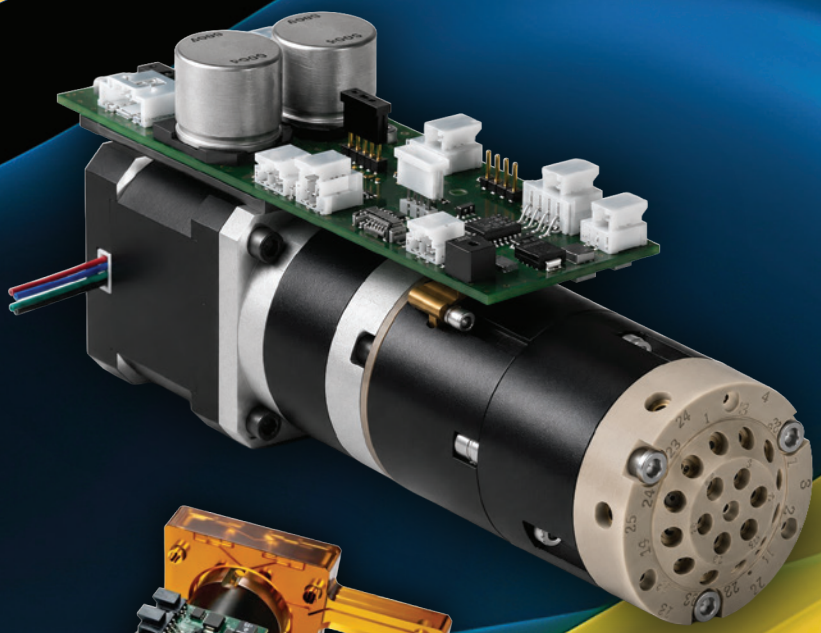
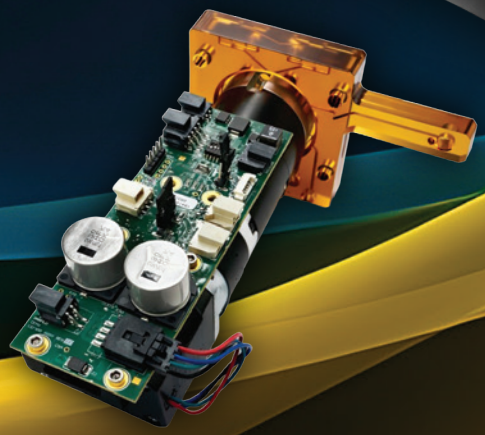
ADVANCING **PRECISION FLUIDICS**
FOR LIFE SCIENCE INNOVATION

MANIFOLDS
LOW PRESSURE ROTARY SHEAR VALVES





- **Capabilities**
- **Custom Manifolds**
- **Low Pressure Valves**
- **Intelligent Fluidic Control**

AFP®
Schivo Group

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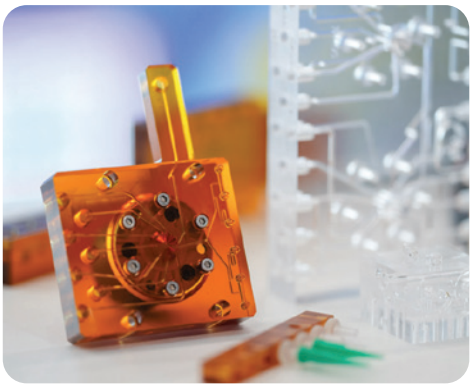
CAPABILITIES



YOUR SINGLE-SOURCE PARTNER FOR COMPLETE FLUIDIC SOLUTIONS

Modern analytical and life science instruments demand more than individual components—they require integrated fluidic architectures engineered for precision, reliability, and scalability.

AFP Life Sciences helps OEMs transform complex concepts into manufacturable, production-ready systems.

Core Capabilities

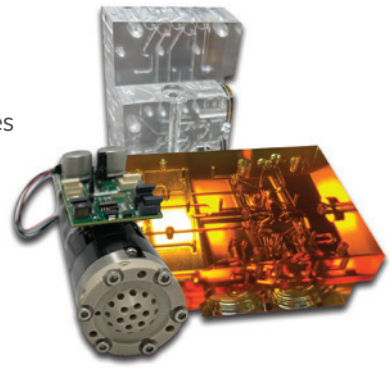
- Precision fluidic component selection
- Custom valve engineering
- Integrated manifold assemblies
- Fluidic subassemblies
- Smart automation-ready architectures
- Design for manufacturability (DFM)
- Rapid prototyping
- Lifecycle commercialization support
- Production-scale manufacturing

CUSTOM FLUIDIC SUBSYSTEMS BUILT FOR PERFORMANCE

Each AFP subsystem is engineered, assembled, and validated as a complete functional unit to reduce integration challenges and improve system reliability.

