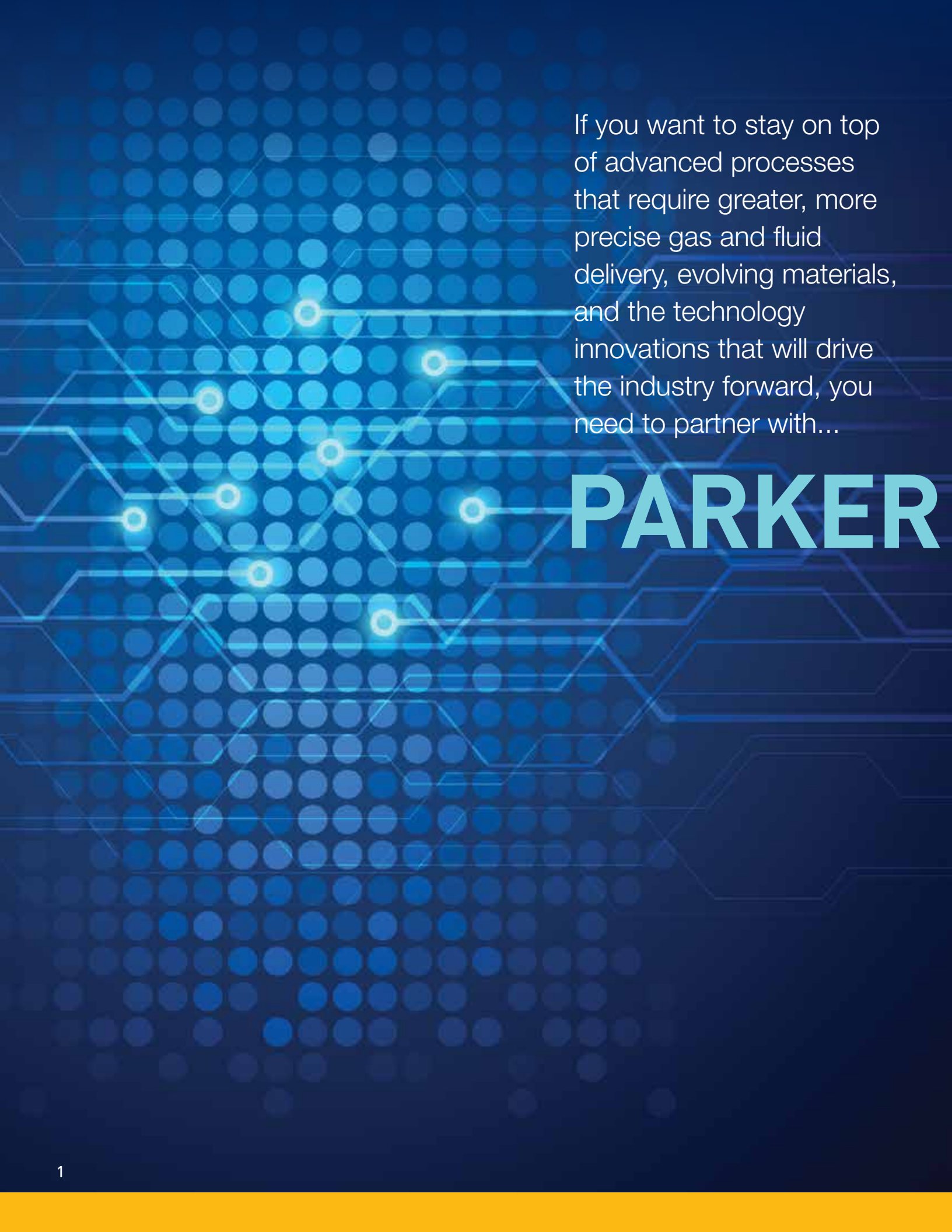
Semiconductor Microelectronics

Innovative solutions for improved performance and profitability

Parker

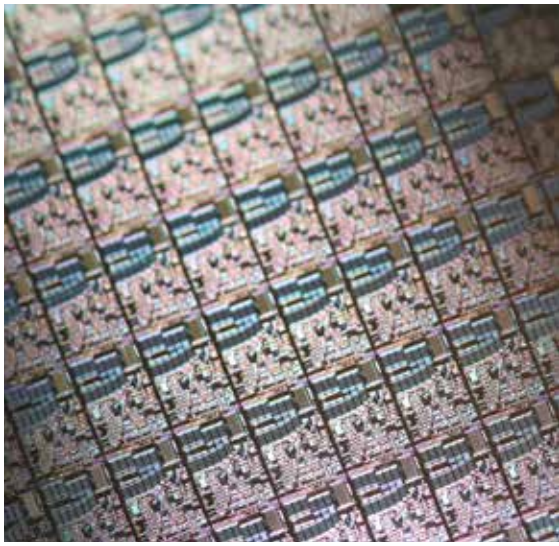
ENGINEERING YOUR SUCCESS.



If you want to stay on top of advanced processes that require greater, more precise gas and fluid delivery, evolving materials, and the technology innovations that will drive the industry forward, you need to partner with...

PARKER

VERIFLO:



As a technical expert in gas and liquid delivery systems and processes for wafer processing, we can help you profit from today's developments – while preparing for tomorrow's challenges.

From ALD and ALE to CMP and wafer cleaning, our new ultra high purity stainless steel and fluoropolymer fittings, valves, regulators and manifolds will help you improve cost of ownership, increase productivity and enhance performance.

Emerging Market Trends [1, 2, 3]

- Semiconductor technology advances are driving wafers to sizes below 10 nm
- Process windows are shrinking, making the ability to filter, regulate, control and convey gases and aggressive process chemicals increasingly critical
- Innovations in smart mobility, cloud computing, social networking and "big data" analytics are leading to new and more specialized semiconductor requirements
- Industry consolidation is demanding better supply chain management to reduce costs

Customized solutions

Parker has the ability to integrate multiple technologies into unique, customer-focused solutions for both gas and chemical systems that offer improved module reliability in smaller, more cost-effective packages, such as this fluoropolymer manifold solution. Contact Parker Veriflo at **(510) 235-1355** to find out more or email us at: **veriflo.sales@parker.com**.

1 Global Semiconductor Industry Study by Ernst & Young
2 Trends and Opportunities in Semiconductor Licensing, skyworksinc.com
3 Key Trends at SemiconWest 2013, semimd.com/blog

