## High Purity Regulators
### Microelectronics Product Line

Catalog 4508/USA
*October 2003*

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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.

**A Leading Manufacturer Of Precision Valves, Regulators & Surface Mount Components**

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.

With the focus of maintaining the highest industry standards,
Parker Hannifin Corporation’s Veriflo Division presents the SMSQ2Micro 1-1/2” & 1-1/8”. The SMSQ2Micro part of the process proven SQ product line, provides excellent stability and sensitivity for today’s modular surface mount systems.

The SMSQ2Micro provides all the performance benefits to modular designs including: springless tied diaphragm design; extraordinary transient response performance; and low particle counts.

**features**

- Meets SEMI Modular Interface specifications.
- Flow capacities up to 30 SLPM, depending on model selection.
- Standard Hastelloy C-22" Poppet and Diaphragm.
- Gas system footprint reduction.
- Reduced wetted volume.
- Ease of component retrofit.
- Standard surface finish 5 micro inch Ra (.13 micro meter).
- No springs or threads are exposed to the wetted area.
- Standard full internal electropolish.
- Available in 1-1/2” and 1-1/8” base size.

**materials of construction**

**Wetted**

Body ............ “VeriClean”, Veriflo’s high purity type 316L Stainless Steel™
Seat ............... PCTFE, optional Vespel®
Diaphragm .......... Hastelloy C-22®
Poppet ............. Hastelloy C-22®
Compression Member .... “VeriClean”, Veriflo’s high purity type 316L Stainless Steel, optional Hastelloy C-22®

**Non-Wetted**

Cap .................. Nickel Plated Brass
Adjusting screw ........ 316L Stainless Steel
Knob SQMicro (blue) ........ ABS Plastic

**operating conditions**

Maximum inlet pressure . . . . 250 psig (17.2 barg)
Outlet pressure .......... -10 in Hg to 60 psig
(5 psia, 250 torr to 4 barg)
Temperature .......... -40°F to 150°F (-40°C to 66°C)

**surface finish**

Standard Ra ............ 5 micro inch
(.13 micro meter) or less

**functional performance**

Design proof pressure .......... 375 psig (26 barg)
Design burst pressure: .......... 750 psig (52 barg)
Flow capacity:
SMSQ2Micro ................. Cv 0.06
SMSQ2Micro130E ............... Cv 0.15
(SEMI Flow Coefficient Test# F-32-0998)

Design Leak Rate:
Across Seat .................. 5 x 10^-4 cc/sec He
Inboard .................. 2 x 10^-6 cc/sec He
Outboard .................. 2 x 10^-6 cc/sec He

**internal volume**

4.0 cc

**standard connections**

SEMI modular interface

**approximate weight**

0.75 lbs (0.34 kgm)
**Dimensional Drawing**

All dimensions are reference and nominal.

**Flow Curves**

**Ordering Information**

**Basic Series**

<table>
<thead>
<tr>
<th>SMSQ2MICRO</th>
<th>30</th>
<th>10</th>
<th>SS</th>
</tr>
</thead>
</table>

**Range**

<table>
<thead>
<tr>
<th>30</th>
<th>0 - 30 psig</th>
</tr>
</thead>
<tbody>
<tr>
<td>60</td>
<td>0 - 60 psig</td>
</tr>
</tbody>
</table>

Preset available upon request

* Recommended for Nitrous Oxide (N₂O) Service.
** Recommended for Carbon Monoxide (CO) or Nickel Carbonyl Ni(CO)₄ Service
*** Hastelloy C-22® Trim (TH) includes compression member.

Hastelloy C-22® is a registered trademark of Haynes International, Inc.
Vespel® is a registered trademark of DuPont Company.

**Optional Features**

<table>
<thead>
<tr>
<th>SS</th>
<th>Stainless Steel Internals**</th>
</tr>
</thead>
<tbody>
<tr>
<td>TH</td>
<td>Hastelloy C-22® Trim***</td>
</tr>
<tr>
<td>VESP</td>
<td>Vespel® Seat*</td>
</tr>
</tbody>
</table>

**Base Size**

<table>
<thead>
<tr>
<th>blank</th>
<th>1-1/2” interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>1-1/8” interface</td>
</tr>
</tbody>
</table>

**Porting**

| 10 | = 2 Port, C-Seal |
| 11 | = 2 Port, High Flow C-Seal |
| 20 | = 3 Port, C-Seal |
| 30 | = 3 Port, High Flow C-Seal |
| 60 | = "W" Seal |

Inlet

Outlet
Parker Hannifin Corporation’s Veriflo Division presents the SQ2Micro, which is part of the process proven SQ product line. The SQ2Micro is a revolutionary, miniature, high performance, point-of-use regulator with a foot-print designed specifically to reduce semiconductor system real estate. The improved alignment of the SQ2Micro allows for even better performance than its predecessor, the SQMicro.

The SQ2Micro provides excellent repeatability, stability, and sensitivity. It shows extraordinary response to step function changes. The outstanding low particle counts of the other SQ’s are duplicated in the SQ2Micro.

The SQ2Micro’s miniature size allows for precise process gas regulation without increasing the size of the tool gas box.

**features**

- Standard Hastelloy C-22® Poppet and Diaphragm.
- Miniature footprint, internal volume, and surface area.
- Dimensions are interchangeable with Veriflo Division Quantum valves.
- No springs or threads are exposed to the wetted area.
- Standard full internal electropolish.

**materials of construction**

**Wetted**

Body .............. “VeriClean”, Veriflo’s high purity type 316L Stainless Steel®, Hastelloy C-22®
Seat .................. PCTFE, optional Vespel®
Diaphragm .................. Hastelloy C-22®
Poppet .................. Hastelloy C-22®
Compression Member ........ “VeriClean”, Veriflo’s high purity type 316L Stainless Steel, optional Hastelloy C-22®

**Non-Wetted**

Cap .................. Nickel Plated Brass
Adjusting screw ............. 416 Stainless Steel
Knob (Blue) .................. ABS Plastic

**operating conditions**

- Maximum inlet pressure ........ 250 psig (17 barg)
- Outlet pressure ................. 10 psia to 60 psig (500 torr to 4 barg)
- Temperature .............. -40°F to 150°F (-40°C to 66°C)

**surface finishes**

Standard Ra .................. 5 micro inch (.13 micro meter) or less

**functional performance**

- Design proof pressure ........ 375 psig (26 barg)
- Design burst pressure ........ 750 psig (52 barg)
- Flow capacity .................. Cv 0.06 (SEMI Flow Coefficient Test #F-32-0998)

- Design Leak Rate:
  - Across Seat .................. 5 x 10^{-8} cc/sec He
  - Inboard .................. 2 x 10^{-10} cc/sec He
  - Outboard .................. 2 x 10^{-9} cc/sec He

**internal volume**

2.56 cc

**standard connections**

Any combination of FS male and/or female fittings.

1/4” Gland to gland length ............. 2.78 ± .02 in. (70.6 ± .05 mm)

1/4” tube stubs inlet and outlet available

End to end length ............. 2.25 ± .03 in. (57.1 ± .05 mm)

**approximate weight**

0.9 lbs. (0.42 kgm)
Dimensional Drawing

All dimensions are reference and nominal.

SQ2Micro

SQ2Micro “A”

Flow Curves

SQ2Micro Flow Curve

Ordering Information

SQ2MICRO30 2P FSMF TH

BASIC SERIES
SQ2MICRO30 = 0-30 psig
SQ2MICRO60 = 0-60 psig

MATERIAL
= 316L Stainless Steel (standard)
H = Hastelloy C-22®

PORTING
2P = 2 Ports
3P = 3 Ports
* Recommended for (N₂O) Service
** Note: (I) = Internal Face Seal
† Recommended for Carbon Monoxide (CO)
or Nickel Carbonyl Ni(CO)₄ Service

Hastelloy C-22® is a registered trademark of Haynes International, Inc.
Vespel® is a registered trademark of DuPont

OPTIONAL FEATURES
A = “A” Style Body
SS = Stainless Steel Internals †
TH = Hastelloy C-22® Trim (Compression Member)
VESPE = Vespel® Seat*

CONNECTIONS
FSMM = 1/4” Face Seal Male In and Out
FSFF = 1/4” Face Seal Female In and Out
FSFM = 1/4” Face Seal Female In Male Out
FSMF = 1/4” Face Seal Male In Female Out
TS = 1/4” Tube Stub

FOR "A" STYLE ONLY:
FSMIM = 1/4” Face Seal Male In and Out**
FSFIF = 1/4” Face Seal Female In and Out**
FSFIM = 1/4” Face Seal Female In Male Out**
FSMIF = 1/4” Face Seal Male In Female Out**
Parker Hannifin Corporation’s Veriflo Division presents the SQ2Micro130E. The SQ2Micro regulator design is based on the process proven SQMicro Series. The SQ2Micro130E incorporates a new poppet and seat allowing increased flow capacity of 100 slpm.

This is an increase from the standard SQMicro (0-3 slpm) and the SQMicroHF (0-30 slpm).

Space savings are apparent both in regulator face-seal to face-seal dimensions and body width, which allows closer spacing of components and process lines. In a state-of-the-art gas box, where the SQMicro is intermixed with Veriflo Quantum 1/4 inch valves and mass flow controllers, maximum gas box density is permitted without sacrificing performance or field serviceability.

**features**

- Standard Hastelloy C-22® Poppet and Diaphragm.
- Minimized footprint, internal volume, and surface area.
- Delivers most of the outstanding performance of the SQ60, despite the size reduction.
- Dimensions are interchangeable with Veriflo Division Quantum valves.
- No springs or threads are exposed to the wetted area.
- Standard full internal electropolish.

**materials of construction**

**Wetted**

Body: “VeriClean”, Veriflo’s high purity type 316L VAR Stainless Steel™, Hastelloy C-22®

Seat: PCTFE, optional Vespel®

Diaphragm: Hastelloy C-22®

Poppet: Hastelloy C-22®

Compression member: “VeriClean”, Veriflo’s high purity type 316L VAR Stainless Steel™, optional Hastelloy C-22®

**Non-Wetted**

Cap: Nickel Plated Brass

Adjusting screw: 416 Stainless Steel

Knob (Black): ABS Plastic

**operating conditions**

- Maximum inlet pressure: 250 psig (10 barg)
- Outlet pressure: 10 in Hg to 60 psig (250 torr) to (4 barg)
- Temperature: -40°F to 150°F (-40°C to 66°C)

**surface finishes**

Standard Ra: 5 micro inch (.13 micro meter) or less

**functional performance**

- Design proof pressure: 375 psig (26 barg)
- Design burst pressure: 750 psig (52 barg)
- Flow capacity: Cv 0.15 (SEMI Flow Coefficient Test #F-32-0998)

Design Leak Rate:

- Across Seat: 5 x 10^-8 scc/sec He
- Inboard: 2 x 10^-10 scc/sec He
- Outboard: 2 x 10^-9 scc/sec He

**internal volume**

4.21 cc

**standard connections**

- Any combination of FS male and/or female fittings.
- 1/4” Gland to gland length: 2.78 ± .02 in. (70.6 ± 0.5 mm)
- 1/4” tube stubs inlet and outlet available.
- End to end length: 2.25 ± .03 in. (57.1 ± 0.5 mm)

**approximate weight**

0.9 lbs. (0.42 kgm)
**SQ2Micro130E**

### Dimensional Drawing

All dimensions are reference and nominal.

