



# VALVE, ACTUATION AND INSTRUMENTATION PORTFOLIO



*Experience In Motion*



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## EXPERIENCE IN MOTION

Every day, our customers are challenged to take their plant operations to the next level. To do that, they need partners who deliver much more than products.

Flowserve is answering that call. We're working with the world's most important providers of oil and gas, power, chemicals, water and other essential products to solve the absolute toughest challenges in fluid motion and control.

Our industry-leading portfolio of pumps, seals, valves and actuation is only part of the story. Our customers need answers that demand extensive know-how and experience, and we've got it. More than 18 000 committed associates are go-to resources for expert engineering, project management, technical support and service in every corner of the world.





### Expertise and Experience

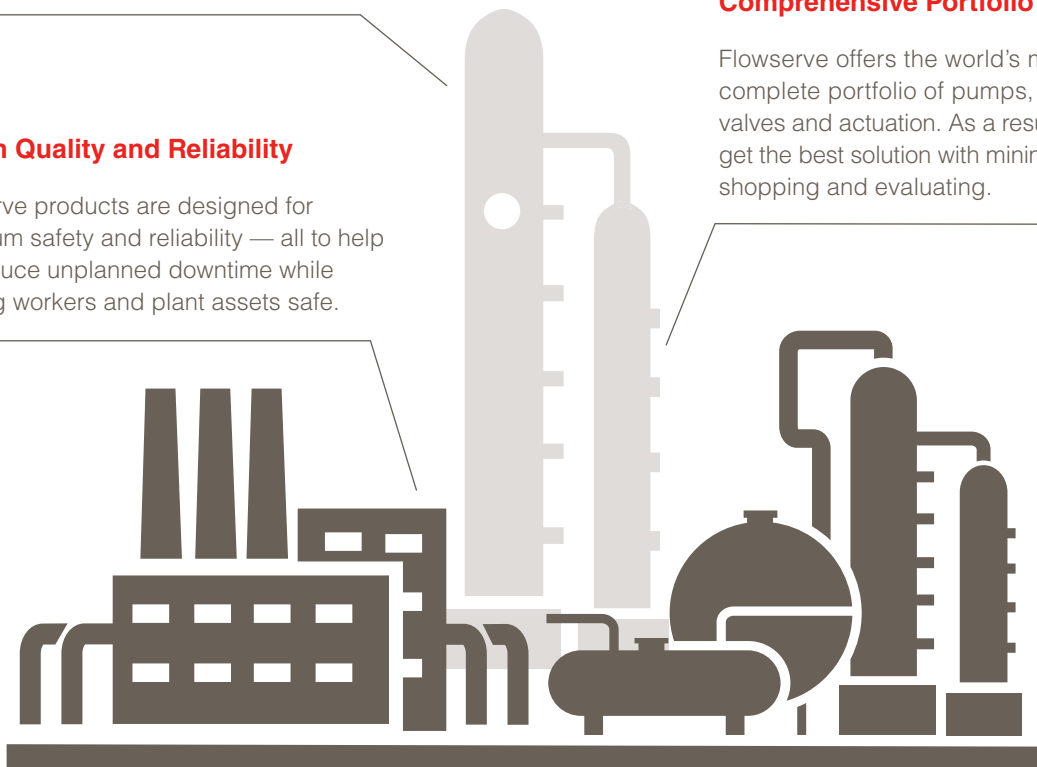
Flowserve has an unrivaled combination of technical expertise and practical experience to help you solve the toughest fluid motion control challenges.

### Proven Quality and Reliability

Flowserve products are designed for maximum safety and reliability — all to help you reduce unplanned downtime while keeping workers and plant assets safe.

### Comprehensive Portfolio

Flowserve offers the world's most complete portfolio of pumps, seals, valves and actuation. As a result, you'll get the best solution with minimal time shopping and evaluating.



### Technology and Insights

We help maximize your systems' efficiency and uptime by applying flow-specific technologies and advanced aftermarket capabilities, all supported by a vast team of technical resources.

### Local Support Worldwide

Flowserve is everywhere you do business. Our global network of Quick Response Centers helps to minimize downtime with hands-on support that's fast and dependable.



## PRECISION CONTROL FOR THE TOUGHEST FLUID MANAGEMENT CHALLENGES

Sites around the world trust Flowserve to provide unmatched control for the most difficult fluid management applications.

World-class valve performance is assured by a full portfolio of quarter-turn, rotary, linear, control and specialty configurations. Unrelenting performance, extended service life, and safe operation are at the core of every valve we manufacture.

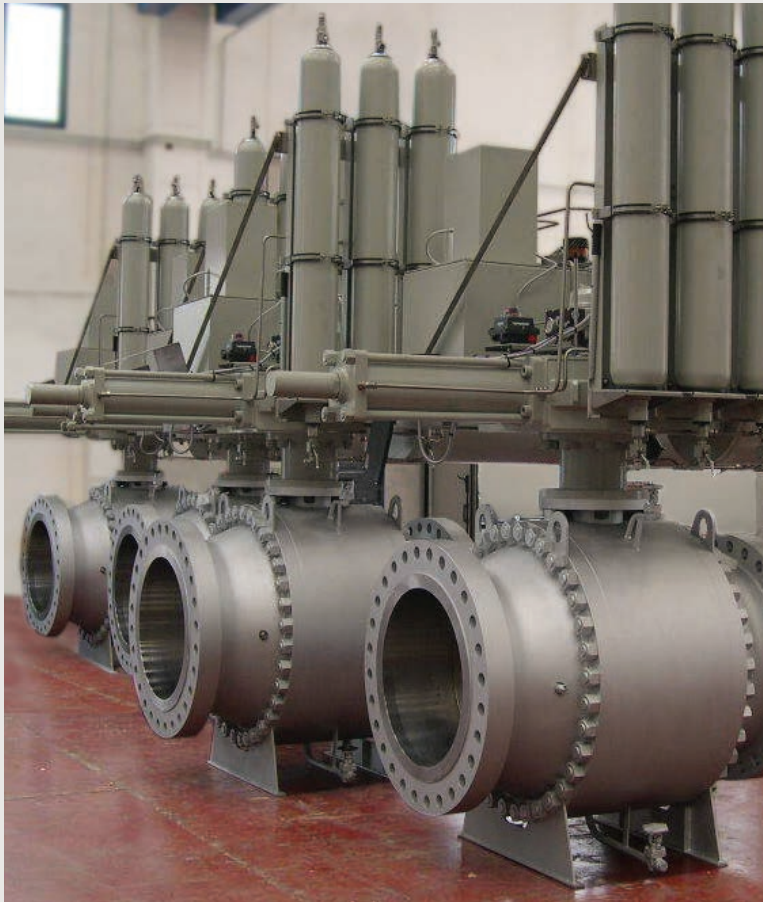
Flowserve also offers precision actuation and instrumentation for every application, from remotely controlled, fully automated electric, hydraulic and pneumatic actuators to electronic positioners and level switches. Fail-safe isolation, on-off modulation and precision process control ensure efficient and reliable operation, even in the most hazardous environments.

Every intelligent flow control solution is designed to deliver industry-leading performance and reliability, with embedded technologies that make them easy for operators to use and maintain. By coupling our control solutions with real-time system analysis, predictive maintenance and remote service capabilities, you'll get end-to-end intelligence that maximizes your uptime.

Even as we meet today's challenges, we're looking ahead to tomorrow's needs, pushing the limits of materials, severe-duty enhancements, precision control, optimized flow and safety.

## WORLD-RENOWNED BRANDS

Flowserve can trace its expertise in flow control back to the mid-19<sup>th</sup> century and the earliest application of control valves. Today, the Flowserve portfolio boasts some of the world's most renowned valve, actuation and instrumentation brands.



Accord™

Anchor/Darling®

Argus®

Atomac®

Automax™

Durco®

Edward®

Kammer®

Limitorque®

Logix™

McCANNA™

NAF®

Norbro®

Nordstrom®

PMV™

Serck Audco®

Valbart®

Valtek®

Worcester®



## INDUSTRIES

The world's infrastructure industries rely on Flowserve to solve their most complex fluid motion and control challenges. We deliver more than the most complete portfolio of pumps, seals, valves and actuation; we help our customers exceed their operational goals. We understand that profitable performance requires critical process equipment and systems operate safely, reliably and at maximum efficiency. Our commitment to meeting these expectations for our customers drives everything we do.



### OIL AND GAS

From production wells deep on ocean floors and remote oil sands, to transportation infrastructures that span continents and refineries that create the world's feedstocks — global energy companies push the limits of fluid motion and control. They need solutions for increasingly demanding applications. To meet their high-temperature, high-pressure processing needs, Flowserve provides unmatched mechanical, hydraulic and materials know-how and the industry's most complete flow management portfolio. Backed by service and support teams around the globe, we can help maximize uptime, productivity and safety, and keep you at the forefront of innovation.



### CHEMICAL

Aggressive corrosion and erosion. Hazardous, toxic substances. Application variation that makes equipment specification more than a little challenging. The chemical industry faces tough challenges, and Flowserve is in the middle of them, solving our customers' most difficult hurdles every day. Our solutions span the industry, from basic, organic, specialty and fine chemicals to biofuels and pharmaceuticals. We continue to build on our materials science heritage and advance sealing and flow control technologies. We do this to help customers improve performance, maximize service life and keep personnel safe.





## **POWER**

Rapid load variations, frequent stops and starts, and the highest temperatures, flows and pressures. Welcome to fluid motion and control in the power industry. These grueling applications are where Flowserve became a driving force in power generation. To appreciate our role, you needn't look further than our pioneering work in nuclear power or the massive machines we've built for conventional steam plants. But that's history. Today, we're developing next generation solutions to meet the newest challenges, including concentrated solar, biomass and geothermal.



## **WATER RESOURCES**

Whether for flood control, desalination, distribution, waste management or agriculture, those who move water need to do it economically, sustainably and reliably. They need low-maintenance equipment and high-efficiency systems that minimize energy consumption. They also need partners who ensure the right solution is specified every time to minimize environmental impacts and control total life cycle costs. Supplying flow management systems for the global water resources is a commitment with far-reaching implications. That's why the world's leading municipalities and water system providers trust Flowserve.



## **GENERAL INDUSTRY**

From paper and metals to sweeteners and electronics, most of the world's products depend on reliable fluid motion and control solutions. Endless demanding and complicated application parameters are found in industries such as food and beverage, mining, steelmaking, and pulp and paper. Flowserve has a global portfolio of solutions and technical expertise capable of tackling the tough and often unique requirements found in these industries. A global network of Quick Response Centers delivers the timely technical support, parts and service needed to keep operations running dependably and profitably.



## SERVICES

### SERVICES THAT DRIVE SAFETY, RELIABILITY AND PERFORMANCE

Flowserve offers a comprehensive suite of services designed to provide unprecedented value and cost savings throughout the life span of the system. By integrating hydraulic, mechanical and materials engineering knowledge with real-world operating and practical business solutions, Flowserve helps customers:

- Increase equipment reliability
- Optimize asset uptime and performance
- Improve plant and personnel safety
- Lower total cost of maintenance



### PARTS, REPAIRS, UPGRADES AND FIELD SERVICES

Investments in well-equipped Quick Response Centers, mobile service fleets, and advanced manufacturing technologies along with the unrivaled expertise of its engineers, technicians and craftsmen enable Flowserve to address virtually every service requirement for process equipment, on- or off-site, regardless of OEM.

- **Repair and Upgrades** — From machining to mechanical upgrades to on-site management, Flowserve repairs and upgrades services to improve equipment performance while reducing downtime and costs.
- **Replacement Parts and Components** — Using its broad network of service and manufacturing centers, Flowserve supplies customers with the quality parts needed to keep operations running smoothly and profitably.
- **Field Services** — From maintenance to management, highly qualified Flowserve project managers, engineers and technicians can be deployed on-site to help your operations run smoothly.

## ENGINEERING AND TECHNICAL SERVICES

With world-class engineering and technical resources in more than 55 countries, Flowserve delivers value-added solutions that improve operational performance and increase profitability for its customers.

- **Technical Assessments** — Flowserve can perform system audits to identify operational issues that may be constraining output or elevating operating costs and recommended solutions.
- **Reliability Services** — Flowserve offers standard solutions to improve rotating equipment reliability while lowering cost of ownership.
- **Engineering Support** — Flowserve engineers can engage remotely or on-site to support grassroots project planning, system design or project management requirements.



## ASSET MANAGEMENT AND OPTIMIZATION

Flowserve continues to invest in capabilities and technologies to help customers realize more payback from their plant assets.

- **LifeCycle Advantage** — Through a combination of on-site assessments and technology, Flowserve experts help customers benchmark operational performance, define key metrics and implement solutions to achieve their long-term operational goals.
- **Intelligent Performance Solutions** — By employing sophisticated products, services and software to collect, examine and understand data, Flowserve helps customers use predictive analytics to take action and improve asset reliability.

## EDUCATION AND TRAINING

Flowserve offers a wide range of innovative programs to help plant operators, reliability specialists, engineers and maintenance personnel deepen their understanding of critical equipment and processes.

- **Learning Resource Center** — At its state-of-the-art Learning Resource Centers, Flowserve provides hands-on training and instruction in the principles of equipment operation, maintenance and reliability.
- **Customer On-site Training** — Flowserve can design, develop, and deliver training programs tailored specifically around the people, equipment and processes at a customer's facility.
- **Online Training** — Flowserve offers web-based modules with online testing and reporting to ensure comprehension of the most important principles.



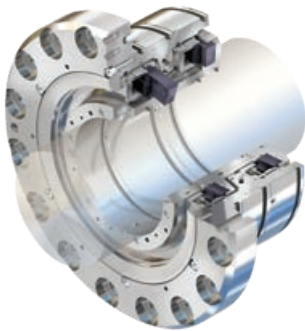
## OTHER FLOWSERVE PRODUCTS

Flowserve has the products, systems and expertise to help processes run smarter, safer and more efficiently. In addition to its extensive valve and actuation portfolios, Flowserve offers high-quality pumps and seals for the world's toughest applications.



### PUMPS

Pumping systems from Flowserve meet customer demands in the most arduous services. Our world-renowned brands of pre-engineered, engineered and special purpose pumps give customers access to the most impressive portfolio of proven hydraulic and mechanical know-how.



### SEALS

Whether for pumps, compressors, mixers or steam turbines, Flowserve mechanical sealing solutions keep rotating equipment running safely and efficiently. You'll find them in the toughest applications, such as flashing hydrocarbons, abrasive slurries and ultra-high pressure gases.

## WHEN AND WHERE YOU NEED US

Our network of manufacturing facilities, design centers of excellence, strategically located Quick Response Centers and customer on-site resources means customers never have to look far for support.





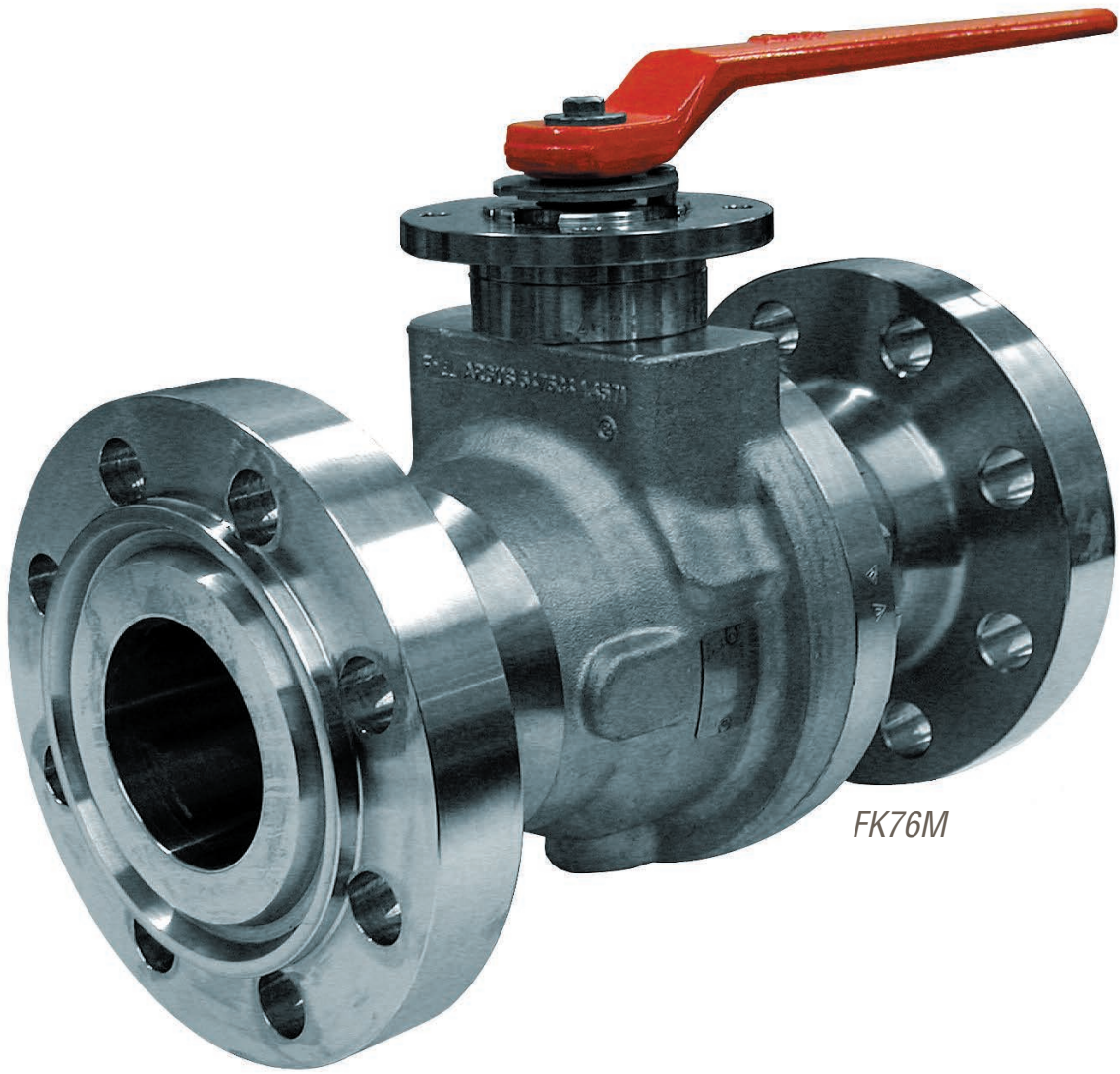


# VALVES

Whether it's critical, lethal, toxic or aggressive, you'll find Flowserve valves doing the job around the world. That's because extended service life, safe operation and environmental protection are at the core of every valve we manufacture. Global customers can easily find the configurations they require, engineered to meet requisite performance and safety standards, whether it's a standard or custom-engineered solution.

It's a portfolio of brands for quarter-turn, rotary, linear, control and specialty configurations that covers today's toughest demands for valve performance. But we're looking ahead to new challenges that will test the current state of valve manufacturing. This mindset pushes us to pursue materials advancements and severe-duty enhancements as well as the next levels of precision control, optimized flow and fail-safe shut-off.

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FK76M



# BALL

Long life and safe operation in tough services, from cryogenics to highly corrosive fluids — these are the hallmarks of our comprehensive and respected ball valve portfolio. Maximum safety and environmental protection are the driving factors in every design, achieved through corrosion-resistant materials, fire-safe testing, blowout-proof stems and tight shut-off features. Global customers can fulfill requirements from dozens of configurations built to a full range of international design and performance standards.

## Ball – Quick Reference\*

Product	Sub-Type	Sizes	Pressures	Temperatures
<b>FK75M</b>	Floating	DN 65 to 300 NPS 2½ to 12	PN 16 to 40 Class 150 to 900	-105°C to 650°C (-157°F to 1202°F)
<b>FK79</b>	Floating	DN 15 to 50 NPS ½ to 2	PN 16 to 250 Class 150 to 2500	-105°C to 650°C (-157°F to 1202°F)
<b>Duball™ DL</b>	Floating	DN 25 to 400 NPS 1 to 16	PN 10 to 40 Class 150 to 300	-30°C to 250°C (-22°F to 482°F)
<b>Worcester Three-Piece Ball</b>	Floating	DN 8 to 150 NPS ¼ to 6	PN 100 Class 600	-46°C to 230°C (-51°F to 446°F)
<b>Worcester Flanged Ball</b>	Floating	DN 15 to 250 NPS ½ to 10	PN 20 to 50 Class 150 to 300	-46°C to 315°C (-51°F to 600°F)
<b>Worcester Cryogenic Ball</b>	Floating	DN 8 to 150 NPS ¼ to 6	PN 100 Class 600	-196°C to 82°C (-321°F to 180°F)
<b>CryoSeal</b>	Floating	DN 15 to 200 NPS ½ to 8	PN 20 to 100 Class 150 to 600	-196°C to 200°C (-320°F to 400°F)

\* Additional products shown on next two pages

## Ball – Quick Reference, cont'd.

Product	Sub-Type	Sizes	Pressures	Temperatures
<b>ProCap Capping Valve</b>	Segmented	DN 500 to 750 NPS 20 to 30	PN 16 Class 150	-30°C to 250°C (-22°F to 482°F)
<b>FK76M</b>	Trunnion-Mounted	DN 65 to 500 NPS 2½ to 36	PN 16 to 160 Class 150 to 900	-105°C to 650°C (-157°F to 1202°F)
<b>HK35</b>	Trunnion-Mounted	DN 50 to 500 NPS 2 to 20	PN 160 to 250 Class 1500 to 2500	-105°C to 650°C (-157°F to 1202°F)
<b>VW1</b>	Trunnion-Mounted	DN 50 to 1600 NPS 2 to 64	PN 20 to 420 Class 150 to 2500	-46°C to 220°C (-50°F to 428°F)
<b>VB2 and VB3</b>	Trunnion-Mounted	DN 25 to 1600 NPS 1 to 64	PN 20 to 420 Class 150 to 2500 API 2000 to 10 000	-196°C to 400°C (-320°F to 750°F)
<b>Subsea</b>	Trunnion-Mounted	DN 50 to 1400 NPS 2 to 56	PN 20 to 420 Class 150 to 2500 API 2000 to 10 000	-46°C to 150°C (-51°F to 302°F)
<b>Double Block and Bleed</b>	Trunnion-Mounted	DN 50 to 1200 NPS 2 to 48	PN 20 to 420 Class 150 to 2500	-196°C to 400°C (-320°F to 750°F)
<b>Cryogenic Ball Valve</b>	Trunnion-Mounted	DN 25 to 1400 NPS 1 to 56	PN 20 to 420 Class 150 to 2500	-196°C to 200°C (-320°F to 392°F)
<b>Trunnball™ DL</b>	Trunnion-Mounted	DN 150 to 900 NPS 6 to 36	PN 10 to 40 Class 150 to 300	-30°C to 250°C (-22°F to 482°F)
<b>Rising Stem Ball Valve (RSBV)</b>	Rising Stem	DN 25 to 600 NPS 1 to 24	PN 10 to 320 Class 150 to 2500	-196°C to 600°C (-321°F to 1112°F)
<b>AKH2</b>	Lined	DN 15 to 350 NPS ½ to 14	PN 16 Class 150	-10°C to 200°C (14°F to 392°F)
<b>AKH2-300</b>	Lined	DN 25 to 150 NPS 1 to 6	PN 50 Class 300	-10°C to 200°C (14°F to 392°F)
<b>AKH2A</b>	Lined	NPS 1 to 6	Class 150	-10°C to 200°C (14°F to 392°F)



Product	Sub-Type	Sizes	Pressures	Temperatures
<b>AKH3</b>	Lined	NPS 1 to 14	Class 150	-10°C to 200°C (14°F to 392°F)
<b>AKH5</b>	Lined	DN 25 to 150 NPS 1 to 6	PN 16 Class 150	-10°C to 350°C (14°F to 662°F)
<b>AKH7-KP</b>	Lined	DN 25 to 50 NPS 1 to 2	For glass connections	-10°C to 200°C (14°F to 392°F)
<b>AKH8</b>	Lined	DN 15 to 150 NPS ½ to 6	PN 16 Class 150	-10°C to 200°C (14°F to 392°F)
<b>V-Port</b>	Lined	DN 25 to 150 NPS 1 to 6	Varies, depending on valve	Varies, depending on valve
<b>AMP3</b>	Lined	DN 25 to 150 NPS 1 to 6	PN 16 Class 150	-10°C to 200°C (14°F to 392°F)
<b>Sight Glass Series</b>	Lined	DN 25 to 150 NPS 1 to 6	PN 16 Class 150	-10°C to 200°C (14°F to 392°F)
<b>AKH6 Fully Lined Tank Drain</b>	Lined	DN 25x50 to 150x200 NPS 1x2 to 6x8	PN 16 Class 150	-10°C to 200°C (14°F to 392°F)
<b>McCANNASEAL®</b>	Top-Entry	DN 15 to 450 NPS ½ to 18	PN 20 to 260 Class 150 to 1500	-196°C to 815°C (-320°F to 1500°F)
<b>VT1</b>	Top-Entry	DN 50 to 1400 NPS 1 <sup>13</sup> / <sub>16</sub> to 16 <sup>3</sup> / <sub>4</sub>	PN 20 to 420 Class 150 to 2500 API 2000 to 10 000	-196°C to 400°C (-320°F to 750°F)

# BALL

## FLOATING

### FK75M



Argus®

A split-body ball valve for the chemical and petrochemical industries with a highly standardized design.

- Increased uptime and durability from robust design with chemical coating and high-performance cladding
- Reliable performance to highest zero-tightness demands enabled by FCI 70-2 Class VI seat design
- Reduced replacement cost via easy upgrades and chemical coating options for diverse applications
- Improved plant and personnel safety assured by valve compliance with fugitive emissions standard ISO 15848

#### SPECIFICATIONS

Sizes: DN 65 to 300; NPS 2½ to 12  
Press: PN 16 to 40; Class 150 to 900  
Temp: -105°C to 650°C  
(-157°F to 1202°F)

Refer to literature  
ARAFLO001-W-FK75M at  
[flowserve.com/library](http://flowserve.com/library).

## FLOATING

### FK79



Argus

With many innovative design features, the FK79 represents the highest standard in valve technology and is designed to meet API-6D, ASME 16.34 and ISO 17292 requirements.

- High performance in severe service conditions and extreme environments ensured by durable design with chemical coating and high-performance cladding
- Reliable performance to highest zero-tightness demands enabled by FCI 70-2 Class VI seat design
- Long service life via double-stem seal system and stem supported in bearings, ensuring seals are free from operating loads
- Reduced environmental impact and improved safety ensured by compliance with TA-Luft, EPA (Method 21) and ISO 15848 fugitive emissions requirements

#### SPECIFICATIONS

Sizes: DN 15 to 50; NPS ½ to 2  
Press: PN 16 to 250; Class 150 to 2500  
Temp: -105°C to 650°C  
(-157°F to 1202°F)

Refer to literature  
ARAFLO001-W-FK79 at  
[flowserve.com/library](http://flowserve.com/library).

## FLOATING

### Duball DL



NAF®

A high-performance, metal-seated, full-bore ball valve, equally suitable for isolation, on-off and modulating control applications.

