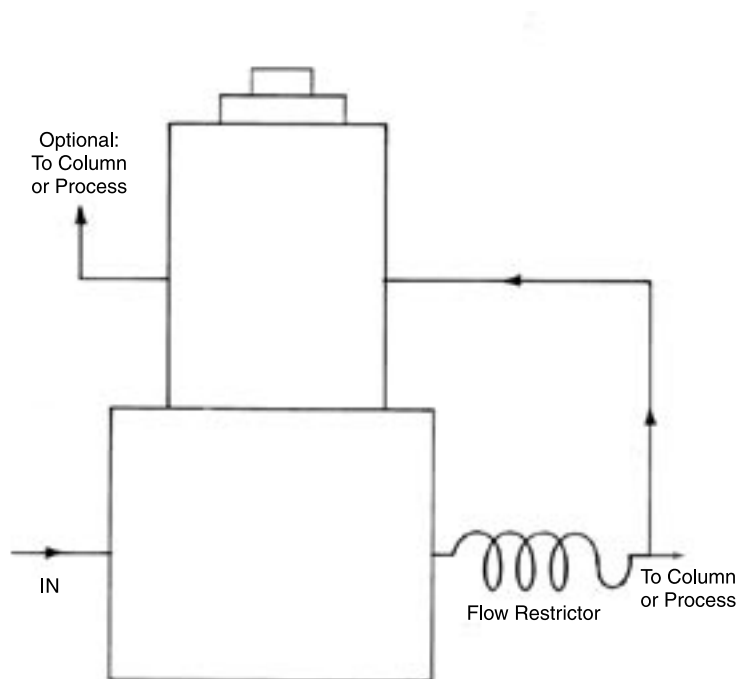
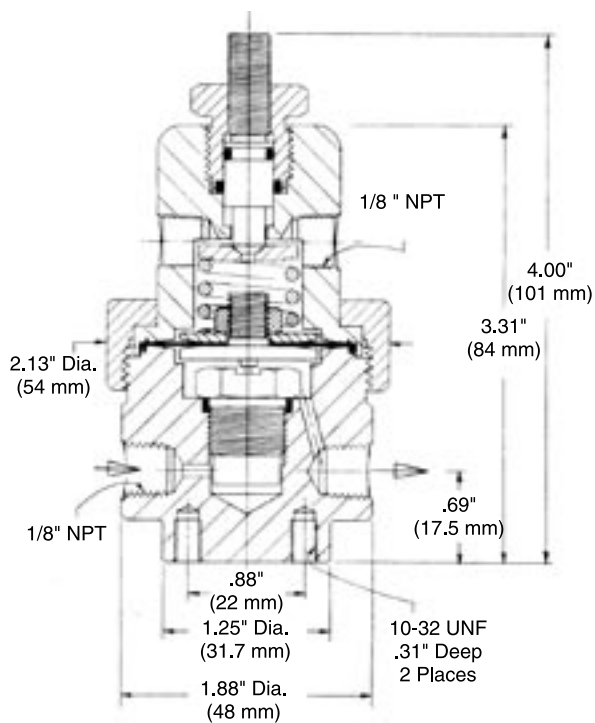
Dome .....	3.2 cc
Body .....	1.9 cc

### Standard Configuration

Ports .....	Body and Dome 1/8" NPT female Less than 0.1 sccm to 1 lpm
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## Dimensional Data



## Ordering Information

LC221S PCTFE and PTFE.....421 00 500

LC221SK PCTFE and Kalrez® .....421 00 550

# Gas or Liquid Flow Controller

Parker Hannifin Corporation's Veriflo Division presents the LC223S. The LC223S is a high pressure gas or liquid flow controller for liquid chromatography, chemical injection and sampling.



## Features

- ▶ Constant flow with varying downstream pressure.
- ▶ Wide flow range: from 25 sccm to 40 slpm.
- ▶ Wide pressure range: 200 to 5000 psig (14 to 345 barg).
- ▶ Corrosion resistant.
- ▶ O<sub>2</sub> cleaned.
- ▶ Repeatability: Flow is stable within ±0.2% of flow value under the following conditions:
  1. Ambient temperature varies no more than 10°F.
  2. Inlet pressure remains constant.
  3. Downstream pressure does not vary by more than 70% of established value.

