Semiconductor Products
Quick Reference

BROOKS INSTRUMENT
Beyond Measure
Unsurpassed precision and control.
For the world’s most demanding industry.

In semiconductor and electronics manufacturing, there is constant demand for innovation in flow and pressure instrumentation. Brooks Instrument meets that demand with the industry’s most advanced flow, pressure, vacuum and vapor delivery products. From its beginning, we have supplied the semiconductor industry with many of the groundbreaking measurement and control devices that set the standard for precision, accuracy and control.

Innovation

• Brooks has the world’s largest installed base of mass flow controllers.

• Our MultiFlo™ technology enables one MFC to support thousands of gas types and range combinations.

• We offer the industry’s first smart MFC that performs real-time diagnostics and flow error detection measurements at every set-point without interrupting the process gas flow.

• Leading semiconductor equipment OEMs and device manufacturers count on Brooks for insight into choosing flow and pressure technology to match unique process gas, chamber matching and throughput challenges.

Leadership

• We help maximize return on investment through application-specific accuracy, durability and repeatability in the instruments we offer.

• Our proven applications expertise, custom metering configurations, service and assistance in selecting products guide you to the best solution faster.

• We utilize the highest quality materials, digital electronics and patented sensor designs.

• Our expert, certified global service capability enables fast response to instrument issues.

Pressure Measurement
& Control .......................... 3
Mass Flow Control ........... 4
Vacuum & Vapor Systems. .... 5
Service & Support .............. 6
## Pressure Measurement & Control

### Mechanical Pressure Gauges, Switches & Transmitters
The industry standard for pressure gauges. Excellent reliability and accuracy combined with durable designs and materials to handle a wide range of semiconductor processes.

### SolidSense II® Pressure Transducers
The industry standard for high and ultra-high purity process pressure measurement. Enhanced with digital electronics for optimal accuracy.

### PC100 Series In-Line Pressure Controllers
High-performance UHP pressure controller, built on proven GF100 technology to provide precision process pressure control.

#### Applications
- **Semiconductor**
  - Strip, ALD, CVD and Etch
  - PVD, Epi, Diffusion, Implant and RTP
- **Compound semiconductor & LED**
  - MOCVD, PVD
  - Etch
- **MEMS**
  - PVD
  - Etch
- **Display**
  - PVD
  - CVD
- **Other**
  - Precision engineered surface coatings, vacuum process applications

#### Key Features
- **316L steel withstands harsh environments**
- **Welded in oxygen-free chambers to meet rigid cleanliness and safety guidelines of demanding high-purity applications**
- **Multiple process connections & socket orientations**
- **Models that measure from vacuum to high pressure**
- **Switch and transmitter versions available**
- **Weld-free, corrosion-resistant materials**
- **High-temperature-annealed VIM-VAR 316L stainless steel body with one-piece, machined sensor**
- **Proprietary micro-machined silicon strain gauges for ultra-stable measurement**
- **Digital thermal compensation ensures accuracy under extreme temperature variations**
- **Models available with integrated display or optional separate top-mounted display**
- **All-metal seal flow path: 5μ inch Ra surface finish**
- **PC125 with embedded flow meter utilizes our proprietary highly corrosion-resistant Hastelloy® C-22 flow sensor**
- **Fast-acting diaphragm-free valve assembly**
- **High-visibility LCD display**
- **Independent diagnostic/service port**
- **Can be configured for upstream or downstream control**

#### Performance
- **Pressure Ranges**
  - Vacuum to 4000 psi (276 bar)
  - Accuracy - 1% FS
- **Multiple switch inputs and outputs available:**
  - Off-on and Type 1 (0 to 9–30 Vdc)
  - Type 2 (8 to 30 Vdc)
  - Type 3 (0 to 5 Vdc)
- **Transmitters available with industry standard outputs - 4–20 mA; 0–5 Vdc, 1–5 Vdc**
- **Pressure Ranges**
  - 15–3000 psi (205 bar)
  - Accuracy 0.25% FS (BFSL)
- **Proof Pressure**
  - 200% FS up to 2,000 psi, 150% FS for higher ranges
- **Burst Pressure 400% FS**
- **Output Type - Analog voltage or current**
- **Pressure Control Range - >2–100%**
- **Flow Range - 20 sccm–10 slm (N2 or H2 only)**
- **Accuracy -**
  - Off-on and Type 1 (0 to 9–30 Vdc)
  - Type 2 (8 to 30 Vdc)
  - Type 3 (0 to 5 Vdc)
  - Transmitters available with industry standard outputs - 4–20 mA; 0–5 Vdc, 1–5 Vdc
- **Pressure Reading - ±1% of reading**
- **Pressure Control - ±1% of reading**
- **Flow Reading - ±1% of reading**
- **Max Pressure**
  - Transducer Pressure Range - 1000 Torr FS, (1.3 bar)
  - Transducer Over Pressure Limit - 2 x FS range

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**Accurate, reliable and cost-effective pressure measurement engineered for high-purity and ultra-high purity process gasses.**

Leading the industry in MFC performance, reliability, innovation and control for the most demanding semiconductor processes.

Advanced technology for ultra-high purity pressure control, ultra-reliable and repeatable vacuum measurement and efficient delivery of ultra-pure vapors.
## Mass Flow Control

### GF100/101 Series Standard High Purity MFCs
- High-purity all-metal flow path MFC for standard and high-flow processes, with MultiFlo™ gas and range programmability.

### GF120XSL/XSD Mass Flow Controllers for SDS Gases
- Low pressure drop MFC for the delivery of sub atmospheric safe delivery system (SDS) gases used in etch and implant processes.