- Long, maintenance-free, safe operation in automated on-off and control service assured by spring-loaded stem seal packing
- Increased plant and personnel safety via blowout-proof stem and high-torque transmission with minimum mechanical backlash
- Broad application versatility enabled by extensive size range and options, including fire-safe tested versions

#### SPECIFICATIONS

Sizes: DN 25 to 400; NPS 1 to 16  
Press: PN 10 to 40; Class 150 to 300  
Temp: -30°C to 250°C (-22°F to 482°F)

Refer to literature NFENTB4167  
at [flowserve.com/library](http://flowserve.com/library).



Worcester

## FLOATING

## Worcester Three-piece Ball

The Worcester family of three-piece ball valves is comprised of numerous configurations to suit a wide variety of application requirements. Each is designed to ASME B16.34 specifications.

- Significantly longer service life compared to conventional ball valves via improved stem seal design
- Increased durability from heavy-duty bolting and valve constructions
- Ease of maintenance enabled by design that allows actuators and brackets to be removed without affecting valve or piping integrity, plus easy access for stem seal adjustment
- Low inventory carrying costs made possible by common mounting brackets for three-piece and equivalent flanged valves

## SPECIFICATIONS

Sizes: DN 8 to 150; NPS ¼ to 6  
 Press: PN 100; Class: 600  
 Temp: -46°C to 230°C (-51°F to 446°F)

Refer to literature WCABR1050 or WCE4459 at [flowserve.com/library](http://flowserve.com/library).



Worcester

## FLOATING

## Worcester Flanged Ball

The Worcester family of standardized flanged ball valves offers tight shutoff and leak-tight stem seals. Each is designed for high-cycle operation, pressure integrity, material compatibility, fast operation and high-temperature endurance.

- Longer service life through unique seat design that minimizes friction and wear
- Economical operation facilitated by low operating torque
- Improved plant and personnel safety via compact, blowout-proof stem

## SPECIFICATIONS

Sizes: DN 15 to 250; NPS ½ to 10  
 Press: PN 20 to 50; Class 150 to 300  
 Temp: -46°C to 315°C (-51°F to 600°F)

Refer to literature WCABR1013 and PB 800 at [flowserve.com/library](http://flowserve.com/library).



Worcester

## FLOATING

## Worcester Cryogenic Ball

Worcester high-performance cryogenic shutoff valves are designed for tough applications involving all types of cryogens, including oxygen, hydrogen, methane, ammonia, nitrogen, fluorine, LNG and deuterium.

- High performance and low thermal stress assured by valve design that assures tight shutoff, zero-body leakage and low torque through large thermal excursions from ambient to -253°C (-425°F)
- Economical performance provided by eliminating the expensive high-maintenance stuffing box common in rising stem globe valves
- Increased plant and personnel safety assured by zero-leak packing, fire-tight design and blowout-proof/pressure-safe stem

## SPECIFICATIONS

Sizes: DN 8 to 150; NPS ¼ to 6  
 Press: PN 100; Class 600  
 Temp: -196°C to 82°C  
 (-321°F to 180°F)

Refer to literature WCABR1040 or WCEBR0013 at [flowserve.com/library](http://flowserve.com/library).

## BALL

### FLOATING

## CryoSeal

The optimum solution for cryogen flow isolation at temperatures as low as -196°C (-320°F), including LNG liquefaction, transportation and regasification. Certified fire-safe and meets ISO 15848 standards.

- Environmental and regulatory compliance made possible by design engineered to meet ISO 15848, ASME B16.34, BS 6364, MSS SP-134, MESG SPE 77/200, ASME B16.10 and API 6D specifications
- Easy in-line maintenance via top-entry design
- Simple and cost-effective to automate due to quarter-turn operation and low-torque seat profiles

### SPECIFICATIONS

Sizes: DN 15 to 200; NPS ½ to 8  
Press: PN 20 to 100; Class 150 to 600  
Temp: -196°C to 200°C  
(-320°F to 400°F)

Refer to MMENBR1027 or MMENIM2007 at [flowserve.com/library](http://flowserve.com/library).



McCANNA™

### SEGMENTED

## ProCap Capping Valve

Unique high-tech capping valve designed for automated filling of wood chips for batch digester applications in the pulp industry.

- Maximized uptime and reduced maintenance requirements via eccentric hubs, which load the seat and provide tight shutoff
- Increased efficiency provided by its unique design that prevents wood chips from getting stuck between the housing and the ball
- Improved safety and environment compliance due to tight shutoff that prevents leakage to the atmosphere during cooking sequence
- Excellent corrosion resistance from EN 1.4408/ASTM A351 CF8M body

### SPECIFICATIONS

Sizes: DN 500 to 750; NPS 20 to 30  
Press: PN 16; Class 150  
Temp: -30°C to 250°C (-22°F to 482°F)

Refer to literature Fk 41.55 at [flowserve.com/library](http://flowserve.com/library).



NAF

### TRUNNION-MOUNTED

## FK76M

Designed to meet API-6D, ASME B16.34 and ISO 17292 requirements, the FK76M delivers durability and low operating torques with a clear separation of sealing and bearing functions. Fire-safe to ISO 10497 and API 607.

- Long service life in severe applications owing to chemical coating and high-performance cladding
- Reliability ensured by seat design to FCI 70-2 Class VI, enabling it to meet the highest demands with zero tightness
- Reduced replacement cost, as performance capabilities of valves can be easily upgraded and coatings can be applied to suit different applications
- Improved plant and personnel safety from valve design, which meets fugitive emission standard ISO 15848

### SPECIFICATIONS

Sizes: DN 65 to 900; NPS 2½ to 36  
Press: PN 16 to 160; Class 150 to 900  
Temp: -105°C to 650°C  
(-157°F to 1202°F)

Refer to literature ARENTB0001 at [flowserve.com/library](http://flowserve.com/library).



Argus



Argus

## TRUNNION-MOUNTED

**HK35**

All the benefits of the FK76M in a high-pressure design. Designed to meet API-6D, ASME B16.34 and ISO 17292 requirements.

- Extended service life and low operating torques provided by clear separation of sealing and bearing functions on both ball and stem
- Environmental compliance assured by stem seal design, which meets current TA-Luft and EPA (method 21) standards
- Increased plant and personnel safety via fire-safe design and construction that complies with fugitive emission standard ISO 15848
- Installation ease enhanced by included DIN ISO mounting plate

## SPECIFICATIONS

Sizes: DN 50 to 500; NPS 2 to 20  
 Press: PN 160 to 250;  
 Class 1500 to 2500  
 Temp: -105°C to 650°C  
 (-157°F to 1202°F)

Refer to literature ARGBR1111  
 at [flowserve.com/library](http://flowserve.com/library).

## TRUNNION-MOUNTED

**VW1**

This API 6D-compliant, welded-body valve seals off both seats at the same time and allows bleeding of the entrapped cavity pressure (double block and bleed) with the ball in the closed position.



Valbart®

- Reduced fugitive emissions made possible by welded-body construction, which eliminates leak paths
- Greater process control and safety assured by dual independent floating seat design, guaranteeing sealing power at any pressure level
- Economical performance due to low torque requirements
- Simplified seal verification made possible by double block and bleed feature

## SPECIFICATIONS

Sizes: DN 50 to 1600; NPS 2 to 64  
 Press: PN 20 to 420; Class 150 to 2500  
 Temp: -46°C to 220°C (-50°F to 428°F)

Refer to VBEEBR1009 or VBENBR1010  
 at [flowserve.com/library](http://flowserve.com/library).

## TRUNNION-MOUNTED

**VB2 and VB3**

The Valbart VB2 and VB3 are repairable, bolted body, side-entry, trunnion-mounted ball valves featuring a fixed ball and floating seat rings. Compliant with API 6D and 6A.



Valbart

- Greater efficiency, safety and control enabled by pressure-absorbing bearings, seat-sealing action at any rated pressure and anti-static design
- Plant and personnel protected by anti-blowout design that ensures the stem is retained by the stem cover
- Environmental compliance assured by zero-emission design
- Reduced actuation costs, as seat design minimizes the torque required to operate the valve without losing the sealing power

## SPECIFICATIONS

Sizes: DN 25 to 1600; NPS 1 to 64  
 Press: PN 20 to 42; Class 150 to 2500;  
 API 2000 to 10 000  
 Temp: -196°C to 400°C  
 (-320°F to 750°F)

Refer to VBEEBR1009 or VBENBR1010  
 at [flowserve.com/library](http://flowserve.com/library).



# BALL

## TRUNNION-MOUNTED

### Subsea



Valbart

Quarter-turn ball valve designed for total reliability against internal and external leaks in shallow and deep-water applications.

- Application flexibility derived from compatibility with hydraulic actuators, ROV-operated gear boxes, and electrical and hydraulic umbilical systems
- Extended life due to robust design that protects against leaks with metal-to-metal seats, elastomeric and thermoplastic seals, and corrosion-resistant alloy seal housing
- Minimized leak paths made possible by body designs plus corrosion-resistant materials of construction
- Complete safety and functionality compliance ensured by hyperbaric chamber testing (API 6DSS certification/API Spec Q1)

#### SPECIFICATIONS

Sizes: DN 50 to 1400; NPS 2 to 56  
Press: PN 20 to 420; Class 150 to 2500; API 2000 to 10 000  
Temp: -46°C to 150°C (-51°F to 302°F)  
Refer to literature VBENBR1005 at [flowserve.com/library](http://flowserve.com/library).

## TRUNNION-MOUNTED

### Double Block and Bleed



Valbart

Side-entry ball valve, with either a bolted or welded body, designed for use in upstream, midstream and downstream oil and gas applications.

- Initial and installation cost savings owing to reduced structural requirements of design that saves both space and weight
- Increased system reliability from single valve with bleed port between two valves
- Improved plant and personnel safety due to anti-blowout stem, fire-safe construction and anti-static design

#### SPECIFICATIONS

Sizes: DN 50 to 1200; NPS 2 to 48  
Press: PN 20 to 420; Class 150 to 2500  
Temp: -196°C to 400°C (-320°F to 750°F)  
Refer to literature VBENBR1004 at [flowserve.com/library](http://flowserve.com/library).

## TRUNNION-MOUNTED

### Cryogenic Ball Valve



Valbart

Meets demanding end-user requirements for leak rate and fugitive emission performance. Body construction and flexible trim configurations ensure proper safe isolation.

- Improved seal performance at extremely low temperatures enabled by isolating stem seals from cold media
- Guaranteed optimum leakage resistance in demanding cryogenic applications via primary energized lip seal
- Increased reliability and safety from automatic discharge of excessive body pressure by internal self-relieving system (top- and side-entry models only)

#### SPECIFICATIONS

Sizes: DN 25 to 1400; NPS 1 to 56  
Press: PN 20 to 420; Class 150 to 2500  
Temp: 196°C to 200°C (-320°F to 392°F)  
Refer to literature VBEEBR1002 at [flowserve.com/library](http://flowserve.com/library).



NAF

## TRUNNION-MOUNTED

**Trunnball DL**

Full-port process ball valve well-suited for the most challenging operating conditions. Frequently used for isolation or on-off applications, but equally suitable for control.

- Improved plant and personnel safety provided by the Z-trim option's excellent cavitation control and noise reduction
- Reduced maintenance enabled by spring-loaded stem seal packing
- Broad application flexibility facilitated by the extensive size range
- Optimum controllability through the use of a sturdy blowout-proof stem that provides high torque transmission with minimal mechanical backlash

## SPECIFICATIONS

Sizes: DN 150 to 900; NPS 6 to 36  
 Press: PN 10 to 40; Class 150 to 300  
 Temp: -30°C to 250°C (-22°F to 482°F)

Refer to literature NFENB4168  
 at [flowserve.com/library](http://flowserve.com/library).

**Performance You Can Count On**

From the bone-chilling cold of the Arctic to the stifling dry heat of desert regions to the hot salty air of tropical coasts, Flowserve solutions can be found anywhere fluid motion and control are mission-critical. Our products excel, even in these challenging environments. And our flow control experts are right there with them to provide the engineering, installation and maintenance support you need to get the most out of your operations.



## RISING STEM

**Rising Stem Ball Valve (RSBV)**

The oil and gas industry's choice for applications requiring a mechanically energized metal or soft seat to prevent losses from process contamination or material leakage. Ideal for frequent cycling.

- Extended service life and low maintenance costs due to unique helix coil stem design, which enables friction-free opening and closing
- Improved product quality, efficiency and safety with tightness performance up to ASME FCI-70-2 Class VI
- Easy in-line inspection and maintenance enabled by top-entry design
- Reduced corrosion due to heavy wall thickness in excess to ASME B16.34
- Improved personnel safety from blowout-proof stem that meets international standards of API 600 and 6D

## SPECIFICATIONS

Sizes: DN 25 to 600; NPS 1 to 24  
 Press: PN 10 to 320; Class 150 to 2500  
 Temp: -196°C to 600°C  
 (-321°F to 1112°F)

Refer to literature VBENBR1008  
 at [flowserve.com/library](http://flowserve.com/library).



Valbart

# BALL

LINED

## AKH2



Atomac®

Designed to reduce energy and pumping costs, the AKH2 two-piece, full-port design minimizes pressure losses and increases flow capacity.

- Minimized downtime and maintenance from long-life seats and large stem sealing area, plus substantial middle flanges and molded liner
- Reduced energy costs enabled by low frictional coefficients and operating torques
- Reduced fugitive emissions made possible by reduction of stem side loads, eliminating potential valve gland leaks
- Increased plant and personnel safety assured by anti-blowout stem and anti-static design

### SPECIFICATIONS

Sizes: DN 15 to 350; NPS ½ to 14  
Press: PN 16; Class 150  
Temp: -10°C to 200°C (14°F to 392°F)  
Refer to literature ATENTB0010 at [flowserve.com/library](http://flowserve.com/library).

LINED

## AKH2-300



Atomac

This valve offers the same advantages as the AKH2 series, while meeting the stricter pressure requirements, wall thickness, face-to-face and flange dimensions of ASME Class 300.

- Enhanced safety derived from ASME Class 300 piping requirements demanded in the chlorine and related industries
- Low inventory carrying costs and simplified maintenance made possible by the high degree of interchangeability with the entire AKH2 series

### SPECIFICATIONS

Sizes: DN 25 to 150; NPS 1 to 6  
Press: PN 50; Class 300  
Temp: -10°C to 200°C (14°F to 392°F)  
Refer to ATETB001 or ATENTB0010 at [flowserve.com/library](http://flowserve.com/library).

LINED

## AKH2A



Atomac

The AKH2A is a short-pattern, full-port lined ball valve that offers the same benefits as the AKH2 at reduced space and weight. Designed per ASME B16.5 Class 150 flange dimensions and ASME B16.10 face-to-face dimensions.

- Broad application versatility enabled by a variety of metallic and non-metallic ball material options as well as available characterized ball for throttling services
- Greater application flexibility and decreased structural impact from reduced space and weight (compared to the AKH2)
- Lower operating costs resulting from high-efficiency performance
- Reduced automation costs due to low turning torque and ISO 5211 universal mounting pad

### SPECIFICATIONS

Sizes: NPS 1 to 6  
Press: Class 150  
Temp: -10°C to 200°C (14°F to 392°F)  
Refer to literature ATETB001 or ATENTB0010 at [flowserve.com/library](http://flowserve.com/library).

LINED

**AKH3**

The AKH3 is an ASME B16.10 short-pattern, reduced-port, lined ball valve. The floating ball design ensures bubble-tight shut-off.



Atomac

- Economical performance and improved process efficiency from bubble-tight shutoff across the pressure range of 1 mbar to 19 bar (14.5 to 275 psi)
- Long-term external leak protection provided by PTFE chevron packing rings in a deep stuffing box, substantial body flanges and molded liner seal
- Low installation costs, as ASME dimensions permit the replacement of previously installed valves with no need to alter existing piping
- Safety assured by blowout-proof stem assembly and anti-static device

## SPECIFICATIONS

Sizes: NPS 1 to 14  
 Press: Class 150  
 Temp: -10°C to 200°C (14°F to 392°F)  
 Refer to ATETB001 or ATENTB0010 at [flowserve.com/library](http://flowserve.com/library).

LINED

**AKH5**

These full-port, ceramic-lined valves are recommended when nothing else will work in applications with abrasive slurries, high-temperature corrosives and services with high-temperature fluctuations.



Atomac

- Long service life and wear resistance enabled by Mg-PSZ ceramic surfaces that resist erosion, corrosion and extreme temperature shock
- Increased uptime from minimal cavity space, which significantly reduces retention of line media and product contamination
- Reduced energy and pumping costs due to full port design, which minimizes pressure loss and increases flow capacity
- Shutoff to ASME FCI 70-2 Class IV
- Virtually no maintenance and low stem torque enabled by large stem sealing area

## SPECIFICATIONS

Sizes: DN 25 to 150; NPS 1 to 6  
 Press: PN 16; Class 150  
 Temp: -10°C to 350°C (14°F to 662°F)  
 Refer to ATETB001 or ATENTB0010 at [flowserve.com/library](http://flowserve.com/library).

LINED

**AKH7-KP**

Engineered exclusively for glass pipe systems. Available with socket/ball or plane end connections per DN EN 12585 or DN EN 1092. For flange/glass end connections, the AKH7-KPF is available.



Atomac

- Long service life and high corrosion resistance via FEP- or PFA-molded fluorocarbon resin liners (others available on request)
- Handling of highly viscous fluids or process applications with high purity requirements enabled by liners' inert, non-stick properties
- Increased plant and personnel safety assured by anti-static design and anti-blowout stem, plus long-term leak protection provided by PTFE chevron packing rings and molded liner/seal

## SPECIFICATIONS

Sizes: DN 25 to 50; NPS 1 to 2  
 Press: For glass connections  
 Temp: -10°C to 200°C (14°F to 392°F)  
 Refer to ATETB001 or ATENTB0010 at [flowserve.com/library](http://flowserve.com/library).

## BALL

LINED

### AKH8



Atomac

This full-port monoblock ball valve improves sticky, adhesive and highly viscous fluid applications, particularly in high cycling requirements that can cause deterioration in floating ball design valves.

- Superior performance in high-viscosity applications made possible by single-piece ball and stem unit
- Reduced downtime and maintenance enabled by metal-to-metal body joint, which absorbs destructive pipe vibrations and negative effects of thermal cycling
- Greater efficiency provided by larger diameter seats and integral retention lip, which minimize flow turbulence and enhance seat stability

#### SPECIFICATIONS

Sizes: DN 15 to 150; NPS ½ to 6  
Press: PN 16; Class 150  
Temp: -10°C to 200°C (14°F to 392°F)  
Refer to literature ATDEENFL0007 at [flowserve.com/library](http://flowserve.com/library).

LINED

### V-Port



Atomac

V-Port valves enable you to achieve precise control and modulation of aggressive products without the expense and long deliveries of exotic alloy valves.

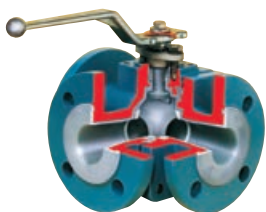
- Greater process control and modulation for throttling applications via characterized ball valve
- Available in models AKH3, AKH8, AKH2A and AKH2; or in Mg-PSZ ceramic for model AKH5.

#### SPECIFICATIONS

Sizes: DN 25 to 150; NPS 1 to 6  
Press: Varies, depending on valve  
Temp: Varies, depending on valve  
Refer to literature ATENTB0010 at [flowserve.com/library](http://flowserve.com/library).

LINED

### AMP3



Atomac

The compact design of this three-way ball valve permits use in corrosive diverter applications with space constraints.

- Lower capital cost in difficult services than alloy valves, with equal or superior corrosion resistance
- Reduced plant operating costs made possible by high-flow capacity, which minimizes valve pressure losses
- Broad application versatility for a wide variety of 90° or 180° flow patterns enabled by L- or T-ball configurations
- Improved efficiency due to floating ball seat design which ensures bubble-tight shutoff across the pressure range

#### SPECIFICATIONS

Sizes: DN 25 to 150; NPS 1 to 6  
Press: PN 16; Class 150  
Temp: -10°C to 200°C (14°F to 392°F)  
Refer to ATETB001 or ATENTB0010 at [flowserve.com/library](http://flowserve.com/library).





Atomac

## LINED

## Sight Glass Series

Atomac sight glasses offer clear visual inspection from either side. An integrated drip lip with a cast core provides visual flow indication, even at low velocity. Available in standard, three-way and four-way models.

- Convenience, efficiency and ease of visual inspection enabled by sight glass on either side
- High durability of inspection apertures assured by borosilicate glass, utilized to withstand high temperatures, mechanical stress and corrosion per DIN 7080
- Long service life and high corrosion resistance due to thick, uniform, blowhole-free FEP or PFA liners for all non-glass internal components

## SPECIFICATIONS

Sizes: DN 25 to 150; NPS 1 to 6  
 Press: PN 16; Class 150  
 Temp: -10°C to 200°C (14°F to 392°F)  
 Refer to ATETB001 or ATENTB0010 at [flowserve.com/library](http://flowserve.com/library).

## LINED

## AKH6 Fully Lined Tank Drain



Atomac

Primarily used for tank drainage, AKH6 valves are also commonly installed in place of reducing spools to downsize piping dimensions.

- Lower energy and pumping costs facilitated by larger inlet port and full-port design, which minimizes pressure loss and increases flow capacity
- Improved handling of highly viscous or high-purity services assured by inert, non-stick liners
- Reduced downtime and easy maintenance made possible by interchangeability of all internal components and spare parts with entire AKH2 series

## SPECIFICATIONS

Sizes: DN 25x50 to 150x200;  
 NPS 1x2 to 6x8  
 Press: PN 16; Class 150  
 Temp: -10°C to 200°C (14°F to 392°F)  
 Refer to ATETB001 or ATENTB0010 at [flowserve.com/library](http://flowserve.com/library).

## TOP-ENTRY

## McCANNASEAL



McCANNA

A high-performance, top-entry, metal- or soft-seated ball valve designed for use in PTA production and other general applications. Ideal for remote operations with high-cycle frequency.

- Reliable operation assured by sealing of carbon graphite seat, with wedge design for consistently "clean" finished product
- Economical performance via quarter-turn and low torque for compatibility with cost-effective actuators
- Improved personnel safety with fire-seal seats and two-way shutoff
- Fast, easy maintenance enabled by top-entry design that permits in-line service and emergency entrance in minutes
- Longer service life from engineered design that maximizes seal and seat lives

## SPECIFICATIONS

Sizes: DN 15 to 450; NPS ½ to 18  
 Press: PN 20 to 260; Class 150 to 1500  
 Temp: -196°C to 815°C  
 (-320°F to 1500°F)  
 Refer to literature MMENBR1015 at [flowserve.com/library](http://flowserve.com/library).

# BALL

## TOP-ENTRY

### VT1

An in-line repairable valve that assures bi-directional sealing with two independent floating seats. Double block and bleed feature, fire-safe design and anti blow-out stem.

- Increased efficiency enabled by independent ball and stem, which minimizes side thrust caused by pressure on the ball
- Improved safety assured by anti-static design that guarantees electrical continuity between all metallic components
- Simplified in-line inspection and maintenance made possible by top-entry design
- Compliance with the most severe pollution-control regulations owing to low-emission valves

#### SPECIFICATIONS

Sizes: DN 50 to 1400; NPS 1<sup>3</sup>/<sub>16</sub> to 16<sup>3</sup>/<sub>4</sub>  
Press: PN 20 to 420; Class 150 to 2500;  
API 2000 to 10 000  
Temp: -196°C to 400°C  
(-320°F to 750°F)

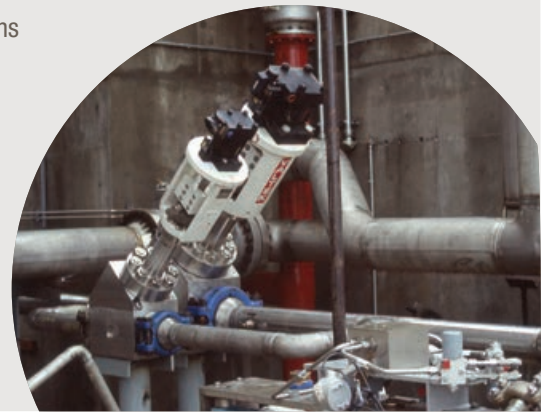
Refer to VBEEBR1009 or VBENBR1010  
at [flowserve.com/library](http://flowserve.com/library).



*Valbart*

## Your Partner in Safety – Valves for O<sub>2</sub> Service

The inherent danger of oxygen and oxygen-enriched applications poses particular safety hazards to your plant and personnel. Flowserve can help mitigate these risks. Our global network of oxygen-trained personnel is ready to work with you to ensure the valves used in your process meet or exceed industry requirements for safety and performance. Whether your application calls for on-off or control valves, Flowserve can provide consistently safe results.







*Big Max BX2001*

# BUTTERFLY

Ideal for precision throttling and on-off applications, especially in lighter-weight piping systems, the Flowserve family of butterfly valves is often specified for its versatility. Outstanding throttling accuracy for process control is achieved through low-friction, erosion-resistant sealing surfaces with very low operating torques. A broad range of applications can be met via metal- and soft-seated designs as well as lined versions for corrosive and hygienic applications.

## Butterfly – Quick Reference

Product	Sub-Type	Sizes	Pressures	Temperatures
<b>Big Max® BX2001</b>	Double-Offset	DN 50 to 900 NPS 2 to 36	PN 10 to 40 Class 150 and 300	-73°C to 288°C (-100°F to 550°F)
<b>TX3</b>	Triple-Offset	DN 80 to 1500 NPS 3 to 60	PN 20 to 260 Class 150 to 1500	-196°C to 820°C (-320°F to 1500°F)
<b>Torex™</b>	Triple-Offset	DN 80 to 700 NPS 3 to 28	PN 10 to 40 Class 150 and 300	-30°C to 350°C (-22°F to 662°F)
<b>BTV</b>	Lined	DN 50 to 600 NPS 2 to 24	PN up to 10 Up to 150 psi	177°C (350°F)
<b>Slimseal®</b>	Lined	DN 50 to 600 NPS 2 to 24	PN 10 to 20 Class 125 to 150	-10°C to 140°C (14°F to 284°F)



# BUTTERFLY

## DOUBLE-OFFSET

### Big Max BX2001

High-performance, all-purpose valve designed for precise throttling control or on-off service with lighter weight piping systems and less expensive, energy-efficient actuators.

- Broad application versatility via numerous design options: wafer and lug bodies; standard PFA, optional UHMWPE and fire-sealed versions; and multiple packing options
- Reduced fugitive emissions through triple-leak protection of primary stem seal plus two optional secondary seals
- Increased capacity and improved flow control with low-profile, double-offset disc
- Improved personnel and plant safety with anti-blowout protection per API 609

#### SPECIFICATIONS

Sizes: DN 50 to 900; NPS 2 to 36  
Press: PN 10 to 40; Class 150 and 300  
Temp: -73°C to 288°C  
(-100°F to 550°F)

Refer to literature DVENTB0039  
at [flowserve.com/library](http://flowserve.com/library).



Durco

## TRIPLE-OFFSET

### TX3

The TX3 boasts reliable, long-lasting, zero-leakage shutoff — even in gas applications. It has obtained numerous industry certifications, so it can be used around the world. Multiple valve body configurations available.