Integrated solutions

- Rotary valves
- Selection valves
- Injection valves
- Solenoid valves
- Custom tubing assemblies



Applications

- Liquid Chromatography
- HPLC / UHPLC
- LC-MS
- Genomics
- IVD
- Analytical Instrumentation

Reduce complexity. Lower risk. Accelerate time to market.

True innovation in analytical and life science instrumentation requires more than sourcing individual components—it demands a fluidic partner that can engineer complete, scalable solutions from concept through commercialization,"

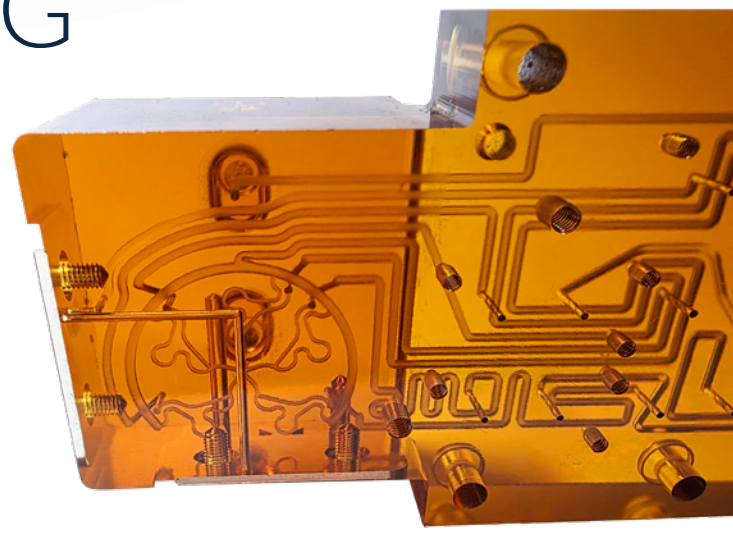
said **Chris Parzych**, Executive Director of Product Management at AFP Life Sciences. "At AFP, we enable the science behind next-generation innovation by helping OEMs reduce complexity, lower risk, and accelerate time to market with fully integrated fluidic architectures designed for precision, manufacturability, and long-term performance."

MANIFOLDS & MANUFACTURING

CUSTOM MANIFOLD INTEGRATION

Simplify Complex Fluid Paths

AFP manifold technologies consolidate multiple fluidic functions into compact, scalable assemblies engineered for performance.



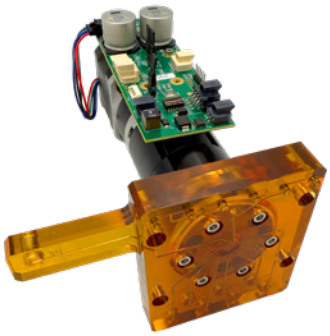
Benefits

- Reduced tubing and connection points
- Smaller instrument footprint
- Improved assembly efficiency
- Fewer leak paths
- Better fluidic repeatability
- Lower service complexity
- Cleaner, scalable architecture

Material Expertise

- PEEK
- Ultem
- Acrylic
- COC
- COP
- Stainless Steel
- Custom engineered materials

Including advanced chemically resistant diffusion-bonded manifold technologies for next-generation diagnostics.



"Diffusion bonding allows us to create monolithic fluidic structures with exceptional dimensional stability and fluidic integrity,"

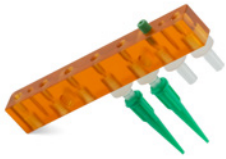
said Chris Parzych of AFP Life Sciences. "Combined with chemically resistant polymer materials, this enables instrumentation platforms to operate under more aggressive cleaning conditions while maintaining precision fluid handling."

ENGINEERED FOR MANUFACTURABILITY. BUILT TO SCALE.

Innovation requires manufacturing discipline.