## Specifications

### Materials of Construction

#### Wetted

Body .....	316L Stainless Steel
Seat .....	Tefzel®
Spring .....	316L Stainless Steel
O-Rings:	
LC223S .....	Fluorocarbon
LC223SK .....	Kalrez®
Diaphragm .....	316L Stainless Steel
Diaphragm Gaskets .....	PTFE
Screen .....	316 Stainless Steel

#### Nonwetted

Cap .....	Stainless Steel
Cap Nut .....	Stainless Steel

### Operating Conditions

Maximum Inlet Pressure .....	5000 psig (345 barg)
Maximum Dome Pressure .....	5000 psig (345 barg)
Required Differential Pressure .....	200 psig (14 barg)
Operating Temperature .....	-20°F to 200°F (-29°C to 94°C)

### Functional Performance

Flow Range .....	25 sccm to 40 slpm
Established by customer supplied flow restriction device.	

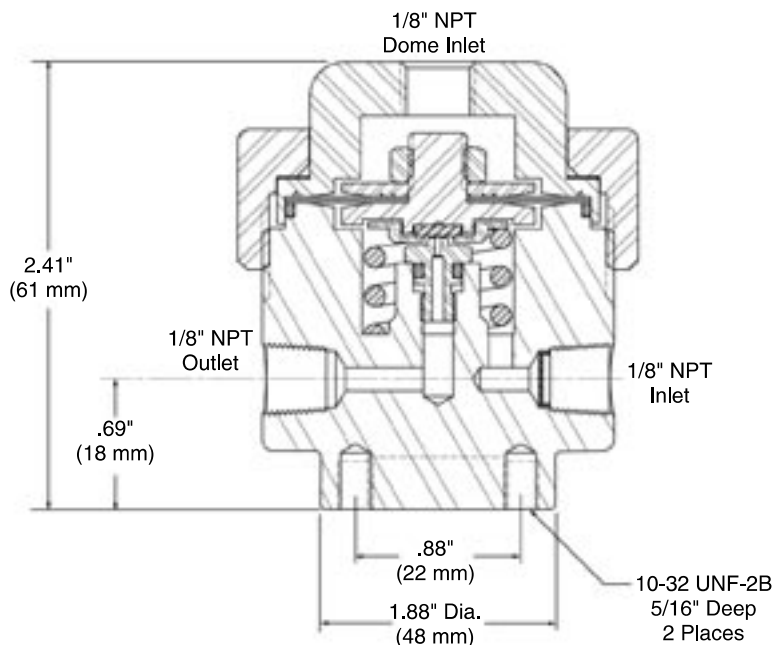
### Internal Volume

Dome .....	2.0 cc
Body .....	2.1 cc

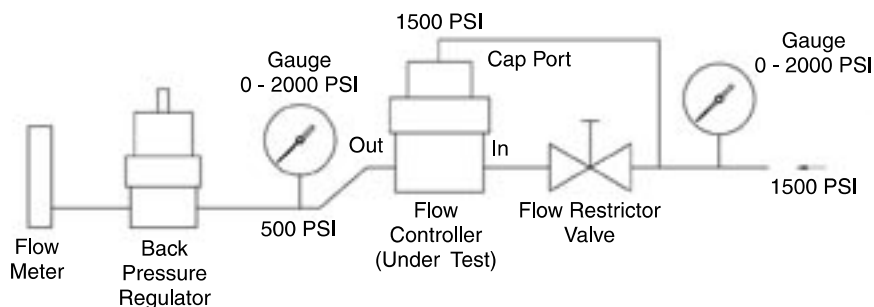
### Standard Configuration

Body Ports .....	1/8" NPT female
Dome Port .....	1/8" NPT female

## Dimensional Data



## Example Test Setup



## Ordering Information

LC223K Kalrez® .....	423 00 249
LC223S Fluorocarbon.....	423 00 250

## Excess Flow Shut-Off Valve

Parker Hannifin Corporation's Veriflo Division presents the FS190. The FS190 is a non-attitude sensitive, excess flow shut-off valve designed to operate with a wide range of inlet pressures.

The capability of operating from 10 to 3500 psig allows it to be used either between a high pressure source at the inlet to the pressure regulator, or in the low pressure delivery line to a process. In both applications, this control valve will automatically shut off the delivery of gas if the flow exceeds a preset limit.

The functional components of the FS190 are incorporated within the body style of a 1-1/4 inch Quantum valve. An actuating knob has been designed to manually operate the valve and clearly indicate the relative operating position - either "Open (Reset)" or "Auto (Shut Off)." A pneumatic actuator may be substituted for the knob, which makes it possible to reset the valve by sending a pressure signal from a remote source.