- Greater process control with API 598 Zero Leakage (bubble-tight) shutoff assured by triple-offset design and laminated metal-graphite seat seal
- Extended service life and outstanding throttling accuracy due to low operating torque resulting from the low-friction, low-wear elliptical sealing surfaces
- Environmental compliance achieved by packing options that meet stringent fugitive emissions requirements
- Improved safety with API 607 fire-safe design plus API 609/ASME B16.34 anti-blowout shaft

#### SPECIFICATIONS

Sizes: DN 80 to 1500; NPS 3 to 60  
Press: PN 20 to 260; Class 150 to 1500  
Temp: -196°C to 820°C  
(-320°F to 1500°F)

Refer to literature DVENBR0061  
at [flowserve.com/library](http://flowserve.com/library).



Durco

## TRIPLE-OFFSET

### Torex

High-performance, triple-offset, metal- or soft-seated butterfly valve frequently used for isolation or on-off applications, but equally suitable for control, especially on high-flow, low-pressure applications.

- Longer service life provided by triple-offset design, which minimizes seat wear during opening and closing
- Minimized pressure loss and low energy costs due to tight shut-off
- Low installation costs enabled by compact wafer design and low weight
- Improved safety assured by Safety Integrity Level (SIL) 3 and IEC 61508 certifications
- Increased uptime — even in difficult media and demanding pressures — through excellent design, materials and performance characteristics

#### SPECIFICATIONS

Sizes: DN 80 to 700; NPS 3 to 28  
Press: PN 10 to 40 Class 150 and 300  
Temp: -30°C to 350°C (-22°F to 662°F)

Refer to literature Fk41.42  
at [flowserve.com/library](http://flowserve.com/library).



NAF



Durco

## LINED

**BTV**

Reliable, leak-free service valve designed for a wide range of demanding requirements in corrosive chemical applications and process industries.

- Reduced downtime through the standard lined body and disc that defends against the most corrosive chemicals
- Lower maintenance costs from the triple-seal design and live-loaded shaft seal that never needs adjustment
- Increased application flexibility provided by a large selection of metal discs for use when greater protection is required
- Increased abrasion resistance in applications up to 93°C (200°F) with optional UHMWPE disc and body

## SPECIFICATIONS

Sizes: DN 50 to 600; NPS 2 to 24  
 Press: PN up to 10; up to 150 psi  
 Temp: up to 177°C (350°F)

Refer to literature DVENBR0020 at [flowserve.com/library](http://flowserve.com/library).



Serck Audco®

## LINED

**Slimseal**

High-performance, “fit and forget”, wafer-type valve with integrally molded body liner designed specifically for corrosive services and hygienic applications.

- Increased uptime compared to loose liners resulting from integrally molded elastomer body liner that is not prone to stretching
- Low maintenance requirements from liner construction that is designed to last throughout the entire valve lifecycle
- Reduced operating costs due to primary and secondary stem seal that prevents ingress of foreign material into valve
- Installation speed and simplicity enabled by a gasket that is integral to the body, and the body liner that eliminates potential for damage to expensive seats

## SPECIFICATIONS

Sizes: DN 50 to 600; NPS 2 to 24  
 Press: PN 10 to 20; Class 125 to 150  
 Temp: -10°C to 140°C (14°F to 284°F)

Refer to literature SRENTB0006 at [flowserve.com/library](http://flowserve.com/library).



*TMCBV*

## ROTARY CONTROL

Long life in severe conditions characterizes this flexible range of plug, ball and butterfly control valves. Precision control can be realized across a range of harsh applications, including fibrous slurries, entrained particles, steam and high-pressure/temperature liquids and gases. Users find numerous performance advantages, from reduced cavitation and flashing to low noise levels, as well as safety assurances from tight shut-off features and designs certified to the latest, global safety standards.

### Rotary Control – Quick Reference

Product	Sub-Type	Sizes	Pressures	Temperatures
<b>MaxFlo® 4</b>	Eccentric Plug	DN 25 to 300 NPS 1 to 12	PN 10 to 63 Class 150 to 600	-100°C to 400°C (-148°F to 750°F)
<b>ShearStream™ HP</b>	Segmented Ball	DN 25 to 400 NPS 1 to 16	PN 10 to 63 Class 150 to 600	-46°C to 316°C (-50°F to 600°F)
<b>Setball™</b>	Segmented Ball	DN 25 to 700 NPS 1 to 28	PN 10 to 40 Class 150 to 300	-30°C to 250°C (-22°F to 482°F)
<b>Setball SF</b>	Segmented Ball	DN 25 to 250 NPS 1 to 10	PN 10 to 40 Class 150 to 300	-30°C to 250°C (-22°F to 482°F)
<b>Valdisk</b>	High-Performance Butterfly	DN 50 to 750 NPS 2 to 30	PN 10 to 400 Class 150 to 2500	-196°C to 649°C (-320°F to 1200°F)
<b>Valdisk TX3</b>	High-Performance Butterfly	DN 80 to 1500 NPS 3 to 60	PN 20 to 260 Class 150 to 1500	-196°C to 820°C (-320°F to 1500°F)
<b>Torex</b>	High-Performance Butterfly	DN 80 to 700 NPS 3 to 28	PN 10 to 40 Class 150 and 300	-30°C to 350°C (-22°F to 662°F)
<b>TMCBV</b>	Trunnion-Mounted Control Ball	DN 75 to 1400 NPS 3 to 56	Class 150 to 2500 API 3000, 5000, 10 000	-196°C to 450°C (-320°F to 842°F)
<b>Trunball DL</b>	Trunnion-Mounted Control Ball	DN 150 to 900 NPS 6 to 36	PN 10 to 40 Class 150 to 300	-30°C to 250°C (-22°F to 482°F)
<b>CPT</b>	Floating Control Ball	DN 8 to 100 NPS ¼ to 4	PN 20 to 110 Class 150 to 600	-29°C to 427°C (-20°F to 800°F)
<b>Duball DL</b>	Floating Control Ball	DN 25 to 400 NPS 1 to 16	PN 10 to 40 Class 150 to 300	-30°C to 350°C (-22°F to 482°F)

# ROTARY CONTROL

## ECCENTRIC PLUG

### MaxFlo 4

Cost-competitive, high-performance general service control valve designed for applications demanding higher rangeability, precise control and higher flow capacity.



Valtek

- Economical performance with the highest rated  $C_v$  (as much as 70% more than competitors), which sometimes allows for smaller sizes to be used
- Longer service life and more precise control enabled by the robust polygon shaft/plug connection
- Low maintenance costs due to double-offset eccentric plug design that reduces seat wear while providing reliable Class IV (metal seat) and VI (soft seat) shutoff
- Improved safety with superior shaft blow-out protection from the ASME B16.34 shaft design

#### SPECIFICATIONS

Sizes: DN 25 to 300; NPS 1 to 12  
Press: PN 10 to 63; Class 150 to 600  
Temp: -100°C to 400°C  
(-148°F to 750°F)

Refer to literature VLENBR0064  
at [flowserve.com/library](http://flowserve.com/library).

## SEGMENTED BALL

### ShearStream HP

Rugged segmented ball valve designed to withstand harsh, particle-entrained processes found in the power, chemical, and oil and gas industries.



Valtek

- Increased uptime enabled by a durable, long-lasting design that easily handles abrasive, erosive and corrosive fluids
- Broad application versatility enabled by exceptional control and rangeability
- High-capacity and large turndown performance due to unrestricted straight-through port design
- High-pressure drop capability with the optional spring-loaded, heavy-duty seat, which provides reliable Class IV (metal seat) and Class VI (resilient UHMWPE seat) shutoff

#### SPECIFICATIONS

Sizes: DN 25 to 400; NPS 1 to 16  
Press: PN 10 to 63; Class 150 to 600  
Temp: -46°C to 316°C (-50°F to 600°F)

Refer to literature VLEEBR0027  
at [flowserve.com/library](http://flowserve.com/library).

## SEGMENTED BALL

### Setball

Cost-competitive general service V-port ball valve that offers excellent rangeability and high-flow capacity.



NAF

- High control accuracy over wide range and under severe conditions provided by V-shaped sector
- Low lifecycle and maintenance costs due to the ability to use low operating torque actuators
- Versatile design that combines the best control characteristics of ball and butterfly valves, allowing it to function as a control and shutoff valve
- Application versatility made possible by specialized materials and stem seal options

#### SPECIFICATIONS

Sizes: DN 25 to 700; NPS 1 to 28  
Press: PN 10 to 40; Class 150 to 300  
Temp: -30°C to 250°C (-22°F to 482°F)

Refer to literature Fk 41.51(19)  
at [flowserve.com/library](http://flowserve.com/library).





NAF

## SEGMENTED BALL

**Setball SF**

Cost-effective general services V-port ball valve that combines compact size, excellent control characteristics and high-flow capacity.

- Low total cost of ownership provided by compact face-to-face dimension and weight reduction
- Lower operating costs due to dual low-friction bearings and specially designed seat that make it possible to use a smaller actuator
- Environmental regulatory compliance enabled by one-piece, leak-proof, wafer-style body that minimizes leakage paths
- Optimum control performance provided by a stem with a splined transmission to the ball sector
- High-performance in a compact size due to direct actuator mounting

## SPECIFICATIONS

Sizes: DN 25 to 250; NPS 1 to 10  
 Press: PN 10 to 40; Class 150 to 300  
 Temp: 30°C to 250°C (-22°F to 482°F)

Refer to literature NFENTB4156  
 at [flowserve.com/library](http://flowserve.com/library).



Valtek

## HIGH-PERFORMANCE BUTTERFLY

**Valdisk**

Heavy-duty design engineered for high-capacity and low-pressure loss. Ideal for fibrous slurries, liquids, and gas and steam applications under extreme pressures and temperatures.

- High-performance throttling, even in large pressure drops close to the seat, enabled by high-thrust cylinder actuator coupled with eccentric-cammed disc
- Greater throttling accuracy assured by low breakout torque provided by jam-lever toggle seating
- Superior process control with bi-directional, bubble-tight shutoff at high and low pressure drops
- Reduced maintenance costs made possible by double-offset disc design, which minimizes seat and disc wear plus reduces leakage

## SPECIFICATIONS

Sizes: DN 50 to 750; NPS 2 to 30  
 Press: PN 10 to 400; Class 150 to 2500  
 Temp: -196°C to 649°C  
 (-320°F to 1200°F)

Refer to literature VLATB010  
 at [flowserve.com/library](http://flowserve.com/library).



Valtek

## HIGH-PERFORMANCE BUTTERFLY

**Valdisk TX3**

The TX3 boasts reliable, long-lasting, zero-leakage shutoff — even in gas applications. It has obtained numerous industry certifications, so it can be used around the world. Multiple valve body configurations available.

- Greater process control with API 598 Zero Leakage (bubble-tight) shutoff assured by triple-offset design and laminated metal-graphite seat seal
- Extended service life and outstanding throttling accuracy due to low operating torque resulting from the low-friction, low-wear elliptical sealing surfaces
- Environmental compliance achieved by packing options that meet stringent fugitive emissions requirements
- Improved safety with API 607 fire-safe design plus API 609/ASME B16.34 anti-blowout shaft

## SPECIFICATIONS

Sizes: DN 80 to 1500; NPS 3 to 60  
 Press: PN 20 to 260; Class 150 to 1500  
 Temp: -196°C to 820°C  
 (-320°F to 1500°F)

Refer to literature VLENBR0061  
 at [flowserve.com/library](http://flowserve.com/library).

# ROTARY CONTROL

## HIGH-PERFORMANCE BUTTERFLY

### Torex

High-performance, triple-offset, metal- or soft-seated butterfly valve. Frequently used for isolation or on-off applications but equally suitable for control, especially on high-flow, low-pressure applications.

- Longer service life provided by triple-offset design which minimizes seat wear during opening and closing
- Cost-effectiveness provided by compact wafer design and low weight
- Improved safety assured by Safety Integrity Level (SIL) 3 and IEC 61508 certifications
- Increased uptime — even in difficult media and demanding pressures — through excellent design, materials and performance characteristics

#### SPECIFICATIONS

Sizes: DN 80 to 700; NPS 3 to 28  
Press: PN 10 to 40; Class 150 and 300  
Temp: -30°C to 350°C (-22°F to 662°F)  
Refer to literature Fk 41.42(17)  
at [flowserve.com/library](http://flowserve.com/library).



NAF

## TRUNNION-MOUNTED CONTROL BALL

### TMCBV

Cost-efficient, compact gas valve that provides excellent flow capacity and high rangeability.

- Improved plant and personnel safety through excellent noise attenuation provided by industry-proven technologies
- Installation ease in tight piping runs enabled by small valve size
- Cost savings due to small actuator and lightweight pipe supports
- High-flow capacity offered in compact design via small valve and actuator sizes, system support and isolation

#### SPECIFICATIONS

Sizes: DN 75 to 1400; NPS 3 to 56  
Press: Class 150 to 2500;  
API 3000, 5000 and 10 000  
Temp: -196°C to 450°C  
(-320°F to 842°F)  
Refer to literature VLENBR0067  
at [flowserve.com/library](http://flowserve.com/library).



Valbart

## TRUNNION-MOUNTED CONTROL BALL

### Trunball DL

Full-port process ball valve well suited for the most challenging operating conditions. Frequently used for isolation or on-off applications, but equally suitable for control.

- Improved plant and personnel safety provided by the Z-trim option's excellent cavitation control and noise reduction
- Reduced maintenance enabled by spring-loaded stem seal packing
- Broad application flexibility facilitated by the extensive size range
- Optimum controllability through the use of a sturdy blowout-proof stem that provides high torque transmission with minimal mechanical backlash

#### SPECIFICATIONS

Sizes: DN 150 to 900; NPS 6 to 36  
Press: PN 10 to 40; Class 150 to 300  
Temp: -30°C to 250°C (-22°F to 482°F)  
Refer to literature NFENTB4168  
at [flowserve.com/library](http://flowserve.com/library).



NAF



Worcester

## FLOATING CONTROL BALL

**CPT**

Rugged and accurate general service valve designed for use in harsh throttling conditions and applications requiring precise computer controls.

- Extremely accurate control through efficient, straight-through flow, rotary shaft sealing and bubble-tight shutoff
- Smooth, stable throttling control due to lubricating action of special coating on ball and TFE/graphite impregnation throughout the thickness of the characterized seat
- Reduced maintenance costs and time due to the use of fewer parts
- Precise fit to match unique control needs through virtually limitless seat designs

## SPECIFICATIONS

Sizes: DN 8 to 100; NPS ¼ to 4  
 Press: PN 20 to 110; Class 150 to 600  
 Temp: -29°C to 427°C (-20°F to 800°F)

Refer to literature WCENBR1001  
 at [flowserve.com/library](http://flowserve.com/library).



NAF

## FLOATING CONTROL BALL

**Duball DL**

Rugged, high-performance general service valve designed for operating conditions where severe demands are made on the design, materials and performance. Available with metal or soft seats.

- Lower maintenance costs and time as well as improved safety with spring-loaded stem seal packing
- High performance enabled by the direct actuator mounting capabilities of the Turnex actuator
- Excellent control, noise reduction and cavitation enabled by unique Z-trim option
- Easy installation and replacement as a result of the off-center joint face of the valve body

## SPECIFICATIONS

Sizes: DN 25 to 400; NPS 1 to 16  
 Press: PN 10 to 40; Class 150 to 300  
 Temp: -30°C to 350°C (-22°F to 482°F)

Refer to literature NFENTB4167  
 at [flowserve.com/library](http://flowserve.com/library).

## Fast and Accurate Valve Selection and Sizing

Significantly reduce control valve sizing and selection errors and improve decision accuracy in record time with *Performance!™ Valve Sizing and Selection Suite*. It puts the power of on-demand control valve selection and sizing at your fingertips. With minimal application data — expected flow, pressure, temperature, process media and line size — *Performance!* identifies the Flowserve control valve, actuators and positioners best suited for your application and services conditions. It's the right tool for the finding the right product — the first time, every time.





Mark One

## LINEAR CONTROL

Ideal for high-accuracy flow control, the Flowserve family of globe/angle linear control valves can be applied from general service to severe applications for both gas and liquids. They are ideal for frequent operation due to their excellent position accuracy and repeatability. Precision control is repeatedly achieved via longer strokes and assured actuator response. Users can satisfy a range of requirements, with choices ranging from cryogenic and high-temperature designs to low noise and anti-cavitation trims.

### Linear Control – Quick Reference\*

Product	Sub-Type	Sizes	Pressures	Temperatures
<b>Mark One™</b>	Linear Globe/Angle	DN 15 to 915 NPS ½ to 36	PN 10 to 400 Class 150 to 2500	-196°C to 815°C (-320°F to 1500°F)
<b>Mark One Three-Way</b>	Linear Globe/Angle	DN 15 to 300 NPS ½ to 12	PN 10 to 400 Class 150 to 2500	-196°C to 400°C (-320°F to 1500°F)
<b>Mark One-X</b>	Linear Globe/Angle	DN up to 300 NPS up to 12	PN 50 to 100 Class 300 to 600	-196°C to 815°C (-320°F to 1500°F)
<b>Mark 100</b>	Linear Globe/Angle	DN 150 to 915 NPS 6 to 36	PN 10 to 100 Class 150 to 600	-196°C to 815°C (-320°F to 1500°F)
<b>Mark 200</b>	Linear Globe/Angle	DN 50 to 750 NPS 2 to 30	PN 160 to 400 Class 900 to 2500	-196°C to 815°C (-320°F to 1500°F)
<b>Mark Two™</b>	Linear Globe/Angle	DN 15 to 150 NPS ½ to 6	PN 10 to 400 Class 150 to 2500	-196°C to 815°C (-320°F to 1500°F)
<b>Mark Eight™</b>	Linear Globe/Angle	DN 25 to 500 NPS 1 to 20	PN 10 to 400 Class 150 to 2500	-196°C to 815°C (-320°F to 1500°F)
<b>FlowTop™ GS</b>	Linear Globe/Angle	DN 15 to 150 NPS ½ to 6	PN 10 to 40 Class 150 to 300	-46°C to 425°C (-50°F to 797°F)
<b>FlowTop</b>	Linear Globe/Angle	DN 15 to 400 NPS ½ to 16	PN 10 to 40 Class 150 to 300	-46°C to 425°C (-50°F to 797°F)

\* Additional products shown on next page



## Linear Control – Quick Reference, cont'd.

Product	Sub-Type	Sizes	Pressures	Temperatures
<b>HpFlow 011000 and 015000</b>	Linear Globe/Angle	NW 16 to 24 NPS ½ to 1	ND 325 to PN 4000 Class 600 to 60 000 psi	-40°C to 250°C (-40°F to 482°F)
<b>LinedFlow™ 132000</b>	Linear Globe/Angle	DN 15 to 150 NPS ½ to 6	PN 16 Class 150	-20°C to 200°C (-4°F to 392°F)
<b>TotalFlow 035000</b>	Linear Globe/Angle	DN 25 to 200 NPS 1 to 8	PN 16 to 400 Class 150 to 2500	-196°C to 700°C (-321°F to 1292°F)
<b>TotalFlow 335000</b>	Linear Globe/Angle	DN 25 to 200 NPS 1 to 8	PN 63 to 250 Class 600 to 1500	-196°C to 700°C (-40°F to 1292°F)
<b>ColdFlow 041000A</b>	Linear Globe/Angle	DN 25 to 200 NPS 1 to 8	PN 16 to 100 Class 150 to 600	-196°C to 100°C (-321°F to 212°F)
<b>ColdFlow 341000</b>	Linear Globe/Angle	DN 4 to 200 NPS 0.16 to 8	PN 16 to 63 Class 150 to 400	-269°C to 100°C (-452°F to 212°F)
<b>SmallFlow™ 080000</b>	Linear Globe/Angle	NPS ¼	PN 400 Class 2500	-40°C to 700°C (40°F to 1292°F)
<b>SmallFlow 385000</b>	Linear Globe/Angle	DN 15 to 25 NPS ½ to 1	PN 16 to 400 Class 150 to 2500	-196°C to 700°C (-321°F to 1292°F)
<b>CleanFlow™ 191000</b>	Linear Globe/Angle	DN 15 to 100 NPS ½ to 4	PN 16 to 25 Class 150	-40°C to 150°C (-40°F to 302°F)
<b>DrainFlow 051000</b>	Linear Globe/Angle	DN 15 to 200 NPS ½ to 8	PN 16 to 40 Class 150 to 300	-40°C to 200°C (-40°F to 392°F)

## LINEAR CONTROL

### LINEAR GLOBE/ANGLE

#### Mark One

Superior performance in liquid and gaseous services, with easy, fast and inexpensive maintenance.



Valtek

- Reliable performance provided by the position accuracy, repeatability and assured response from the positioner plus the stiff and high-thrust, spring-cylinder actuator
- Significant application flexibility offered by a broad solutions envelope and a wide variety of trim options to eliminate cavitation damage and abate noise
- Installation and maintenance ease resulting from compact, light-weight package
- Lower maintenance and spare inventory costs facilitated by the clamped-in seat and top-entry trim plus a high degree of parts interchangeability

#### SPECIFICATIONS

Sizes: DN 15 to 915; NPS ½ to 36  
 Press: PN 10 to 400; Class 150 to 2500  
 Temp: -196°C to 815°C  
 (-320°F to 1500°F)

Refer to literature VLENTB0001 at [flowserve.com/library](http://flowserve.com/library).

### LINEAR GLOBE/ANGLE

#### Mark One Three-Way

A three-way version of the Mark One, this valve is used for combining or diverting service. Like the Mark One, it offers superior performance in liquid and gaseous services in simple, rugged design.



Valtek

- Reliable performance provided by the position accuracy, repeatability and assured response from the positioner plus the stiff and high-thrust, spring-cylinder actuator
- Enhanced process control due to exceptionally tight shutoff
- Reduced inventory carrying costs owing to a high degree of interchangeability with Mark One Series valves
- Fast, easy and inexpensive maintenance facilitated by compact, lightweight body and actuator package plus clamped-in seat and top-entry trim

#### SPECIFICATIONS

Sizes: DN 15 to 300; NPS ½ to 12  
 Press: PN 10 to 400; Class 150 to 2500  
 Temp: -196°C to 400°C  
 (-320°F to 752°F)

Refer to literature VLENTB0001 at [flowserve.com/library](http://flowserve.com/library).

### LINEAR GLOBE/ANGLE

#### Mark One-X

The Mark One-X offers a cost-effective means of installing a small valve in a much larger line without line reducers or expanders. It is identical to a standard Mark One except for its body, which has expanded outlets.



Valtek

- Lower valve and installation costs made possible by using a smaller, lighter valve and eliminating line expanders and reducers (plus their associated welding and radiography requirements)
- Reliable performance provided by the position accuracy, repeatability and assured response from the positioner plus the stiff and high-thrust, spring-cylinder actuator
- Reduced downtime with clamped-in seat and self-aligning seat ring
- Decreased inventory carrying costs from a high degree of interchangeability with Mark One Series valves

#### SPECIFICATIONS

Sizes: DN up to 300; NPS up to 12  
 Press: PN 50 to 100; Class 300 to 600  
 Temp: -196°C to 815°C  
 (-320°F to 1500°F)

Refer to literature VLATB100 at [flowserve.com/library](http://flowserve.com/library).

# LINEAR CONTROL

## LINEAR GLOBE/ANGLE

### Mark 100

A large control valve designed for larger size applications. Suited for maximum capacity  $C_v$ , and severe applications in both gas and liquid services.

- Cost-effective performance, as higher  $C_v$  capacity allows for smaller valve sizes
- Superior process control made possible by long stroke lengths, the position accuracy, repeatability and assured response from the positioner, and the stiff and high-thrust, spring-cylinder actuator
- Reduced downtime with the clamped-in seat and self-aligning seat ring
- Severe service application versatility provided by a wide variety of noise abatement and anti-cavitation trims

#### SPECIFICATIONS

Sizes: DN 150 to 915; NPS 6 to 36  
Press: PN 10 to 100; Class 150 to 600  
Temp: -196°C to 815°C  
(-320°F to 1500°F)

Refer to literature FCATB0100  
at [flowserve.com/library](http://flowserve.com/library).



Valtek

## LINEAR GLOBE/ANGLE

### Mark 200

Designed for gas and liquid control while significantly reducing noise and cavitation. Ideal for high-flow, high-pressure and extreme temperature applications in the oil and gas and power industries.

- Cost-effective and significantly smaller and lighter design that outperforms competing brands
- Greater severe service protection with finer control provided by larger galleries and longer strokes
- Improved safety and reduced maintenance costs derived from a broad spectrum of severe service trim solutions for noise abatement and cavitation control
- Easy, low-cost maintenance and extremely tight shutoff made possible by the clamped-in seat and self-aligning seat ring

#### SPECIFICATIONS

Sizes: DN 50 to 400; NPS 2 to 16  
Press: PN 160 to 400;  
Class 900 to 2500  
Temp: -196°C to 815°C  
(-328°F to 1500°F)

Refer to literature VLENTB0200  
at [flowserve.com/library](http://flowserve.com/library).



Valtek

## LINEAR GLOBE/ANGLE

### Mark Two

Fabricated from bar stock, the Mark Two is an extremely versatile automatic control valve. It is available in many different configurations with short lead times, especially for high-pressure classes or special alloys.

- Application versatility arising from numerous body styles, end connections, bonnet types and materials of construction
- Reduced maintenance owing to top-entry trim with clamped-in seat ring and double stem-guided design, which eliminates contact between the plug and seat retainer
- Parts interchangeability with Mark One Series valves
- Available cryogenic extended bonnet handles temperatures down to -253°C (-423°F)

#### SPECIFICATIONS

Sizes: DN 15 to 150; NPS ½ to 6  
Press: PN 10 to 400; Class 150 to 2500  
Temp: -196°C to 815°C  
(-320°F to 1500°F)

Refer to literature VLATB106  
at [flowserve.com/library](http://flowserve.com/library).



Valtek



Valtek

## LINEAR GLOBE/ANGLE

**Mark Eight**

The Mark Eight features a unique Y-style globe body that provides higher flow capacities and less process turbulence than conventional globe valves.

- Lower valve recovery factor and higher  $C_v$  per given size over traditional globe style valves due to the nearly straight-through passage of the Y-style body
- Significantly reduced noise and vibration owing to less restrictive body style, which generates less line turbulence
- Easy, low-cost maintenance and extremely tight shutoff made possible by clamped-in seat and self-aligning seat ring
- Decreased inventory carrying costs from a high degree of interchangeability with Mark One Series valves

## SPECIFICATIONS

Sizes: DN 25 to 500; NPS 1 to 20  
 Press: PN 10 to 400; Class 150 to 2500  
 Temp: -196°C to 815°C  
 (-320°F to 1500°F)

Refer to literature VLENTB0008 at [flowserve.com/library](http://flowserve.com/library).

## LINEAR GLOBE/ANGLE

**FlowTop GS**

The FlowTop GS control valve (types V746 and V748) is a fully integrated valve-actuator-instrumentation package for continuous process flow loop control throughout the plant.