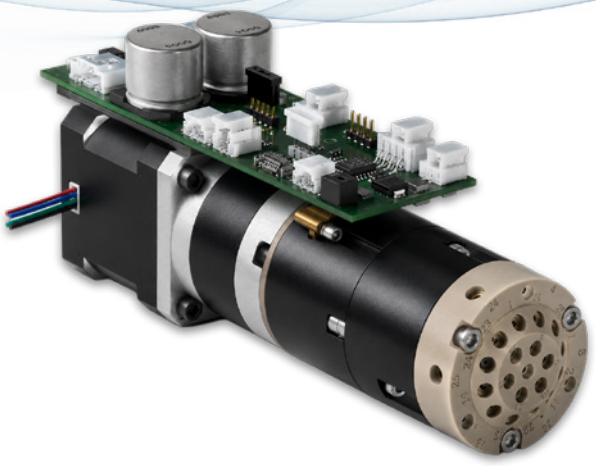
AFP combines engineering expertise with vertically integrated manufacturing:

- Precision CNC machining
- Micro machining
- Laser processing
- Injection molding
- Advanced polymer manufacturing
- Cleanroom assembly
- Leak testing
- Quality validation
- Scalable commercialization



Designed for performance. Built for production.

LOW PRESSURE **VALVES**



PRECISION VALVE TECHNOLOGIES FOR LOW & HIGH PRESSURE FLUIDIC CONTROL

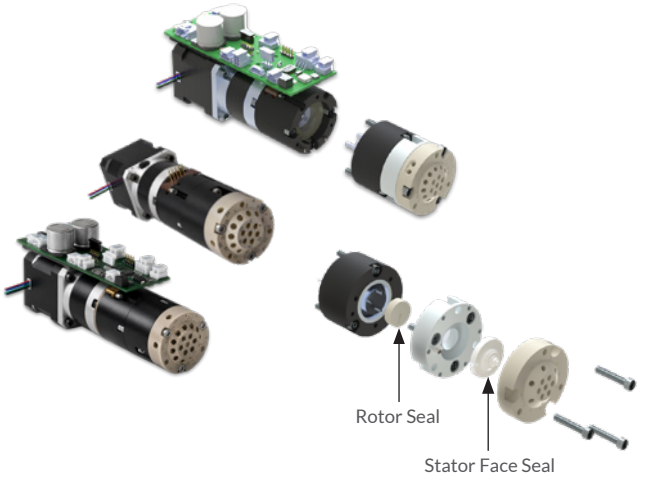
Low and high pressure fluidic valves—including precision **injector valves** and **selection valves**—play a critical role in enabling accurate, reliable fluid control across chromatography, genomics, and in vitro diagnostic (IVD) systems, with each optimized for distinct application demands.

LOW PRESSURE VALVES

Flexible Fluid Control for Complex Reagent Management

Applications:
- Reagent selection
- Wash protocols
- Sample prep automation
- Fluid multiplexing
- Magnetic bead handling
- Dilution / filtration
- Dynamic mixing
- Buffer routing mountable

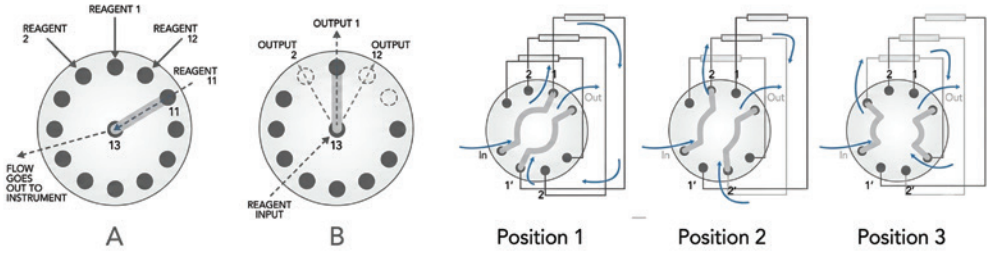
Benefits:
- Zero dead volume
- Reduced reagent waste
- Prevents unwanted mixing
- Faster actuation
- Simplified control
- Compact footprint
- Long operational life
- Standalone or manifold



Supports **4–24 fluid streams**

Selection Valves:

Deliver high flow flexibility and efficient automation for complex fluid routing and multiplexing.



Selection valves are designed to direct, switch, or route fluids between multiple flow paths, making them ideal for reagent selection, buffer routing, sample preparation, wash protocols, magnetic bead handling, and fluid multiplexing where high flow flexibility and efficient automation are essential.