Why Parker in today's facility

From **bulk chemical** and **gas delivery** to **wafer cleaning, specialty gas,** and **tool hookup** to **OEM equipment,** Veriflo products deliver.

- Proven ultra high purity gas and liquid delivery devices and assemblies
- More stainless steel and fluoropolymer fittings, valves, regulators and manifolds than any other supplier
- Integrated solutions that work together seamlessly to increase throughput, ensure media purity and reduce expensive downtime
- Selectable levels of integration to reduce technical risk
- Joint product development services from concept through production, including application and validation support as needed

PROVEN. SAFE. RELIABLE. RESPONSIVE.
We have been the primary supplier of ultra high pressure (UHP) regulators and valves for leading semiconductor tool manufacturers for over 25 years.

SIMPLIFIED SUPPLY CHAIN
As a single source provider, Parker saves you time and money with an unmatched fluoropolymer and stainless steel alloy selection.

- Industry-leading pricing
- Fast turnaround times
- Supply chain management

FREE TECHNICAL SUPPORT AND TRAINING
We offer worldwide technical support and on-site technical training at no cost to you. Regional technical support is also available, with backup support from USA senior application engineers.

National and international certifications verify that our systems and solutions offer the highest possible quality and reliability.

SEMI F57-0301 COMPLIANT **22 SERIES**

GLOBAL CONNECTIVITY AND LOCAL AVAILABILITY
Our global footprint assures local availability, no matter where you develop, assemble, manufacture or operate.

The new **gas and liquid delivery** products needed for tomorrow's wafer manufacturing.

INNOVATIONS IN ACTION

With the world's appetite for electronics and mobile devices continuing to grow, our newest solutions will help you meet the challenges they create.