- High flow rates with excellent rangeability, repeatability and fine control
- Standard clamped seat rings offer tight shut-off and simple removal; no galling problems related to threaded seat rings
- Direct-mounted digital positioners do not require pneumatic tubing (air-to-open)
- Wide application range owing to trim and material options
- Quick installation and simple setup by maintenance technicians without the need for instrument or process engineering skills
- Anti-noise and anti-cavitation trim designs available

## SPECIFICATIONS

Sizes: NPS ½ to 6 (DN 15 to 150)  
 Press: Class 150 to 300 (PN 10 to 40)  
 Temp: -46°C to 425°C (-50°F to 797°F)

Refer to literature VLENTB8610 at [flowserve.com/library](http://flowserve.com/library).



Valtek

## LINEAR GLOBE/ANGLE

**FlowTop**

The FlowTop control valve (types V726, V738, V740) is a high-performance, general application valve coupled with the high-thrust FlowAct pneumatic diaphragm actuator and an engineered threaded seat ring, enabling tight shut-off.

- Superior control in liquid and gaseous services due to the integrated design of valve body, pneumatic actuator and digital positioner
- Digital positioners are direct-mounted without the need for pneumatic tubing (air-to-open)
- Application versatility and reduced spare inventories owing to modular design
- Low total cost of ownership derived from rugged design and inexpensive maintenance
- Anti-noise and anti-cavitation trim designs available

## SPECIFICATIONS

Sizes: NPS ½ to 16 (DN 15 to 400)  
 Press: Class 150 to 300 (PN 10 to 40)  
 Temp: -46°C to 425°C (-50°F to 797°F)

Refer to SAENTBV738, SAENTBV740, SAENTBV726 at [flowserve.com/library](http://flowserve.com/library).



Valtek

# LINEAR CONTROL

## Giants of Offshore Production

When building the world's largest FPSOs, capable of producing 500 000 barrels of oil per day, ExxonMobil chose Flowserve pump and valve control systems for its Kizomba A and B floating platforms. Drawing on decades of offshore experience, Flowserve provided 74 high-performance pump systems and 360 control valves. Most were custom engineered to accommodate the weight and space parameters of the project.



Kämmer

### LINEAR GLOBE/ANGLE

## HpFlow 011000 and 015000

Split-body control valves well-suited for high-pressure (HpFlow 015000) and extreme-pressure (HpFlow 011000) services in the chemical industry and injection applications. Available in numerous materials.

- Reliable high-pressure and extreme-pressure performance made possible by unique split-body design that allows seat to be clamped between body parts
- Application flexibility enabled by a wide range of available materials, plus high-pressure (IG standard) or ASME flange connections
- Longer service life and reduced noise provided by multistage, high-pressure letdown valve option

### SPECIFICATIONS

Sizes: NW 16 to 24; NPS ½ to 1  
Press: ND 325 to PN 4000;  
Class 600 to 60 000 psi  
Temp: -40°C to 250°C (-4°F to 482°F)

Refer to literature KMEEBR1120  
at [flowserve.com/library](http://flowserve.com/library).



Kämmer

### LINEAR GLOBE/ANGLE

## LinedFlow 132000

This plastic-lined valve for corrosive applications features an advanced PTFE bellows design, enabling a standard pressure rating of PN 16. Ideal for chemical and mining applications.

- Economical operation due to high-quality lining materials and increased flow capacity
- Broad application versatility assured by a wide variety of liner materials, including PTA, FEP, PP, PVDF ETFE and antistatic PFA
- Improved plant and personnel safety from anti-blowout stem design, plus superior connection between body and liner
- Reliable and consistent performance as a result of excellent reproducible trims, even for very small coefficient of flow ( $C_v$ ) values
- Ease of maintenance and replacement provided by threaded plug and seat design

### SPECIFICATIONS

Sizes: DN 15 to 150; NPS ½ to 6  
Press: PN 16; Class 150  
Temp: -20°C to 200°C (-4°F to 392°F)

Refer to literature KMENBR3221  
at [flowserve.com/library](http://flowserve.com/library).





Kämmer

## LINEAR GLOBE/ANGLE

**TotalFlow 035000**

The TotalFlow 035000 is the most versatile Kämmer globe valve design. It is suitable for general service applications with special requirements and more. Custom modifications and variations available on request.

- Robust, reliable performance with broad flexibility made possible via a variety of body and material configurations (ANSI or DIN in globe, angle or three-way valve designs)
- Greater process control assured by excellent control accuracy, rangeability and repeatability
- Severe service application versatility provided by a wide variety of noise abatement and anti-cavitation trims
- Environmental compliance with German clean air act (TA-Luft)

## SPECIFICATIONS

Sizes: DN 25 to 200; NPS 1 to 8  
 Press: PN 16 to 400; Class 150 to 2500  
 Temp: -196°C to 700°C  
 (-321°F to 1292°F)

Refer to literature KMENBR3520  
 at [flowserve.com/library](http://flowserve.com/library).

## LINEAR GLOBE/ANGLE

**TotalFlow 335000**

Designed for medium- and high-pressure applications where threaded seats are not acceptable — especially in the oil and gas, power and chemical industries — this valve complements the Valtek Mark One and Severe Service Multi-Z valve series.

- Low initial cost, installation ease and broad application flexibility made possible by modular parts and material configurations
- Ease of maintenance in extreme temperatures, without special tools, enabled by retained seat design
- Greater process control via clamped seat with cage-guided plug head
- Longer, industry-leading service life from superior bellows seal designs capable of exceeding one million cycles (depending on pressure and temperature)
- Severe service application versatility provided by a wide variety of noise abatement and anti-cavitation trims

## SPECIFICATIONS

Sizes: DN 25 to 200; NPS 1 to 8  
 Press: PN 63 to 250; Class 600 to 1500  
 Temp: -196°C to 700°C  
 (-40°F to 1292°F)

Refer to literature KMENBR3530  
 at [flowserve.com/library](http://flowserve.com/library).



Kämmer

## LINEAR GLOBE/ANGLE

**ColdFlow 041000A**

An updated version of the proven ColdFlow 041000 low-temperature control valve series, improving performance for air separation units and LNG plants. Optional soft seat inserts available for non-oxygen applications.

- Greater process control with lower heat transfer via improved plug and plug-guiding design
- Low-temperature performance made possible by extended bonnet that protects packing, gaskets and seals from cryogenic temperatures
- Extreme temperature capability down to -196°C (-321°F; 77°K) with optional gaskets and packings
- Ease of maintenance facilitated by top-entry design in valves up to DN 100 and NPS 4, plus modular configuration

## SPECIFICATIONS

Sizes: DN 25 to 200; NPS 1 to 8  
 Press: PN 16 to 100; Class 150 to 600  
 Temp: -196°C to 100°C  
 (-321°F to 212°F)

Refer to literature KMENTB4114  
 at [flowserve.com/library](http://flowserve.com/library).



Kämmer

## LINEAR CONTROL



Kämmer

### LINEAR GLOBE/ANGLE

## ColdFlow 341000

Cryogenic control valves for helium liquefaction and other liquefied gases at temperatures as low as 269°C (-452°F; 4°K). Used in accelerator research institutes as well as fusion reactors.

- Extremely low-temperature and vacuum capabilities enabled by body and extension design
- Ease of maintenance via top-entry design with integrated seat, plus modular configuration
- Superior sealing provided by standardized PCTFE plug tip
- Lower energy consumption due to minimized heat transfer and water vapor transmission
- Reliable performance assured by metal bellows seal

### SPECIFICATIONS

Sizes: DN 4 to 200; NPS 0.16 to 8  
Press: PN 16 to 63; Class 150 to 400  
Temp: -269°C to 100°C  
(-452°F to 212°F)

Refer to literature KMDET B4104  
at [flowserve.com/library](http://flowserve.com/library).



Kämmer

### LINEAR GLOBE/ANGLE

## SmallFlow 080000

This micro-flow valve (NPS ¼) with a compact and lightweight actuator is perfect for laboratory, pilot plant, industrial R&D and chemical injection applications. The proven market standard for micro-flow valves.

- High-precision controlling, even in restricted spaces, thanks to compact design
- Greater process control guaranteed by precise, reproduceable  $C_v$  trims down to  $6.3 \times 10^{-5}$ , measured and calibrated individually
- Application flexibility made possible by a wide range of body materials, including steel and high alloys
- High- and low-temperature capabilities with various bonnet options
- High-pressure connections or weld ends available on request

### SPECIFICATIONS

Sizes: NPS ¼  
Press: PN 400; Class 2500  
Temp: -40°C to 700°C (40°F to 1292°F)

Refer to literature KMEN T B8020  
at [flowserve.com/library](http://flowserve.com/library).



Kämmer

### LINEAR GLOBE/ANGLE

## SmallFlow 385000

A ½-in or 1-in version of the proven Kämmer low- and micro-flow valve technologies, suitable for most low-flow applications.

- Greater process control guaranteed by precise, reproduceable  $C_v$  trims down to  $6.3 \times 10^{-5}$  and up to 4.7, measured and calibrated individually
- Longer service life from hydroformed bellows with up to three walls
- Suitable for liquid nitrogen services down to -196°C (-321°F) with cryogenic extension option
- Compliance with fugitive emissions requirements up to PN 250 provided by bellows seal option

### SPECIFICATIONS

Sizes: DN 15 to 25; NPS ½ to 1  
Press: PN 16 to 400; Class 150 to 2500  
Temp: -196°C to 700°C  
(-321°F to 1292°F)

Refer to literature KMEN B R5000  
at [flowserve.com/library](http://flowserve.com/library).



Kämmer

## LINEAR GLOBE/ANGLE

**CleanFlow 191000**

Automatic sanitary control valves for batch sequencing and production-scale bioprocessing in food and beverage, biotech, pharmacy and other applications requiring sterile valves.

- Compliance with cleaning in place (CIP), sanitizing in place (SIP) and other standards assured by optimized body design with no pits, cracks or pockets
- Hygienic and aseptic performance enabled by modular design
- Superior process control and longer service life in hygienic, food and beverage applications made possible by PTFE stem guide and self-lubricating bearings
- Pharmaceutical, biotechnology and ultra-clean capabilities, with or without test ports for leak detection, available with aseptic configurations

## SPECIFICATIONS

Sizes: DN 15 to 100; NPS ½ to 4  
 Press: PN 16 to 25; Class 150  
 Temp: -40°C to 150°C  
 (-40°F to 302°F)

Refer to literature KMEEBR9123  
 at [flowserve.com/library](http://flowserve.com/library).



Kämmer

## LINEAR TANK BOTTOM

**DrainFlow 051000**

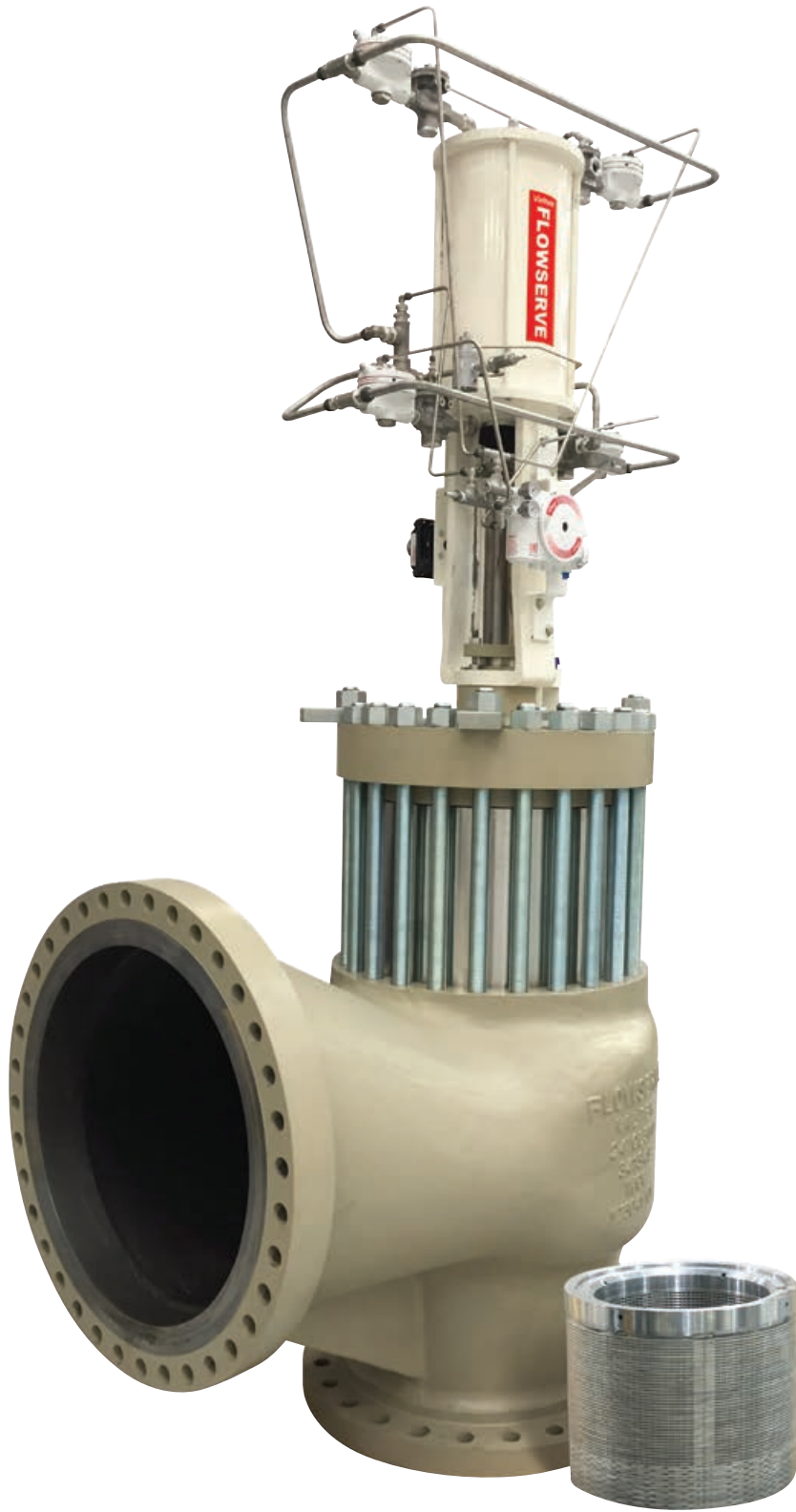
A highly flexible tank flush valve design capable of being adapted to any vessel, with numerous trim and customization options. Also available as a control valve.

- Broad application versatility made possible by a diverse range of configurations and special designs, including bellows seal option, normalizing fins, pocket-free body, steam jacketing or retracting plug
- Ease of maintenance from compact, lightweight design that allows in-line access under the tank
- High-temperature capability above 200°C (392°F) with flexible graphite body gasket and packing option

## SPECIFICATIONS

Sizes: DN 15 to 200; NPS ½ to 8  
 Press: PN 16 to 40; Class 150 to 300  
 Temp: -40°C to 200°C (-40°F to 392°F)

Refer to literature KMEEBR5120  
 at [flowserve.com/library](http://flowserve.com/library).



*Mark 100  
with Stealth trim*

## SEVERE SERVICE CONTROL

Longer service life and lower maintenance costs are made possible through precision-engineered valve and trim options — even in corrosive, erosive and high-velocity applications. A range of advanced anti-erosion, noise reduction and anti-cavitation selections neutralizes the detrimental wear and tear that too often reduce valve life or lead to failures. Maximum flexibility is achieved through severe service products that incorporate a range of material, pressure and temperature options.

### Severe Service Control Valves – Quick Reference

Product	Sub-Type	Sizes	Pressures	Temperatures
<b>Survivor™</b>	Anti-Erosion	DN 25 to 600 NPS 1 to 24	PN 20 to 420 Class 150 to 2500	-10°C to 400°C (14°F to 752°F)
<b>Multi-Z</b>	Cavitation Elimination	DN 25 to 200 NPS 1 to 8	PN 63 to 400 Class 300 to 2500	-10°C to 400°C (14°F to 752°F)

### Severe Service Control Trim – Quick Reference\*

Product	Sub-Type	Base Valve	Sizes	$K_v$ ( $C_v$ ) Range
<b>MegaStream™</b>	Noise Reduction	Valtek Mark Series	DN 25 to 900 NPS 1 to 36	4 to 8737 (5 to 10 100)
<b>Stealth™</b>	Noise Reduction	Valtek Mark Series	DN 80 to 900 NPS 3 to 36	to 3547 (4100)
<b>TMCBV N2 and D1</b>	Noise Reduction	Valbart TMCBV	DN 80 to 1400 NPS 3 to 56	117 to 77 850 (135 to 90 000)
<b>Z-Trim™</b>	Noise Reduction	Setball, Duball DL and Trunnball DL	DN 40 to 500 NPS 1½ to 20	4 to 65 000 (5 to 75 000)
<b>CavControl™</b>	Cavitation Control	Valtek Mark Series	DN 25 to 600 NPS 1 to 24	1.3 to 865 (1.5 to 1000)

\* Additional products shown on next page

## Severe Service Control Trim – Quick Reference, cont'd.

Product	Sub-Type	Sizes	Pressures	Temperatures
<b>TMCBV C2 and C1</b>	Cavitation Control	Valbart TMCBV	DN 100 to 1400 NPS 4 to 56	4 to 65 000 (5 to 75 000)
<b>ChannelStream™</b>	Cavitation Elimination	Valtek Mark Series	DN 40 to 900 NPS 1½ to 36	5 to 623 (6 to 720)
<b>DiamondBack™</b>	Cavitation Elimination	Valtek Mark Series	DN 40 to 400 NPS 1½ to 16	2 to 1773 (3 to 2050)
<b>SideWinder™</b>	Cavitation Elimination	Valtek Mark Series	DN 15 to 100 NPS ½ to 4	0.078 to 8.425 (0.09 to 9.74)





Valtek

## ANTI-EROSION

**Survivor**

Reliable solutions designed for use in the harshest conditions — erosion, corrosion, slurry, high-velocity, and even flashing applications.

- High-flow capacity ensured by sweep angle design that minimizes particle erosion damage on the body
- Reduced maintenance and longer service life enabled by oversized gallery that decreases fluid velocity, minimizing erosion damage
- Reliable, long-lasting performance made possible with optional ceramic trim materials, providing the highest level of erosion resistance, even in flashing sonic velocity flow with abrasive solids
- Application-specific efficiency assured by custom-engineering

## SPECIFICATIONS

Sizes: DN 25 to 600; NPS 1 to 24  
 Press: PN 20 to 420; Class 150 to 2500  
 Temp: -10°C to 400°C (14°F to 752°F)

Refer to literature VLENTB0036  
 at [flowserve.com/library](http://flowserve.com/library).



Valtek

## CAVITATION ELIMINATION

**Multi-Z**

The Multi-Z valve delivers durable multistage cavitation elimination and precision control, even in applications where entrained solids are a problem.

- Particulate tolerant design accommodates very high-pressure drops, eliminating cavitation through multistage pressure drop
- High rangeability and tight control with precision-machined plugs
- Tight leakage protection with a shielded seat protected from high fluid velocities while closing and opening

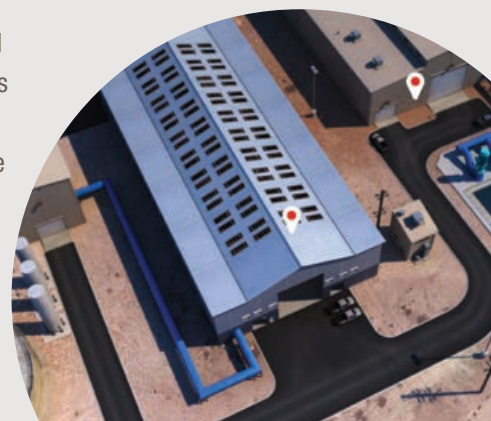
## SPECIFICATIONS

Sizes: DN 25 to 200; NPS 1 to 8  
 Press: PN 63 to 400; Class 300 to 2500  
 Temp: -10°C to 400°C (14°F to 752°F)

Refer to literature VLENTB1631  
 at [flowserve.com/library](http://flowserve.com/library).

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# SEVERE SERVICE CONTROL

## NOISE REDUCTION

### MegaStream



Valtek

MegaStream reduces control valve noise and vibration in a wide range of gas applications through staging, frequency shifting, attenuation and velocity control.

- Improved personnel safety due to noise attenuation up to 30 dBA
- Longer valve and system life enabled by reducing downstream noise and vibration
- Cost-effective, reliable and long-lasting performance derived from heavy-duty, nested cylinder design
- Low installation costs enabled by interchangeability with standard Mark Series seat retainers

#### SPECIFICATIONS

Base Valve: Valtek Mark Series  
Sizes: DN 25 to 900; NPS 1 to 36  
K<sub>v</sub> (C<sub>v</sub>) Range: 4 to 8737 (5 to 10 100)  
Flow Direction: Under the plug  
Pressure Stages: 1 to 7

Refer to literature FCENBR0067 at [flowserve.com/library](http://flowserve.com/library).

## NOISE REDUCTION

### Stealth



Valtek

Stealth combines new advances in noise control with proven technologies to create the most effective device capable of eliminating noise in the most demanding services.

- Improved personnel safety due to significant noise reduction — by as much as 40 dBA — resulting from the combined effect of six noise-, velocity- and pressure-control mechanisms
- Longer valve and system life enabled by reducing downstream noise and vibration
- Increased valve capacity due to optimized flow path, which reduces exit turbulence
- Cost-competitive solution made possible by stacked disc construction

#### SPECIFICATIONS

Base Valve: Valtek Mark Series  
Sizes: DN 80 to 900; NPS 3 to 36  
K<sub>v</sub> (C<sub>v</sub>) Range: to 3547 (4100)  
Flow Direction: Under the plug  
Pressure Stages: 6 to 20

Refer to literature FCENBR0067 at [flowserve.com/library](http://flowserve.com/library).

## NOISE REDUCTION

### TMCBV N2 and D1



Valbart

These economical trim options offer cavitation- and noise-control options based on proven Flowserve MegaStream technology.

- Broad application flexibility enabled by TMCBV system, offering a wide range of exclusive trims for gas applications
- High rangeability allows one valve to handle a range of operating parameters
- Lower total cost of ownership made possible by smaller, lighter valves requiring less expensive actuators and pipe supports
- Greater personnel safety from noise attenuation up to 20 dBA

#### SPECIFICATIONS

Base Valve: Valbart TMCBV  
Sizes: DN 100 to 1400; NPS 4 to 56  
K<sub>v</sub> (C<sub>v</sub>) Range: 117 to 77 850  
(135 to 90 000)

Pressure Stages: 1 to 4

Refer to VLENBR0067 or VBENTB0068 at [flowserve.com/library](http://flowserve.com/library).



NAF

## NOISE REDUCTION

**Z-Trim**

Z-Trim combines the benefits of an advanced control valve with the simplicity of a ball valve. Most effective with low to medium pressure drops, the Z-Trim excels at eliminating noise in high flow services.

- Innovative ball trim design provides effective noise attenuation where pressure drops are high, and still delivers the high capacity expected from a ball valve
- Improved personnel safety due to noise attenuation up to 17 dBA
- Increased reliability and reduced maintenance in applications with entrained media owing to self-cleaning design
- Installation and retrofit costs are kept low, as only one part must be changed

## SPECIFICATIONS

Base Valve: Setball, Duball DL and Trunball DL  
 Sizes: DN 40 to 500; NPS 1.5 to 20  
 $C_v$  Range: 58 to 25 537  
 Flow Direction: Bidirectional  
 Pressure Stages: 1 to 5  
 Refer to literature FCENBR0067 at [flowserve.com/library](http://flowserve.com/library).

## CAVITATION CONTROL

**CavControl**

A cost-effective trim that minimizes cavitation damage to valve components with a special seat retainer that controls the location and concentrates vapor bubble implosion away from metal parts.



Valtek

- Lower maintenance costs plus improved reliability, performance and service life due to innovative design that controls damage by isolating cavitation away from metal components
- Low cost of ownership and simplified maintenance made possible by high degree of parts interchangeability with other valve models
- Broad application versatility enabled by characterization option

## SPECIFICATIONS

Base Valve: Valtek Mark Series  
 Sizes: DN 25 to 600; NPS 1 to 24  
 $K_v$  ( $C_v$ ) Range: 1.3 to 865 (1.5 to 1000)  
 Flow Direction: Over the plug  
 Pressure Stages: 1  
 Refer to literature FCENBR0068 at [flowserve.com/library](http://flowserve.com/library).

## CAVITATION CONTROL

**TMCBV C2 and C1**

These cost-saving trim options provide effective cavitation control based on proven Flowserve CavControl technology.



Valtek

- Extended valve life and reduced wear due to engineered design that directs cavitation away from critical surfaces
- Broad application flexibility enabled by TMCBV system that offers a wide range of exclusive trims for liquid applications
- Lower total cost of ownership made possible by smaller, lighter valves requiring less expensive actuators and pipe supports
- Improved personnel safety resulting from a reduction in hydrodynamic noise by as much as 15 dBA

## SPECIFICATIONS

Base Valve: Valbart TMCBV  
 Sizes: DN 100 to 1400; NPS 4 to 56  
 $K_v$  ( $C_v$ ) Range: 4 to 65 000 (5 to 75 000)  
 Pressure Stages: 1  
 Refer to VLENBR0067 or VBENTB0068 at [flowserve.com/library](http://flowserve.com/library).

# SEVERE SERVICE CONTROL

## CAVITATION ELIMINATION

### ChannelStream

ChannelStream trim prevents cavitation from forming and minimizes hydrodynamic noise in the most severe liquid applications.

- Reduced maintenance and extended service life assured by cavitation-eliminating design, even in the most difficult applications
- Increased efficiency from staged pressure drops
- Low cost of ownership made possible by high degree of parts interchangeability with conventional Mark One valves
- Broad application flexibility available with characterization option

#### SPECIFICATIONS

Base Valve: Valtek Mark Series  
Sizes: DN 40 to 900; NPS 1½ to 36  
K<sub>v</sub> (C<sub>v</sub>) Range: 5 to 623 (6 to 720)  
Flow Direction: Over the plug  
Pressure Stages: 2 to 6

Refer to literature FCENBR0068 at [flowserve.com/library](http://flowserve.com/library).



Valtek

## CAVITATION ELIMINATION

### DiamondBack

The most technologically advanced anti-cavitation design in the industry, the Valtek DiamondBack uses staged pressure drops to eliminate cavitation, even in the most demanding services.

- Reduced maintenance and long service life assured by cavitation-eliminating design, which minimizes damage, even in the most difficult applications
- Low cost of ownership and extended service life from erosion-minimizing design
- Even greater service life with optional tungsten carbide trim that also minimizes damage from erosion
- Quick and easy maintenance enabled by easy-to-clean stacked disc design

#### SPECIFICATIONS

Base Valve: Valtek Mark Series  
Sizes: DN 40 to 400; NPS 1½ to 16  
K<sub>v</sub> (C<sub>v</sub>) Range: 2 to 1773 (3 to 2050)  
Flow Direction: Over the plug  
Pressure Stages: 3 to 6

Refer to literature VLENBR0005 at [flowserve.com/library](http://flowserve.com/library).