Low pressure selection valves are particularly well suited for genomics, molecular diagnostics, and sample prep workflows where gentle fluid handling and precise routing of multiple fluid streams are required.

SMART VALVE PLATFORMS

NEXT-GENERATION INTELLIGENT FLUIDICS

AFP introduces the industry's first Intelligent Electronic Rotary Valves (IERV).

These groundbreaking valves integrate advanced precision sensing and predictive monitoring capabilities to optimize system performance and improve instrument reliability.

Ideal for:

- Genomics
- Microfluidics
- Molecular Diagnostics
- Life Science Instrumentation
- DNA Sequencing
- Proteomics
- Clinical Diagnostics

AFP's intelligent valve technology delivers true closed-loop feedback, providing real-time position verification and performance monitoring to ensure precise, reliable fluid control. Unlike conventional valves that simply execute commands without confirmation, our system continuously validates operation—enhancing accuracy, reducing risk, and enabling predictive maintenance capabilities that set a new industry standard.

RAPID DEVELOPMENT & SYSTEM INTEGRATION

ParLINK™ Software

ParLINK™ enables engineers to monitor performance and optimize valve behavior during prototyping.

Supported communication protocols:

- CAN-bus
- RS-232
- GPIO

ADVANCED INTELLIGENT FEATURES

Predictive Seal Loss Monitoring
Detects seal wear before it impacts system performance.

Torque Sensing & Monitoring
Ensures optimal valve operation while detecting emerging issues.

Flow Sensing with SPC Monitoring
Provides real-time fluid performance monitoring.

Pressure Sensing with Closed-Loop Protection
Protects against pressure spikes, clogs, and burst conditions.

Backlash Monitoring & Compensation
Maintains accurate port alignment and predicts wear.

WHY INTELLIGENT FLUIDICS MATTER

AFP IERV technology enables:

- ✓ Predictive maintenance
- ✓ Improved uptime
- ✓ Reduced service costs
- ✓ Smarter automation
- ✓ Real-time diagnostics
- ✓ Faster integration

PREDICTIVE MAINTENANCE INTELLIGENCE FOR AFP **SMART VALVES**

MOVING BEYOND REACTIVE MAINTENANCE

Traditional fluidic systems are typically maintained on fixed service intervals or repaired only after performance issues occur. While this approach may prevent some failures, it often leads to unnecessary maintenance costs, unexpected downtime, reduced instrument performance, and premature component replacement.

AFP's Predictive Maintenance Technology transforms valves and pumps from passive mechanical components into intelligent diagnostic assets capable of continuously monitoring their own health and performance. By leveraging advanced motion-control analytics, embedded diagnostics,

AFP's Predictive Maintenance Technology transforms valves and pumps from passive mechanical components into intelligent diagnostic assets capable of continuously monitoring their own health and performance.

and real-time operating data, AFP valves can identify early signs of wear and degradation long before they impact system performance or result in failure. Protected by AFP's patented technology (U.S. Patent Application Publication No. US20240376999A1), this innovative platform continuously analyzes the operating condition and health of critical fluidic components without requiring additional sensors or external monitoring hardware.

This innovative capability enables instrument manufacturers and end users to shift from reactive and schedule-based maintenance to a condition-based maintenance strategy. The result is improved reliability, reduced downtime, optimized service intervals, lower operating costs, enhanced instrument uptime, and greater confidence in critical analytical, diagnostic, and life science applications.

By creating a digital health profile for every valve and pump throughout its operating life, AFP delivers a smarter approach to fluidic system management—one that helps maximize performance, extend component life, and support the next generation of intelligent instrumentation.

PREDICT PROBLEMS BEFORE THEY BECOME FAILURES

- Detect wear before leakage occurs
- Eliminate unnecessary preventive maintenance
- Reduce unplanned downtime
- Extend valve and pump service life
- Enable remote diagnostics and fleet monitoring
- Support Industry 4.0 and smart instrument initiatives
- Create a digital health record for every valve and pump
- Improve reliability while lowering total cost of ownership

By establishing a baseline force profile during initial operation, the system can detect subtle changes in friction, wear,