![Dimensional Drawing](image)

### Flow Curves

Inlet Pressure: 90 psig

![Flow Curves](image)

### Ordering Information

<table>
<thead>
<tr>
<th>SQ2MICRO130E30</th>
<th>2P</th>
<th>FSMF</th>
<th>TH</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BASIC SERIES</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SQ2MICRO130E30 = 0 - 30 psig</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SQ2MICRO130E60 = 0 - 60 psig</td>
<td></td>
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</tr>
<tr>
<td><strong>MATERIAL</strong></td>
<td></td>
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<tr>
<td>= 316L VAR Stainless Steel (Standard)</td>
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</tr>
<tr>
<td>H = Hastelloy C-22®</td>
<td></td>
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<td></td>
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<tr>
<td><strong>PORTING</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2P = 2 Ports</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3P = 3 Ports</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>* Recommended for Nitrous Oxide (N₂O) Service</td>
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<tr>
<td>** Note: (I) = Internal Face Seal</td>
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<td></td>
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<tr>
<td>† Recommended for Carbon Monoxide (CO) or Nickel Carbonyl Ni(CO)₄ Service</td>
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</tr>
</tbody>
</table>

**OPTIONS**

A = "A" Style Body

SS = Stainless Steel Internals †

TH = Hastelloy C-22® Trim (Compression Member)

VES = Vespel® Seat*

**CONNECTIONS**

FSMM = 1/4" Face Seal Male In and Out

FSFF = 1/4" Face Seal Female In and Out

FSFM = 1/4" Face Seal Female In Male Out

FSMF = 1/4" Face Seal Male In Female Out

TS = 1/4" Tube Stub

**FOR "A" STYLE ONLY:**

FSMIM = 1/4" Face Seal Male In and Out**

FSFIF = 1/4" Face Seal Female In and Out**

FSFIM = 1/4" Face Seal Female In Male Out**

FSMIF = 1/4" Face Seal Male In Female Out**

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Vespel® is a registered trademark of DuPont Company.
Parker Hannifin Corporation’s Veriflo Division presents the SQ130E. This regulator is a high flow, springless and threadless, point-of-use regulator designed to be used in process gas cabinets for gas companies, equipment manufacturers, and end users. The SQ130E has a $C_v$ four times greater (.2 $C_v$) than the process proven SQ60, from which the SQ130E was developed.

The SQ130E provides precise control of process gas pressure at or near the tool for flow rates of up to 300 slpm at 200 psig inlet. The result is a stable flow and pressure to the mass flow controller.

**features**

- Increased flow capacity
- Standard Hastelloy C-22® Poppet and Diaphragm.
- Tied-diaphragm for added safety.
- Hurricane cleaning for “near-absolute” contamination control.
- Metal-to-metal, diaphragm-to-body seal.
- No springs or threads are exposed to the wetted area.

**materials of construction**

**Wetted**

- Body: “VeriClean”, Veriflo’s high purity type 316L Stainless Steel™, Hastelloy C-22®
- Seat: PCTFE, optional Vespel®
- Diaphragm: Hastelloy C-22®
- Poppet: Hastelloy C-22®
- Compression Membrane: “VeriClean”, Veriflo’s high purity type 316L Stainless Steel™, optional Hastelloy C-22®

**Non-Wetted**

- Cap: Brass, Nickel Plated
- Nut: 316L Stainless Steel
- Knob (Blue): ABS Plastic

**operating conditions**

- Maximum inlet pressure: 1000 psig (70 barg)
- Outlet pressure: 0-30 psig (2 barg)
- Temperature: -40°F to 150°F (-40°C to 66°C)

**surface finishes**

- Standard Ra: 10 micro inch (.25 micro meter) or less
- Optional Ra: EV = 5 micro inch (.13 micro meter) or less

**functional performance**

- Design proof pressure: 1300 psig (89.7 barg)
- Design burst pressure: 3000 psig (207 barg)
- Flow Capacity: $C_v$ 0.2 (SEMI Flow Coefficient Test #F-32-0998)

- Design Leak Rate:
  - Across Seat: $5 \times 10^{-8}$ scc/sec He
  - Inboard: $2 \times 10^{-10}$ scc/sec He
  - Outboard: $2 \times 10^{-9}$ scc/sec He

**internal volume**

- 6.19 cc

**standard connections**

- Any combination of FS male and/or female fittings:
  - 1/4” Gland to gland length: $3.7 \pm 0.02$ in. (94.0 ± 0.5 mm)
- 1/4” tube stubs inlet and outlet available
- End to end length: $3.7 \pm 0.03$ (94.0 ± 0.8 mm)

**approximate weight**

- 1.5 lbs. (.7 kg)
SQ130E

**Dimensional Drawing**

All dimensions are reference and nominal.

**Flow Curves**

SQ130E100

Inlet Pressure = 250 psig

**Porting Configurations**

**Ordering Information**

**Basic Series**

SQ130E

**Pressure Setting**

30 = 30 psig
50 = 50 psig
100 = 100 psig

**Material**

= 316L Stainless Steel (standard)
H = Hastelloy C-22®

**Porting**

2P = 2 Ports
3P = 3 Ports
4P = 4 Ports

**Outlet Gauge**

V3 = 30 in. Hg-0 - 30 psig
L = 30 in. Hg-0 - 60 psig
V1 = 30 in. Hg-0 - 100 psig
X = No Gauge

*Recommended for Nitrous Oxide (N₂O) Service
†Recommended for Carbon Monoxide (CO) or Nickel Carbonyl Ni(CO)₄ Service

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Vespel® is a registered trademark of DuPont Company.

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Parker Hannifin Corporation’s Veriflo Division presents the SQ140E. The SQ140E was developed in response to the need for high performance point-of-use regulators for modern semiconductor processing. It was designed from scratch with no preconceptions or ties to older high pressure designs.

Precise control of gas pressure at or near the tool served, makes possible stable process control by a mass flow controller. The resulting accurate delivery from the mass flow controller goes right to the bottom line in process repeatability.

**High Purity Regulators**

**SQ140E**

**High Performance Point-Of-Use Regulator**

- **features**
  - Standard Hastelloy C-22® Poppet and Diaphragm.
  - High flow capacity with minimal pressure drop and low supply pressure.
  - Tied-diaphragm for added safety.
  - Capable of operating at a wide range of flows from 0.1 cc/min to 100 liters/min with only 5 psig pressure drop.
  - Design and materials of construction ensure compatibility with the high flow of corrosive gases.
  - No springs or threads are exposed to the wetted area.

- **materials of construction**
  - **Wetted**
    - Body: “VeriClean”, Veriflo’s high purity type 316L VAR Stainless Steel®, Hastelloy C-22®
    - Seat: PCTFE, optional Vespel®
    - Diaphragm: Hastelloy C-22®
    - Poppet: Hastelloy C-22®
    - Compression Member: “VeriClean”, Veriflo’s high purity type 316L VAR Stainless Steel, optional Hastelloy C-22®
  - **Non-Wetted**
    - Cap: Nickel Plated Brass
    - Nut: Nickel Plated Brass
    - Knob (Blue): ABS Plastic

- **operating conditions**
  - Maximum inlet pressure: 250 psig (17 barg) optional 750 psig (52 barg)
  - Outlet pressure: 0-30 psig (2 barg), 0-50 psig (3 barg), 0-100 psig (7 barg)
  - Temperature: -40°F to 150°F (-40°C to 66°C)

- **surface finishes**
  - Standard Ra: 10 micro inch (.25 micro meter) or less
  - Optional Ra: EV=5 micro inch (.13 micro meter) or less

- **functional performance**
  - Design proof pressure: 375 psig (26 barg)
  - Design burst pressure: 750 psig (52 barg)
  - Flow capacity: Cv = 25 (SEMI Flow Coefficient Test #F-32-0998)
  - Design Leak Rate:
    - Across Seat: 5 x 10^-8 scc/sec He
    - Inboard: 2 x 10^-9 scc/sec He
    - Outboard: 2 x 10^-9 scc/sec He

- **internal volume**
  - 19.02 cc

- **standard connections**
  - Any combination of FS male and/or female fittings:
    - 1/4” Gland to gland length: 4.64 ± .02 in. (117.9 ± .5 mm)
    - 1/2” Gland to gland length: 5.59 ± .02 in. (142 mm ± .5 mm)

- **approximate weight**
  - 4 lbs 10 oz. (2.1 kg)
**SQ140E**

### Dimensional Drawing

All dimensions are reference and nominal.

![Dimensional Drawing](image)

- **Ø 3.00** (76.2 mm)
- **Ø 2.75** (69.9 mm)
- **Ø 2.54** (64.5 mm)
- **6.12** (155 mm)
- **2.54** (64.5 mm)
- **1.00** (25.4 mm)
- **.69** (17.5 mm)
- **5.59** (142 mm)

### Flow Curves

**SQ140E**
- **Inlet Pressure 250 psig**
- **Outlet Pressure (psig)**
- **N₂ Flow (LPM)**

**SQ140E**
- **Inlet Pressure 80 psig**
- **Outlet Pressure (psig)**
- **N₂ Flow (LPM)**

### End to End Dimensional Chart

1/4" FS 4.64" (117.9 mm)
1/2" FS 5.59" (142 mm)
1/2" TS 4.64" (117.9 mm)

### Ordering Information

**SQ140E 30  4P  V3  V1 FS MMF PM**

**BASIC SERIES**
- SQ140E

**PRESSURE SETTING**
- 30 = 30 psig
- 50 = 50 psig
- 100 = 100 psig

**MATERIAL**
- = 316L VAR Stainless Steel (standard)
- H = Hastelloy C-22®

**PORTING**
- 2P = 2 Ports
- 3P = 3 Ports
- 4P = 4 Ports

**OUTLET GAUGE**
- V3 = -30 in. Hg-0 - 30 psig
- L = -30 in. Hg-0 - 60 psig
- V1 = -30 in. Hg-0 - 100 psig
- X = No Gauge

**OPTIONAL FEATURES**
- PM = Panel Mount
- SS = Stainless Steel Internals†
- TH = Hastelloy C-22® Trim (Compression member)
- VESP = Vespel® Seat*
- 750 = 750 psig Max Inlet

**PORT CONFIGURATION**
- M = Male
- F = Female
- I = Internal Female Face Seal (1/4" Only)

**PORT STYLE**
- FS = 1/4" Face Seal
- FS8 = 1/2" Face Seal
- TS = 1/4" Tube Stubs
- TS6 = 3/8" Tube Stubs

**INLET GAUGE**
- V1 = -30 in. Hg-0 - 100 psig
- 2 = 0 - 200 psig
- 10 = 0 - 1000 psig
- X = No Gauge

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*Recommended for Nitrous Oxide (N₂O) Service
d†Recommended for Carbon Monoxide (CO) or Nickel Carbonyl Ni(CO)₄ Service

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**HIGH PURITY REGULATORS**

11
Parker Hannifin Corporation’s Veriflo Division presents the SQ420E. The SQ Series was developed in response to the need for high performance point-of-use regulators for modern semiconductor processing. The SQ’s were designed from scratch, with no preconceptions, no ties to older high-purity designs.