Valtek

## CAVITATION ELIMINATION

### SideWinder

SideWinder is a unique solution that delivers durable multi-stage cavitation elimination and precision control in high pressure drop, small flow applications.

- Reduced maintenance and extended service life assured by cavitation-eliminating design, even in the most difficult applications
- Capable of eliminating cavitation in high pressure drop, small flow applications
- Capable of tolerating small particulate
- Axial flow design with low clearance flow for precise control at low openings

#### SPECIFICATIONS

Base Valve: Valtek Mark Series  
Sizes: DN 15 to 100; NPS ½ to 4  
K<sub>v</sub> (C<sub>v</sub>) Range: 0.078 to 8.425  
(0.09 to 9.74)

Flow Direction: Over the plug  
Pressure Stages: 5 to 18

Refer to literature FCENBR0068 at [flowserve.com/library](http://flowserve.com/library).



Valtek





*Equiwedge  
MSIV/MFIV*



# GATE

Reliable, tight shutoff and low-pressure drop operation characterize the Flowserve range of gate valves. Flexible wedge, split wedge, slab gate and double-disk configurations cover a range of requirements to meet any user need, from general service to severe conditions with gross thermal transients or dual-phase fluids. Plant personnel are kept safe through the application of fast-acting valves manufactured to ASME B16.34, ASME Section III and RCC-M design codes.

## Gate – Quick Reference

Product	Sub-Type	Sizes	Pressures	Temperatures
<b>Equiwedge™ MSIV/MFIV</b>	Flexible Split Wedge	DN 100 to 1050 NPS 4 to 42	PN 110 to 420 Class 600 to 2500	-29°C to 566°C (-20°F to 1050°F)
<b>Equiwedge</b>	Flexible Split Wedge	DN 65 to 900 NPS 2½ to 36	PN 110 to 610 Class 600 to 3600	-29°C to 650°C (-20°F to 1200°F)
<b>Flex Wedge</b>	Flexible Wedge	DN 65 to 600 NPS 2½ to 24	PN 20 to 260 Class 150 to 1500	-29°C to 566°C (-20°F to 1050°F)
<b>Double Disk</b>	Parallel Slide	DN 15 to 600 NPS ½ to 24	PN 20 to 325 Class 150 to 1888	-29°C to 566°C (-20°F to 1050°F)
<b>Split Wedge</b>	Split Wedge	DN 15 to 50 NPS ½ to 2	PN 20 to 140 Class 150 to 800	-29°C to 566°C (-20°F to 1050°F)
<b>Slab Gate</b>	Slab	DN 50 to 1600 NPS 2 to 64	PN 20 to 420 Class 150 to 2500	-100°C to 400°C (-148°F to 750°F)

# GATE



Edward®

## FLEXIBLE SPLIT WEDGE

### Equiwedge MSIV/MFIV

Compliant with ASME Section III and RCC-M design codes, this valve is the industry standard for fast-acting, reliable isolation of main steam or feedwater lines.

- Plant and personnel safety assured by verifiable gas/hydraulic actuator design, which can close the valve within 3–5 seconds of receipt of signal
- Maximized actuator readiness made possible by self-contained energy storage and critical component redundancies
- Extended service life enabled by simplified modular design with no external hose or piping connections and a 12-year maintenance cycle
- Environmental and functional qualifications per IEEE and ASME QME-1 requirements

#### SPECIFICATIONS

Sizes: DN 100 to 1050; NPS 4 to 42  
Press: PN 110 to 420;  
Class 600 to 2500  
Temp: -29°C to 566°C  
(-20°F to 1050°F)

Refer to literature EVENCT0004 at [flowserve.com/library](http://flowserve.com/library).

## FLEXIBLE SPLIT WEDGE

### Equiwedge

A large-bore gate valve with body-guided split wedges, offering superior leak tightness and performance.

- Maximized MTBF and lower total cost of ownership derived from optimized component flexibility that reduces component stress from thermal binding
- Minimized valve leakage enabled by disk guidance and optimized gate design, ensuring tight seating
- Longer component life with cast and forged offerings incorporating the latest in hard-facing welding processes

#### SPECIFICATIONS

Sizes: DN 65 to 900; NPS 2½ to 36  
Press: PN 110 to 610;  
Class 600 to 3600  
Temp: -29°C to 650°C  
(-20°F to 1200°F)

Refer to literature EVENBR1005 at [flowserve.com/library](http://flowserve.com/library).



Edward

## FLEXIBLE WEDGE

### Flex Wedge

Flexible wedge gate valve with a single-piece optimized gate designed to minimize seat leakage.

- Broad versatility of nuclear applications enabled by a wide range of sizes and pressure classes
- Additional versatility ensured by compatibility with most actuation methods, including handwheel/bevel gear, electric, pneumatic and hydraulic
- Reliable operation under extreme plant scenarios ensured by seismic qualifications

#### SPECIFICATIONS

Sizes: DN 65 to 600; NPS 2½ to 24  
Press: PN 20 to 260; Class 150 to 1500  
Temp: -29°C to 566°C  
(-20°F to 1050°F)

Refer to literature EVENCT0004 at [flowserve.com/library](http://flowserve.com/library).



Anchor/Darling®



Anchor/Darling

## PARALLEL SLIDE

## Double Disk

Providing tight shutoff under the most severe conditions, this exclusive disk and wedge design resists effects of extreme temperature, gross thermal transients, high and low differential pressures, and dual-phase fluids.

- Improved personnel safety made possible by bonnet design, which allows easy access to valve internals while minimizing radiation exposure
- Reliable closing, smooth operation and long service life enabled by design that minimizes accumulation of sediment and sludge
- Lower maintenance time and costs thanks to simple part design, parts interchangeability and in-line maintenance capability

## SPECIFICATIONS

Sizes: DN 15 to 600; NPS ½ to 24  
 Press: PN 20 to 325; Class 150 to 1888  
 Temp: -29°C to 566°C  
 (-20°F to 1050°F)

Refer to literature EVENCT0004 at [flowserve.com/library](http://flowserve.com/library).



Anchor/Darling

## SPLIT WEDGE

## Split Wedge

Compact gate valve design with body-guided, two-piece gates provides reliable operation and sealing.

- Reliable sealing assured by brazed-in seat
- Economical performance from rugged design that smoothes flow transitions to minimize flow turbulence
- Longer service life from stronger, oversized stem and graphite packing, providing stronger disc-to-stem connection and less wear
- Reduces cost and maintenance with ADVanseal pressure sealing system, which eliminates leakage

## SPECIFICATIONS

Sizes: DN 15 to 50; NPS ½ to 2  
 Press: PN 20 to 140; Class 150 to 800  
 Temp: -29°C to 566°C  
 (-20°F to 1050°F)

Refer to literature EVENCT0004 at [flowserve.com/library](http://flowserve.com/library).



Valbart

## SLAB

## Slab Gate

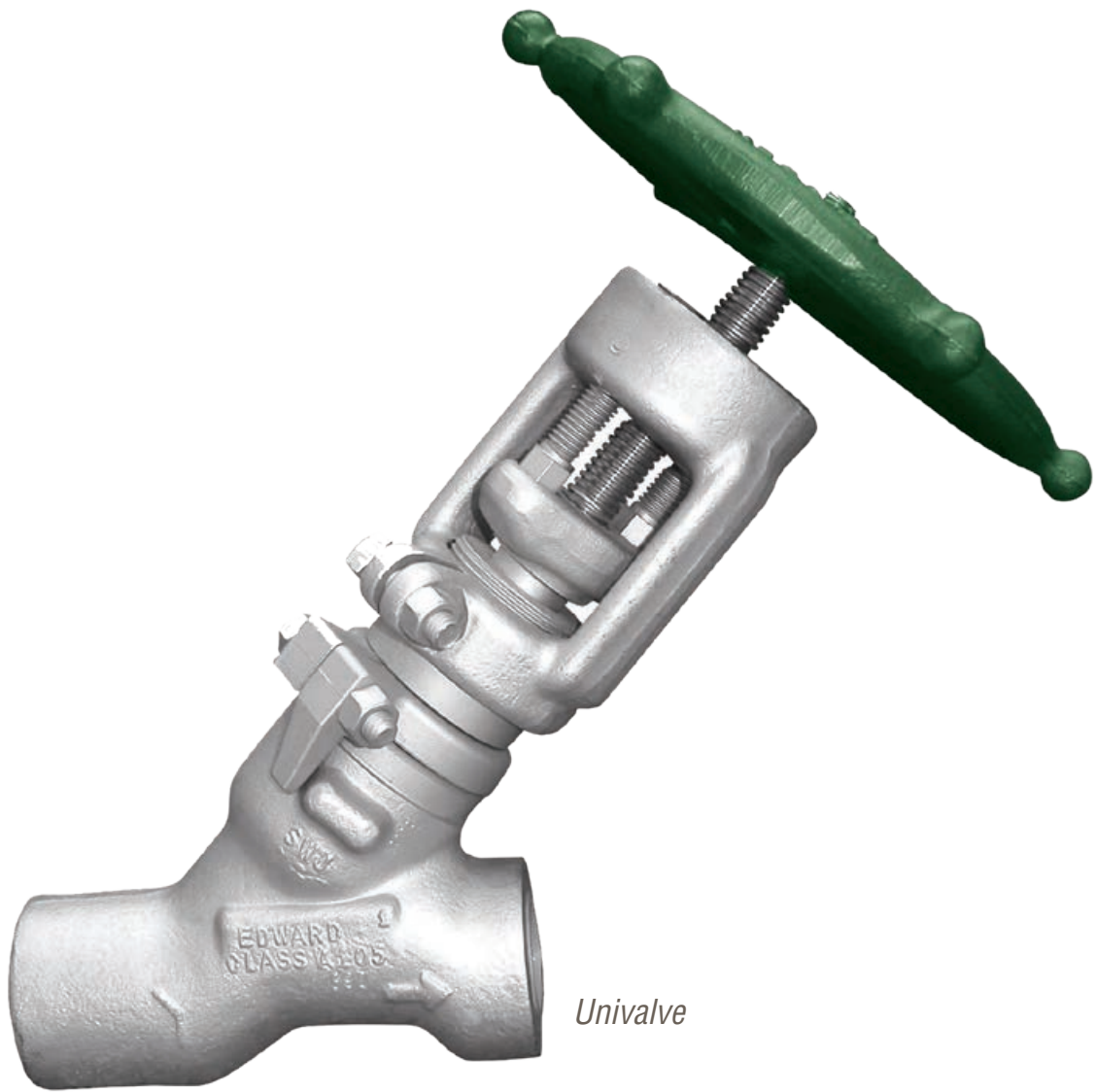
Cost-competitive, high-performance general service control valve designed for applications demanding higher rangeability, precise control and higher flow capacity.

- Economical performance with the highest rated  $C_v$  (up to 70% more than competitors), which sometimes allows for smaller sizes to be used
- Longer service life and more precise control enabled by the robust polygon shaft/plug connection
- Low maintenance costs due to double-offset eccentric plug design that reduces seat wear while providing reliable Class IV (metal seat) and VI (soft seat) shutoff
- Improved safety with superior shaft blow-out protection from the ASME B16.34 shaft design

## SPECIFICATIONS

Sizes: DN 25 to 300; NPS 1 to 12  
 Press: PN 10 to 63; Class 150 to 600  
 Temp: -100°C to 400°C  
 (-148°F to 750°F)

Refer to literature VLENBR0064 at [flowserve.com/library](http://flowserve.com/library).



*Univalve*

# GLOBE

Maintaining a safe plant environment and extending service life — that's what's engineered into every Flowserve globe valve. Whether it's fail-safe response in nuclear plants or reliable performance in high-temperature/pressure boiler plant services, every Flowserve globe valve incorporates special features to maximize performance. Optimized flow passages and smooth transitions reduce pressure drop and destructive turbulence.

## Globe – Quick Reference\*

Product	Sub-Type	Sizes	Pressures	Temperatures
<b>Flite-Flow® Main Steam Isolation</b>	Y-Pattern	DN 600 to 850 NPS 24 to 34	PN 110 to 260 Class 600 to 900	-29°C to 565°C (-20°F to 1050°F)
<b>Flite-Flow</b>	Y-Pattern	DN 65 to 800 NPS 2½ to 32	PN 50 to 760 Class 300 to 4500	-29°C to 650°C (-20°F to 1200°F)
<b>Univalve®</b>	Y-Pattern	DN 15 to 100 NPS ½ to 4	PN 290, 460 and 760 Class 1690, 2680 and 4500	-29°C to 816°C (-20°F to 1500°F)
<b>Edward Bolted Bonnet</b>	Y-Pattern	DN 8 to 50 NPS ¼ to 2	PN 130 and 260 Class 800 and 1500	-29°C to 565°C (-20°F to 1050°F)
<b>Edward Blow-off</b>	Y-Pattern	DN 25 to 65 NPS 1 to 2½	PN 50 to 420 Class 300 to 2500	-29°C to 565°C (-20°F to 1050°F)
<b>1878 Y-Pattern</b>	Y-Pattern	DN 15 to 50 NPS ½ to 2	PN 20 to 325 Class 150 to 1878	-29°C to 371°C (-20°F to 700°F)
<b>Anchor/Darling Y-Pattern</b>	Y-Pattern	DN 15 to 600 NPS ½ to 24	PN 20 to 260 Class 150 to 1500	-29°C to 565°C (-20°F to 1050°F)

\* Additional products shown on next page

# Globe – Quick Reference, cont'd.

Product	Sub-Type	Sizes	Pressures	Temperatures
<b>Edward Bolted Bonnet</b>	T-Pattern	DN 15 to 50 NPS ½ to 2	PN 110 and 260 Class 600 and 1500	-29°C to 538°C (-20°F to 1000°F)
<b>1878 T-Pattern</b>	T-Pattern	DN 15 to 50 NPS ½ to 2	PN 20 to 325 Class 150 to 1878	-29°C to 371°C (-20°F to 700°F)
<b>Anchor/Darling T-Pattern</b>	T-Pattern	DN 65 to 60 NPI 2½ to 24	25 to 260 Class 150 to 1500	-29°C to 565°C (-20°F to 1050°F)





Edward

## Y-PATTERN

## Flite-Flow Main Steam Isolation

High-performance, service-proven technology designed for use when Y-pattern globe valves are chosen for nuclear applications.

- Standards compliance achieved via construction per ASME Section III design code
- Plant and personnel safety assured by single-stored energy system, redundant control systems and verifiable 2–10-second, fail-safe response, regardless of main steam system conditions or loss of electrical power
- Increased reliability with functional verification prior to plant startup or during outages
- High efficiency due to optimized flow path plus integrated actuator
- Environmental and functional qualifications per IEEE requirements

## SPECIFICATIONS

Sizes: DN 600 to 850; NPS 24 to 34  
 Press: PN 110 to 260; Class 600 to 900  
 Temp: -29°C to 565°C  
 (-20°F to 1050°F)

Refer to literature EVENCT0004  
 at [flowserve.com/library](http://flowserve.com/library).



Edward

## Y-PATTERN

## Flite-Flow

Reliable, stop and stop-check valve designed to provide maximum flow capacity and minimum leakage in high-pressure, high-temperature applications.

- Increased uptime via engineered design with optimized flow passages to minimize flow direction changes and reduce pressure drop
- High performance achieved by rigid body design to minimize body distortions and reduce leakage
- Minimized leakage through precise disc alignment between disc and seat
- Longer service life from detached design that minimizes body stress for increased body and hard-facing lifetime

## SPECIFICATIONS

Sizes: DN 65 to 800; NPS 2½ to 32  
 Press: PN 50 to 760; Class 300 to 4500  
 Temp: -29°C to 650°C  
 (-20°F to 1200°F)

Refer to literature EVENCT0002  
 at [flowserve.com/library](http://flowserve.com/library).



Edward

## Y-PATTERN

## Univalve

High-performance globe valve designed for maximum flow capacity and minimum leakage in high-pressure, high-temperature applications.

- Increased uptime via engineered design with optimized flow passages to minimize flow direction changes and reduce pressure drop
- High performance achieved by rigid body design to minimize distortions and reduce leakage
- Minimized leakage between seat and disc through machined construction of body bore and hard-faced seat in a single operation to ensure tight seating
- Longer service life from design that eliminates side thrust issues and prevents misalignment, galling and stem bending

## SPECIFICATIONS

Sizes: DN 15 to 100; NPS ½ to 4  
 Press: PN 290, 460 and 760;  
 Class 1690, 2680 and 4500  
 Temp: -29°C to 816°C  
 (-20°F to 1500°F)

Refer to literature EVENCT0001  
 at [flowserve.com/library](http://flowserve.com/library).

# GLOBE

## Y-PATTERN

### Edward Bolted Bonnet

Durable, high-performance small bore globe valve with a bolted-bonnet design for improved maintenance.

- Increased uptime from construction material hardness with a low coefficient of friction that results in reduced torque, minimal stem wear and elimination of galling
- Lower maintenance costs due to bolted bonnet, four-bolt design
- Longer service life from integral hardened seat and secondary stem which provide positive shutoff, extended seat life and leak protection
- Improved plant and personnel safety through rugged, knobbed hand wheel that provides sure grip, even when wearing gloves

#### SPECIFICATIONS

Sizes: DN 8 to 50; NPS ¼ to 2  
Press: PN 130 and 260  
Class 800 and 1500  
Temp: -29°C to 565°C  
(-20°F to 1050°F)

Refer to literature EVENCT0001 at [flowserve.com/library](http://flowserve.com/library).



Edward

## Y-PATTERN

### Edward Blow-off

High-performance, blow-off valve designed for applications requiring intermittent operation to remove accumulated sediment from equipment and piping, or rapidly lower the boiler water level.

- Standards compliance assured by design that meets ASME boiler code criteria in a wide variety of applications
- Increased reliability via forged steel construction that withstands the rigors of intermittent use
- High-pressure, high-temperature performance assured through design, construction material graduations through increasing class sizes

#### SPECIFICATIONS

Sizes: DN 25 to 65; NPS 1 to 2½  
Press: PN 50 to 420; Class 300 to 2500  
Temp: -29°C to 565°C  
(-20°F to 1050°F)

Refer to literature EVENCT0001 at [flowserve.com/library](http://flowserve.com/library).



Edward

## Y-PATTERN

### 1878 Y-Pattern

Versatile, reliable Y-pattern globe valve designed with ideal size and weight parameters to deliver maximum utility when new or replacement Class 150 to 1878 valves are required.

- Lower operating costs and high inventory flexibility due to versatility of one valve designed to operate in three pressure classes
- Standards compliance assured by design that meets ASME Section III, Class 1, 2 and 3 design codes
- Increased durability via a one-piece, low-profile, investment cast body/yoke assembly that results in smooth flow passages
- Reduced maintenance with T-head stem design that enables easy changing of disc
- Functional qualifications per pressure Class 1878 (intermediate) requirements

#### SPECIFICATIONS

Sizes: DN 15 to 50; NPS ½ to 2  
Press: PN 20 to 325; Class 150 to 1878  
Temp: -29°C to 371°C (-20°F to 700°F)

Refer to literature ADENBR0002 at [flowserve.com/library](http://flowserve.com/library).



Anchor/Darling



Anchor/Darling

## Y-PATTERN

## Anchor/Darling Y-Pattern

High-performance, investment cast globe valve designed to minimize destructive turbulence in a variety of demanding throttling applications.

- Increased uptime via large radius curves in body design to ensure smooth transitions and eliminate abrupt changes in fluid direction
- Lower maintenance costs enabled by no-weld design and rapid change kit
- Broad application versatility provided by Y, angle and Y-angle pattern valve options and wide range of pressure configurations
- Functional qualifications per pressure Class 1878 (intermediate) requirements

## SPECIFICATIONS

Sizes: DN 15 to 600; NPS ½ to 24  
 Press PN 20 to 260; Class 150 to 1500  
 Temp: -29°C to 565°C  
 (-20°F to 1050°F)

Refer to literature EVENCT0004  
 at [flowserve.com/library](http://flowserve.com/library).

## When and Where You Need Us

Flowserve customers never have to look far for support. Our network of manufacturing facilities, design centers of excellence, strategically located Quick Response Centers and on-site customer resources ensures you'll receive timely responses to your critical repair needs, engineering challenges, routine maintenance support and product upgrade requirements. In addition, our commitment to localization drives employment and training, creating a skilled workforce near our customers' locations.



## T-PATTERN

## Edward Bolted Bonnet

High-performance, small-bore stop valve designed with four-bolt, bolted-bonnet design for reliability and reduced maintenance; angle pattern models are also available.

- Increased uptime from construction material hardness with a low coefficient of friction that results in reduced torque, minimal stem wear and elimination of galling
- Longer service life from integral hardened seat and secondary stem, which provide positive shutoff, extended seat life and leak protection
- Improved plant and personnel safety through rugged, knobbed hand-wheel that provides sure grip, even when wearing gloves
- High-flow performance enabled by optimized flow passages that minimize flow direction changes and reduce pressure drops

## SPECIFICATIONS

Sizes: DN 15 to 50; NPS ½ to 2  
 Press: PN 110 and 260;  
 Class 600 and 1500  
 Temp: -29°C to 538°C  
 (-20°F to 1000°F)

Refer to literature EVENCT0001  
 at [flowserve.com/library](http://flowserve.com/library).



Edward

# GLOBE



*Anchor/Darling*

## T-PATTERN

### 1878 T-Pattern

Rugged, one-piece, low-profile globe valve constructed with precision cast body/yoke assembly using the latest investment casting techniques.

- Reduced maintenance with lower, non-rotating stem with T-head design that facilitates disc removal and replacement
- Standards compliance assured by design that meets ASME Section III, Class 1, 2 and 3 design codes
- Increased durability via a one-piece, low-profile, investment-cast body/yoke assembly that results in smooth flow passages
- Functional qualifications per pressure Class 1878 (intermediate) requirements
- Application versatility provided by three disc styles: quick-open plug, parabolic and cage type

## SPECIFICATIONS

Sizes: DN 15 to 50; NPS ½ to 2  
Press: PN 20 to 325; Class 150 to 1878  
Temp: -29°C to 371°C (-20°F to 700°F)

Refer to literature EVENCT0004 at [flowserve.com/library](http://flowserve.com/library).



*Anchor/Darling*

## T-PATTERN

### Anchor/Darling T-Pattern

High-performance, cast-stop valve designed to minimize destructive turbulence in a variety of demanding throttling applications.

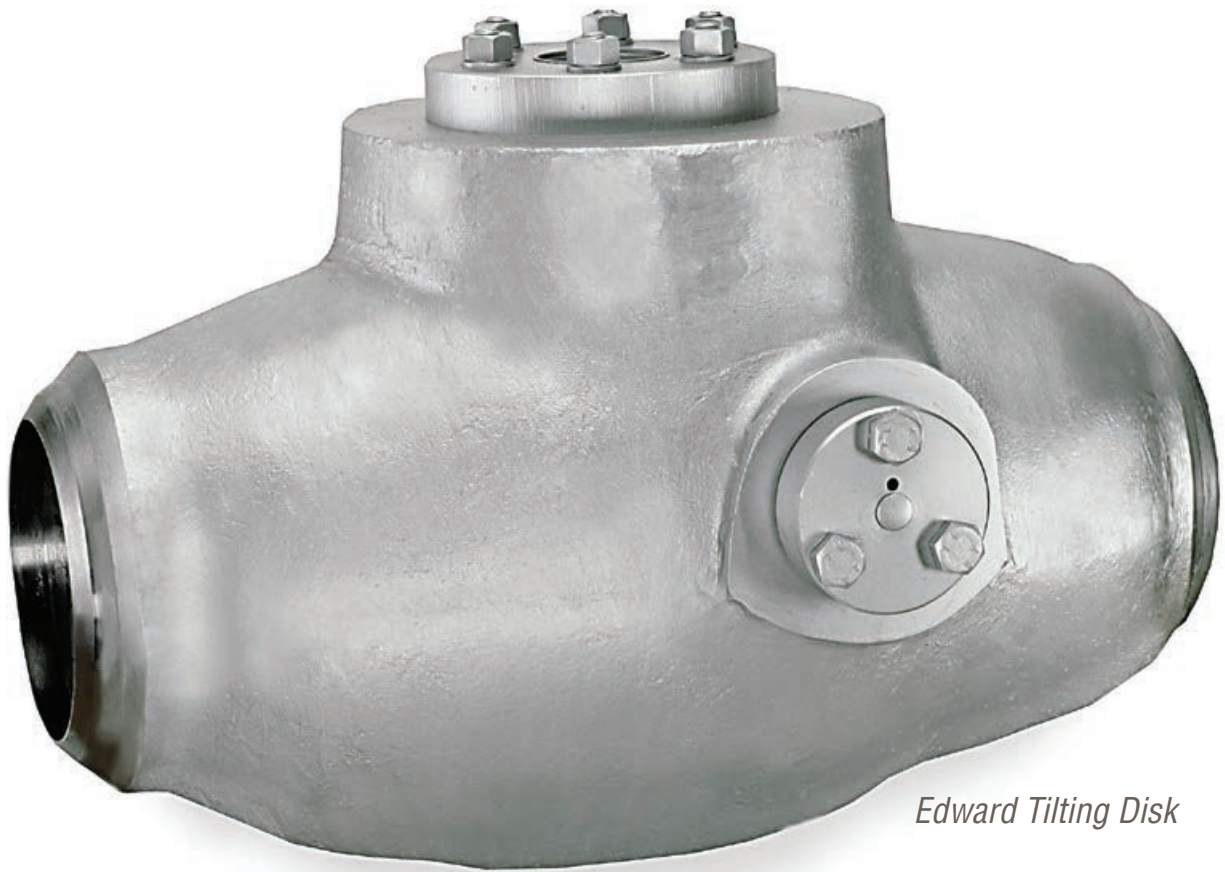
- Increased uptime via large radius curves in body design to ensure smooth transitions and eliminate abrupt changes in fluid direction
- Broad application versatility in high-temperature, high-pressure applications enabled by wide range of pressure and size options
- Longer service life from body and plug designed to minimize cavitation
- Available with functional qualifications per pressure Classes 150 through 1500 for nuclear service

## SPECIFICATIONS

Sizes: DN 65 to 600; NPS 2½ to 24  
Press: PN 20 to 260; Class 150 to 1500  
Temp: -29°C to 565°C (-20°F to 1050°F)

Refer to literature EVENCT0004 at [flowserve.com/library](http://flowserve.com/library).





*Edward Tilting Disk*



# CHECK

Leak-free, tight sealing, protection against reverse flow and minimal flow direction changes are at the core of Flowserve check valve designs. A broad range of configurations that includes piston, tilting disc, spring-loaded disc and dual-plate models meets the critical, high-temperature/pressure demands of the world's major industries. Customers can carefully match application requirements through myriad valve body, seat and disc options.