Ultra High Purity, Competitively Priced FR Series Regulators

Applications: *Valve manifold boxes, point-of-use tool hookup and gas cabinets*

Parker's FR 1000 and FR 1400 Series of ultra high purity regulators provide precise, stable control of process gases in downstream point-of-use applications, reducing short- and long-term costs for semiconductor OEMs, integrators, and fab facilities. Both offer metal-to-metal seals for enhanced leak integrity; Hastelloy® C-22® diaphragms for increased cycle like and corrosion resistance; single-melt or double-melt 316L stainless steel construction.

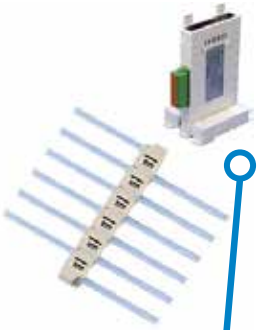
- FR 1000 Series – Low flow capacity with 0.09 Cv and 0.15 Cv versions; sealed cap and bonnet port standard on double-melt 316L stainless steel models
- FR 1400 Series – Tied diaphragm design with 0.5 Cv high flow capacity; low inlet pressure (300 psig) and high inlet pressure (3000 psig) models available

Cost-Saving UHP Metal Face Seal and Weld Fittings

Applications: *Valve manifold boxes, gas cabinets and tool hookups*

Specifically designed for ultra high purity (UHP) semiconductor applications. Compact design allows for system miniaturization and close coupled spacing. Permanent heat code marking on wetted components provides full material traceability. All new products are available in SEMI F20 compliant material.

- UHP Metal Face Seal fittings available as glands, nuts, caps and plugs in 316, 316L and 316L double-melt stainless steel; pressures up to 8000 psig
- UHP Weld fittings available in 316L and 316L double-melt stainless steel in elbows, tees, crosses and reducers; pressures up to 8500 psig



New Corrosion Resistant Series P22 Valves Reduce Tool Cost

Applications: *Wet etch and wafer cleaning*

New ultra clean manual and pneumatic valves offer increased flow and provide better seat sealing for enhanced leak-free performance and greater safety.

- Deliver high cycle life in acids and slurry with reduced maintenance
- True lock-out, tag-out design on maual valves
- Compact footprint
- Meet SEMI F57-0301 standards

CFM1 Series Compact Ultrasonic Flow Meter

Applications: *Liquid delivery, wafer cleaning, slurry*

Offers greatly increased accuracy (plus or minus 2% of reading)

- Provides a higher turndown ratio. Handles higher concentration acids, slurries, and other typical semiconductor process fluids
- Six-channel converter reduces space

New High Cycle, High Speed Valve Offers Increased Cycle Life, Greater Reliability