Precise control of the gas discharge pressure at or near the tool served, makes possible stable process control by a mass flow controller. The resulting accurate delivery from the mass flow controller goes right to the bottom line in process repeatability.

**features**
- Standard Hastelloy C-22® Poppet and Diaphragm.
- High flow capacity with minimal pressure drop, and low supply pressure.
- Tied-diaphragm for added safety.
- Hurricane cleaning for “near absolute” contamination control.
- Capable of operating at a wide range of flows from 0.5 cc/min to more than 800 liters/min.
- Design and materials of construction ensure compatibility with high flowing corrosive gases.
- No springs or threads are exposed to the wetted area.

**materials of construction**

**Wetted**
- Body: “VeriClean”, Veriflo’s high purity type 316L VAR Stainless Steel®, Hastelloy C-22®
- Seat: PCTFE, optional Vespel®
- Diaphragm: Hastelloy C-22®
- Poppet: Hastelloy C-22®
- Compression Member: “VeriClean”, Veriflo’s high purity type 316L VAR Stainless Steel®, optional Hastelloy C-22®

**Non-Wetted**
- Cap: Nickel Plated Brass
- Nut: Nickel Plated Brass
- Knob (Blue): ABS Plastic

**operating conditions**
- Maximum inlet pressure: 250 psig (17.2 barg)
- Outlet pressure: 0-30 psig (2 barg) adjustable, 0-50 psig (3 barg) adjustable, 0-100 psig (7 barg) adjustable
- Temperature: -40°F to 150°F (-40°C to 66°C)

**surface finishes**
- Standard Ra: 10 micro inch (.25 micro meter) or less
- Optional Ra: EV=5 micro inch (.13 micro meter) or less

**functional performance**
- Design proof pressure: 375 psig (26 barg)
- Design burst pressure: 750 psig (52 barg)
- Flow Capacity: Cv 1.5 (SEMI Flow Coefficient Test #F-32-0998)
- Design Leak Rate:
  - Across Seat: 5 x 10⁻⁸ scc/sec He
  - Inboard: 2 x 10⁻¹⁰ scc/sec He
  - Outboard: 2 x 10⁻¹⁰ scc/sec He

**internal volume**
- 22.32 cc

**standard connections**
- Any combination of FS male and/or female fittings:
  - 1/4” Gland to gland length: 4.64 ± 0.02 in. (117.9 ± 0.5 mm)
  - 1/2” Gland to gland length: 5.59 ± 0.02 in. (142 mm ± 0.5 mm)

**approximate weight**
- 4 lbs 10 oz. (2.1 kg)
SQ420E

**Dimensional Drawing**

All dimensions are reference and nominal.

- **1.80** (45.7 mm) HOLE REQUIRED FOR PANEL MOUNTING
- **1.00** (25.4 mm) 10-32 UNF 2 PLACES
- **.69** (17.5 mm)

**End to End Dimensional Chart**

<table>
<thead>
<tr>
<th>Porting Style</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/4&quot; FS</td>
<td>4.64&quot;  (117.9 mm)</td>
</tr>
<tr>
<td>1/2&quot; FS</td>
<td>5.59&quot;  (142 mm)</td>
</tr>
<tr>
<td>1/2&quot; TS</td>
<td>4.64&quot;  (117.9 mm)</td>
</tr>
</tbody>
</table>

**Flow Curves**

**Inlet Pressure 250 (psig)**

**Porting Configurations**

2 PORT 3 PORT 4 PORT

**Ordering Information**

**BASIC SERIES**

SQ420E 30 4P V3 V1 FS FM MM PM

**PRESSURE SETTING**

- 30 = 30 psig
- 50 = 50 psig
- 100 = 100 psig

**MATERIAL**

- 316L VAR Stainless Steel (standard)
- H = Hastelloy C-22®

**PORTING**

- 2P = 2 Ports
- 3P = 3 Ports
- 4P = 4 Ports

**OUTLET GAUGE**

- V3 = -30 in. Hg- 0 - 30 psig
- L = -30 in. Hg- 0 - 60 psig
- V1 = -30 in. Hg- 0 - 100 psig
- X = No Gauge

**OPTIONAL FEATURES**

- PM = Panel Mount
- TH = Hastelloy C-22® Trim (Compression Member)
- VESP = Vespel® Seat*
- SS = Stainless Steel Internals**

**PORT CONFIGURATION**

- M = Male
- F = Female
- I = Internal Female Face Seal (1/4" Only)

**PORT STYLE**

- FS = 1/4" Face Seal
- FS8 = 1/2" Face Seal
- TS = 1/4" Tube Stubs
- TS6 = 3/8" Tube Stubs

**INLET GAUGE**

- V1 = -30 in. Hg- 0 - 100 psig
- 2 = 0 - 200 psig
- 4 = 0 - 400 psig
- X = No Gauge

* Recommended for Nitrous Oxide (N₂O) Service
** Recommended for Carbon Monoxide (CO) or Nickel Carbonyl Ni(CO)₄ Service

Hastelloy C-22® is a registered trademark of Haynes International, Inc.
Vespel® is a registered trademark of DuPont Company.
Parker Hannifin Corporation’s Veriflo Division presents the SQB series regulators. The SQB Series was designed specifically for bulk specialty gas delivery systems. The design incorporates all the benefits of the SQ Series regulators while giving the benefit of higher pressures.

These higher pressures become important when dealing with media that condenses easily. The higher pressure rating can be used to bring the pressure down allowing heat to be added back into the system and thus, maintaining a superheated vapor.

Caution: This regulator is intended for bulk delivery systems and not for systems that require frequent bottle changeouts.

## Features

- Standard Hastelloy C-22® Poppet and Diaphragm.
- High flow capacity with minimal pressure, drop, and low supply pressure.
- Tied-diaphragm for added safety.
- Hurricane cleaning for “near absolute” contamination control.
- Capable of operating at a wide range of flows from 5 liters/min to more than 1000 liters/min.
- Design and materials of construction ensure compatibility with high flowing corrosive gases.
- No springs or threads are exposed to the wetted area.

## Materials of Construction

### Wetted

- **Body**: “VeriClean”, Veriflo’s high purity type 316L VAR Stainless Steel®, Hastelloy C-22®
- **Seat**: PCTFE, optional Vespel®
- **Diaphragm**: Hastelloy C-22®
- **Poppet**: Hastelloy C-22®
- **Compression Member**: “VeriClean”, Veriflo’s high purity type 316L VAR Stainless Steel®, Hastelloy C-22®

### Non-Wetted

- **Cap**: Nickel Plated Brass
- **Nut**: Nickel Plated Brass
- **Knob (Blue)**: ABS Plastic

## Operating Conditions

- **Maximum Inlet Pressure**: 1250 psig (86 barg)
- **Outlet Pressure**: 5-100 psig (.3-7 barg)
- **5-200 psig (.3-14 barg)
- **5-300 psig (.3-21 barg)
- **Temperature**: -40°F to 150°F (-40°C to 66°C)

## Surface Finishes

- **Standard Ra**: 10 micro inch (.25 micro meter) or less
- **Optional Ra**: EV=5 micro inch (.13 micro meter) or less

## Functional Performance

- **Design Proof Pressure**: 1875 psig (129 barg)
- **Design Burst Pressure**: 3750 psig (259 barg)
- **Flow Capacity**: 
  - **Cv** (SQB200) = .65
  - **Cv** (SQB420) = 1.0
- **Design Leak Rate**:
  - **Across Seat**: 5 x 10⁻⁸ scc/sec He
  - **Inboard**: 2 x 10⁻¹⁰ scc/sec He
  - **Outboard**: 2 x 10⁻⁹ scc/sec He

## Standard Connections

Any combination of FS male and/or female fittings:
- **1/4” Gland to gland length**: 4.64 ± .02 in. (117.9 ± .5 mm)
- **1/2” Gland to gland length**: 5.59 ± .02 in. (142 mm ± .5 mm)

## Internal Volume

22.32cc

## Approximate Weight

4 lbs 10 oz. (2.1 kgs)
SQB Series

Dimensional Drawing
All dimensions are reference and nominal.

End to End Dimensional Chart

<table>
<thead>
<tr>
<th>Porting Style</th>
<th>Dimension (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2&quot; FS</td>
<td>5.60&quot; (142)</td>
</tr>
<tr>
<td>3/4&quot; FS</td>
<td>6.34&quot; (161)</td>
</tr>
<tr>
<td>1.0&quot; FS</td>
<td>8.25&quot; (210)</td>
</tr>
<tr>
<td>1/2&quot; TS</td>
<td>4.75&quot; (121)</td>
</tr>
<tr>
<td>3/4&quot; TS</td>
<td>4.75&quot; (121)</td>
</tr>
<tr>
<td>1.0&quot; TS</td>
<td>5.60&quot; (142)</td>
</tr>
</tbody>
</table>

Hole Required In Panel For Mounting

Ø1.80 (45.7 mm)

0.69 (17.5 mm)

3.00 (76.2 mm)

5.99 (149.6 mm)

2.54 (64.5 mm)

1.00 (25.4 mm)

Porting Configurations

2 PORT

3 PORT

4 PORT

Ordering Information

SQB420E 100 4P 01 20 FS8 MMMF PM

BASIC SERIES
SQB420E

PRESSURE SETTING
100 = 5 to 100 psig
200 = 5 to 200 psig
300 = 5 to 300 psig

MATERIAL
= 316L Stainless Steel
H = Hastelloy C-22®

PORTING
2P = 2 Ports
3P = 3 Ports
4P = 4 Ports

OUTLET GAUGE
01 = 0 - 100 psig
2 = 0 - 200 psig
4 = 0 - 400 psig
X = No Gauge

OPTIONAL FEATURES
PM = Panel Mount
TH = Hastelloy C-22® Trim (Compression Member)
VES = Vespe® Seat*
SS = Stainless Steel Internals**

PORT CONFIGURATION
M = Male
F = Female
I = Internal Female Face Seal (1/4" Only)

PORT STYLE
FS8 = 1/2 Inch Face Seal
FS12 = 3/4 Inch Face Seal
TS6 = 3/8 Inch Tube Stubs
TS8 = 1/2 Inch Tube Stubs
TS12 = 3/4 Inch Tube Stubs

INLET GAUGE
10 = 0 - 1000 psig
20 = 0 - 2000 psig
X = No Gauge

Hastelloy C-22® is a registered trademark of Haynes International, Inc.
Vespe® is a registered trademark of DuPont Company.