## Check – Quick Reference\*

Product	Sub-Type	Sizes	Pressures	Temperatures
<b>Flite-Flow</b>	Piston (Lift)	DN 65 to 800 NPS 2½ to 32	PN 50 to 760 Class 300 to 4500	-29°C to 650°C (-20°F to 1200°F)
<b>Univalve</b>	Piston (Lift)	DN 15 to 100 NPS ½ to 4	PN 290, 460 and 760 Class 1690, 2680 and 4500	-29°C to 816°C (-20°F to 1500°F)
<b>Edward Bolted Bonnet</b>	Piston (Lift)	DN 15 to 50 NPS ½ to 2	PN 110 to 260 Class 600 and 1500	-29°C to 538°C (-20°F to 1000°F)
<b>1878 Piston Check</b>	Piston (Lift)	DN 15 to 50 NPS ½ to 2	PN 110, 150, 260 and 325 Class 600, 900, 1500 and 1878	38°C to 371°C (100°F to 700°F)
<b>Anchor/Darling Piston (Lift) Check</b>	Piston (Lift)	DN 65 to 600 NPI 2½ to 24	PN 20 to 260 Class 150 to 1500	-29°C to 565°C (-20°F to 1050°F)
<b>1878 Swing Check</b>	Swing	DN 15 to 50 NPS ½ to 2	PN 110, 150, 260 and 325 Class 600, 900, 1500 and 1878	-29°C to 371°C (-20°F to 700°F)
<b>Anchor/Darling Swing Check</b>	Swing	DN 65 to 600 NPI 2½ to 24	PN 20 to 260 Class 150 to 1500	-29°C to 565°C (-20°F to 1050°F)

\* Additional products shown on next page

## Check – Quick Reference, cont'd.

Product	Sub-Type	Sizes	Pressures	Temperatures
<b>Edward Tilting Disk</b>	Tilting Disk	DN 65 to 600 NPS 2½ to 24	PN 110 to 760 Class 600 to 4500	-29°C to 650°C (-20°F to 1200°F)
<b>Anchor/Darling Tilting Disk</b>	Tilting Disk	DN 65 to 600 NPS 2½ to 24	PN 20 to 260 Class 150 to 1500	-29°C to 565°C (-20°F to 1050°F)
<b>NAF Check</b>	Tilting Disk	DN 40 to 1000 NPS 1½ to 24	PN 20 to 40 Class 150 to 300	-30°C to 350°C (-22°F to 662°F)

## PISTON (LIFT)

**Flite-Flow**

Rugged, large bore, cast body, piston check valve designed to operate in critical high-pressure and high-temperature environments.



Edward

- Increased uptime and longer service life due to integral Stellite seating surfaces
- Improved reliability and service integrity via body-guided disc design to ensure tight sealing and check valve protection in the event of fluid back flow
- Superior flow performance enabled by streamlined flow shapes that reduce pressure drops and support full lift
- Broad application versatility in high-temperature, high-pressure applications enabled by wide range of pressure and size options

## SPECIFICATIONS

Sizes: DN 65 to 800; NPS 2½ to 32  
 Press: PN 50 to 760; Class 300 to 4500  
 Temp: -29°C to 650°C  
 (-20°F to 1200°F)

## PISTON (LIFT)

**Univalve**

Reliable piston check valve designed for high-temperature and high-pressure uses in a variety of environments.



Edward

- Increased uptime from the use of anti-thrust rings in the body-guided disc, which eliminates misalignment and galling
- Greater process control due to integral hard-surfaced seat, which allows positive shutoff and seat life
- Enhanced service integrity through optimum flow shape that minimizes flow direction changes and pressure drops
- Lower operating costs enabled by a die-formed, flexible graphite gasket seated to a prescribed bonnet torque that provides a reliable seal

## SPECIFICATIONS

Sizes: DN 15 to 100; NPS ½ to 4  
 Press: PN 290, 460 and 760;  
 Class 1690, 2680 and 4500  
 Temp: -29°C to 816°C  
 (-20°F to 1500°F)

Refer to literature EVENCT0004  
 at [flowserve.com/library](http://flowserve.com/library).

## PISTON (LIFT)

**Edward Bolted Bonnet**

Durable, small bore check valve, forged and equipped with a bolted cover design to enable easy maintenance.



Edward

- Increased uptime from the use of anti-thrust rings in the body-guided disc, which eliminates misalignment and galling
- Greater process control due to integral hard-surfaced seat, which allows positive shutoff and extends seat life
- Lower maintenance costs due to bolted bonnet, four-bolt design
- Longer service life from positive metal-to-metal stop design that prevents over-compression of the gasket
- Optimized flow passages minimize flow direction changes and reduce pressure drops

## SPECIFICATIONS

Sizes: DN 15 to 50; NPS ½ to 2  
 Press: PN 110 and 260;  
 Class 600 and 1500  
 Temp: -29°C to 538°C  
 (-20°F to 1000°F)

# CHECK

## PISTON (LIFT)

### 1878 Piston Check

High-performance 1878 piston check valve designed for low leakage rate testing (LLRT) and available with EPR/EPDM resilient seated discs.



*Anchor/Darling*

- Lower operating and inventory costs due to versatility of one valve designed to operate in three pressure classes
- Standards compliance assured by design that meets ASME Section III, Class 1, 2 and 3 design codes
- Improved reliability and service integrity from investment cast body construction that results in contoured, smooth flow path and high C<sub>v</sub>
- Improved reliability enabled by lightweight disc and non-cobalt seat ring
- Functional qualifications per pressure class 1878 (intermediate) requirements

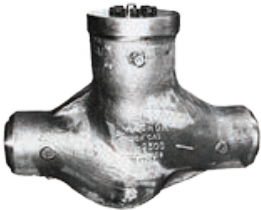
#### SPECIFICATIONS

Sizes: DN 15 to 50; NPS ½ to 2  
Press: PN 110, 150, 260 and 325;  
Class 600, 900, 1500 and 1878  
Temp: -29°C to 371°C (-20°F to 700°F)  
Refer to literature EVENCT0004 at [flowserve.com/library](http://flowserve.com/library).

## PISTON (LIFT)

### Anchor/Darling Piston (Lift) Check

Versatile lift check valves designed for low or pulsating flow applications where pressure drop through the valve is not critical.



*Anchor/Darling*

- Broad application flexibility provided by the variety of available body types
- High performance ensured by cast body with large radius curves designed to optimize internal flow passages and minimize pressure drops
- Improved reliability and service integrity via body-guided disc design to ensure tight sealing and check valve protection in the event of fluid back flow
- Rapid operation made possible by equalizer lines that connect the bonnet area above the disc to the downstream port to improve disc lift and eliminate dash-pot effect

#### SPECIFICATIONS

Sizes: DN 65 to 600; NPI 2½ to 24  
Press: PN 20 to 260; Class 150 to 1500  
Temp: -29°C to 565°C  
(-20°F to 1050°F)  
Refer to literature EVENCT0004 at [flowserve.com/library](http://flowserve.com/library).

## Quality Defined by You

Flowserve quality systems are designed to align with the customer definition of quality. We apply process-based, data-centric methods to every level of our supply chain to ensure reliable quality and timely fulfillment of order requirements. We call this our Results-driven Initiative on Safety and Quality (RISQ), and it comprises more than 3200 employees worldwide, each committed to providing the quality products and services your operations demand.





Anchor/Darling

## SWING

**1878 Swing Check**

Rugged, specialized swing check valve optimally designed for use in reactor penetration and isolation applications.

- Rapid disassembly/reassembly during maintenance and repair that minimizes exposure to radiation
- Environmental/regulatory compliance and improved plant safety due to ALARA-compliant design
- Functional qualifications per ratings in accordance with ASME Section III, Class 1 pressure class 1878 (intermediate) requirements
- Greater process control through available dual-seat disc design for leak-free sealing at both high- and low-pressure differentials

## SPECIFICATIONS

Sizes: DN 15 to 50; NPS ½ to 2  
 Press: PN 110, 150, 260 and 325;  
 Class 600, 900, 1500 and 1878  
 Temp: -29°C to 371°C (-20°F to 700°F)

Refer to literature EVENCT0004 at [flowserve.com/library](http://flowserve.com/library).



Anchor/Darling

## SWING

**Anchor/Darling Swing Check Valve**

All-purpose swing check valve provides economical reverse-flow protection for piping system applications where flow is relatively constant.

- Broad application and installation versatility via option to install in horizontal or vertical lines (with flow up)
- Low initial cost and low ongoing costs due to ease of maintenance
- Functional qualifications per ratings in accordance with ASME Section III
- Greater process control through available dual-seat disc design for leak-free sealing at both high- and low-pressure differentials
- Reliable performance enabled by design that ensures tight sealing

## SPECIFICATIONS

Sizes: DN 65 to 600; NPI 2½ to 24  
 Press: PN 20 to 260; Class 150 to 1500  
 Temp: -29°C to 565°C  
 (-20°F to 1050°F)

Refer to literature EVENCT0004 at [flowserve.com/library](http://flowserve.com/library).

## TILTING DISK

**Edward Tilting Disk**

Designed to close as quickly as possible, this large-bore valve minimizes loud, damaging slamming and vibration noises caused by high-velocity reverse flow in high-pressure and high-temperature applications.

- Greater process control assured by precision-machined cover and integral hard-surfaced seats
- Fast shutoff response facilitated by counterweighted dome-shaped disk, low-friction pivots and enclosed torsion springs
- Long, reliable service in high pressures and temperatures due to preloaded pressure-energized flexible graphite composite
- Easy installation and alignment made possible by adjustable hinge pin

## SPECIFICATIONS

Sizes: DN 65 to 600; NPS 2½ to 24  
 Press: PN 110 to 760;  
 Class 600 to 4500  
 Temp: -29°C to 650°C  
 (-20°F to 1200°F)

Refer to literature EVENCT0002 at [flowserve.com/library](http://flowserve.com/library).



Edward

# CHECK

## TILTING DISK

### Anchor/Darling Tilting Disk

Designed for applications requiring assured operability and controlled closure, the Anchor/Darling Tilting Disk check valve also maintains the disc open in the best position to minimize pressure drop.



*Anchor/Darling*

- High-efficiency performance from differential seat angles, ensuring better seal with low seating force, plus hydrofoil profile for extra stability
- Longer service life enabled by valve design, which causes disc stops to impact body away from sealing surfaces
- Reduced downtime via easily replaceable seal-welded seat rings that minimize distortion from body stress

#### SPECIFICATIONS

Sizes: DN 65 to 600; NPS 2½ to 24  
Press: PN 20 to 260; Class 150 to 1500  
Temp: -29°C to 565°C  
(-20°F to 1050°F)

Refer to literature EVENCT0004  
at [flowserve.com/library](http://flowserve.com/library).

## TILTING DISK

### NAF Check

A cost-effective compact tilting disc check valve. Unique design gives excellent tightness and minimizes water-hammering.



*NAF*

- Low total cost of ownership provided by compact face-to-face dimension — invaluable where space is limited
- Reduced handling costs and easier installation thanks to low weight
- Reliability and regulatory compliance assured by tightness that exceeds API 598 standards
- Longer service life with optional spring, which reduces risk of damage from water-hammer effect in liquid media

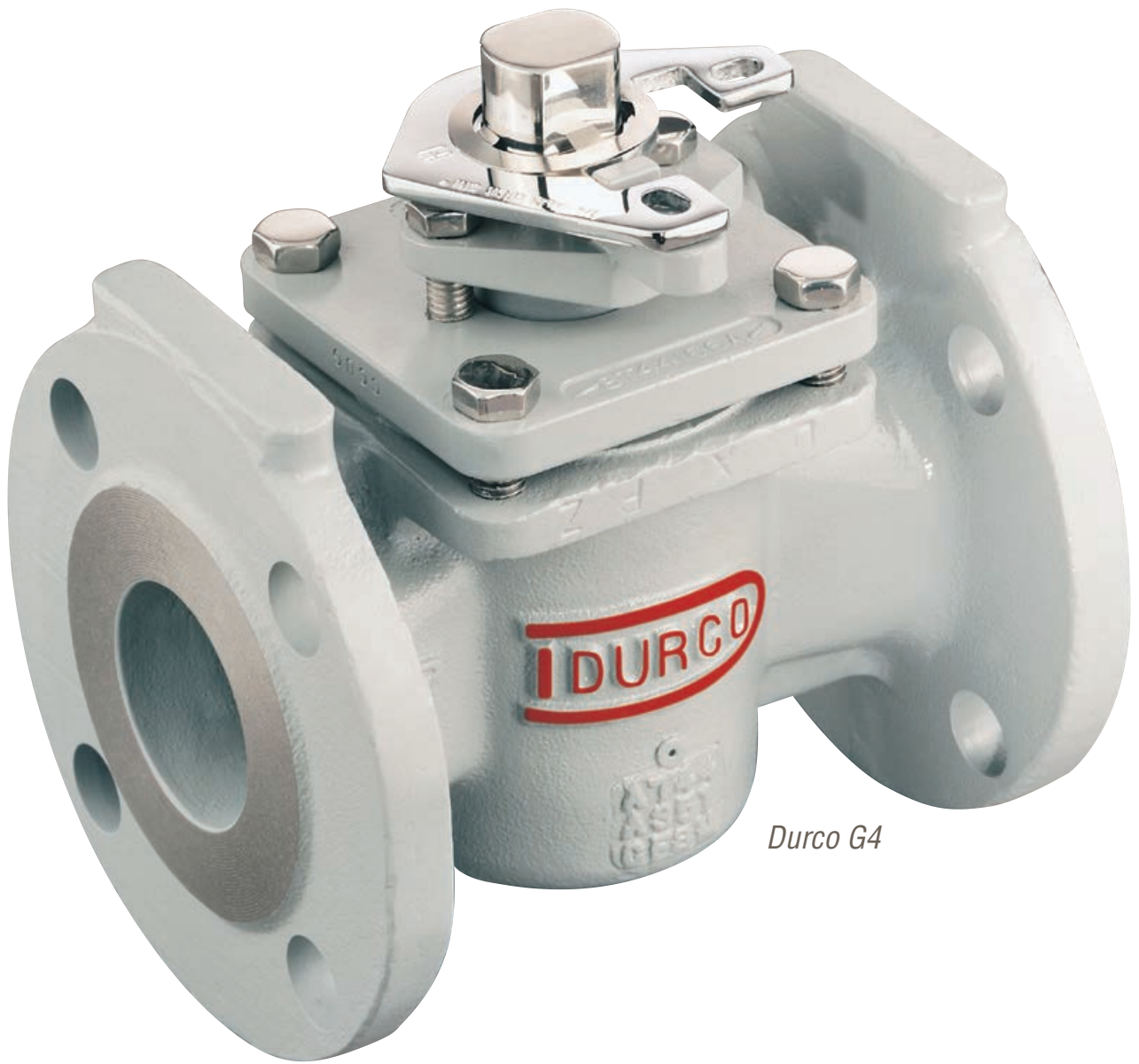
#### SPECIFICATIONS

Sizes: DN 40 to 1000; NPS 1½ to 24  
Press: PN 20 to 40; Class 150 to 300  
Temp: -30°C to 350°C (-22°F to 662°F)

Refer to literature Fk 30.70 and  
Fk 30.71 at [flowserve.com/library](http://flowserve.com/library).







*Durco G4*

# PLUG

The range of plug valve applications is broad, and the Flowserve portfolio reliably addresses the vast majority of requirements. High temperatures and pressures. Corrosive or dirty media. Lethal, toxic and sub-zero fluids. Our family of plug valves delivers low energy consumption through low-torque designs and safe operation with tight shutoff performance. High levels of uptime are achieved through pressure-balanced designs. Absolute shutoff requirements can be addressed by double-isolation models or non-lubricated designs, depending on application.

## Plug – Quick Reference\*

Product	Sub-Type	Sizes	Pressures	Temperatures
<b>Mach 1™</b>	Non-Lubricated	DN 25 to 200 NPS 1 to 8	PN 10, 16, 25, 40 and 100 Class 150, 300 and 600	-46°C to 274°C (-50°F to 525°F)
<b>G4</b>	Non-Lubricated	DN 15 to 450 NPS ½ to 20	PN 10, 16, 25 and 40 Class 150 and 300	-46°C to 288°C (-50°F to 550°F)
<b>G4BZ-HF</b>	Non-Lubricated	DN 15 to 450 NPS ½ to 20	PN 10, 16, 25 and 40 Class 150 and 300	-46°C to 288°C (-50°F to 550°F)
<b>Multiport Series — Steel and Iron</b>	Lubricated	NPS ½ to 12 DN 15 to 300	PN 20 to 420; Class 150 to 2500; 150 to 400 CWP (iron)	to 450°C (232°F)
<b>Super Nordstrom® — Steel</b>	Lubricated	NPS ½ to 4 DN 15 to 100	Class 150 to 600	-29°C to 177°C (-20°F to 350°F)
<b>Bolted Gland — Iron</b>	Lubricated	NPS 6 to 36 DN 150 to 900	120 to 500 CWP	-29°C to 177°C (-20°F to 350°F)
<b>Bolted Gland — Steel</b>	Lubricated	NPS 6 to 12 DN 150 to 300	Class 150	-29°C to 177°C (-20°F to 350°F)
<b>Dynamic Balance® — Iron</b>	Lubricated	NPS 4 to 20 DN 100 to 500	150 to 200 CWP	-29°C to 177°C (-20°F to 350°F)

\* Additional products shown on next page

## Plug – Quick Reference, cont'd.

Product	Sub-Type	Sizes	Pressures	Temperatures
<b>Dynamic Balance — Steel</b>	Lubricated	NPS 1 to 30 DN 25 to 750	Class 150 to 2500	-46°C to 816°C (-50°F to 1500°F)
<b>Super Nordstrom Two-Bolt Cover — Iron</b>	Lubricated	NPS ½ to 5 DN 15 to 125	200 CWP	-29°C to 93°C (-20°F to 200°F)
<b>Super Nordstrom Two-Bolt Cover — Steel</b>	Lubricated	NPS ¾ to 4 DN 20 to 100	13.7 bar (200 psi)	-29°C to 93°C (-20°F to 200°F)
<b>DIPV — Double-Isolation</b>	Lubricated	DN 15 to 600 NPS ½ to 24	PN 20 to 420 Class 150 to 2500 API 2000 to 10 000	-46 to 375°C (-51 to 700°F)
<b>Double-Isolation — Steel</b>	Lubricated	DN 50 to 300 NPS 2 to 12	Class 150 to 2500	-46°C to 232°C (-50°F to 450°F)
<b>Screwed Gland Type — Iron</b>	Lubricated	DN 15 to 100 NPS ½ to 4	200 to 800 CWP	-29°C to 178°C (-20°F to 353°F)
<b>Taper Plug</b>	Lubricated	DN 15 to 300 NPS ½ to 12	to PN 50 to Class 300	-20°C to 250°C (-5°F to 480°F)
<b>Super-H</b>	Lubricated	DN 15 to 300 NPS ½ to 36	PN 20 to 420 Class 150 to 2500 API 2000 to 10 000	-46°C to 375°C (-51°F to 700°F)
<b>TIPV — Twin Isolation</b>	Lubricated	DN 15 to 600 NPS ½ to 24	PN 20 to 420 Class 150 to 2500 API 2000 to 10 000	-46°C to 375°C (-51°F to 700°F)
<b>T4E</b>	Lined	DN 15 to 300 NPS ½ to 12	PN 16 Class 150 to 300	-29°C to 204°C (-20°F to 400°F)



Durco

## NON-LUBRICATED

**Mach 1**

All-purpose, non-lubricated SleeveLine plug valve designed to provide reliable service with consistent, lower torques for cost-effective actuation.

- Dependable, tight shutoff and in-line seal adjustment from tapered plug design
- Reduced actuation costs from lower constant turning torques owing to unique plug and sleeve design
- Lower maintenance costs with in-line seat replacement
- High-temperature and high-pressure capabilities to 274°C (525°F) and Class 600 (derated)
- Ease of operation enabled by ISO 5211 mounting pad with universal flange and double-D plug stem that accepts most standard actuation

## SPECIFICATIONS

Sizes: DN 25 to 200; NPS 1 to 8  
 Press: PN 10, 16, 25, 40 and 100;  
 Class 150, 300 and 600  
 Temp: -46°C to 274°C (-50°F to 525°F)  
 Refer to literature DVATB0030  
 at [flowserve.com/library](http://flowserve.com/library).



Durco

## NON-LUBRICATED

**G4**

Reliable, versatile SleeveLine plug valve designed for the most corrosive and difficult chemical services where drop-tight shutoff is an absolute requirement.

- Dependable, tight shutoff and in-line seal adjustment from tapered plug design
- Lower maintenance costs due to design that utilizes two adjuster fasteners that permit in-line seal adjustments under pressure within seconds
- Low fugitive emissions through fluoropolymer reverse-lip diaphragm that provides a pressure-activated, self-energizing dynamic and static stem seal
- Compatibility with a range of Automax™ actuators and other instrumentation
- Options for lethal, toxic and sub-zero fluid services plus process control and high flow requirements

## SPECIFICATIONS

Sizes: DN 15 to 450; NPS ½ to 20  
 Press: PN 10, 16, 25 and 40;  
 Class 150 and 300  
 Temp: -46°C to 288°C (50°F to 550°F)  
 Refer to literature DVENBR0024  
 at [flowserve.com/library](http://flowserve.com/library).



Durco

## NON-LUBRICATED

**G4BZ-HF**

Reliable, HF alkylation plug valve preferred at refineries throughout the world when drop-tight shutoff is an absolute requirement.

- Corrosion-resistant Monel M35-1 and API 607 fire-sealed construction ideal for refinery applications that include HF and H<sub>2</sub>SO<sub>4</sub> alkylation
- Dependable, tight shutoff and in-line seal adjustment from tapered plug design
- Low fugitive emissions through fluoropolymer reverse-lip diaphragm that provides a pressure-activated, self-energizing dynamic and static stem seal
- Ease of operation enabled by compatibility with a wide range of Automax actuators and other instrumentation

## SPECIFICATIONS

Sizes: DN 15 to 450; NPS ½ to 20  
 Press: PN 10, 16, 25 and 40;  
 Class 150 and 300  
 Temp: -46°C to 288°C (-50°F to 550°F)  
 Refer to literature DVENTB0025  
 at [flowserve.com/library](http://flowserve.com/library).

# PLUG

## LUBRICATED

### Multiport Series – Steel and Iron

Dynamic Balance (steel), Super Nordstrom (steel) and Nordstrom Iron multiport plug valves are extremely efficient and designed for applications that ordinarily require two to four straightway valves.



Nordstrom

- Low inventory carrying costs and convenient operations as a result of the simplified piping that eliminates the need for other fittings
- Broad application use via the ports and stops that can be arranged to fit required operating conditions
- Greater process control by eliminating waste, overpressure on equipment or incorrect mixtures due to the convenient design
- Efficient operation facilitated by the sealant grooves, which provide consistent lubrication while protecting against corrosion

#### SPECIFICATIONS

Sizes: NPS ½ to 12; DN 15 to 300  
Press: PN 20 to 420; Class 150 to 2500;  
150 to 400 CWP (iron)  
Temp: to 450°C (232°F)

Refer to literature NVABR0014  
at [flowserve.com/library](http://flowserve.com/library).

## LUBRICATED

### Super Nordstrom – Steel

Well-tested, economical line of super-steel plug valves that provides dependable operations and eliminates the need for field readjustments.



Nordstrom

- Greater process control provided by the bubble-tight shutoff and predictable torque
- Increased uptime provided by the precisely controlled vertical lifting of the plug, which eliminates its wedging without affecting tight shutoff
- Durable performance via the specially shaped weather seal that protects the stem, gland and packing from hostile environments and corrosion
- Reliable operation enabled by the Sealdport™ sealant grooving system, designed to give complete distribution of pressurized sealant to seating surfaces

#### SPECIFICATIONS

Sizes: NPS ½ to 4, DN 15 to 100  
Press: Class 150 to 600  
Temp: -29°C to 177°C (-20°F to 350°F)

Refer to literature NVENBR1004  
at [flowserve.com/library](http://flowserve.com/library).

## LUBRICATED

### Bolted Gland – Iron

Reliable bolted gland iron valve for applications in high-stress environments, such as gas, HVAC, wastewater, oil, steam and more.



Nordstrom

- Reduced downtime as a result of sealant channels that provide lubrication and protect the seating surface against corrosion, erosion or accumulation of solids
- Greater process control provided by leak-free, easy turning performance of the gland, which flexes
- High-pressure performance made possible by the heavy-wall body, which can withstand higher-than-line sealant pressure and expected line stresses
- Reliable operation enabled by the Sealdport sealant grooving system, designed to give complete distribution of pressurized sealant to seating surfaces

#### SPECIFICATIONS

Sizes: NPS 6 to 36; DN 150 to 900  
Press: 120 to 500 CWP  
Temp: -29°C to 177°C  
(-20°F to 350°F)

Refer to literature NVENBR1003  
at [flowserve.com/library](http://flowserve.com/library).





Nordstrom

## LUBRICATED

**Bolted Gland – Steel**

Reliable bolted gland steel valve for applications in high-stress environments, such as gas, HVACI, wastewater, oil, steam and more.

- Reduced downtime provided by fixed-adjustment gland, which allows for quick field adjustments if necessary
- Personnel safety and ease of maintenance resulting from double ball checks, which maintain pressure in the enclosed grooving system and prevent back pressure on the sealant chamber
- Greater process control provided by leak-free, flexible metal sealing diaphragm
- Reliable operation enabled by the Sealdport sealant grooving system, designed to give complete distribution of pressurized sealant to seating surfaces

## SPECIFICATIONS

Sizes: NPS 6 to 12; DN 150 to 300

Press: Class 150

Temp: -29°C to 177°C (-20°F to 350°F)

Refer to literature NVENBR1004 at [flowserve.com/library](http://flowserve.com/library).



Nordstrom

## LUBRICATED

**Dynamic Balance – Iron**

Dependable and durable iron plug valve that eliminates the problems often associated with conventional plug valves.

- Increased uptime due to pressure-balanced plug, which ensures predictable torque, even under high differential, vibration and thermal cycling
- Greater process control enabled by the stainless steel spring, which preloads to prevent vibration and thermal cycling
- Reduced maintenance derived from the equal pressure above and below the plug and port created by the balanced holes on both ends
- Reliable operation enabled by the Sealdport sealant grooving system, designed to give complete distribution of pressurized sealant to seating surfaces

## SPECIFICATIONS

Sizes: NPS 4 to 20; DN 100 to 500

Press: 150 to 200 CWP

Temp: -29°C to 177°C (-20°F to 350°F)

Refer to literature NVENBR1004 at [flowserve.com/library](http://flowserve.com/library).



Nordstrom

## LUBRICATED

**Dynamic Balance – Steel**

Dependable and durable steel plug valve that eliminates the problems often associated with conventional plug valves.

- Increased uptime due to pressure-balanced plug, which ensures predictable torque, even under high differential, vibration and thermal cycling
- Reliable performance in hostile environments provided by the anti-friction coating weather seal that provides superior corrosion resistance
- Reduced downtime with pressure-energized stem seals
- Broadest range of sizes, pressure classes and materials
- Reliable operation enabled by the Sealdport sealant grooving system, designed to give complete distribution of pressurized sealant to seating surfaces

## SPECIFICATIONS

Sizes: NPS 1 to 30; DN 25 to 750

Press: Class 150 to 2500

Temp: -46°C to 816°C  
(-50°F to 1500°F)

Refer to literature NVENBR1004 at [flowserve.com/library](http://flowserve.com/library).