Applications: *ALD, high speed switching for process gases*

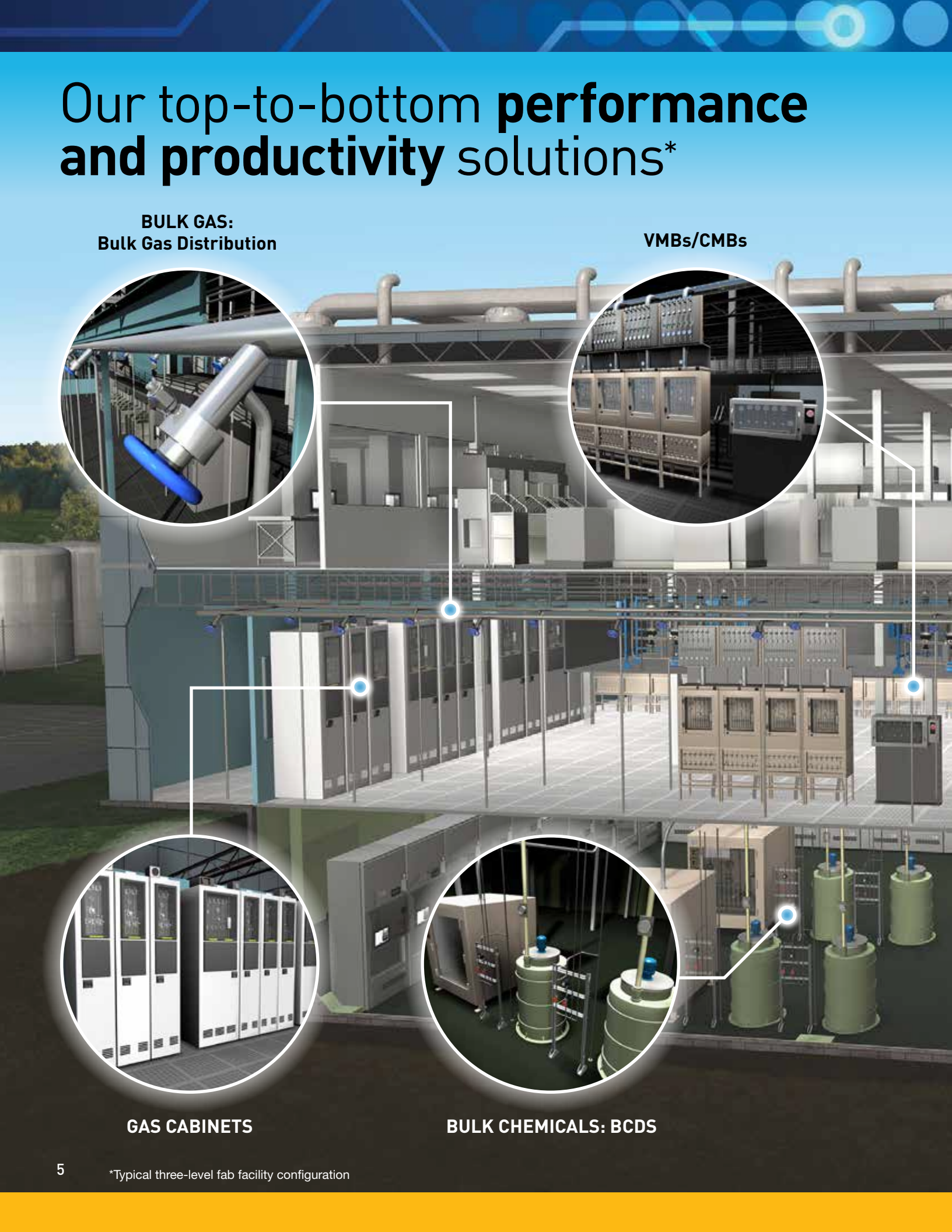
The HCS1 Series is a UHP stainless steel diaphragm valve with a demonstrated cycle life up to 100 million cycles and a response time of 10ms.

HPX1 Series High Purity PFA Heat Exchanger for High Resolution Process Temperature Control