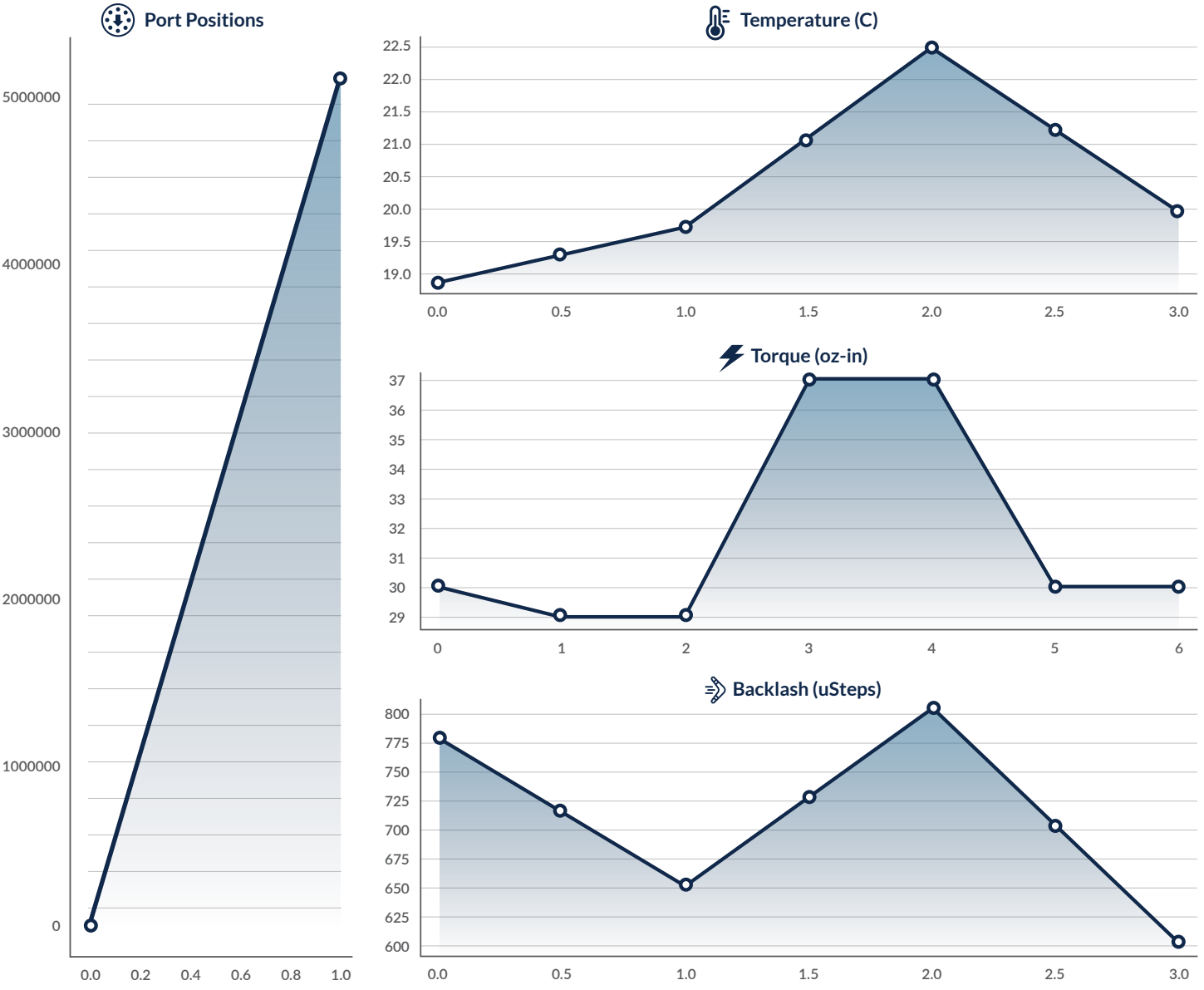
PREDICTIVE MAINTENANCE INTELLIGENCE FOR AFP **SMART VALVES**

HOW IT WORKS

The predictive maintenance capability is based on continuously monitoring **torque, positional accuracy, backlash, temperature, and motor current draw** to calculate the actual forces acting between moving components within a valve or pump. These parameters are used to characterize the interaction of materials across the entire **soft-to-hard material spectrum**, including polymers, ceramics, stainless steels, coatings, and composite materials.

By establishing a baseline force profile during initial operation, the system can detect subtle changes in friction, wear, deformation, and alignment that occur throughout the life of the component. As materials wear, the coefficient of friction changes, resulting in measurable changes in torque, current draw, backlash, and positional repeatability, which serve as indicators of degradation long before a functional failure occurs.