## PLUG

### LUBRICATED

## Super Nordstrom Two-Bolt Cover – Iron

Economical two-bolt cover iron valve designed to withstand the harsh gas industry environment and provide corrosion protection.



Nordstrom

- Cost-effective design that eliminates external leakage without the use of costly accessories to protect exposed threaded stems
- Ease of operations and maintenance through the use of valves that can be operated with standard 2-inch square wrench and adapter
- Increased uptime enabled by the thermally bonded, low-friction plug coating that creates low operating torque
- Greater process control through the sealant jacking that ensures positive operation and drop-tight closure

### SPECIFICATIONS

Sizes: NPS ½ to 5; DN 15 to 125  
Press: 200 CWP  
Temp: -29°C to 93°C (-20°F to 200°F)  
Refer to literature NVENBR1003 at [flowserve.com/library](http://flowserve.com/library).

### LUBRICATED

## Super Nordstrom Two-Bolt Cover – Steel

Highly reliable, two-bolt cover steel valve providing all the well-known Nordstrom features for the gas industry in a design that can be welded in-line.



Nordstrom

- Ease of installation provided by weld ends that permit installation directly into welded gas-distribution lines
- Improved resistance to fracture from ground movement provided by the increased strength and ductility compared to flanged iron valves
- Highly reliable operation provided by the coated, tapered iron plug, which has exceptionally low coefficient of friction and separates the metal plug and body
- Longer service life due to the corrosion protection provided by the weather seal and internal stops, which eliminate the trash pocket between the cover and stem

### SPECIFICATIONS

Sizes: NPS ¾ to 4; DN 20 to 100  
Press: 13.7 bar (200 psi)  
Temp: -29°C to 93°C (-20°F to 200°F)  
Refer to literature NVENBR1004 at [flowserve.com/library](http://flowserve.com/library).

### LUBRICATED

## DIPV – Double-Isolation

Reliable, double-isolation plug valve with two independent obturators in a single body; ideal for double block and bleed applications.



Serck Audco

- Improved plant and personnel safety assured by double-isolation design that allows the operator to verify valve isolation before carrying out maintenance
- A cost-, space- and weight-saving alternative to a double block and bleed system using two valves in series
- Installation ease from compact design with the same face-to-face dimension as a single valve, often replacing it without the need for pipe work modifications
- Greater process control via pressure-balanced design that provides true bubble-tight, double-isolation capability within a single valve body

### SPECIFICATIONS

Sizes: DN 15 to 600; NPS ½ to 24  
Press: PN 20 to 420; Class 150 to 2500;  
API 2000 to 10 000  
Temp: -46°C to 375°C (-51°F to 700°F)  
Refer to literature SRENTB0001 at [flowserve.com/library](http://flowserve.com/library).



Nordstrom

## LUBRICATED

**Double-Isolation – Steel**

High-performance, double-isolation steel plug valve designed for critical shutoff applications where absolute shutoff is required for safety, environmental or process reasons.

- Broad application versatility due to robust design, making valve well-suited for isolation in compressor, pump, meter, water or gas injection system applications
- Improved plant and personnel safety assured by double-isolation design
- Installation ease from compact design with the same face-to-face dimension as a single valve
- Greater process control via proven Dynamic Balance pressure-balanced and sealing technology to prevent unequal pressure above/below the plug
- Low lifecycle costs compared to two single valves

## SPECIFICATIONS

Sizes: DN 50 to 300; NPS 2 to 12  
 Press: Class 150 to 2500  
 Temp: -46°C to 232°C (-50°F to 450°F)  
 Refer to literature NVENBR1016 at [flowserve.com/library](http://flowserve.com/library).



Nordstrom

## LUBRICATED

**Screwed Gland Type – Iron**

Rugged, dependable, quarter-turn plug valve designed to require no adjustments in the field once the plug has been carefully adjusted by valve assembler.

- Increased uptime via controlled plug motion design provided by the flexing of spring washers
- Greater process control enabled by tapered plug that is lapped individually with its matching body, providing perfect seating contact
- Longer service life assured by positive rotary action and sealant channels that protect the seating surfaces
- Positive operation and drop-tight closure ensured by sealant jacking and thermally bonded, low-friction plug coating for low operating torque

## SPECIFICATIONS

Sizes: DN 15 to 100; NPS ½ to 4  
 Press: 200 to 800 CWP  
 Temp: -29°C to 178°C (-20°F to 353°F)  
 Refer to literature NVENBR1003 at [flowserve.com/library](http://flowserve.com/library).



Serck Audco

## LUBRICATED

**Taper Plug**

Reliable, standard type taper plug valve designed for general isolation purposes in a variety of liquid, gaseous and slurry services. Available in cast iron and steel to suit application.

- Greater process control via tapered plug design that offers leak tightness while maintaining smooth valve operation
- Longer service life through tapered seat surfaces of the plug and body that prevent exposure to line fluid when valve is in the open position
- Increased reliability due to the straight flow path design that minimizes pressure loss by allowing very little resistance to flow

## SPECIFICATIONS

Sizes: DN 15 to 300; NPS ½ to 12  
 Press: to PN 50; to Class 300  
 Temp: -20°C to 250°C (-5°F to 480°F)  
 Refer to SRENTB0002 and SRENTB0003 at [flowserve.com/library](http://flowserve.com/library).

## PLUG

### LUBRICATED

## Super-H

Rugged, pressure-balanced plug valve designed for demanding oil and gas isolation applications where bubble-tight shutoff and reliable operation are critically important.

- High reliability and certainty of zero-leakage sealing down the line achieved by large, metal-to-metal seat mating areas and precise seat mating procedures
- Increased uptime from pressure-balanced plug design that utilizes pressure to balance the forces acting on the plug and prevent taper locking
- Lower maintenance costs via in-line maintainable design that allows sealant to be injected with the valve in any position and under pressure
- Longer service life assured by seats that are protected against line media while the valve is open

### SPECIFICATIONS

Sizes: DN 15 to 1050; NPS ½ to 42  
Press: PN 20 to 420; Class 150 to 2500;  
API 2000 to 10 000  
Temp: -46°C to 375°C  
(-51°F to 700°F)

Refer to literature SRENTB0004  
at [flowserve.com/library](http://flowserve.com/library).



Serck Audco

### LUBRICATED

## TIPV – Twin Isolation

Reliable, double-isolation plug valve with two independent obturators in a single body; ideal for double block and bleed applications.

- Improved plant and personnel safety assured by double-isolation design that allows the operator to verify valve isolation before carrying out maintenance
- Cost-, space- and weight-saving alternative to double block and bleed system using two valves in series; same face-to-face as a single valve in Class 600 and above
- Lower maintenance costs via in-line maintainable design that allows sealant to be injected with the valve in any position and under pressure
- Greater process control via pressure-balanced design that provides true bubble-tight, double-isolation capability within a single valve body

### SPECIFICATIONS

Sizes: DN 15 to 600; NPS ½ to 24  
Press: PN 20 to 420; Class 150 to 2500;  
API 2000 to 10 000  
Temp: -46°C to 375°C  
(-51°F to 700°F)

Refer to literature SRENTB0005  
at [flowserve.com/library](http://flowserve.com/library).



Serck Audco

## Reduced Cost of Ownership

We get it. Reducing equipment total cost of ownership is critical to improving your bottom line. Flowserve has helped more than 200 strategic alliance partners reduce their equipment ownership costs through programs that address asset management and optimization, engineering and technical services, education and training, and aftermarket parts and services. In fact, one customer with seven refineries is projected to save in excess of \$20 million over five years.





*Durco*

#### LINED

## T4E

Durco T4E valves provide maximum corrosion resistance while eliminating product contamination at a reasonable cost. Available with pneumatic or electric actuators for on-off or modulating control applications.

- Cost-effective alternative to high-alloy body materials
- Reliable performance in extreme service conditions such as severe cycling, vacuum applications, and elevated temperatures ensured by T-slots and anchor holes that provide strong attachment of lining to body and plug
- Efficient, high-flow capacity due to large ports, which reduce friction losses and pressure drop
- Easy maintenance with in-line adjustment; no disassembly is required to restore seating

#### SPECIFICATIONS

Sizes: DN 15 to 300; NPS ½ to 12

Press: PN 16; Class 150 to 300

Temp: -29°C to 204°C (-20°F to 400°F)

Refer to literature DVENBR0066 at [flowserve.com/library](http://flowserve.com/library).







## ACTUATION & INSTRUMENTATION

While pumps, seals and valves seem to get most of the attention, it's often the actuators and positioning solutions that are running the show. Fail-safe isolation. On-off modulation. Precision process control. These are the must-haves of fluid motion and control, no matter how difficult or remote the application.

Our actuator and positioning products are equal parts durability and sophistication, an ideal balance that delivers reliable valve control in tough, hazardous environments. From small-footprint, compact electric actuators to high-torque, high-speed, fluid-powered products, every solution is built to withstand its environment and deliver industry-leading service life. Embedded technologies make them easy to use and set up. More importantly, operators can readily identify and expedite solutions to process and equipment issues through advanced prognostics, diagnostics and communications protocols.

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MX

# ELECTRIC

Delivering unmatched positioning accuracy for control and modulating functions, Flowserve electric actuators are the world's first choice for some of the most challenging applications. Compact, lightweight designs keep footprints small. Cost-effective capital investment is matched by reduced costs for operation, control functions, maintenance, environmental compliance and safety. Superior process monitoring, data logging and information feedback options maximize efficiency and minimize downtime.

## Electric – Quick Reference\*

Product	Sub-Type	Torque	Thrust	Output Speed	Temperatures
<b>L120</b>	Intrusive Multi-Turn	136 to 81 600 Nm (100 to 60 000 ft-lb)	4500 to 225 000 kN (10 000 to 500 000 lbf)	750 to 3000 rpm	-50°C to 65°C (-56°F to 150°F)
<b>SMB</b>	Intrusive Multi-Turn	20 to 81 349 Nm (15 to 60 000 ft-lb)	36 to 2224 kN (8000 to 500 000 lbf)	1800 to 3600 rpm	-20°F to 150°F (-29°C to 66°C)
<b>SB and SBD</b>	Intrusive Multi-Turn	353 to 11 253 Nm (260 to 8300 ft-lb)	62 to 1112 kN (14 000 to 250 000 lbf)	1800 to 3600 rpm	-20°F to 150°F (-29°C to 66°C)
<b>QX</b>	Non-Intrusive, Quarter-Turn	54 to 2033 Nm (40 to 1500 ft-lb)	—	5 to 120 s	-55°C to 70°C (-67°F to 156°F)
<b>QXM</b>	Non-Intrusive, Multi-Turn	24 to 337 Nm (18 to 250 ft-lb)	3 to 40 kN (593 to 9065 lbf)	3 to 24 rpm	-30°C to 70°C (-22°F to 156°F)
<b>MX</b>	Non-Intrusive, Multi-Turn	27 to 2307 Nm (20 to 1700 ft-lb)	35 to 333 kN (8000 to 75 000 lbf)	15 to 200 rpm	-60°C to 70°C (-76°F to 158°F)

\* Additional products shown on next page

## Electric – Quick Reference, cont'd.

Product	Sub-Type	Topology	Comm. Meth.	Max. Tran.	Max. Devc.	Max. Dist.
<b>Modbus DDC</b>	Network Controls	Multi-drop (single ended/redundant loop for MX)	Master-Slave	19.2 Kbps	250	1200 m (without repeaters)
<b>Modbus Ethernet TCP/IP</b>	Network Controls	Redundant bi-directional loop or daisy chain	Modbus protocol over RS-485 or Ethernet	38.4 Kbps	250	1.52 km (without repeaters)
<b>Foundation Fieldbus H1 with DTM</b>	Network Controls	Multi-drop, Point-to-Point, Tree	Publisher/Subscriber	31.25 Kbps	240/network — 32/segment (with repeater)	1900 m/segment
<b>PROFIBUS DP V1 with Redundancy and DTM</b>	Network Controls	Multi-drop, Point-to-Point Daisy Chain	Master-Slave	1.5 Mbps	127	1200 m (without repeaters)
<b>PROFIBUS PA</b>	Network Controls	Multi-drop, Point-to-Point, Tree	Master-Slave	31.25 Kbps	127 (31 per repeater)	1200 m (without repeaters)
<b>DeviceNet</b>	Network Controls	Multi-drop, Linear Trunkline/Dropline	Master-Slave	500 Kbps	64	500 m
<b>Hart with DTM</b>	Network Controls	Multi-drop, Point-to-Point	Master-Slave	1.2 Kbps	15	1800 m/network

*All network PCBs meet EMC requirements to European Directive 2004/108/EC and vibration/seismic requirements to Machinery Directive 2006/42/EC.*

INTRUSIVE MULTI-TURN

## L120



Limitorque®

From commercial power feedwater and steam systems, to oil and gas refining and coking, to water filtration and treatment, the L120 has a solid record in the most demanding applications.

- Proven safety with explosion-proof certification, torque overload protection, plus resistance to lightning, EMI, fire, vibration and high-pressure steam
- Longer service life from aluminum and ductile iron housings, plus anti-friction bearing-supported alloy steel worm shafts with bronze worm gears
- Broad application flexibility via integration with most network protocols through UEX electronic controls package
- Extreme environment performance available from weatherproof, submersible and explosion-proof construction options

SPECIFICATIONS

Torque: 136 to 81 600 Nm  
(100 to 60 000 ft-lb)  
Thrust: 4500 to 225 000 kN  
(10 000 to 500 000 lbf)  
Output Speed: 750 to 3000 rpm  
Temp: -50°C to 65°C (-56°F to 150°F)  
Refer to literature LMENBR1200 at [flowserve.com/library](http://flowserve.com/library).

INTRUSIVE MULTI-TURN

## SMB



Limitorque

Introduced in the 1960s, SMB actuators are used by the U.S. Navy, every nuclear power facility in the U.S., and virtually every other industrial environment.

- Long service life with rugged with cast iron housing and precision-machined gearing
- Extreme environment performance enabled by nuclear, weatherproof, submersible or explosion-proof construction
- Lower maintenance and downtime owing to torque-limiting feature, which de-energizes the motor to prevent valve damage in the event of an obstruction
- Fully qualified for nuclear applications to IEEE 384, 323 and 344

SPECIFICATIONS

Torque: 20 to 81 349 Nm  
(15 to 60 000 ft-lb)  
Thrust: 36 to 2224 kN  
(8000 to 500 000 lbf)  
Output Speed: 1800 to 3600 rpm  
Temp: -29°C to 66°C (-20°F to 150°F)  
Refer to literature LMENBR1400 at [flowserve.com/library](http://flowserve.com/library).

INTRUSIVE MULTI-TURN

## SB and SBD



Limitorque

These spring-compensated extensions of the SMB product line are available for applications where thermal expansion may pose a jammed-valve risk, or where valve discs are subject to extremely high-speed closure.

- High-temperature capability enabled by design that allows for thermal expansion and contraction of the valve stem and actuator stem nut
- High-speed performance made possible by spring-loaded stem nut, which absorbs the seating shock caused by rapid closing
- Longer service life via impact-dampening capability, which enables actuators to function at speeds as high as three times normal rates
- Optimized performance for stem contraction and torque back-seating applications available with double-compensating SBD configuration

SPECIFICATIONS

Torque: 353 to 11 253 Nm  
(260 to 8300 ft-lb)  
Thrust: 62 to 1112 kN  
(14 000 to 250 000 lbf)  
Output Speed: 1800 to 3600 rpm  
Temp: -29°C to 66°C (-20°F to 150°F)  
Refer to literature LMENBR1400 at [flowserve.com/library](http://flowserve.com/library).

# ELECTRIC

## NON-INTRUSIVE, QUARTER-TURN

### QX

The QX design builds on more than 20 years of proven MX technology to provide all the user-preferred features in a quarter-turn smart actuator package.

- Greater process control with non-contacting absolute encoders that provide accurate position sensing
- B.I.S.T., built-in self-test which never needs batteries to retain position data, even in the event of main power loss
- Extreme environment performance made possible by non-intrusive design, 100% solid-state controls, and reliable digital communication control system
- Flexible control configurations, setup and diagnostics in 11 languages, and advanced brushless DC motor that supports most global voltages, AC or DC

#### SPECIFICATIONS

Torque: 54 to 2033 Nm  
(40 to 1500 ft-lb)  
Output Speed: 5 to 120 s  
Temp: -55°C to 70°C (-67°F to 156°F)  
Refer to literature LMENBR3302  
at [flowserve.com/library](http://flowserve.com/library).



Limitorque

## NON-INTRUSIVE, MULTI-TURN

### QXM

A smart, non-intrusive electronic valve actuator with a maximum of 20 drive sleeve turns. Designed for limited, short stroke, light torque rising stem valve applications such as choke or control valves.

- Lower operating costs compared to pneumatic actuators, with the added advantages of electrical operation
- Greater process control from accuracy that meets and exceeds EN 15714 (Class D) and IEC 60034 standards for modulating service
- Increased reliability via electro-magnetic noise protection of analog process control signals

#### SPECIFICATIONS

Torque: 24 to 337 Nm; (18 to 250 ft-lb)  
Thrust: 3 to 40 kN; (593 to 9065 lbf)  
Output Speed: 3 to 24 rpm  
Temp: -30°C to 70°C (-22°F to 156°F)  
Refer to literature LMENBR3302  
at [flowserve.com/library](http://flowserve.com/library).



Limitorque

## NON-INTRUSIVE, MULTI-TURN

### MX

Introduced in 1997 and into its third generation, the MX is built upon a wealth of experience and performance in valve actuation. Thousands are installed in all major market segments.

- Broad versatility owing to a wide variety of configurations, including torque-only, thrust-based, linear thrust base and rising stem applications
- Increased uptime from patented absolute positioning encoder that never needs batteries and B.I.S.T. built-in self-test
- Instant actuator status and valve position in 11 languages provided by graphical display with local control switches with solid-state Hall effect devices
- Low-temperature capability to -60°C (-76°F) with arctic temperature and solid-state starter options for modulation to 1200 starts per hour

#### SPECIFICATIONS

Torque: 27 to 2307 Nm (20 to 1700 ft-lb)  
Thrust: 35 to 333 kN;  
(8000 to 75 000 lbf)  
Output Speed: 15 to 200 rpm  
Temp: -60°C to 70°C (-76°F to 158°F)  
Refer to literature LMENBR2302  
at [flowserve.com/library](http://flowserve.com/library).



Limitorque



## Leading the Charge in Electric Innovation

Flowserve was one of the first companies to introduce electric actuators back in the 1980s. Since then, we've significantly increased their efficiency while dramatically reducing their cost. In recent years, these advances have reached a tipping point that makes electric actuators the first choice for a wide variety of applications. Today's electric actuators can provide superior positioning accuracy for control or modulating functions, plus invaluable diagnostic and process data.



### NETWORK CONTROLS

## Modbus DDC

Limatorque ensures complete integration with Modbus DDC. Connect up to 250 actuators with a single twisted-pair cable on an RS-485 network to a PLC/SCADA system or Limatorque Master Station.



- Greater process control in even the largest networks made possible by support for up to 250 actuators
- Increased efficiency, security and safety via Master Station option, enabling complete single-source control and diagnostics for MX, QX, L120 and LY units
- Complies with EMC requirements to European Directive 2004/108/EC and vibration/seismic requirements to Machinery Directive 2006/42/EC

### SPECIFICATIONS

Topology: Multi-drop (single ended/  
redundant loop for MX)  
Comm. Meth: Master-Slave  
Max. Trans. Rate: 19.2 Kbps  
Max. Devices: 250  
Max. Dist: 1200 m (without repeaters)  
Refer to LMENIM2329 and  
LMENFL5100 at [flowserve.com/library](http://flowserve.com/library).

### NETWORK CONTROLS

## Modbus Ethernet TCP/IP

Combining the simplicity of the Modbus protocol with the widespread Ethernet standard, Limatorque products with Modbus Ethernet TCP/IP connect to any Modbus network that supports TCP/IP and RS485 systems.



- Greater process control enabled by support for up to 250 devices
- Increased flexibility and reduced costs via off-the-shelf Ethernet tools, permitting control from a DCS, PLC or PC
- Easy installation with simple module that connects directly to Modbus terminals
- Optimized communication performance supported by baud rate options from 1.2K up to 38.4K
- Complies with ODVA CIP specifications for internet protocols, Industrial Ethernet (IE) regulations IEC 61158 (Fieldbus) and IEEE 802

### SPECIFICATIONS

Topology: Redundant bi-directional  
loop or daisy chain  
Comm. Meth: Modbus protocol over  
RS-485 or Ethernet  
Max. Trans. Rate: 38.4 Kbps  
Max. Devices: 250  
Max. Dist: 1.52 km (without repeaters)  
Refer to literature LLMENIM2329 at  
[flowserve.com/library](http://flowserve.com/library).

# ELECTRIC

## NETWORK CONTROLS

### Foundation Fieldbus H1 with DTM



Limiterque actuators with Foundation Fieldbus can act as a link active scheduler and time master for regulating communication on a fieldbus segment.

- Broad network versatility from support for multiple topologies, including point-to-point, bus with spurs, daisy chain, tree or combinations of these
- Ease of installation and setup with direct connection to PLC or DCS systems from major manufacturers, including Emerson, Honeywell, ABB, GE and Yokogawa
- Increased performance, safety and environmental compliance from Flowserve ValveSight™ support
- Complies with EMC requirements to European Directive 2004/108/EC and vibration/seismic requirements to Machinery Directive 2006/42/EC

#### SPECIFICATIONS

Topology: Multi-drop, Tree, Point-to-Point  
Comm. Meth: Publisher/Subscriber  
Max. Trans. Rate: 31.25 Kbps  
Max. Devices: 240/network;  
32/segment (with repeater)  
Max. Dist: 1900 m/segment

Refer to literature LMENIM2330 at [flowserve.com/library](http://flowserve.com/library).

## NETWORK CONTROLS

### PROFIBUS DP V1 with Redundancy and DTM



Limiterque actuators with PROFIBUS DP are designed to operate sensors and actuators via a centralized controller in production (factory) automation applications.

- Reduced maintenance and related operating costs via intuitive software that proactively identifies maintenance needs, preventing unscheduled shutdowns
- Increased efficiency enabled by network that allows users to communicate in real time with every device and monitor diagnostics information, including alarms
- Complies with EMC requirements to European Directive 2004/108/EC
- Complies with Profibus specification, Slave-Redundancy\_2.212\_v12 and transfers communication for both flying and system redundancy in  $\leq 500$  ms per specification
- Supports NAMUR NE-107

#### SPECIFICATIONS

Topology: Multi-drop, Point-to-Point, Daisy Chain  
Comm. Meth: Master-Slave  
Max. Trans. Rate: 1.5 Mbps  
Max. Devices: 127  
Max. Dist: 1200 m (without repeaters)

Refer to LMENIM2339 and LMENFL2336 at [flowserve.com/library](http://flowserve.com/library).

## NETWORK CONTROLS

### PROFIBUS PA



Limiterque actuators with PROFIBUS PA are used to monitor and control process automation applications.

- Broad application flexibility via analog and digital input/output function blocks
- Ease of installation and setup made possible by direct connection to PLC or DCS systems from major manufacturers, including Emerson, Honeywell, ABB and Yokogawa
- Increased performance, safety and environmental compliance from Flowserve ValveSight support
- Complies with EMC requirements to European Directive 2004/108/EC and vibration/seismic requirements to Machinery Directive 2006/42/EC

#### SPECIFICATIONS

Topology: Multi-drop, Tree, Point-to-Point  
Comm. Meth: Master-Slave  
Max. Trans. Rate: 31.25 Kbps  
Max. Devices: 127 (31 per repeater)  
Max. Dist: 1200 m (without repeaters)

Refer to literature LMENIM2336 at [flowserve.com/library](http://flowserve.com/library).

NETWORK CONTROLS

## DeviceNet

Limiterque actuators integrate seamlessly with DeviceNet. DeviceNet is a digital, multi-drop network that connects and serves as a communication network between industrial controllers and field devices.



- Broad application flexibility via support for multiple communication hierarchies and message prioritization
- Greater reliability and reduced downtime assured by cyclic redundancy checking (CRC), auto retries, and bus-powered network interface that allows alarm information to be communicated when actuator loses main power
- Complies with EMC requirements to European Directive 2004/108/EC and vibration/seismic requirements to Machinery Directive 2006/42/EC

SPECIFICATIONS

Topology: Multi-drop, Linear Trunkline/Dropline  
 Comm. Meth: Master-Slave  
 Max. Trans. Rate: 500 Kbps  
 Max. Devices: 64  
 Max. Dist: 500 m

Refer to literature LMENIM2328 at [flowserve.com/library](http://flowserve.com/library).

NETWORK CONTROLS

## Hart with DTM

Limiterque actuators with HART (Highway Addressable Remote Transducer) allow secondary masters, such as handheld communicators, to be connected without interfering with the plant control system.



- Greater process control, asset management efficiency and safety made possible by enabling the use of both centralized control/monitoring and smart field devices
- Faster diagnostic feedback and summaries due to burst mode that enables response of up to three commands continuously
- Complies with EMC requirements to European Directive 2004/108/EC and vibration/seismic requirements to Machinery Directive 2006/42/EC

SPECIFICATIONS

Topology: Multi-drop, Point-to-Point  
 Comm. Meth: Master-Slave  
 Max. Trans. Rate: 1.2 Kbps  
 Max. Devices: 15  
 Max. Dist: 1800 m/Network

Refer to LMENFL2340 or LMENIM2340 at [flowserve.com/library](http://flowserve.com/library).



*V Series Bevel*

## GEARBOXES

Whether for manual or motorized operation, Flowserve quarter- and multi-turn gearboxes stand up to the toughest performance requirements and environmental challenges. Trouble-free operation, high uptime and rugged dependability are engineered into every unit through high-strength gearing, robust housings and roller bearing-supported shafts. Broad application versatility is achieved via weatherproof and submersible constructions and a wide range of output speeds and torques.

### Gearboxes – Quick Reference

Product	Sub-Type	Torque to	Thrust to	Temperatures
<b>V</b> Series Bevel	Multi-Turn	52 000 Nm (38 350 ft-lb)	7650 kN (1.7 million lbf)	-35°C to 90°C (-31°F to 194°F)
<b>SR</b> Series Spur	Multi-Turn	23 000 N (16 984 ft-lb)	3500 kN (787 000 lbf)	-35°C to 90°C (-31°F to 194°F)
<b>WG</b> Series Worm	Quarter-Turn	442 000 Nm (326 000 ft-lb)	—	-35°C to 90°C (-31°F to 194°F)
<b>HBC</b> Series Worm	Quarter-Turn	126 204 Nm (93 000 ft-lb)	—	-29°C to 66°C (-20°F to 150°F)

# GEARBOXES

## MULTI-TURN

### V Series Bevel

V Series bevel gearboxes are designed for manual and motorized operation for industrial gate and globe valves as well as slide gates.



Limitorque

- Broad application versatility provided by excellent sealing of mating surfaces, which allows for weatherproof or temporary submersion applications
- Increased uptime facilitated by roller bearing-supported shaft and high-strength bevel gearing, which are rated for extremely high thrust and torque requirements
- Longer service life via ductile iron housing and roller bearing-supported shafts and drive sleeve that provide durability

#### SPECIFICATIONS

Torque to: 52 000 Nm (38 350 ft-lb)  
Thrust to: 7650 kN (1.7 million lbf)  
Temp: -35°C to 90°C (-31°F to 194°F)  
Refer to literature LMENFL3602 at [flowserve.com/library](http://flowserve.com/library).