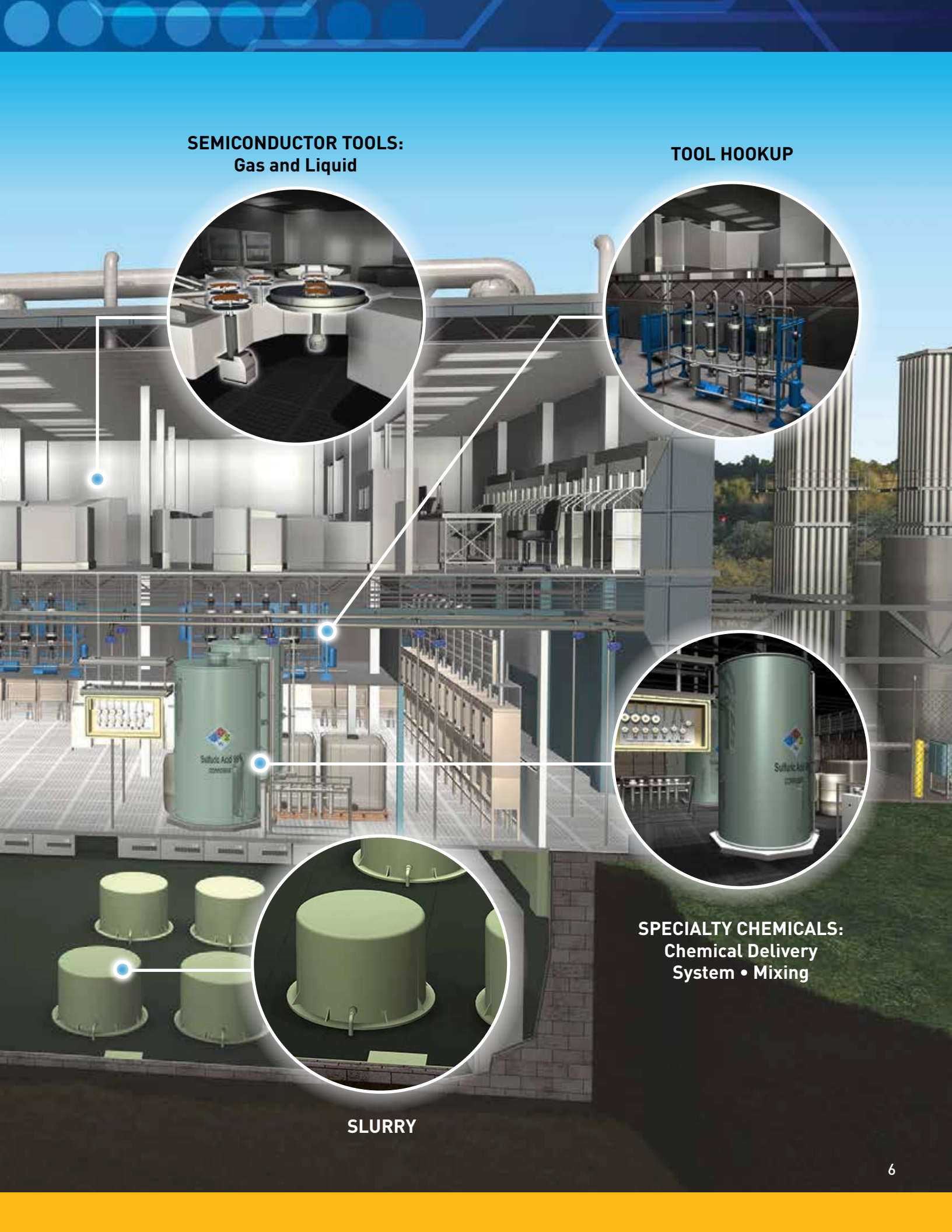
Application: *Wafer cleaning*

Special PFA tubing enables high performance temperature control of chemicals. Transfers heat to surrounding fluids while ensuring process purity and safety through a leak-proof design.

Our top-to-bottom **performance and productivity** solutions*



*Typical three-level fab facility configuration


SEMICONDUCTOR TOOLS:
Gas and Liquid
TOOL HOOKUP
SPECIALTY CHEMICALS:
Chemical Delivery
System • Mixing
SLURRY

Gas Delivery, Mixing and Distribution

REGULATORS

New! FR 1000 Series: UHP single-stage. Competitively priced. Low flow. Stainless steel. Metal-to-metal seals for enhanced leak integrity.

New! FR 1400 Series: UHP single-stage. Competitvely priced. High flow. Stainless steel. Metal-to-metal seals for enhanced leak integrity.

BFR5K Series: For UHP bulk gas. High flow. Welded. Stainless steel. Flow rates as high as 5,000 slpm. Unique balanced poppet.

HF1200 & HFT1200W Series: UHP single stage. High flow. Welded. Stainless steel. Inlet pressure up to 1,250 psig.

IR4000W Series: Single stage. Internally threadless. Welded. Stainless steel. Inlet pressure up to 4,000 psig.

NPR4000 Series: UHP single stage. For applications involving negative delivery pressures with low pressure gas sources such as WF6, BCL3.

NPR959W & 959W Series: UHP single stage, tied diaphragm regulator. High pressure. Welded. Stainless steel. Shuts off should a leak across the seat occur.

QR4000 Series: High purity, high pressure non-tied diaphragm regulator with metal-to-metal seal.

QRM & QRMHF Series: UHP single stage. Miniature. Welded. Stainless steel. Threadless, non-tied diaphragm regulators provide faster purge times and extended seat life.

SMQRM & SMQRMHF Series: UHP surface mount. Miniature. Stainless steel. Threadless non-tied diaphragm regulators offer faster purge times and extended seal life.

SMSQ2Micro Series: UHP surface mount. 1-1/8" and 1-1/2". Stainless steel. Provides excellent repeatability, stability, sensitivity and extraordinary response to step function changes.

SQ Series: UHP high performance point-of-use. Welded. Stainless steel.

SQB Series: High flow, high pressure for bulk specialty gas systems.