The FS190 is offered with six different pressure/flow limits: A,B,C,D,E, and F (see flow curve). The nominal differential pressure created at the flow limit is 5 psig for limit values A,B,C, and D. For limit values E and F, the differential pressure is 12 psig. The differential pressure that is created is not affected by mounting orientation (non-attitude sensitive).



## Specifications

### Materials of Construction

#### Wetted

Body .....	"VeriClean," Veriflo's custom high purity type 316L Stainless Steel™
Compression Member .....	316L Stainless Steel
Seat .....	PCTFE
Diaphragm .....	Elgiloy® or equivalent
Spring .....	Hastelloy C-22®
Poppet .....	316L Stainless Steel
Orifice .....	316L Stainless Steel

#### Nonwetted

Knob .....	Anodized Aluminum (Red)
Stem .....	416 Stainless Steel (Lubricated)
Cap .....	316L Stainless Steel

### Operating Conditions

Supply Pressure:	
A - D Flow Limit Setting .....	10 psig to 3,500 psig (.7 barg to 241 barg)
E - F Flow Limit Setting .....	20 psig to 3,500 psig (1.4 barg to 241 barg)
Differential Pressure .....	.5 psig or 12 psig (.3 barg or .8 barg)
Flow Limit Settings .....	6 available
Temperature .....	-10 F° to 150 °F (-23° C to 66° C)

### Functional Performance

Design Leak Rate:	
Outboard .....	2 x 10 <sup>-9</sup> scc/sec He
Inboard .....	2 x 10 <sup>-10</sup> scc/sec He

### Internal Volume

1.86 cc (including face seal fittings)

### Surface Finishes

Standard Ra .....	15-20 micro in (.38 to .5 micrometer) or less
Optional Ra .....	EX = 10 micro in (.25 micrometer) or less

Welded units only

### Standard Configuration

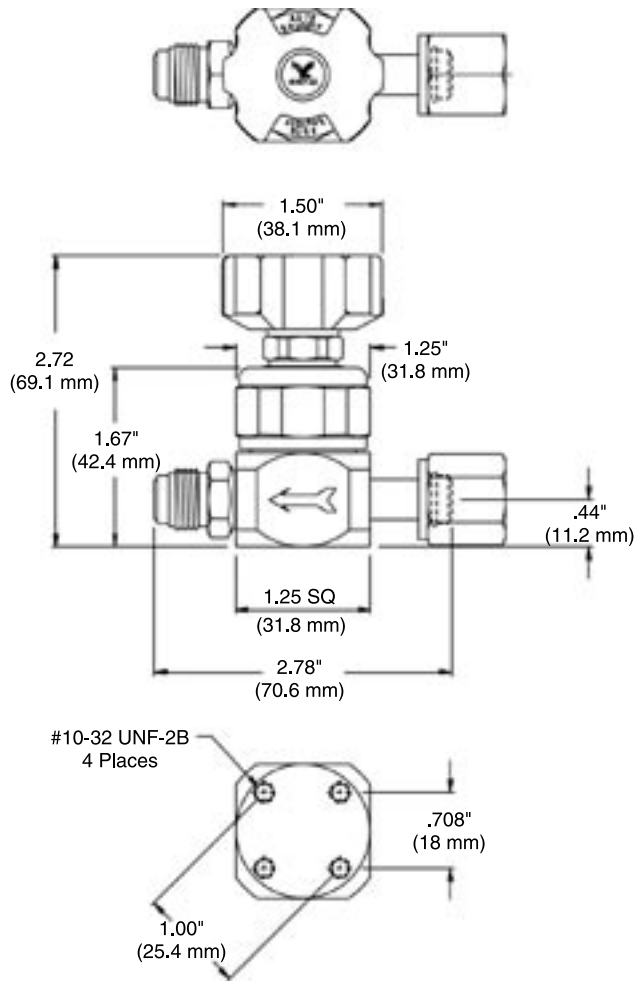
1/4" NPT female, 1/4" face seals or 1/4" tube stubs