* Recommended for Nitrous Oxide (N2O) Service
** Recommended for Carbon Monoxide (CO) or Nickel Carbonyl Ni(CO)4 Service

Flow Curves

SQB420E300

Outlet Pressure (psig)

N2 Flow (slpm)

Hastelloy C-22® is a registered trademark of Haynes International, Inc.
Vespe® is a registered trademark of DuPont Company.
Parker Hannifin Corporation’s Veriflo Division presents the SQ60 which was developed in response to the need for high-performance point-of-use regulators for modern semiconductor manufacturing. It is a springless, threadless, point-of-use regulator designed for process gas cabinets for gas companies, equipment manufacturers, and end users. The SQ60 provides precise control of the process gas pressure at or near the tool up to 5 slpm. The result is a stable flow and pressure to the mass flow controller.

**features**

- Standard Hastelloy C-22® Poppet and Diaphragm.
- Tied-diaphragm for added safety.
- "Hurricane" cleaning for "near absolute" contamination control.
- Capable of operating at a range of flows from 0.1 cc/min to 5 slpm.
- Metal-to-metal, diaphragm-to-body seal assures high leak integrity.
- No springs or threads are exposed to the wetted area.

**materials of construction**

**Wetted**

- Body: "VeriClean", Veriflo’s high purity type 316L VAR Stainless Steel™, Hastelloy C-22®
- Seat: PCTFE, optional Vespel®
- Diaphragm: Hastelloy C-22®
- Poppet: Hastelloy C-22®
- Compression Member: "VeriClean", Veriflo’s high purity type 316L Stainless Steel™, optional Hastelloy C-22®

**Non-Wetted**

- Cap: Brass, Nickel Plated
- Nut: Brass, Nickel Plated
- Knob (Blue): ABS Plastic

**operating conditions**

- Maximum inlet pressure: 250 psig (17 barg)
- Outlet pressure:
  - 0-30 psig (2 barg)
  - 0-50 psig (3 barg), 0-100 psig (7 barg)
- Temperature: -40°F to 150°F (-40°C to 66°C)

**surface finishes**

- Standard Ra: 10 micro inch (.25 micro meter) or less
- Optional Ra: EV=5 micro inch (.13 micro meter) or less

**functional performance**

- Design proof pressure: 375 psig (26 barg)
- Design burst pressure: 750 psig (52 barg)
- Flow capacity: CV = .054 (SEMI Flow Coeffient Test #F32-0998)

- Design Leak Rate:
  - Across Seat: 5 x 10^-8 scc/sec He
  - Inboard: 2 x 10^-10 scc/sec He
  - Outboard: 2 x 10^-9 scc/sec He

**internal volume**

- 6.35 cc

**standard connections**

- Any combination of FS male and/or female fittings:
  - 1/4” Gland to gland length: 3.7 ± .02 in. (94 ± .5 mm)
  - 1/4” tube stubs inlet and outlet available:
    - End to end length: 3.7 ± .02 (94 ± .5 mm)

**approximate weight**

- 4 lbs 10 oz. (2.1 kgs)
SQ60

**Dimensional Drawing**

All dimensions are reference and nominal.

---

**Flow Curves**

**Inlet Pressure: 30 psig**

---

**Porting Configurations**

---

**Ordering Information**

---

**BASIC SERIES**

SQ60

**PRESSURE SETTING**

<table>
<thead>
<tr>
<th>Value</th>
<th>Pressure (psig)</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

**MATERIAL**

- 316L VAR Stainless Steel (standard)
- H = Hastelloy C-22®

**PORTING**

- 2P = 2 Ports
- 3P = 3 Ports
- 4P = 4 Ports

**OUTLET GAUGE**

- V3 = -30 in. Hg - 0 - 30 psig
- L = -30 in. Hg - 0 - 60 psig
- V1 = -30 in. Hg - 0 - 100 psig
- X = No Gauge

---

**OPTIONAL FEATURES**

<table>
<thead>
<tr>
<th>Code</th>
<th>Feature</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM</td>
<td>Panel Mount</td>
</tr>
<tr>
<td>SS</td>
<td>Stainless Steel Internals**</td>
</tr>
<tr>
<td>TH</td>
<td>Hastelloy C-22® Trim (Compression Member)</td>
</tr>
<tr>
<td>VESP</td>
<td>Vespe® Seat*</td>
</tr>
<tr>
<td>3.4</td>
<td>3.4&quot; Optional End-To-End Dimension</td>
</tr>
</tbody>
</table>

**PORT CONFIGURATION**

- M = Male
- F = Female
- I = Internal Female Face Seal (1/4" Only)

**PORT STYLE**

- FS = 1/4" Face Seal
- FS8 = 1/2" Face Seal
- TS = 1/4" Tube Stubs
- TS6 = 3/8" Tube Stubs

**INLET GAUGE**

- V1 = -30 - 0 - 100 psig
- 2 = 0 - 200 psig
- 4 = 0 - 400 psig
- X = No Gauge

---

* Recommended for Nitrous Oxide (N₂O) Service
** Recommended for Carbon Monoxide (CO) or Nickel Carbonyl (Ni(CO)₄) Service

Hastelloy C-22® is a registered trademark of Haynes International, Inc.

Vespel® is a registered trademark of DuPont Company.
Parker Hannifin Corporation’s Veriflo Division presents the SQ60SA. This regulator was developed in response to the need for high performance point-of-use pressure regulator in the sub-atmospheric range. The SQ60SA was designed as a special modification of the popular SQ60, which revolutionized low flow point-of-use regulation.

Precise control of the gas pressure to the process tool makes stable process control by a mass flow controller possible. The resulting accurate delivery from the mass flow controller goes right to the bottom line in process repeatability.

### SQ60SA High Performance Point-Of-Use Regulator

#### features
- Sub-atmospheric pressure control.
- Fail safe seat with “tied-diaphragm” construction.
- Hurricane cleaning for “near-absolute” contamination control.
- Capable of operating at 5 scc/min up to 5 lpm.
- Design and materials of construction ensure compatibility with corrosive gases.
- Metal to metal seal to atmosphere.
- No wetted spring.
- Standard full internal electropolish.

#### materials of construction

**Wetted**
- Body: “VeriClean”, Veriflo’s high purity type 316L VAR Stainless Steel®, Hastelloy C-22®
- Seat: PCTFE, optional Vespel®
- Diaphragm: Hastelloy C-22®
- Poppet: Hastelloy C-22®
- Compression Member: “VeriClean”, Veriflo’s high purity type 316L Stainless Steel®, optional Hastelloy C-22®

**Non-Wetted**
- Cap: Brass Nickel Plated
- Nut: 316L Stainless Steel
- Knob (White): ABS Plastic

#### operating conditions
- Maximum Inlet pressure: 250 psig (17 barg)
- Outlet pressure: -25 in Hg to 15 psig (1 barg)
- Temperature: -40ºF to 150ºF (-40ºC to 66ºC)

#### surface finishes
- Standard Ra: 10 micro inch (.25 micro meter) or less
- Optional Ra: EV=5 micro inch (.13 micro meter) or less

#### functional performance
- Design proof pressure: 375 psig (26 barg)
- Design burst pressure: 750 psig (52 barg)
- Flow Capacity: Cv 0.15
  - (SEMI Flow Coefficient Test #F-32-0998)

#### Design Leak Rate:
- Across Seat: 5 x 10^-6 cc/sec He
- Inboard: 2 x 10^-10 cc/sec He
- Outboard: 2 x 10^-9 cc/sec He

#### internal volume
- 6.35 cc

#### standard connections
- Any combination of FS male and/or female fittings.
- 1/4 inch Gland to gland length: 3.70 ± 0.02 in. (94 ± 0.5 mm)
- 1/4 inch tube stubs inlet and outlet available.
- End to end length: 3.70 ± 0.02 in. (94 ± 0.5 mm)

#### approximate weight
- 1.5 lbs (7kgs)
**Dimensional Drawing**

All dimensions are reference and nominal.

```
<table>
<thead>
<tr>
<th>Dimension</th>
<th>Value (in mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ø2.18</td>
<td>55.4</td>
</tr>
<tr>
<td>Ø1.56</td>
<td>39.6</td>
</tr>
<tr>
<td>.69</td>
<td>17.5</td>
</tr>
<tr>
<td>1.88</td>
<td>47.6</td>
</tr>
<tr>
<td>3.70</td>
<td>94</td>
</tr>
<tr>
<td>.88</td>
<td>22.2</td>
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<tr>
<td>2.02</td>
<td>51.3</td>
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<td>.40</td>
<td>10.1</td>
</tr>
<tr>
<td>1.38</td>
<td>35.1</td>
</tr>
</tbody>
</table>
```

**Flow Curves**

```
<table>
<thead>
<tr>
<th>Inlet Pressure (psig)</th>
<th>Outlet Pressure (Torr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000</td>
<td>800</td>
</tr>
<tr>
<td>900</td>
<td>700</td>
</tr>
<tr>
<td>800</td>
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<td>500</td>
<td>300</td>
</tr>
<tr>
<td>400</td>
<td>200</td>
</tr>
<tr>
<td>300</td>
<td>100</td>
</tr>
</tbody>
</table>
```

**Porting Configurations**

```
Port Style  | Configuration |
-----------|---------------|
LP         | HP            |
HP         | LP            |
```

**Ordering Information**

```
<table>
<thead>
<tr>
<th>Series</th>
<th>Model</th>
<th>Porting Configurations</th>
</tr>
</thead>
<tbody>
<tr>
<td>SQ60SA</td>
<td>4P</td>
<td>2 PORT</td>
</tr>
</tbody>
</table>
```

**Optional Features**

- PM = Panel Mount
- SS = Stainless Steel Internals
- TH = Hastelloy C-22® Trim (Compression Member)
- VESP = Vespel® Seat
- 3.4 = 3.4" Optional End-To-End Dimension

**Port Configuration**

- M = Male
- F = Female
- I = Internal Face Seal Female (1/4" Only)

**Port Style**

- FS = 1/4" Face Seal
- FS8 = 1/2" Face Seal
- TS = 1/4" Tube Stub
- TS6 = 3/8" Tube Stub

**Inlet Gauge**

- L = 30 in. Hg- 0 - 60 psig
- V1 = 30 in. Hg- 0 - 100 psig
- X = No Gauge

---

Hastelloy C-22® is a registered trademark of Haynes International, Inc.
Vespel® is a registered trademark of DuPont Company.