### GF125/126 Series Pressure Transient Insensitive MFCs
- Ultra-high purity MFC with extremely fast response time and multi-variable pressure transient insensitive (PTI) performance.

### GF135 Series with Real-Time Flow Error Detection
- Groundbreaking “smart” ultra-high purity MFC performs integral rate-of-decay flow measurement without stopping process gas flow, providing real-time diagnostic data for APC & FDC.

### Applications

#### Semiconductor
- MOCVD & Wafer Handling:
  - ALD, CVD, Diffusion, EPI, Etch Implant, LPCVD, PVD, RTP & strip
- LED:
  - MOCVD, Etch & PVD
- MEMS:
  - PVD
- Display:
  - CVD & PVD

#### Semiconductor
- Etch, Implant:
  - ALD, CVD, Diffusion, EPI, Etch, LPCVD, MOCVD, PVD, RTP & Strip

#### LED
- MOCVD & Etch

#### MEMS
- CVD & Etch

#### Display
- CVD

### Key Features

- All-metal seal flow path: 10μ inch Ra surface finish
- Ultra-fast corrosion-resistant Hastelloy® flow sensor improves reproducibility at high temperatures
- Long-term zero stability of <±0.5% full scale per year
- Local display indicates flow, temperature and network address for easy troubleshooting
- MultiFlo™ technology enables one MFC to support thousands of gas types and range combinations without removing it from the gas line or compromising on accuracy
- Ultra-high purity flow path — 4μ inch Ra surface finish
- Low pressure drop corrosion-resistant Hastelloy® flow sensor
- Zero Stability - <±0.6% FS per year
- Able to control SDS gases from 10 Torr – 30 psid
- Gases supported: Ar, AsF5, AsH3, BF3, GeF4, H2O, H2Se, HMDSN, HMDSO, N2, N2O, PF3, PH3, SiF4, Xe

### Performance

#### Flow Ranges
- Standard: 3 sccm–55 slm
- High Flow: 55 slm–300 slm
- Accuracy — ±1% of SP
- Repeatability — <±0.15% SP
- Response Time — 700 ms– <1 sec

#### Flow Ranges
- Standard: 4–25 sccm
- High Flow: >25 – 1 slpm
- Accuracy — ±1% of SP
- Repeatability — <±0.15% SP
- Response Time — <3 secs
- Min Operating Inlet Pressure — 4–20 sccm ≤10 Torr

#### Flow Ranges
- Standard: 3 sccm–5 slm (N2 Eq.)
- Accuracy - ±1% SP 10-100% FS
- Repeatability - <±0.15% SP
- Response Time - <300 ms - <400 ms
- Pressure Transient Insensitivity - <1% SP for up to 5 psi/sec upstream pressure spike

### Flow Range
- 3 sccm–5 slm (N2 Eq.)
- Accuracy - ±1% SP 10-100% FS
- Repeatability - <±0.15% SP
- Response Time - <300 ms - <400 ms
- Pressure Transient Insensitivity - <1% SP for up to 5 psi/sec upstream pressure spike
**CMC Series Capacitance Manometers**

Compact, unheated vacuum gauges for cost-effective vacuum measurement.

**XacTorr® Series Capacitance Manometers**

Advanced vacuum measurement technology virtually eliminates drift and provides longer operational life.

**Vapor Delivery Modules**

Self-contained sub-system for the delivery of ultra-high purity water vapor.

### Applications

- **Semiconductor**
  - Strip, ALD, Epi, Diffusion, Implant and RTP
  - CVD and Etch
  - MOCVD, PVD
  - Etch

- **Compound semiconductor & LED**
  - MOCVD, PVD, Etch

- **MEMS**
  - CVD, Etch

- **Display**
  - CVD

- **Other**
  - Precision engineered surface coatings, vacuum process applications

### Key Features

- All-welded construction and Inconel® wetted surfaces ensures reliable, repeatable operation
- Exceptional performance over a wide range of operating temperatures
- Economic alternative to larger premium unheated gauges
- Shielded sensor resists particle accumulation
- Dual-zone temperature control improves measurement stability and repeatability
- Multi-decade digital calibration provides superior window of known accuracy
- Independent diagnostic service port
- Direct water vapor measurement with superior flow accuracy
- Connects directly to the house deionized water supply
- Operates at lower temperatures (non-superheated state)
- Independent diagnostic service port

### Performance

- **Pressure Ranges** - 10–1000 Torr
- **Accuracies** -
  - Type A - ±0.25% of Reading
  - Type B - ±0.5% of Reading (optional)
- **Temperature Range** - Ambient to 80°C
- **Measurement Range** - 3.5 Decades
- **Pressure Ranges** - 0.1–1000 Torr
- **Accuracy** - ±0.15%–0.25% of Reading
- **Temperature Range** - Ambient to 160°C
- **Measurement Range** - 4 Decades
- **Flow Range** - 3000 sccm (H2O vapor)
- **Accuracy** - 1% of SP
- **Repeatability** - <±0.2% FS
- **Response Time** - <2 secs
Copy Exact Service & Support

Brooks Instrument products are recognized as the most stable and reliable in the world. To keep your products operating at the highest level of accuracy and extend their life, your best choice is to trust Brooks Instrument Factory Certified Service repair and recalibration offerings.

Only Brooks Instrument Factory Certified Service ensures that your Brooks Instrument flow, pressure, vapor and vacuum products are serviced utilizing the same metrology standards, work instructions, equipment and custom software as our manufacturing processes — by expert technicians trained exclusively on servicing Brooks products.

We have service centers located near fabs across the globe, to ensure fast turnaround on repair and recalibration requests. Complete details are available at www.BrooksInstrument.com/globalsupportcenters.

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