SQHP Series: UHP high pressure. Welded. Stainless steel.

SQServo: Ultra precision, high flow regulator. Incorporates pressure-setting knob controlling a precise pressure sensor, pneumatic servovalve and a high flow, "dome loaded" large SQ pressure regulator controlled by the servovalve.

SQ2MICRO Series: UHP tied diaphragm. Miniature. Welded. Stainless steel. Point-of-use. Provides excellent repeatability, stability, sensitivity and extraordinary response to step function changes. Facilitates closer spacing of components, process lines.

VALVES

FS190 Series: Excess flow shut-off valves. Stainless steel.

F9 Series: UHP check valves. Stainless steel. Welded. Features a patented, asymmetric spring design for consistently quiet operation. Sized to conserve panel space.

HCS1 Series: UHP stainless steel diaphragm valve. For high speed switching for process gases.

Quantum 830: Value-priced for diaphragm valve high purity applications. Similar to 930 Series.

SM930 Series: UHP surface mount diaphragm valves. 1-1/8" and 1-1/2". Stainless steel.

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17R Series: UHP stainless steel diaphragm valves. High pressure, high flow. 1/2" spring type. For high purity fluid systems. Manual and pneumatic. Vacuum to 3,000 psig.

18R Series: UHP stainless steel diaphragm valves. High pressure, high flow for high purity fluid systems. 1/2" and 3/8". Manual and pneumatic. Vacuum up to 1,500 psig.

600 Series: CvMax UHP stainless steel bellows valves. Manual and pneumatic. The industry's leading straight-through full flow for the highest gas flow with minimal pressure drop.

700 Series: UHP stainless steel bulk gas distribution valves. High flow bellows. Unique design reduces valve weight, lowering installation costs.

845 Series: UHP stainless steel diaphragm valves. High pressure. Welded. 845AOP offers patent-pending actuator requiring only 75 psi actuation pressure. Operates from vacuum to 3,500 psig.

855 Series: UHP stainless steel diaphragm valves. High flow. Welded. Similar to, but lower priced than the 955. 250 psig max for manual and air actuated versions.

930 Series: UHP stainless steel diaphragm valves. Welded. Available with manual operators and air operated actuators.

935 Series: 1/2" UHP stainless steel positive retraction diaphragm valves. High flow. Superior control of gases and liquids.

945 Series: UHP stainless steel diaphragm valves. High pressure. Welded.

955 Series: UHP stainless steel diaphragm valves. High flow. Welded. Manual and pneumatic. For UHP systems up to 250 psig. 955AOP is ideal for low vapor pressure gas delivery systems.

970 Series: UHP diaphragm valves. High flow in a 1-1/2" package. Welded. Air and manually operated.

1004 Series: CyMax UHP stainless steel positive-retraction diaphragm valves. Manual and pneumatic. Welded.

FITTINGS

New! UHP Metal Face Seal and Weld Fittings: Competitively priced. Compact size. Metal-to-metal seal. Welded. Heat code markings on wetted components for full material traceability

MiniButtweld: Leak-free fittings for ultra high purity applications. Compact for use with orbital weld equipment. Prevent outgassing and inhibit corrosion.

VacuSeal™: Leak-free for UHP applications. Mating gasket and toroid design provide a metal-to-metal seal from vacuum to positive pressure.

OTHERS

VAC100 Series: UHP vacuum generator. Stainless steel. Welded. For use in conjunction with purge systems.

Click on specific product names for additional information.

Fluid Delivery, Mixing and Distribution

REGULATORS

PR-01 Pressure Regulator: 1/4" regulator from modified PTFE with precision machined seat offers high cycle life, lower replacement costs and less downtime.

PR-08 Pressure Regulator: 1/2" regulator with no exposed metals for use in high purity fluid handling applications, including aggressive chemicals and slurry. Large diaphragm prevents the effects of pressure surge transfer downstream.

BR-08 Back Pressure Regulator: Improved performance with no exposed metals. For aggressive chemical and slurry applications. Prevents the effects of pressure surges from transferring downstream. One piece, precision machined diaphragm manufactured from modified PTFE.