*Recommended for Nitrous Oxide (N₂O) Service
†Recommended for Carbon Monoxide (CO) or Nickel Carbonyl Ni(CO)₄ Service
Parker Hannifin Corporation’s Veriflo Division presents the SQHP. This high purity regulator is a continuation of Veriflo’s process-proven SQ line of regulators. A high pressure version of the high-purity SQ60 point-of-use regulator, the SQHP was designed for state-of-the-art semiconductor applications.

features

- Standard Hastelloy C-22º Poppet and Diaphragm.
- “VeriClean”, Veriflo’s low sulfur high purity 316L VAR Stainless Steel™, which enhances electropolishing, surface resistance, and corrosion resistance.
- Provides precise pressure control of outlet pressure with an inlet pressure as high as 3,500 psig.
- No high pressure seals to atmosphere.
- Unique patented compression member loads the seal to the body without requiring a threaded nozzle or additional seals to atmosphere.
- Tied diaphragm for added safety.
- Metal-to-metal diaphragm-to-body seal assures high leak integrity.
- 100% Helium leak tested.

materials of construction

Wetted
- Body .............. “VeriClean”, Veriflo’s high purity type 316L VAR Stainless Steel™, Hastelloy C-22º
- Seat ............... PCTFE, optional Vespel®
- Diaphragm ............ Hastelloy C-22º
- Poppet. .............. Hastelloy C-22º
- Compression Member . “VeriClean”, Veriflo’s high purity type 316L VAR Stainless Steel™, optional Hastelloy C-22º

Non-Wetted
- Nut . . . . . . . . . . . . 316L Stainless Steel
- Cap . . . . . . . . . . . . Nickel Plated Brass
- Knob (Red) . . . . . . ABS Plastic

operating conditions

- Maximum inlet pressureero . 3500 psig (240 barg)
- Outlet pressure. . . . . . 0 to 30 psig (2 barg)
- 0 to 60 psig (4 barg), 0 to 100 psig (7 barg)
- Temperature . . . . . . . –40°F to 150°F (–40°C to 66°C)

surface finishes

- Standard Ra . . . . . . . 10 micro inch (.25 micro meter) or less
- Optional Ra . . . . . . . 5 micro inch (.13 micro meter) or less

functional performance

- Design proof pressure . . . . . . . 5,250 psig (362 barg)
- Design burst pressure . . . . . . 10,500 psig (724 barg)
- Flow capacity . . . . . . . . . . . . . . . Cv .06
- (SEMI Flow Coefficient Test #F-32-0998)

- Design Leak Rate:
  - Outboard . . . . . . . 2 x 10⁻¹² scc/sec He
  - Inboard . . . . . . . 2 x 10⁻¹² scc/sec He
  - Across seat . . . . . . . 5 x 10⁻¹² scc/sec He

- Supply pressure effect. . . . . . <0.1 psig per 100 psig (<.02 barg per 6.7 barg)

internal volume

- 6.35 cc

standard connections

- Any combination of FS male and/or female fittings.
- 1/4" Gland to gland length ............ 3.70 ± .02 in. (94.0 ± .05 mm)
- 1/4" inch tube stubs inlet and outlet.
- End to end length ....................... 3.70 ± .02 in. (94.0 ± .05 mm)

approximate weight

- 1.5 lbs (7kgs)
**SQHP**

### Dimensional Drawing

All dimensions are reference and nominal.

![Dimensional Drawing Image]

### Flow Curves

![Flow Curves Image]

### Porting Configurations

2 PORT | 3 PORT | 4 PORT

### Ordering Information

<table>
<thead>
<tr>
<th>SQHP</th>
<th>PRESSURE SETTING</th>
<th>MATERIAL</th>
<th>PORTING</th>
<th>OUTLET GAUGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>30 psig</td>
<td>316L VAR Stainless Steel (Standard)</td>
<td>2P = 2 Ports</td>
<td>V3 = -30 in. Hg- 0 - 30 psig</td>
</tr>
<tr>
<td>50</td>
<td>50 psig</td>
<td>Hastelloy C-22®</td>
<td>3P = 3 Ports</td>
<td>V3 = -30 in. Hg- 0 - 30 psig</td>
</tr>
<tr>
<td>100</td>
<td>100 psig</td>
<td>Hastelloy C-22®</td>
<td>4P = 4 Ports</td>
<td>V3 = -30 in. Hg- 0 - 30 psig</td>
</tr>
</tbody>
</table>

- **PM** = Panel Mount
- **SS** = Stainless Steel Internals**
- **TH** = Hastelloy C-22® Trim (Compression Member)
- **VESPE** = Vespel® Seat*
- **3.4** = 3.4" Optional End-To-End Dimension

### Optional Features

- **PM** = Panel Mount
- **SS** = Stainless Steel Internals**
- **TH** = Hastelloy C-22® Trim (Compression Member)
- **VESPE** = Vespel® Seat*
- **3.4** = 3.4" Optional End-To-End Dimension

### Port Configuration

- **M** = Male
- **F** = Female
- **I** = Internal Female Face Seal (1/4" Only)

### Port Style

- **FS** = 1/4" Face Seal
- **TS** = 1/4" Tube Stubs
- **TS6** = 3/8" Tube Stubs

### Inlet Gauge

- **10** = 0 - 1000 psig
- **30** = 0 - 3000 psig
- **40** = 0 - 4000 psig
- **X** = No Gauge

* Recommended for Nitrous Oxide (N₂O) Service
** Recommended for Carbon Monoxide (CO) or Nickel Carbonyl Ni(CO)₄ Service

Hastelloy C-22® is a registered trademark of Haynes International, Inc.

Vespel® is a registered trademark of DuPont Company.
Parker Hannifin Corporation’s Veriflo Division presents the Quantum 959. The 959 is a high purity, high pressure tied diaphragm regulator.

The 959 regulator controls pressure flows accurately and predictably without changing the liquids or gases and without adding particles or ions to the flowing material.

Subatmospheric pressure control available with the NPR959.

**materials of construction**

**Wetted**
- Body: “VeriClean”, Veriflo’s high purity type 316L Stainless Steel™, Hastelloy C-22®
- Seat: PCTFE, optional Vespel®
- Poppet: 316L Stainless Steel, Hastelloy C-22®
- Poppet Spring: 316L Stainless Steel, Inconel®
- Compression Member: 316L Stainless Steel, Hastelloy C-22®
- Screen: Hastelloy C-22®

**Non-Wetted**
- Nut: 316L Stainless Steel
- Cap: Nickel Plated Brass

**operating conditions**

- Maximum inlet: 3500 psig (240 barg)
- Outlet: 0-30 psig (2 barg), 0-100 psig (7 barg), 0-150 psig (10.3 barg)
- NPR: -25 in Hg to 30 psig
- Temperature: -40°F to 150°F (-40°C to 65°C)

**functional performance**

- Flow capacity: \( C_v = 0.04 \)
  - Optional: \( C_v = 0.20 \)
  - (SEMI Flow Coefficient Test # F-32-0998)

- Design Leak Rate:
  - Outboard: \( 1 \times 10^{-9} \) scc/sec He
  - Inboard: \( 2 \times 10^{-10} \) scc/sec He
  - Across seat: \( 2 \times 10^{-9} \) scc/sec He

**standard configurations**

- Any combination of FS male and/or female fittings:
  - 1/4 inch Gland to gland length: \( 3.70 \pm .02 \) in. (94.0 ± .5 mm)
  - Optional: \( 3.40 \pm .02 \) in. (86.0 ± .5 mm)
  - 1/4 inch tube stubs inlet and outlet:
    - End to end length: \( 3.70 \pm .02 \) in. (94.0 ± .5 mm)
  - 1/4 inch female pipe threads inlet and outlet:
    - End to end length: \( 1.88 \pm .02 \) in. (47.7 ± .5 mm)

**internal volume**
- 5.41 cc

**surface finishes**

- Standard Ra: 15-20 m inch (.38 to .5 mm), or less
- Optional Ra: EX = 10 m inch (.25 m meter), EV = 5 m inch (.13 to .5 m meter) or less

**approximate weight**
- 2 lbs (.9 kg)

**features**

- “VeriClean”, Veriflo’s low sulfur high purity 316L, Stainless Steel™ enhances electropolishing, welding, and corrosion resistance.

- Unique patented compression member loads the seal to the body without requiring a threaded nozzle or additional seals to atmosphere.

- Internally threadless nozzle assembly.

- Metal-to-metal diaphragm-to-body seal assures high leak integrity.

- Minimal particle generation and entrapment.

- High cycle life.

- 100% Helium leak tested.
**Dimensional Drawing**

All dimensions are reference and nominal.

![Dimensional Drawing Image]

**Flow Curves**

**Porting Configurations**

**Ordering Information**

**BASIC SERIES**
- 95930 = 0 - 30 psig
- 959100 = 0 - 100 psig
- 959150 = 0 - 150 psig
- NPR95930 = -25 in Hg- 0-30 psig

**MATERIALS**
- W = Welded 316L Stainless Steel
- H = Hastelloy C-22®

**PORTING**
- 2P = 2 Ports
- 3P = 3 Ports
- 4P = 4 Ports
- 4PB = 4 Ports

**OUTLET GAUGE**
- V3 = -30 in Hg-0-30 psig
- V1 = -30 in Hg-0-100 psig
- V2 = -30 in Hg-0-200 psig
- X = No Gauge

**OPTIONAL FEATURES**
- DO = Dome Loaded
- PM = Panel Mount
- TH = Trim Hastelloy C-22® Internals**
- VESP = Vespel® Seat
  (Recommended for Nitrous Oxide-N2O Serviced)
- 3.4 = FS Fittings 3.4" Face to Face

**PORT CONFIGURATION**
- M = Male
- F = Female
- I = Internal Face Seal***

**PORT STYLE**
- FS = 1/4" Face Seal
- TS = 1/4" Tube Stubs

**INLET GAUGE**
- V1 = -30 in Hg -0-100 psig
- 10 = 0-1000 psig
- 30 = 0-3000 psig
- 40 = 0-4000 psig
- X = No Gauge

* Hastelloy C-22® Material Includes: Hastelloy C-22® Body, Compression Member, Poppet, Diaphragm, Screen, and Inconel® Spring

** Trim Hastelloy C-22® Includes: 316L Stainless Steel Body, Hastelloy C-22® Compression Member, Poppet, Diaphragm, Screen, and Inconel® Spring

*** Use Material Code ‘W’

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Vespel® is a registered trademark of DuPont Company.
Inconel® is a registered trademark of Inco Alloys International
Parker Hannifin Corporation’s Veriflo Division presents the 735TDR. The two stage, tied-diaphragm regulator is designed to provide constant outlet pressure regardless of inlet pressure fluctuations.

Subatmospheric pressure control available with the NPR735.