### Approximate Weight

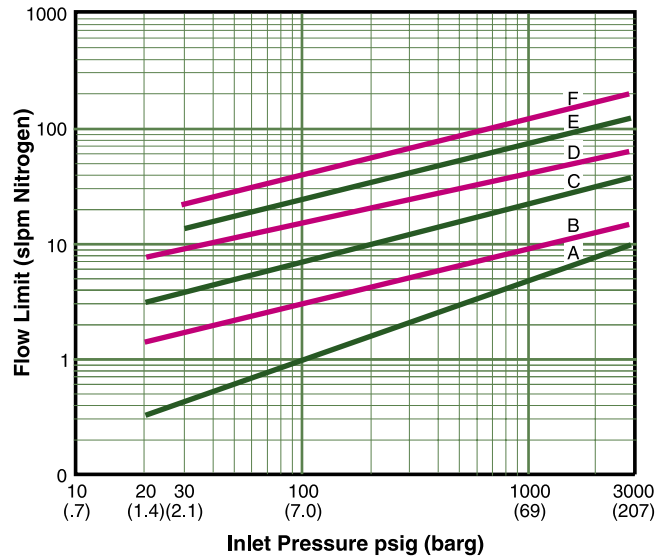
12.5 oz. (.32 kg)

### O<sub>2</sub> Cleaned

### Dimensional Data



### Sizing Chart



### Ordering Information

<b>FS190</b>	<b>S</b>	<b>A</b>	<b>FSFM</b>	<b>AOP</b>
<b>Basic Series</b> FS190	<b>Material</b> S 316L Stainless Steel			<b>Options</b> AOP Air Operated TH Hastelloy C-22® Trim internals* 3.70 FLV 120 Dimensional Replacement 3.46 FLV 110 Dimensional Replacement
<b>Flow Limit Setting</b> Nominal Flow Limit at:		<b>Connection (Inlet &amp; Outlet)</b>		
<u>1000 psig Inlet</u>	<u>30 psig Inlet</u>	P 1/4" NPTF	FSMM 1/4" FS Male In - Male Out	* Includes: Hastelloy C-22® Compression member, poppet, spring and orifice.
A = 5 SLPM	0.3 SLPM	FSFF 1/4" FS Female In - Female Out	FSFM 1/4" FS Female In - Male Out	
B = 9 SLPM	2 SLPM	FSMF 1/4" FS Male In - Female Out	TS 1/4" Welded Tube Stubs	
C = 21 SLPM	4 SLPM			
D = 40 SLPM	9 SLPM			
E = 72 SLPM	15 SLPM			
F = 121 SLPM	22 SLPM			



## Pressure Relief Valve

Parker Hannifin Corporation's Veriflo Division presents the VR7 Series relief valve. The VR7 is an economical relief valve designed to vent excess pressure from a regulator should a minor seat leak occur.

The VR7 is recommended for use with regulators to protect the regulator and outlet pressure gauge. The VR7 is not intended for applications where repeated or frequent venting is required.



### Features

- ▶ Choice of seal materials for system compatibility.
- ▶ Hex body provides wrench flats.
- ▶ Available with a variety of connections, seat materials, and pressure settings.
- ▶ O<sub>2</sub> cleaned.

**Note:** The VR7 **SHOULD ONLY** be used to protect Article 3, Paragraph 3 category equipment as defined in Pressure Equipment Directive 97/23/EC Dated: 29, May 1997.

## Specifications

### Materials of Construction

#### Wetted

Body .....	316L Stainless Steel, Brass
Seal .....	Fluorocarbon or Kalrez®
Spring .....	302 Stainless Steel
Poppet .....	316L Stainless Steel, Brass
Screw .....	316L Stainless Steel, Delrin

### Operating Conditions

Maximum Pressure .....	750 psig (52 barg)
Adjustable Ranges .....	10-20 psig (.6-1.4 barg), 20-100 psig (1.4-7 barg), 100-250 psig (7-17 barg), 250-500 psig (17-34 barg)

#### Temperature Range

Fluorocarbon and Kalrez® .....	-30°F to 400°F (-35°C to 204°C)
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### Functional Performance