VALVES

New! 22 Series UHP Fluoropolymer Valves: Pneumatic and manual valves offer increased flow and better seat sealing for enhanced leak-free performance and greater safety. High cycle life in acids and slurry. Compact footprint. Manual valves feature a true lock-out, tag-out design.

MV-10 PFA Manual 2-Way Diaphragm Valves: Full 1/4" orifice provides maximum flow in a compact package. Molded PFA body with precision machined sealing areas for superior chemical resistance.

MV-11 PFA Manual 2-Way Diaphragm Valves: Full 1/2" orifice provides maximum flow in a compact package. Molded PFA body with precision machined sealing areas for superior chemical resistance. Submersible option.

MV-12 PFA Manual 2-Way Diaphragm Valves: Full 1" orifice provides maximum flow in a compact package. Molded PFA body with precision machined sealing areas for superior chemical resistance. Requires three full turns from fully closed to fully open position.

MV-16 PFA Manual 2-Way Diaphragm Valves: Full 3/4" orifice provides maximum flow in a compact package. Molded PFA body with precision machined sealing areas for superior chemical resistance. Multi-turn capability for precise flow adjustment.

MV-20-04 PFA Manual 2-Way Diaphragm Valves: PTFE slurry valve. Molded PFA body with precision machined sealing areas for superior chemical resistance. Improved cycle life with less fluid shear. High load point seat seal.

CV-1 Check Valves (1/4" – 1"): High purity PTFE valves for aggressive chemical or gas applications. No O-rings required for sealing. Machined PTFE spring for low cracking pressure and minimal back pressure for resealing.

CV-32 Check Valves (2"): The largest fluoropolymer check valve in the industry for bulk chemical transfer. High integrity sealing for back flow protection for PFA piping systems. Low cracking pressure. High flows.

RV Series Relief Valves: Molded PFA body with precision machined PTFE seats and diaphragm poppet. Permits flow upon reaching field set relief pressure. Resets when 35% of set point is reached.

MV-13 Series Needle Valves: One-piece PFA stem/handle and bodies provides strength and corrosion resistance for aggressive chemical and gas applications. PFA stem stop for safer operation.

Full Line PFA/PTFE Thermoplastic Valves: Includes full listing of manual and pneumatic valves, as well as check, relief and solenoid valves.

Parker in today's facility

FITTINGS

Parbond: For ultra pure or corrosive chemical applications. Leak-tight connections ideal for high flow, minimal pressure drop applications. Requires fusion welding.

Parflare: For ultra pure or corrosive chemical applications. PFA body for cleaner operation. Leak-tight with minimal dead volume. Can be used in side loading and vibration applications.

Pargrip: For corrosive environments and chemical applications. Leak-tight connections reduce downtime. Easy assembly. Numerous configurations reduce system complexity and cost.

MANIFOLDS

CASYs (Custom Manifold Assemblies): Offer typical space savings of 70% while eliminating many connections, minimizing dead legs and reducing installation costs and labor.

FLOW METERS

CFM1 Compact Ultrasonic Flow Meter: Offers greatly increased accuracy (plus or minus 2% of reading) compared to competition. Handles higher concentration acids, slurries and plating chemicals. Six channel converter saves space.

HEAT EXCHANGERS

HPX1 Heat Exchanger: Transfers heat to surrounding fluids while ensuring process purity and safety through a leak-proof design. Completely submersible.

OTHER

PFA Gauge Protectors: Suitable for pressure, vacuum, and dual range operations in semiconductor and aggressive chemical applications. In-line design for quick installation. Available with or without a gauge.

TS Series Thermocouple Sensor Assembly: Point-of-use temperature monitoring in fluid handling systems. Excellent accuracy and repeatability. High purity PFA coated thermocouples offer superior chemical resistance.

SMU-1 Series Inline Static Mixers: Improved radial mixi efficiency and consistency fo quick and convenient mixing of chemicals, CMP slurry and deionized water. Smaller footprints than competition.

PPV Series 6" PFA Pressure Vessels: For use in dispensing chemical delivery systems utilizing vacuum/pressurization techniques. Modular design with standard components for easy customization.

PFA DI Water Spray Gun: High purity PFA body with precision machined sealing areas. No need for elastomer seals. Optional recirculation kit. Available with multiple connectors.

Click on specific product names for additional information.

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