### materials of construction

**Wetted**
- Body: “VeriClean™, Veriflo’s custom high purity type 316L Stainless Steel™, Hastelloy C-22™
- Seat: PCTFE, optional Vespel®
- Diaphragm: 316L Stainless Steel
- Poppet: 316L Stainless Steel
- Poppet Spring: 316L Stainless Steel
- Compression Member: 316L Stainless Steel
- Filter: Hastelloy C-22™

**Non-Wetted**
- Nut: 316L Stainless Steel
- Cap: Nickel plated Brass

### operating conditions

- Maximum inlet: 3,500 psig (240 bar)
- Outlet: 0 to 30 psig (2 bar) adjustable, 0 to 100 psig (7 bar) adjustable
- NPR: -25 in Hg to 30 psig
- Temperature: -40°F to 150°F (–40°C to 65°C)

### functional performance

**Flow capacity**

\[ C_v = 0.04 \]

(SEMI Flow Coefficient Test # F-32-0998)

**Design Leak Rate**

- Outboard: \(1 \times 10^{-9} \text{ scc/sec He}\)
- Inboard: \(2 \times 10^{-10} \text{ scc/sec He}\)
- Across seat: less than \(2 \times 10^{-9} \text{ scc/sec He}\)

**Supply pressure effect**

\[ \text{per 100 psi (6.8 bar), See flow curves} \]

### standard configurations

- Any configuration of FS male and/or female fittings.
- Gland to gland length: 3.70 (94 mm)
- Optional: 3.40 (86.4 mm)
- ¼ inch female pipe threads Other configurations available as options, including as many as seven ports

### internal volume

10.10 cc

### surface finishes

- Standard Ra: 15-20 micro inch (.381 to .508 micro meter) or less
- Optional Ra: 10 micro inch (.254 micro meter) or less
- 5 micro inch (.127 micro meter) or less

### approximate weight

3.5 lbs (1.6 kg)
These tests were performed using Nitrogen at ambient conditions.
Parker Hannifin Corporation’s Veriflo Division presents the QR4000 Series pressure regulator. The QR4000 is a high purity, high pressure non-tied diaphragm regulator. The QR4000 Series utilizes a metal-to-metal diaphragm seal which provides enhanced leak integrity.

### features
- “VeriClean”, Veriflo’s custom low sulfur, high purity 316L Stainless Steel™ that enhances electropolishing, welding and corrosion resistance.
- Unique patented compression member loads the seal to the body without requiring a threaded nozzle or additional seals to atmosphere.
- Internally threadless nozzle assembly.
- Metal-to-metal diaphragm to body seal assures high leak integrity and lifetime bonding.
- Minimal particle generation and entrapment.
- High cycle life.
- 100% Helium leak tested.

### materials of construction
**Wetted**
- Body: “VeriClean”, Veriflo’s high purity type 316L Stainless Steel™, Hastelloy C-22™
- Compression Member: Inconel®
- Diaphragm: Hastelloy C-22™
- Poppet and Poppet Spring: Inconel®
- Screen: Hastelloy C-22™
- Carrier: Stainless Steel®, Hastelloy C-22™
- Backup Washer: 316 Stainless Steel™
- Seat: PCTFE, PEEK™, Vespel®

**Non-Wetted**
- Nut: 316 Stainless Steel™
- Cap: Nickel Plated Brass, optional Stainless Steel
- Knob (Black): ABS Plastic

### 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), 20-500 psig (35 barg)
- Temperature:
  - PCTFE: -40°F to 150°F (-40°C to 65°C)
  - PEEK™: -40°F to 275°F (-40°C to 135°C)
  - Vespel®: -40°F to 500°F (-40°C to 260°C)

### functional performance
- Flow capacity:
  - Standard: CV .06
  - Optional: CV .02, .15†
  - (SEMI Flow Coefficient Test #F-32-0998)
- Design Leak Rate:
  - Outboard: 1 x 10⁻¹⁰ scc/sec He
  - Inboard: 2 x 10⁻¹⁰ scc/sec He
  - Across seat: 4 x 10⁻⁸ scc/sec He
- Supply Pressure Effect:
  - .02 CV: 0.23 psig per 100 psig (.016 barg per 7 barg)
  - .06 CV: 0.6 psig per 100 psig (.04 barg per 7 barg)
  - .15 CV: 1.5 psig per 100 psig (.1 barg per 7 barg)

### standard configurations
See Dimension Table on back page.

### internal volume
4.0 cc without fittings

### surface finishes
- Standard Ra: 10 Micro Inch (.25 micro meter) or less
- Optional Ra: 5 Macro Inch (.13 micro meter) or less

### approximate weight
1.5 lbs (.7 kg)

* Proprietary Carpenter Stainless Steel
† Refer to Range Table for specific information.
All dimensions are reference and nominal.
**Flow Curve**

**QR4001 .06 CV**

![QR4001 Flow Curve Diagram](image)

**QR4002 .15 CV**

![QR4002 Flow Curve Diagram](image)

**Porting Configurations**

- **Porting Code 2P**
- **Porting Code 3P**
- **Porting Code 4P**
- **Porting Code 4PB**
- **Porting Code 5P**
- **Porting Code 6P**
BASIC SERIES
QR4000 = 1 - 10 psig†
QR4001 = 1 - 30 psig
QR4002 = 1 - 60 psig
QR4003 = 2 - 100 psig
QR4004 = 3 - 250 psig
QR4005 = 20 - 500 psig

MATERIALS
H = Hastelloy C-22®
S = 316L Stainless Steel

SEAT MATERIALS
K = PCTFE (formerly Kel-F®)
P = PEEK™
V = Vespel®**

PORTING
2P = 2 Ports
3P = 3 Ports
4P = 4 Ports
4PB = 4 Ports
5P = 5 Ports
6P = 6 Ports

OUTLET GAUGE
OL = 0 - 60 psig
01 = 0 - 100 psig
4 = 0 - 400 psig
6 = 0 - 600 psig
X = No Gauge

FLOW CAPACITY†
= .06 Cv (standard)
1 = .02 Cv
2 = .15 Cv

SEAT MATERIALS
K = PCTFE (formerly Kel-F®)
P = PEEK™
V = Vespel®**

PORT STYLE
FS = 1/4" Face Seal
FS8 = 1/2" Face Seal
TS = 1/4" Tube Stub
TS8 = 1/2" Tube Stub

PORT CONFIGURATION
M = Male
F = Female
I = 1/4" Internal Face Seal Female

OPTIONAL FEATURES
D = Dome Loaded

Note: PANEL MOUNT OPTION:
Order Panel Nut Ring P/N 41900363 as separate line item.

Hastelloy C-22® material includes: Hastelloy C-22® body, Hastelloy C-22® Carrier
** Recommended for Nitrous Oxide (N₂O) Service
†† Only available with .06 Cv
††† Only available with .06 Cv

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Elgiloy® is a registered trademark of Elgiloy Company.
Vespel® is a registered trademark of DuPont Company.
Viton® is a registered trademark of DuPont Dow Elastomers.
PEEK™ is a trademark of Victrex plc.

Dimension Table
<table>
<thead>
<tr>
<th>Connection Type</th>
<th>End to End Dimension</th>
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<tbody>
<tr>
<td>1/4&quot; Face Seal</td>
<td>3.70 ± .02 in. (94 ± .5 mm)</td>
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<tr>
<td>1/2&quot; Face Seal</td>
<td>4.82 ± .02 in. (122.4 ± .5 mm)</td>
</tr>
<tr>
<td>All Tube Stubs</td>
<td>3.70 ± .02 in. (94 ± .5 mm)</td>
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Range Table
<table>
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<tr>
<th>Model Basic Series</th>
<th>Max Inlet PSIG</th>
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<td></td>
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<tr>
<td>QR4000</td>
<td>.06 .02 .15</td>
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<td>QR4004</td>
<td>400 400 1250</td>
</tr>
<tr>
<td>QR4005</td>
<td>400 400 1250</td>
</tr>
</tbody>
</table>
Parker Hannifin Corporation’s Veriflo Division presents the High Purity NPR4000 regulator for applications involving negative delivery pressures with low pressure gas sources.

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

**materials of construction**

**Wetted**
- **Body**: “VeriClean”, Veriflo’s high purity type 316L Stainless Steel, Hastelloy C-22®
- **Compression Member**: Inconel®
- **Diaphragm**: Hastelloy C-22®
- **Pin**: Hastelloy C-22®
- **Poppet**: Bigloy®
- **Poppet Spring**: 316L Stainless Steel, Hastelloy C-22®
- **Screen**: Hastelloy C-22®
- **Carrier**: Stainless Steel*, Hastelloy C-22®
- **Seat**: PCTFE, PEEK™, Vespel®

**Non-Wetted**
- **Cap**: Nickel Plated Brass
- **Nut**: 316L Stainless Steel, Nickel Plated Brass††
- **Knob**: ABS Plastic

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

**functional performance**
- **Flow capacity**:
  - Standard: .06 Cᵥ
  - Optional: .02, .15
  (SEMI Flow Coefficient Test #F-32-0998)
- **Design Leak Rate**:
  - Outboard: .1 x 10⁻⁶ scch/sec He
  - Inboard: .2 x 10⁻¹⁰ scch/sec He
  - Across seat: .4 x 10⁻¹⁰ scch/sec He
- **Supply Pressure Effect**: .06 psig (.04 barg) per 100 psig (6.80 barg)

**standard configurations**
- Any configuration of 1/4” FS male and/or female fittings:
- Gland to gland length 3.70±.02 in. (94.0 ± .5 mm)
- See Porting Guide for available configurations.

**internal volume**
- 4.0 cc

**surface finishes**
- Standard Ra: 10 micro inch (.25 micro meter)

**approximate weight**
- 1.5 lbs. (.7 kg)

* Proprietary Carpenter Stainless Steel with corrosion resistance equal or better than 316.
†† Nickel Plated Brass for PCTFE seat.
**NPR4000 Series**

**Cross Sectional Drawing**

- Diameter: Ø1.44 (36.6 mm)
- Hole Req'd in Panel for Mounting: 2.32 (58.9)
- Hole Diameter: .69 (17.5)
- Flats: 1.38 (34.9)
- Flats Diameter: .68 (22.2)

**Flow Curves**

**Flow Curves for NPR4000**

- Inlet Pressure: 4 PSIG

**Porting Configurations**

- Porting Codes: 2P, 3P, 4P, 4PB

**Ordering Information**

### BASIC SERIES
- NPR4000

### MATERIALS
- H = Hastelloy®
- S = 316L Stainless Steel

### FLOW CAPACITY
- Standard: .06 Cv
- 1 = .02 Cv
- 2 = .15 Cv

### SEAT MATERIALS
- K = PTFE
- P = PEEK™
- V = Vespel®

### PORTING
- **OUTLET GAUGE**
  - V3 = -30 in Hg-0-30 psig
  - X = No Gauge
- **INLET GAUGE**
  - V3 = -30 in Hg-0-30 psig
  - V1 = -30 in Hg-0-100 psig
  - 4 = 0 - 400 psig
  - X = No Gauge

### OPTIONAL FEATURES
- T = Corrosion trim, internal (Hastelloy®
  - Carrier)

### PORT CONFIGURATION
- M = Male
- F = Female

### PORT STYLE
- FS = 1/4" Face Seal
- TS = 1/4" Tube Stub
- 4T = 1/4" Compression Fitting

**Notes:**
- Gauge Ports are 1/4" FS Male standard.
- Gauge Ports are 1/4" NPT Female for compression ends.
- *Recommended for Nitrous Oxide (N₂O) Service

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Parker Instrumentation

**High Purity Regulators**
Parker Hannifin Corporation’s Veriflo Division presents the HFR900W Regulator. The HFR900W is designed and engineered for the control of high purity, corrosive, toxic, flammable, and inert gases, at a high flow rate and low inlet pressure.