Simultaneous monitoring of valve operating parameters including positional data, temperature, torque, and backlash.



PREDICTIVE MAINTENANCE INTELLIGENCE FOR AFP **SMART VALVES**

The system continuously tracks these parameters and correlates them with operating conditions such as temperature and motion direction. Changes in friction coefficient, increasing backlash, rising torque requirements, or declining positional accuracy can indicate rotor/stator wear, seal degradation, spring fatigue, shaft wear, coating breakdown, or loss of mechanical preload.

Because these measurements are derived from existing motion-control hardware and embedded diagnostics, no additional sensors are required, creating a cost-effective and highly scalable predictive maintenance platform. The result is the ability to identify performance degradation before leakage, loss of accuracy, or catastrophic failure occurs, enabling condition-based maintenance rather than reactive maintenance.

All operating data can be stored within onboard memory or external databases and analyzed using **Statistical Process Control (SPC)** methodologies. Historical trends of torque, friction coefficient, backlash, temperature, positional accuracy, and force measurements can be used to establish control limits, monitor process capability, identify drift, and predict remaining useful life of critical components.

By combining real-time monitoring with long-term SPC trend analysis, the system creates a digital health record for each valve or pump, supporting predictive maintenance, reliability engineering, warranty reduction, remote diagnostics, and continuous improvement initiatives across an installed fleet of instruments.

Historical trends of torque, friction coefficient, backlash, temperature, positional accuracy, and force measurements can be used to establish control limits, monitor process capability, identify drift, and predict remaining useful life of critical components.

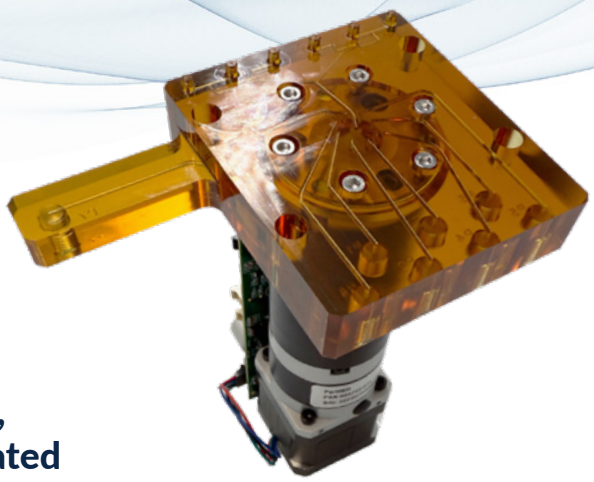
SUMMARY

AFP's predictive maintenance capability is most effective when implemented in accordance with AFP's validation methodology and application-specific operating guidelines. Because force, torque, backlash, positional accuracy, temperature, and friction characteristics vary significantly based on valve design, materials, operating pressures, fluids, duty cycles, and environmental conditions, AFP works closely with customers to establish baseline performance profiles and acceptable operating thresholds.

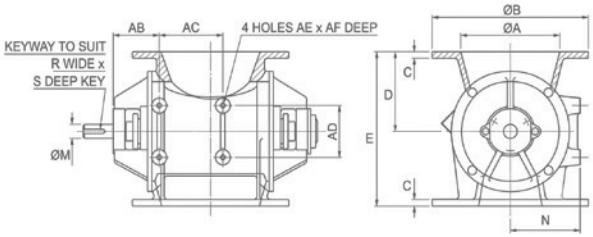
Through this collaborative validation process, AFP develops application-specific algorithms, SPC control limits, wear models, and maintenance criteria that maximize predictive accuracy while minimizing false indications. As a result, customers are encouraged to work directly with AFP during implementation to optimize the system for their specific application, ensuring the highest level of reliability, predictive capability, and long-term performance.