Flow Capacity .....	C <sub>v</sub> = 0.37 (SEMI Flow Coefficient Test #F-32-0998)
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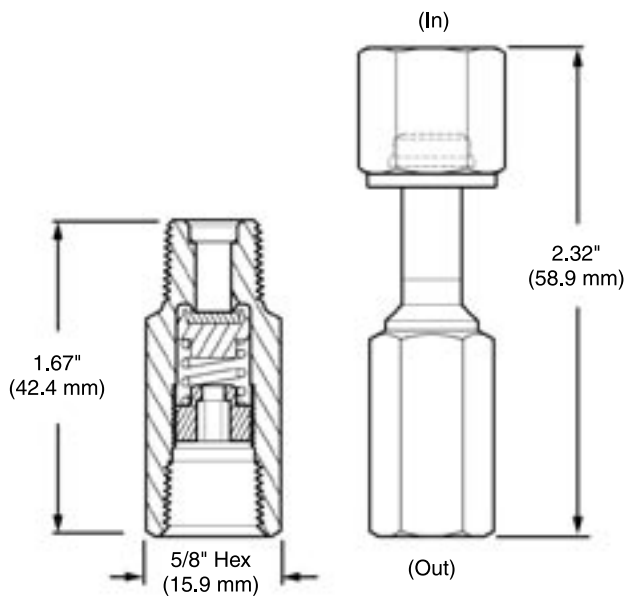
### Standard Connections

1/4" pipe threads – male inlet, female outlet (NPT).  
1/4" female pipe thread outlet, FS male or female fitting inlet.

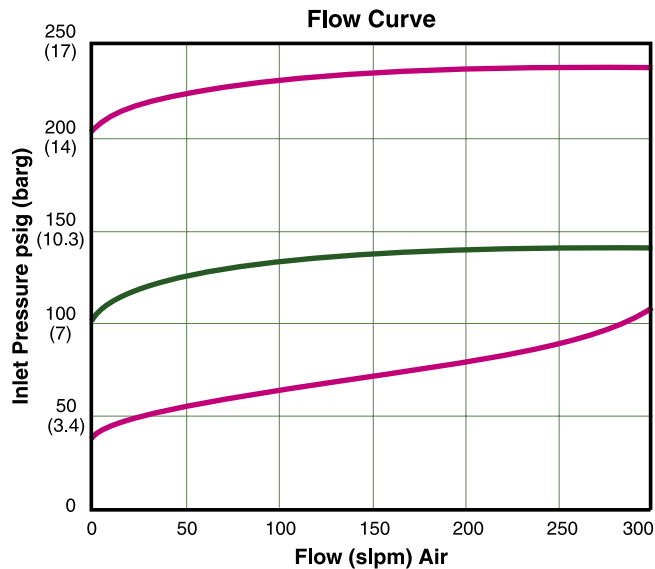
### Approximate Weight

2.0 oz. (.06 kg)

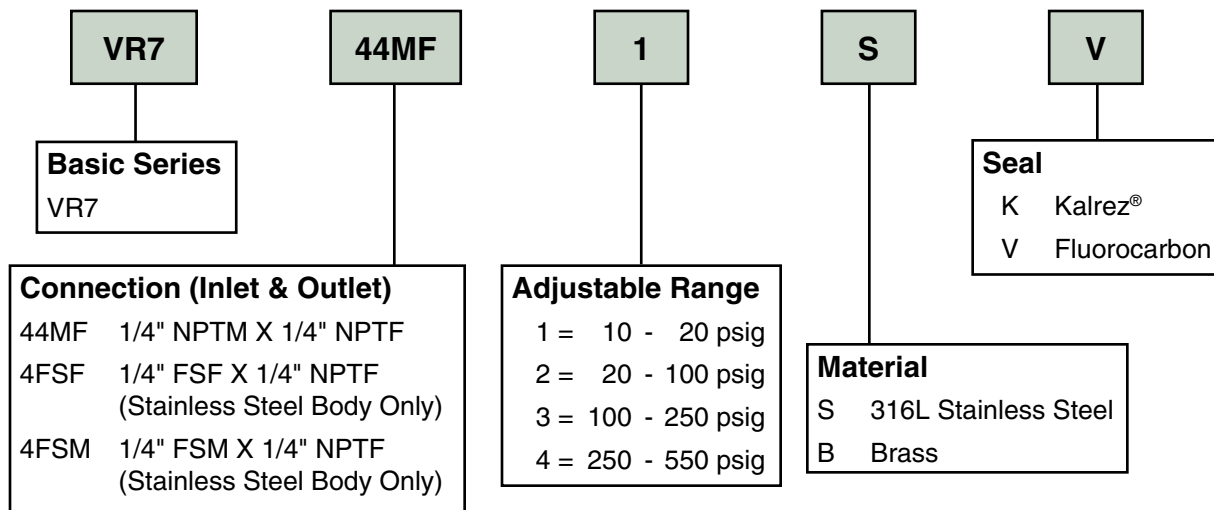
## Dimensional Data



## Performance Curve



## Ordering Information



**Note: After relieving, service is required.**



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