**features**

- **“VeriClean”**, Veriflo’s custom low sulfur high purity 316L Stainless Steel™ enhances electropolishing, welding and corrosion resistance.
- Internally Electropolished.
- Connections are welded to the regulator body by autogenous butt welding. This process eliminates small cavities that could create long-term “virtual leaks” and affect the purity of the process gas.
- The HFR900W was designed to withstand an internal vacuum without distortion of the diaphragm or deterioration of the seat and seal.
- The low leakage rates of the HFR900W Series eliminates the back diffusion of atmospheric contamination into the system.

**materials of construction**

**Wetted**

- Body: “VeriClean”, Veriflo’s high purity type 316L Stainless Steel
- Diaphragm: 316L Stainless Steel
- Seat: 316L Stainless Steel
- Seal: Teflon® and Viton® or optional Teflon® and Kalrez®

**Non-Wetted**

- Cap: Nickel Plated Brass
- Knob (Black): ABS Plastic

**operating conditions**

- **Maximum supply pressure:**
  - HFR90WV: 500 psig (35 barg)
  - HFR90WK: 200 psig (14 barg)
- **Outlet Pressure:**
  - 1-30 psig (2 barg)
  - 2-75 psig (5 barg)
  - 5-150 psig (10 barg)
- **Temperature:** 
  - –40°F to 150°F (–40°C to 66°C)

**functional performance**

- **Design burst pressure:**
  - HFR90WV: 1500 psig (105 barg)
  - HFR90WK: 600 psig (41 barg)
- **Design Proof pressure:**
  - HFR90WV: 750 psig (51 barg)
  - HFR90WK: 300 psig (21 barg)
- **Flow capacity:**
  - Cv = .85 (SEMI Flow Coefficient Test #F-32-0998)
- **Design Leak Rate:**
  - Outboard: 2 x 10⁻⁸ scc/sec He
  - Inboard: 2 x 10⁻⁹ scc/sec He
- **Supply pressure effect:**
  - 4 psig per 100 psig (.3 per 7 barg)

**standard configurations**

- 3/8", 1/2" Tube Stub
- 1/2" Parker Face Seal Fittings
- 1/4", 1/2" Parker A-Lok Compression Fittings

See Regulator Porting Guide for other available options.

**internal volume**

2.33 cu in (38 cc)

**surface finishes**

- Standard Ra: 15 - 20 micro-inch (.38 – .5 micro meter) or less

**approximate weight**

2.5 lbs. (1.2 kg)
**HFR9000W Series**

**Cross Sectional Drawing**

**Flow Curves**

**Connection Chart**

<table>
<thead>
<tr>
<th>Connection Size</th>
<th>“A”</th>
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</thead>
<tbody>
<tr>
<td>inlet &amp; outlet</td>
<td>inch</td>
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<tr>
<td>1/4” TS</td>
<td>3.76</td>
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<tr>
<td>3/8” TS</td>
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<tr>
<td>1/2” TS</td>
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<tr>
<td>1/4” FS</td>
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<td>1/2” FS</td>
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<tr>
<td>1/2” Compression Fittings</td>
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</table>

**Ordering Information**

**BASIC SERIES**
- HFR900 = 1-30 psig
- HFR901 = 2-75 psig
- HFR902 = 5-150 psig

**MATERIALS**
- W = Welded 316L Stainless Steel

**PORTING**
- 2P = 2 Ports
- 3P = 3 Ports
- 4P = 4 Ports
- 4PB = 4 Ports

**REGULATOR OUTLET GAUGE**
- 03 = 0-30 psig
- 01 = 0-100 psig
- 2 = 0-200 psig
- X = No Gauge

*Compression fittings are welded and inclusive of nuts and ferrules.

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Kalrez® and Teflon® are registered trademarks of DuPont Company.

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Kalrez® and Teflon® are registered trademarks of DuPont Company.
Parker Hannifin Corporation’s Veriflo Division presents the SPR860 Series regulator. The SPR860 is designed for very high flow with medium to low supply pressure and minimal pressure drop. An internal control system monitors both upstream and downstream pressures and servos the regulator in response to fluctuations.

This establishes a constant pressure delivery with significant variations in demand. In a typical application, using nitrogen as a medium, with an inlet pressure of 80 psig and an outlet pressure setting of 20 psig, the outlet pressure is maintained within 2 psig of its original setting while the flow demand increases from zero to more than 500 slpm.

**features**

- Servo control system does not require an external source to operate nor a continuous bleed to atmosphere.
- 100% Helium Leak and functional tested.
- Cleaned and assembled to “Semiconductor Quality” standards.
- Electropolished and passivated post welding.

**materials of construction**

**Wetted**
- Body: “VeriClean”, Veriflo’s custom high purity type 316L Stainless Steel™
- Seat: 316L Stainless Steel
- Seal: Teflon® and Viton® or optional Teflon® and Kalrez®
- Diaphragm: 316L Stainless Steel, Teflon® lined

**Non-Wetted**
- Cap: Nickel Plated Brass
- Knob (blue): ABS Plastic

**operating conditions**

Maximum inlet pressure:
- SPR860 V: 500 psig (35 barg)
- SPR860 K: 200 psig (14 barg)

Outlet pressure:
- 0-30 psig (2.07 bar)
- 0-100 psig (7 barg)
- 0-150 psig (10.35 barg)

Temperature: –40°F to 150°F (–40°C to 66°C)

**functional performance**

Design Burst Pressure:
- SPR860 V: 1500 psig (103 barg)
- SPR860 K: 600 psig (41.38 barg)

Design Proof pressure:
- SPR860 V: 750 psig (52 barg)
- SPR860 K: 300 psig (20.7 barg)

Design Leak Rate:
- Outboard: $1 \times 10^{-9}$ scc/sec He
- Inboard: $2 \times 10^{-9}$ scc/sec He

Supply pressure effect: 0.8 psig per 100 psig (0.05 barg per 7 barg)

Flow Capacity: $C_v = 0.85$

(SEMI Flow Coefficient Test #F-32-0998)

**internal volume**

51 cc

**surface finishes**

Standard Ra: 15-20 micro inch (0.38 to 0.5 micro meters) or less

**approximate weight**

2.5 lbs. (1.2 kg)
**SPR860 Series**

**Dimensional Drawing**

*All dimensions are reference and nominal.*

**Flow Curves**

**SPR860**

- Range: 0-30 psig
- Supply Pressure: 50 psig or 60 psig

**SPR861**

- Range: 0-100 psig
- Supply Pressure: 100 psig or 500 psig

**Porting Configurations**

- 2 PORT
- 3 PORT

**Ordering Information**

<table>
<thead>
<tr>
<th>SPR860</th>
<th>W</th>
<th>3P</th>
<th>V3</th>
<th>FS8</th>
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<td>BASIC SERIES</td>
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</table>

**MATERIALS**

- W = Welded 316L Stainless Steel

**PORTING**

- 2P = 2 Ports
- 3P = 3 Ports

**REGULATOR OUTLET GAUGE**

- V3 = -30 in Hg - 0 - 30 psig
- V1 = -30 in Hg - 0 - 100 psig
- VX = -30 in Hg - 0 - 150 psig
- V2 = -30 in Hg - 0 - 200 psig
- 2 = 0 - 200 psig
- X = No Gauge

**OPTIONAL FEATURES**

- PM = Panel Mount

**SEAL MATERIAL**

- V = Viton® (500 psig max)
- K = Kalrez® (200 psig max)

**PORT CONFIGURATIONS (Face Seal Only)**

- M = Male
- F = Female
- I = Internal Female FS (1/4"Gauge Port Only)

**PORT STYLE**

- FS = 1/4" Face Seal
- FS8 = 1/2" Face Seal
- FS12 = 3/4" Face Seal

Kalrez® and Teflon® are registered trademarks of DuPont Company. Viton® is a registered trademark of DuPont Dow Elastomers.
Parker Hannifin Corporation’s Veriflo Division presents the BFR5K Bulk Gas Series regulator. The BFR5K was created in response to the need for a small, high flow, high performance regulator for semiconductor processing.

This state-of-the-art device builds on the knowledge gained in fabrication of the Veriflo SQ regulator line to provide the cleanest operating gas components available in the world.

The BFR5K provides a stable outlet pressure over a wide variety of conditions with flow rates as high as 5000 slpm.

The unique balanced poppet design allows the regulator to maintain the outlet pressure setting regardless of changes in the upstream pressure.

**features**

- Standard 316L Stainless Steel Poppet and 321 Stainless Steel Bellows.
- High flow capacity with minimal pressure drop.
- Balanced poppet provides for minimal supply pressure effect.
- Tied diaphragm to poppet for added safety.
- Hurricane cleaning for “near absolute” contamination control.

Capable of operating at a wide range of flows from 100 up to 10,000 slpm.

Design and materials of construction ensure compatibility with semiconductor bulk gases.

No wetted spring.

**materials of construction**

**Wetted**

Body: “VeriClean”, Veriflo’s high purity type 316L VAR Stainless Steel

Seat: PCTFE

Bellows:
- Inner: Inconel® 718
- Outer: 321 Stainless Steel

Poppet & Trim: “VeriClean”, Veriflo’s high purity type 316L VAR Stainless Steel

**Non-wetted**

Cap: Nickel Plated Brass

**operating conditions**

- Maximum inlet pressure: 500 psig
- Outlet pressure: 0-200 psig
- Temperature: -40°F to 150°F (-40°C to 66°C)

**functional performance**

- Flow Capacity: Cv 4.5 (SEMI Flow Coefficient F-32)
- Design Leak Rate:
  - Across Seat: $5 \times 10^{-6}$ scc/sec He
  - Inboard: $2 \times 10^{-10}$ scc/sec He
  - Outboard: $1 \times 10^{-9}$ scc/sec He

**standard connections**

See chart on reverse side

**surface finishes**

- Standard Ra: 10 micro inch (.25 micro meter) or less
- Optional Ra: EV=5 micro inch (.13 micro meter) or less

**internal volume**

71 cc without connections

**approximate weight**

- Dome Loaded: 5.7 lbs (2.6 kg)
- Manual: 7.7 lbs (3.5 kg) (with 1.00” Tube Stubs)
BFR5K Series

3377 HIGH PURITY REGULATORS

BASIC SERIES

PRESSURE SETTING

60 = 0 - 60 psig
100 = 0 - 100 psig
150 = 0 - 150 psig
200 = 0 - 200 psig
DL = 0 - 200 psig (Dome Loaded)

SEAT MATERIALS

K = PCTFE

PORTING

2P = 2 Ports
3P = 3 Ports*
4P = 4 Ports*

OUTLET GAUGE

OL = 0 - 60 psig
01 = 0 - 100 psig
2 = 0 - 200 psig
4 = 0 - 400 psig
X = No Gauge

OPTIONAL FEATURES

G = Tamper Proof

PORT CONFIGURATION*

M = Male
F = Female

PORT STYLE (Line Size)

TS12 = 3/4" Tube Stub
TS16 = 1" Tube Stub
TS24 = 1.5" Tube Stub
FS12 = 3/4" Face Seal
FS16 = 1" Face Seal

MATERIALS

S = 316L Stainless Steel

SEAT MATERIALS

K = PCTFE

Dimensional Drawing

Manual

Pressure Setting

Outlet Gauge

Flow Curves

End to End Dimension Chart

Tubing

<table>
<thead>
<tr>
<th>Size</th>
<th>3/4&quot;</th>
<th>1&quot;</th>
<th>1.5&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;A&quot; inches</td>
<td>5.0</td>
<td>5.0</td>
<td>10.5</td>
</tr>
<tr>
<td>&quot;A&quot; mm</td>
<td>127.0</td>
<td>127.0</td>
<td>266.7</td>
</tr>
</tbody>
</table>

Fitting

<table>
<thead>
<tr>
<th>Size</th>
<th>3/4&quot;</th>
<th>1&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;A&quot; inches</td>
<td>6</td>
<td>6.5</td>
</tr>
<tr>
<td>&quot;A&quot; mm</td>
<td>152.4</td>
<td>165.1</td>
</tr>
</tbody>
</table>

Material

Inconel® is a registered trademark of Inco Alloys International.
PEEK™ is a trademark of Victrex plc.