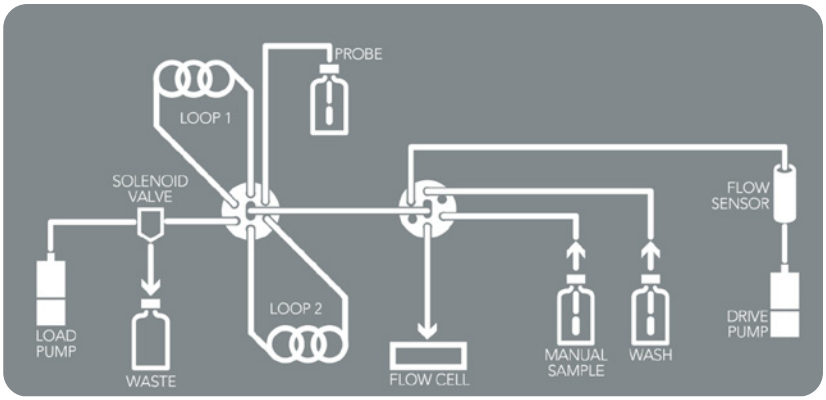
This partnership enables customers to fully leverage the technology while benefiting from AFP's expertise in fluidics, materials science, wear mechanisms, motion control, and predictive maintenance analytics. The result is a smarter, more reliable fluidic system capable of delivering enhanced uptime, reduced maintenance costs, improved operational efficiency, and greater confidence throughout the product lifecycle.

AFP **INTELLIGENT** ELECTRONIC **ROTARY VALVES**



The industry's first intelligent electronic rotary valve, the "IERV," improves your system design with integrated sensors, predictive features, and a smarter design.

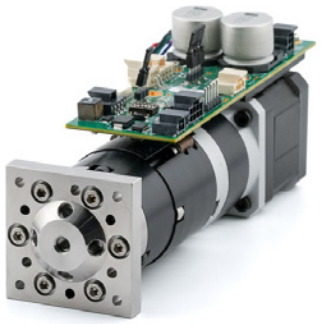




Available in:

- Low Pressure (LP)
- Medium Pressure (MP)

Rotary Shear Valves	IERV™ LP	IERV™ MP
Pressure Rating	0–110 psi (0–7 bar)	0–6,000 psi (0–414 bar)
2-position, 4-port	X	
2-position, 6-port	X	X
2-position, 10-port	X	X
4-position, 5-port	X	
4-position, 4-port	X	
6-position, 7-port	X	X
10-position, 11-port	X	
12-position, 13-port	X	
14-position, 15-port	X	
16-position, 17-port	X	
18-position, 19-port	X	
20-position, 21-port		
23-position, 24-port	X	
30-position, 31-port	X	
Custom Configurations	X	X



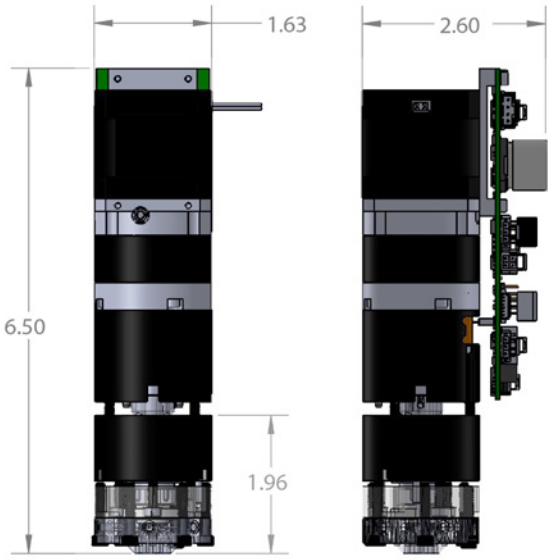
*25,000 psi valve in development

*Please inquire for industry cross-reference "drop-in"

AFP **INTELLIGENT** ELECTRONIC **ROTARY VALVES**

Rotary Shear Valves	IERV™ LP	IERV™ MP
Wetted Materials	PEEK, UHMWPE, Ceramic *Custom Materials Available*	Stainless Steel w/PEEK, Both PEEK *Custom Materials Available*
Port-to-Port Volume*	0.25–50.9 µL	0.28–0.50 µL
Flow Passage Diameters	0.010-0.060 in | 0.25-1.5 mm	0.004–0.012 in | 0.10–0.30 mm
Operating Temperature	0–60 °C	0–60 °C
Connections	1/4-28, 6-40 Manifold Integrated	10–32, M4
Replacement Components	IERV Kit, Stators, Rotor seals	IERV Kit, Stators, Rotor seals
Position Capability	Multilocation with random access within TIR of 0.0012 in	
Optional Driver Board	Yes	Yes
Stop-to-Stop Actuation Speed	100–250 ms	100–250 ms
ParLINK™ Software	X	X
Communication Protocols Available	CAN-bus, RS-232, IC2 (flow), GPIO, ANALOG, Dedicated Pressure Sensor connection.	
64-Unit Tandem Addressing	X	X
Micro stepping	X	X
Multi Direction +/-	X	X
Best Position Teaching	X	X
Backlash Calc & Removal	X	X
Predictive Seal Loss Monitoring	X	X
Torque Sensing & Monitoring	X	X
Pressure Sensing	X	
Pressure SPC Monitoring	X	
Ports Leak Decay Test	X	
Flow Sensing	X	
Flow SPC Monitoring	X	
Reverse Voltage Protection	X	X
Short Circuit Protection	X	X