Inconel® is a registered trademark on Inco Alloys International.
PEEK™ is a trademark of Victrex plc.

Ordering Information

BFR5K 100 S K 3P 01 FS16 MMM G

Optional Features

G = Tamper Proof

Port Configuration*

M = Male
F = Female

Port Style (Line Size)

TS12 = 3/4" Tube Stub
TS16 = 1" Tube Stub
TS24 = 1.5" Tube Stub
FS12 = 3/4" Face Seal
FS16 = 1" Face Seal

Outlet Gauge

OL = 0 - 60 psig
01 = 0 - 100 psig
2 = 0 - 200 psig
4 = 0 - 400 psig
X = No Gauge
Parker Hannifin Corporation’s Veriflo Division presents the SQServo pressure regulator. The SQServo incorporates a pressure-setting knob controlling a precise pressure sensor, a pneumatic servo-valve, and a high flow, “dome loaded” large SQ pressure regulator, controlled by the servo-valve.

The pressure sensing servo-valve mechanism smoothly controls the outlet pressure of the larger pressure regulator to +/- 0.25 psig. The pneumatic servo valve, integrated with the modified SQ60, amplifies the control signal causing the SQServo to precisely maintain the set pressure.

### features
- Flow rates in excess of 4,000 liters per minute (SLPM).
- Pressure drops typically less than 3 psig.
- Sensor mechanism continuously monitors and maintains outlet pressure.
- Tied Diaphragm Dome Loaded Pressure Regulator.
- No wetted spring.
- No threads exposed to the wetted area.
- Constructed in “VeriClean” 316L VAR Stainless Steel™ and fully internal electropolished.
- Standard Hastelloy C-22® diaphragm and poppet.

### materials of construction
**Wetted**
- Body: “VeriClean,” Veriflo’s high purity type 316L VAR Stainless Steel™
- Seat: PCTFE, optional Vespel®
- Diaphragm: Hastelloy C-22®
- Sensor Diaphragm: Hastelloy C-22®
- Poppet: Hastelloy C-22®
- Compression Member: “VeriClean,” Veriflo’s high purity type 316L VAR Stainless Steel

**Non-Wetted**
- Caps: Nickel Plated Brass
- Nuts: 316L Stainless Steel
- Knob (Blue): ABS Plastic

### operating conditions
- **Maximum inlet pressure:**
  - 140E: 1250 psig (86 barg)
  - 420E: 250 psig (17 barg)
- **Outlet pressure:**
  - 0-30 psig (2 barg)
  - 0-50 psig (3.4 barg)
  - 0-100 psig (7 barg)
- **Temperature:** -40°F to 165°F (-40°C to 74°C)

### surface finishes
- **Standard Ra:** 10 micro inch (.25 micro meter) or less
- **Optional Ra:** 5 micro inch (.13 micro meter) or less

### functional performance
- **Design proof pressure:**
  - 140E: 1875 psig (122 barg)
  - 420E: 375 psig (26 barg)
- **Design burst pressure:**
  - 140E: 3750 psig (259 barg)
  - 420E: 750 psig (52 barg)
- **Flow Capacity:**
  - 140E: 0.25 Cv
  - 420E: 1.2 Cv
  (SEMI Flow Coefficient Test #F-32-0899)
- **Design Leak Rate:**
  - Across Seat: $5 \times 10^{-6}$ cc/sec He
  - Inboard: $2 \times 10^{-6}$ cc/sec He
  - Outboard: $2 \times 10^{-6}$ cc/sec He

### internal volume
- 42 cc

### standard connections
- Any combination of 1/2” FS male and/or female fittings.
- Gland to gland length: 8.30 (218.7 mm)

### approximate weight
- 8 lbs. (3.7 kg)
Applications

The SQServo pressure regulators have been developed for two basic groups of applications:
- Delivery of very high flow rates of gas.
- Precise control of a gas delivery pressure under changing flow conditions.

The SQServo Pressure Regulators (SQServo140E and the SQServo420E) require an external source of Nitrogen or CDA to operate at a minimum of 20 psig greater than the maximum outlet pressure. As a safety measure, if an interruption of the control gas supply occurs, the gas delivery from the SQServo will be shut off automatically.

A continuous bleed of dome pressure of about .5 SLPM will vent from the Servo Control Mechanism and is used to improve the resolution sensitivity of the outlet pressure regulation.

Operational Information

The pressure regulator incorporates two functional components integrated into a single unit. The smaller component is a pressure sensor and controller. It senses the outlet pressure, compares it to a mechanical pressure setting, and generates a control signal as a function of the difference between the actual outlet pressure and the pressure setting. It does not obstruct the flow through the device.

The larger component is a pneumatically "dome loaded" SQ (high flow) pressure regulator. It receives the pneumatic signal sent by the controller and functions to create an outlet pressure equal to the pressure setting. The two components work together to minimize the difference between the pressure setting and the actual outlet pressure independent of flow. Through the comparison of the pressures and the "amplification" of the servo mechanism, a small deviation from the pressure setting (< 1 psig) can create a large change in the position of the SQServo valve-seat assembly, to the point of effectively using the entire Cv capability of the pressure regulator.

Two sizes of SQServo regulators are offered as indicated in the Cv Chart below:

<table>
<thead>
<tr>
<th>Model</th>
<th>Cv</th>
<th>Max Inlet</th>
</tr>
</thead>
<tbody>
<tr>
<td>SQServo140E</td>
<td>.25</td>
<td>1250 psig (86 barg)</td>
</tr>
<tr>
<td>SQServo420E</td>
<td>1.2</td>
<td>250 psig (17 barg)</td>
</tr>
</tbody>
</table>
Dimensional Drawing

All dimensions are reference and nominal.

- Inlet For External Source Of N2/CDA
- Servo Sensor Diaphragm
- Regulator Diaphragm
- Dome Operated SQ High Flow Regulator
- Servo Control Mechanism
- Outlet
Flow Curves

![Graph showing flow curves for N₂ flow vs. pressure outlet.]

**Ordering Information**

**SQSERVO140E** 30 3P V1 FS8 FM SS

**BASIC SERIES**
- SQSERVO140E
- SQSERVO420E

**BASIC MODEL**
- 30 = 0 - 30 psig
- 50 = 0 - 50 psig
- 100 = 0 - 100 psig

**PORTING**
- 2P = 2 Ports
- 3P = 3 Ports

**OUTLET GAUGE**
- V3 = -30 in. Hg - 0 - 30 psig
- L = -30 in. Hg - 0 - 60 psig
- V1 = -30 in. Hg - 0 - 100 psig
- X = No gauge

**OPTIONAL FEATURES**
- SS = Stainless Steel Internals†
- TH = Hastelloy C-22® Trim (Compression Member)
- VESP = Vespel® Seat *
- xxxx = Preset**

**PORT CONFIGURATION**
- M = Male
- F = Female

**PORT STYLE**
- FS8 = 1/2" Face Seal
- FS12 = 3/4" Face Seal
- TS6 = 3/8" Tube Stub
- TS8 = 1/2" Tube Stub
- TS12 = 3/4" Tube Stub

*Recommended for Nitrous Oxide (N₂0) Service
**Special 4-digit number will be issued by factory to indicate customer specific pressure setting
†Recommended for Carbon Monoxide (CO) or Nickel Carbonyl Ni(CO)₄ Service

Hastelloy C-22® is a registered trademark of Haynes International, Inc.
Kel-F 81® is a registered trademark of 3M Company.
Vespel® is a registered trademark of DuPont Company.
Parker’s Charter
To be a leading worldwide manufacturer of components and systems for the builders and users of durable goods. More specifically, we will design, market and manufacture products controlling motion, flow and pressure. We will achieve profitable growth through premier customer service.

Product Information
North American customers seeking product information, the location of a nearby distributor, or repair services will receive prompt attention by calling the Parker Product Information Center at our toll-free number: 1-800-C-PARKER (1-800-272-7537). In Europe, call 00800-C-PARKER-H (00800-2727-5374).

About Parker Hannifin Corporation
Parker Hannifin is a leading global motion-control company dedicated to delivering premier customer service. A Fortune 500 corporation listed on the New York Stock Exchange (PH), our components and systems comprise over 1,400 product lines that control motion in some 1,000 industrial and aerospace markets. Parker is the only manufacturer to offer its customers a choice of hydraulic, pneumatic, and electromechanical motion-control solutions. Our Company has the largest distribution network in its field, with over 7,500 distributors serving nearly 400,000 customers worldwide.

The Fluid Connectors Group designs, manufactures and markets rigid and flexible connectors, and associated products used in pneumatic and fluid systems.

The Aerospace Group is a leader in the development, design, manufacture and servicing of control systems and components for aerospace and related high-technology markets, while achieving growth through premier customer service.

The Hydraulics Group designs, produces and markets a full spectrum of hydraulic components and systems to builders and users of industrial and mobile machinery and equipment.

The Automation Group is a leading supplier of pneumatic and electromechanical components and systems to automation customers worldwide.

The Seal Group designs, manufactures and distributes industrial and commercial sealing devices and related products by providing superior quality and total customer satisfaction.

The Filtration Group designs, manufactures and markets quality filtration and clarification products, providing customers with the best value, quality, technical support, and global availability.

The Instrumentation Group is a global leader in the design, manufacture and distribution of high-quality critical flow components for worldwide process instrumentation, ultra-high-purity, medical and analytical applications.

The Climate & Industrial Controls Group designs, manufactures and markets system-control and fluid-handling components and systems to refrigeration, air-conditioning and industrial customers worldwide.

The Instrumentation Group