*The volume in an orifice from an inlet port to the common port in the valve



Best Position Teaching:
Uses flow during factory calibration to set port positions

Backlash Calc & Removal:
Eliminates wear from extra movements

Predictive Seal Loss Monitoring:
Ensure your valves do not wear out

Torque Sensing & Monitoring :
Used for predictive maintenance and to detect other potential problems

Pressure Sensing + SPC Monitoring:
Protect the system and avoid expensive clogs and bursts

Flow Sensing + SPC Monitoring:
Ensure system performance every run

Applications

- Genomics
- Proteomics
- DNA Sequencing
- Diagnostics
- Microfluidics

ORDERING INFORMATION

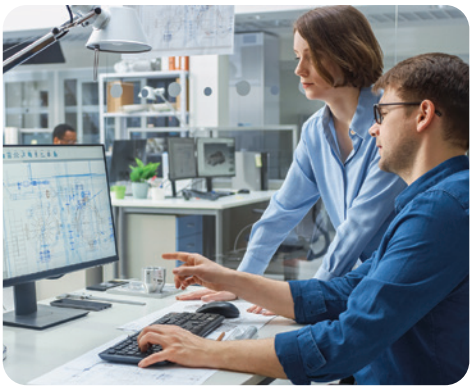
IERV ORDERING INFORMATION

The following components and accessories support AFP Intelligent Electronic Rotary Valve systems.

Part number	Description
PAR-060723-014	Complete valve assembly optimized for low pressure applications (100 PSIG)
PAR-060723-035	Complete valve assembly optimized for medium pressure applications (600 PSIG)
PAR-070623-040	Complete valve assembly optimized for high pressure applications (2500 PSIG)
PAR-052	1/4-28 fittings, quantity 25
PAR-053	6-40 fittings, quantity 25
PAR-054	11 meters of 1/16" OD PTFE tubing
PAR-055	CAN communication cable with DB9 connector
PAR-056	Power cable with pigtail connection
PAR-057	Peak PCAN USB to CAN adapter for ParLINK™
PAR-058	RS232 serial communication cable
PAR-059	Flow sensor cable
PAR-060	Sensirion flow sensor
PAR-061	Pressure sensor
PAR-064	Tandem CAN connection cable
PAR-065	Pressure sensor cable
ParLINK™	USB drive containing ParLINK™ evaluation software

INNOVATION BEGINS WITH THE RIGHT PARTNER

At AFP Life Sciences, we do more than supply precision fluidic components—we enable the science that drives breakthrough discovery, next-generation genomics, and transformative innovation. From advanced fluidic solutions to a complete portfolio of replacement parts, partnering with AFP provides the expertise, reliability, and technology foundation to accelerate development and unlock what's next.



PARTNER WITH **AFP LIFE SCIENCES**

From concept through commercialization, AFP helps OEMs reduce risk, accelerate timelines, and achieve superior fluidic performance.

Why AFP

- ✓ Precision engineering
- ✓ Custom fluidic architectures
- ✓ Integrated manufacturing expertise
- ✓ Analytical & life science specialization
- ✓ Commercialization support

Precision Manufacturing and Contract Services for the Highest-Quality, Most-Reliable Valves, Components, and High-Level Assemblies

AFP's vertically integrated precision manufacturing delivers unmatched quality in valves, manifolds, and fluidic assemblies—and those same capabilities are available through our contract manufacturing & engineering services. From prototype to production, we help OEMs achieve analytically clean, leak-free performance, higher uptime, and faster time-to-market across GC, LC, MS, IVD, and genomics.

AFP LIFE SCIENCES

Precision Fluidic Solutions for Analytical & Life Science Innovation
Let's engineer what's next.

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