## MULTI-TURN

### SR Series Spur

The SR Series is a solid-performing, multi-turn, spur gearbox designed for manual or motorized operation of gate and globe valves as well as slide gates.



Limitorque

- Well suited for high vibration or tight space requirements owing to parallel input shaft and output drive sleeve
- Application versatility provided by available weatherproof and submersible constructions as well as a wide range of output speeds and torques
- Increased uptime facilitated by roller bearing-supported shaft and high-strength gearing, which are rated for extremely high thrust and torque requirements
- High strength and durability provided by ductile iron housing and roller bearing-supported shafts and drive sleeve

#### SPECIFICATIONS

Torque to: 23 000 Nm (16 984 ft-lb)  
Thrust to: 3500 kN (787 000 lbf)  
Temp: -35°C to 90°C (-31°F to 194°F)  
Refer to literature LMENIM3701 at [flowserve.com/library](http://flowserve.com/library).

## QUARTER-TURN

### WG Series Worm

The WG Series of worm gearboxes offers unsurpassed quality and longevity in a wide variety of weatherproof, submersible and buried-service applications.



Limitorque

- Extraordinary range of output speeds and torques made possible by compatibility with a wide array of numerous electric actuators
- Reduced downtime provided by the removable, top-entry, splined valve shaft adapter, which ensures proper engagement of the valve stem
- Increased uptime due to rugged ductile iron housing, roller bearing-supported shaft and well-designed sealing, which stands up to tough conditions

#### SPECIFICATIONS

Torque to: 442 000 Nm (326 000 ft-lb)  
Temp: -35°C to 90°C (-31°F to 194°F)  
Refer to literature LMENFL2102 at [flowserve.com/library](http://flowserve.com/library).



*Limitorque*

QUARTER-TURN

## HBC Series Worm

The HBC is the strongest worm gearbox on the market. It delivers consistent, trouble-free performance in demanding applications, ranging from nuclear power plants to critical service flow control in hydroelectric plants.

- Broad application versatility provided by ability to actuate a wide range of devices, both manually or motorized, at a considerable range of output speeds and torques
- Increased uptime due to bronze worm gear paired with alloy steel worm shaft
- Lower maintenance costs due to heavy-duty construction; proven in use for more than 50 years to be rugged and dependable
- Ease of operation made possible by valve position pointer, which makes at-a-glance position checking easier than ever

### SPECIFICATIONS

Torque to: 126 204 Nm (93 000 ft-lb)  
Temp: -29°C to 66°C (-20°F to 150°F)

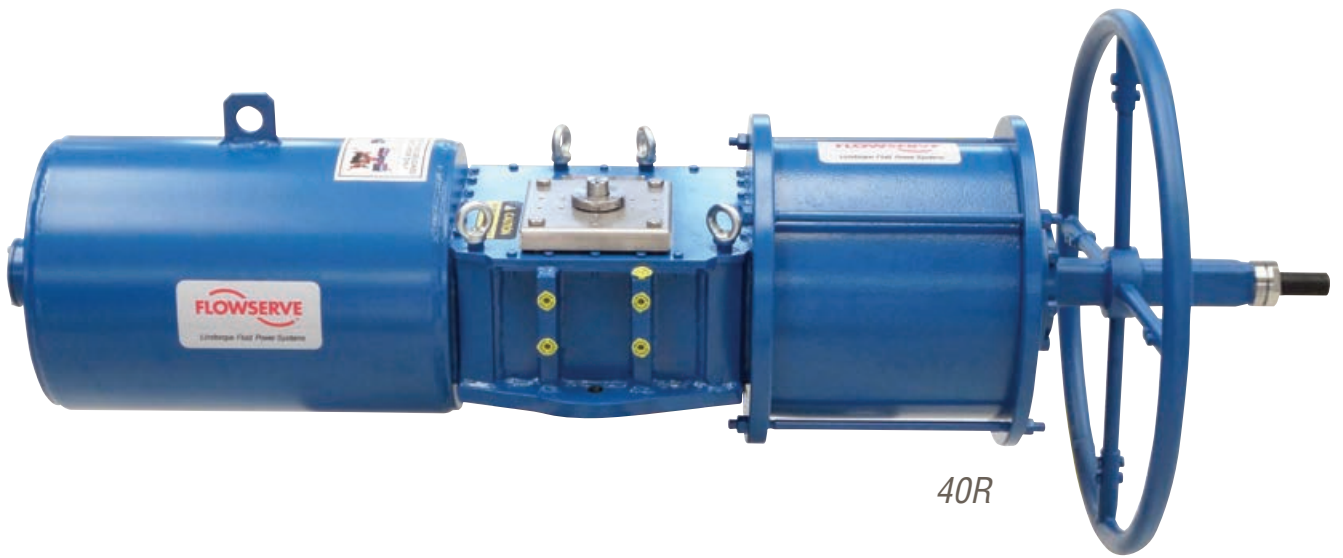
Refer to literature LMENBR3500  
at [flowserve.com/library](http://flowserve.com/library).

## Smart Solutions for the World's Toughest Applications

No matter how extreme the environment or strict the regulations, customers the world over trust Flowserve actuation and positioning products to provide reliable, intelligent control. Whether your devices need to endure polar ice or desert heat, provide fail-safe protection in explosive atmospheres or nuclear power stations, or control complicated modulating processes with pinpoint accuracy, Flowserve has an actuation solution that's right for your application.







40R

# FLUID POWER

Whether you need fail-safe action, high-torque power or high-speed functionality, Flowserve fluid power actuators are built for the world’s toughest jobs. Reliable operation, reduced maintenance and longer service life are made possible by the simplicity, efficiency and flexibility built into every design. From nuclear power plants to offshore drilling platforms, the world’s most critical infrastructures rely on Flowserve for rugged, efficient actuators with service lifespans of a quarter-century or more.

## Fluid Power – Quick Reference\*

Product	Sub-Type	Torque	Thrust	MAWP	Temperatures
<b>LPS</b>	Pneumatic — Scotch Yoke	550 kNm (405 659 ft-lb)	—	12 barg (174 psig)	-60°C to 160°C (-76°F to 320°F)
<b>LPC</b>	Pneumatic — Scotch Yoke	5500 Nm (4057 ft-lb)	—	12 barg (174 psig)	-60°C to 160°C (-76°F to 320°F)
<b>RG, ARG and WRG</b>	Pneumatic — Scotch Yoke	248 kNm (2.2M in-lb)	—	10.3 barg (150 psig)	-55°C to 149°C (-67°F to 300°F)
<b>Turnex™</b>	Pneumatic — Linkage	60 to 20 000 Nm (44 to 1475 ft-lb)	—	8 barg (116 psig)	-30°C to 80°C (-22°F to 176°F); to -40°C (-40°F) on request
<b>LRP</b>	Pneumatic — Scotch Yoke	10 to 1700 Nm (88 to 15 046 in-lb)	—	8.3 barg (120 psig)	-40°C to 150°C (-40°F to 302°F)
<b>F39</b>	Pneumatic — Rack & Pinion	7100 Nm (62 835 in-lb)	—	8.3 barg (120 psig)	-40°C to 150°C (-40°F to 302°F)
<b>40R</b>	Pneumatic — Rack & Pinion	7100 Nm (62 835 in-lb)	—	8.3 barg (120 psig)	-40°C to 150°C (-40°F to 302°F)
<b>33R</b>	Pneumatic — Rack & Pinion	2309 Nm (20 436 in-lb)	—	5.5 barg (80 psig)	-40°C to 150°C (-40°F to 302°F)

\* Additional products shown on next page

## Fluid Power – Quick Reference, cont'd.

Product	Sub-Type	Torque	Thrust	MAWP	Temperatures
<b>P61</b>	Pneumatic — Rack & Pinion	1063 Nm (9408 in-lb)	—	8.3 barg (120 psig)	-40°C to 150°C (-40°F to 302°F)
<b>Supernova™</b>	Pneumatic — Rack & Pinion	5005 Nm (44 294 in-lb)	—	8 barg (120 psig)	-50°C to 150°C (-55°F to 302°F)
<b>SXL</b>	Pneumatic — Rack & Pinion	765 Nm (6770 in-lb)	—	8.3 barg (120 psig)	-50°C to 150°C (-55°F to 302°F)
<b>NR</b>	Pneumatic — Rotary	5 to 1285 Nm (43 to 11 381 in-lb)	—	6 barg (80 psig)	-60°C to 70°C (-76°F to 158°F)
<b>VR</b>	Pneumatic — Rotary	8 to 4160 Nm (72 to 36 820 in-lb)	—	10.3 barg (150 psig)	-60°C to 177°C (-76°F to 350°F)
<b>FlowAct™</b>	Pneumatic — Linear	—	0.25 to 60 kN (56.2 to 13 488.5 lbf)	6 barg (87 psig)	-40°C to 80°C (-40°F to 176°F)
<b>VL</b>	Pneumatic — Linear	—	15.85 to 262.53 kN (3564 to 59 020 lbf)	10.3 barg (150 psig)	-40°C to 177°C (-40°F to 350°F)
<b>VL-C</b>	Pneumatic — Linear	—	15.85 to 134.11 kN (3564 to 30 150 lbf)	10.3 barg (150 psig)	-40°C to 177°C (-40°F to 350°F)
<b>VL-ES</b>	Pneumatic — Linear	—	72.73 to 166.45 kN (16 350 to 37 420 lbf)	10.3 barg (150 psig)	-40°C to 177°C (-40°F to 350°F)
<b>VL-UHC</b>	Pneumatic — Linear	—	15.85 to 125.88 kN (3564 to 28 300 lbf)	10.3 barg (150 psig)	-40°C to 80°C (-40°F to 176°F)
<b>Series 2 Type KP</b>	Pneumatic — Linear	—	to 35.0 kN (7868 lbf)	6 barg (87 psig)	-40°C to 80°C (-40°F to 176°F)
<b>Series 4 Type KA</b>	Pneumatic — Linear	—	to 25.5 kN (5735 lbf)	1.4 to 4.2 barg (20 to 60 psig)	-30°C to 80°C (-22°F to 176°F)
<b>LHS and LHH</b>	Hydraulic	550 kNm (405 659 ft-lb)		345 barg (5000 psig)	-60°C to 160°C (-76°F to 320°F)
<b>LDG</b>	Direct Gas	550 kNm (405 659 ft-lb)		105 barg (1500 psig)	-40°C to 160°C (-40°F to 320°F)

PNEUMATIC — SCOTCH YOKE

## LPS

Ideal for medium or large valve actuation and any application requiring robust design, long service life and high-speed operation. Meets the most stringent safety and performance standards for oil and gas applications.



Limitorque

- Low total cost of ownership provided by 25-year design life and maintenance intervals up to six years
- High-speed performance with reduced size, weight and consumption made possible by highly efficient design
- Modular construction allows easy on site maintenance without special tools and without removal from the valve
- Regulatory compliance with the highest industry standards, including EN 15714 and IEC 61508 (SIL 3 capable)

SPECIFICATIONS

Torque: 550 kNm (405 659 ft-lb)  
 MAWP: 12 barg (174 psig)  
 Temp: -60°C to 160°C (-76°F to 320°F)  
 Refer to LFENBR0001 or LFENFLO001 at [flowserve.com/library](http://flowserve.com/library).

PNEUMATIC — SCOTCH YOKE

## LPC

Suitable for pneumatic on-off, light modulating and control applications of small or medium quarter-turn valves in general and protective services. Also useable in safety services up to SIL 3 in accordance with IEC 61508.



Limitorque

- Low total cost of ownership provided by proven design with 25-year lifecycle and maintenance intervals up to five years (or per EN 15714 endurance testing)
- Application versatility enabled by flexible field conversion from Fail Close CW to Fail Open CCW and easy retrofitting via specially designed coupling interface
- Superior reliability and durability above typical industry standards, thanks to heavy-duty design and excellent corrosion resistance
- Regulatory compliance with the toughest industry standards, including EN 15714 and ISO 9001

SPECIFICATIONS

Torque: 5500 Nm (4057 ft-lb)  
 MAWP: 12 barg (174 psig)  
 Temp: -60°C to 160°C (-76°F to 320°F)  
 Refer to LFENBR0002 or LFENTB0002 at [flowserve.com/library](http://flowserve.com/library).

PNEUMATIC — SCOTCH YOKE

## RG, ARG and WRG

A ductile cast iron actuator series, ideal for general process and chemical applications where highly standardized pneumatic actuators are required. It offers more than 250 torque profiles and significantly reduces transverse loads.



Automax Accord™ Worcester

- Easier installation in tight spaces via pull-to-compress design and concentric nested spring configuration plus easy on-site field reconfiguration
- Increased efficiency from canted yoke and support system, which delivers approximately 20% higher break torque
- Greater process control via bidirectional travel stops that allow precise adjustment of open and closed positions
- Environmental protection assured by IP67M (temporary submersion) rating and marine-grade epoxy surface treatment

SPECIFICATIONS

Torque: 248 kNm (2.2M in-lb)  
 MAWP: 10.3 barg (150 psig)  
 Temp: -55°C to 149°C (-67°F to 300°F)  
 Refer to literature AXEBR1002 at [flowserve.com/library](http://flowserve.com/library).

# FLUID POWER

## PNEUMATIC — LINKAGE

### Turnex

The Turnex is a heavy-duty actuator for high-performance modulating control. It is also used for on-off service.



*NAF*

- Maintenance-free operation enabled by robust linkage system with bushing, providing optimum torque curve for quarter-turn valves and eliminating play
- Seamless integration with NAF control valve package provided by unique direct mounting concept
- Installation ease enhanced by internal air passages, eliminating external pipes
- Minimizes spare parts with unique system of sleeves for different stem diameters, plus more than three decades of parts consistency

#### SPECIFICATIONS

Torque: 60 to 20 000 Nm  
(44 to 1475 ft-lb)  
MAWP: 8 barg (116 psig)  
Temp: -30°C to 80°C (-22°F to 176°F);  
to -40°C (-40°F) on request

Refer to literature Fk 74.59  
at [flowserve.com/library](http://flowserve.com/library).

## PNEUMATIC — RACK & PINION

### LRP

The Limatorque LRP actuator is robust and reliable. It is designed for high-performance automation of quarter-turn valves in a wide range of applications.



*Limatorque*

- Improved reliability, performance stability and service life enabled by unique piston support rods that ensure side loads are transmitted through the bearings, not the body
- Efficient torque matching ensured by the linear torque curve of the balanced double rack and pinion design plus a large range of sizes
- Installation ease and application flexibility with ISO 5211 mounting with star drive output as well as Namur VDI/VDE 3845 top mounting and solenoid mounting patterns

#### SPECIFICATIONS

Torque: 1700 Nm (1250 ft-lb)  
MAWP: 8 barg (116 psig)  
Temp: -40°C to 150°C (-40°F to 302°F)

Refer to literature LFENBR0009  
at [flowserve.com/library](http://flowserve.com/library).

## PNEUMATIC — RACK & PINION

### F39

High-cycle pneumatic power for on-off or throttling control of rotary valves and dampers. Available in double-acting or spring-return configurations.



*Worcester*

- Longer service life enabled by piston support rods that eliminate the need for the body to be used as a bearing surface
- Increased efficiency from balanced double rack-and-pinion, eliminating side loads
- Faster operation speed is a standard feature, thanks to unique design enabling unrestricted air flow through guide rods
- Increased plant and personnel safety via long screws, allowing complete release of spring energy during disassembly

#### SPECIFICATIONS

Torque: 7100 Nm (62 835 in-lb)  
MAWP: 8.3 barg (120 psig)  
Temp: -40°C to 150°C (-40°F to 302°F)

Refer to literature WCENBR1003  
at [flowserve.com/library](http://flowserve.com/library).

PNEUMATIC — RACK & PINION

## 40R

Recognized as the leading name in the quarter-turn pneumatic actuator market for half a century. With 11 sizes available, torque output can be closely matched to the required valve torque.



Norbro®

- Longer service life enabled by piston support rods that eliminate the need for the body to be used as a bearing surface
- Increased safety plus ease of maintenance from anti-blowout pinion, airflow through support rods, and long end cap screws to release spring energy
- Application flexibility made possible by large size range and Namur VDE/VDI 3845 top-mounting pattern for easy fitting and interchangeability of ancillary equipment
- Minimizes space requirements with compact fail-safe option, available in same body size as double-acting configuration

SPECIFICATIONS

Torque: 7100 Nm (62 835 in-lb)  
 MAWP: 8.3 barg (120 psig)  
 Temp: -40°C to 150°C  
 (-40°F to 302°F)

Refer to literature NBEBR0003 at [flowserve.com/library](http://flowserve.com/library).

PNEUMATIC — RACK & PINION

## 33R

A 180-degree actuator derived from the world-renowned Norbro 40R, designed to compliment the Worcester Series 18/19 multi-way ball valve.



Norbro

- Longer service life enabled by piston support rods that eliminate the need for the body to be used as a bearing surface
- Increased safety plus ease of maintenance from anti-blowout pinion, airflow through support rods, and long end cap screws to release spring energy
- Application flexibility made possible by large size range and Namur VDE/VDI 3845 top-mounting pattern for easy fitting and interchangeability of ancillary equipment
- Easy installation in tight spaces via spring-return version, available in same body size as double-acting configuration, creating a compact fail-safe option

SPECIFICATIONS

Torque: 2309 Nm (20 436 in-lb)  
 MAWP: 5.5 barg (80 psig)  
 Temp: -40°C to 150°C (-40°F to 302°F)

Refer to NBEBR0002 or NBEBR0003 at [flowserve.com/library](http://flowserve.com/library).

PNEUMATIC — RACK & PINION

## P61

The P61 brings new levels of control to batch filling operations. Based on the 40R, it is designed specifically to provide rapid, repeatable and highly accurate filling control for weigh/measuring processes.



Norbro

- Greater process control assured by two-stage operation which allows high flow followed by repeatable trickle flow before closing
- Longer service life enabled by piston support rods that eliminate the need for the body to be used as a bearing surface
- Increased safety from bolted-on cover sleeve, anti-blowout pinion, airflow through support rods, and long end cap screws to release spring energy

SPECIFICATIONS

Torque: 1063 Nm (9408 in-lb)  
 MAWP: 8.3 barg (120 psig)  
 Temp: -40°C to 150°C (-40°F to 302°F)

Refer to NBEBR0004 or NBEBR0003 at [flowserve.com/library](http://flowserve.com/library).



# FLUID POWER

## PNEUMATIC — RACK & PINION

### Supernova



*Accord*

Supernova ASAP series rack and pinion actuators are designed for butterfly, plug or ball valves, and offer one compact design for double acting and spring return.

- Increased efficiency and cycle life from precision die-cast pistons with large cylinder bearings
- Greater precision and reliability assured by integral travel stops in both directions, plus 10 degrees of overtravel for precise adjustment
- Longer, trouble-free service life enabled by precision-extruded hard anodized aluminum body and a one-piece, factory-lubricated, nitride-protected pinion gear
- Ease and flexibility of installation via dual ISO 5211 mounting pattern

#### SPECIFICATIONS

Torque: 5005 Nm (44 294 in-lb)  
MAWP: 8 barg (120 psig)  
Temp: -50°C to 150°C (-55°F to 302°F)  
Refer to ACENBR0004 or ACENBR0001 at [flowserve.com/library](http://flowserve.com/library).

## PNEUMATIC — RACK & PINION

### SXL



*Automax*

Ideal for corrosive environments, the SXL Series utilizes a 316 stainless steel body with stainless steel or aluminum pistons and springs. Optional polished finishes for sanitary applications also available.

- Longer service life and lower maintenance cost from corrosion-resistant materials
- Greater process control enabled by bi-directional travel stops, with 5° overtravel and 10° undertravel adjustment in each direction
- Installation ease via ISO 5211 mounting with Namur VDE/VDI 3845 top-mounting pattern for easy fitting and interchangeability of ancillary equipment

#### SPECIFICATIONS

Torque: 765 Nm (6770 in-lb)  
MAWP: 8.3 barg (120 psig)  
Temp: -50°C to 150°C (-55°F to 302°F)  
Refer to literature LPR0006 at [flowserve.com/library](http://flowserve.com/library).

## PNEUMATIC — ROTARY

### NR



*Valtek*

The Flowserve Valtek NR diaphragm rotary actuator features excellent sensitivity that provides quick, accurate movements for precise control.

- Long operating life enabled by rolling diaphragm that creates minimal wear
- Lower maintenance and parts cost assured by simple design
- Increased efficiency from ISO 9001-compliant design, allowing direct mounting of positioners for minimal lost motion

#### SPECIFICATIONS

Torque: 5 to 1285 Nm  
(43 to 11 381 in-lb)  
MAWP: 6 barg (80 psig)  
Temp: -60°C to 70°C (-76°F to 158°F)  
Refer to literature VLENIM0064 at [flowserve.com/library](http://flowserve.com/library).

PNEUMATIC — ROTARY

## VR

The Flowserve Valtek VR cylinder actuator is a high-pressure, compact actuator with high torque and pneumatic stiffness for excellent throttling capabilities.

- Greater process control enabled by standard splined shaft connection that eliminates backlash
- Lower maintenance costs, greater ease of installation, and compliance with seismic requirements assured by compact, lightweight and rugged design
- Long service life via low-friction bearings that provide millions of cycles with minimal wear while minimizing hysteresis
- Increased plant and personnel safety made possible by air-purged, fully enclosed transfer case

SPECIFICATIONS

Torque: 8 to 4160 Nm  
 (72 to 36 820 in-lb)  
 MAWP: 10.3 barg (150 psig)  
 Temp: -60°C to 177°C (-76°F to 350°F)  
 Refer to literature VLATB031  
 at [flowserve.com/library](http://flowserve.com/library).



Valtek

PNEUMATIC — LINEAR

## FlowAct

The FlowAct pneumatic diaphragm actuator is a high-thrust, multi-spring actuator for direct or reverse action — easy installation and field reversible without additional parts.

- High-speed performance enabled by low volume between diaphragm and case
- Greater efficiency from fabric-reinforced, roll-type diaphragm that maintains linear stem positioning
- Lower maintenance cost made possible by maintenance-free stem bushing

SPECIFICATIONS

Thrust: 0.25 to 60 kN (56.2 to 13 488.5 lbf)  
 MAWP: 6 barg (87 psig)  
 Temp: -40°C to 80°C (-40°F to 176°F)  
 Refer to literature SAENTBFACT  
 at [flowserve.com/library](http://flowserve.com/library).



Valtek

PNEUMATIC — LINEAR

## VL

The VL Series is the standard set of actuators for Valtek control valves, providing precise control and reliable performance for more than 30 years.

- Increased efficiency provided by substantially higher thrust capabilities compared to diaphragm actuators, allowing tighter valve shutoff
- Installation and maintenance ease made possible by exceptionally compact and lightweight aluminum cylinder
- Ease of maintenance further enabled by durable construction and cylinder design, which provides easy access to all internal components
- Lower installation and replacement costs with standard O-rings for static and dynamic seals

SPECIFICATIONS

Thrust: 15.85 to 262.53 kN  
 (3564 to 59 020 lbf)  
 MAWP: 10.3 barg (150 psig)  
 Temp: -40°C to 177°C (-40°F to 350°F)  
 Refer to literature VLENBR0002  
 at [flowserve.com/library](http://flowserve.com/library).



Valtek

# FLUID POWER

## PNEUMATIC — LINEAR

### VL-C

Offering identical springs and all the advantages of Flowserve standard aluminum actuators, the VL-C replaces all aluminum parts with carbon steel.

- High performance enabled by replacing all aluminum parts with carbon steel
- Lower maintenance costs and time from simple design
- Broad nuclear application flexibility provided by a variety of options and accessories, allowing the VL cylinder to fit into almost any application requiring high thrust and low maintenance
- Low inventory carrying costs enabled by lower-cost VL soft goods that are easier to find

#### SPECIFICATIONS

Thrust: 15.85 to 134.11 kN  
(3564 to 30 150 lbf)  
MAWP: 10.3 barg (150 psig)  
Temp: -40°C to 177°C (-40°F to 350°F)  
Refer to literature VLENBR0002  
at [flowserve.com/library](http://flowserve.com/library).



Valtek

## PNEUMATIC — LINEAR

### VL-ES

Using many of the same design concepts as the VL-C, the VL-ES offers external spring cans for applications where longer strokes or unusually high spring thrust are required.

- Longer service life — up to 2 million cycles — from dynamic quad seal design, stronger springs, plug stem jam nut, and thrust bearings that prevent windup
- Installation and maintenance ease made possible by exceptionally compact and lightweight aluminum cylinder
- Ease of maintenance via spring cylinder actuator design requiring the removal of just two parts to access all internal components
- Lower installation and replacement costs thanks to standard O-rings for static and dynamic seals

#### SPECIFICATIONS

Thrust: 72.73 to 166.45 kN  
(16 350 to 37 420 lbf)  
MAWP: 10.3 barg (150 psig)  
Temp: -40°C to 177°C (-40°F to 350°F)  
Refer to literature VLENBR0002  
at [flowserve.com/library](http://flowserve.com/library).



Valtek

## PNEUMATIC — LINEAR

### VL-UHC

For applications where ultra high cycle (UHC) life is needed, VL-UHC Series actuators offer up to 2 million full stroke cycles with periodic soft goods replacement.

- Significantly longer service life provided by dynamic quad seals, plug stem jam nut, recessed O-ring adjusting screw seal, and stronger springs with stress-reducing thrust bearings
- Lower maintenance costs and time from simple design that requires removal of just two parts to access all internal components
- Broad nuclear application flexibility provided by a variety of options and accessories, allowing the VL cylinder to fit into almost any application requiring high thrust and low maintenance

#### SPECIFICATIONS

Thrust: 15.85 to 125.88 kN  
(3564 to 28 300 lbf)  
MAWP: 10.3 barg (150 psig)  
Temp: -40°C to 80°C (-40°F to 176°F)  
Refer to literature VLENBR0002  
at [flowserve.com/library](http://flowserve.com/library).



Valtek

PNEUMATIC — LINEAR

## Series 2 Type KP

Stainless steel actuators for standard use. Multi-spring design, fail-open or fail-close position, and various accessories such as handwheels or limit stops make the KP actuator a frequent choice among operators.



Kämmer®

- Broad application versatility offered by a wide range of sizes, integrated options and accessories
- Increased durability from stainless steel material, which provides superior corrosion resistance, even without a protective coating
- Installation ease and flexibility enabled by compact variations with enclosed accessories

SPECIFICATIONS

Thrust: to 35.0 kN (7868 lbf)  
 MAWP: 6 barg (87 psig)  
 Temp: -40°C to 80°C  
 (-40°F to 176°F)

Refer to literature KMEEBR0021 at [flowserve.com/library](http://flowserve.com/library).

PNEUMATIC — LINEAR

## Series 4 Type KA

Compared to other manufacturers' diaphragm actuator designs, Series 4 offers much higher thrust, compact design and lighter weight. Field-reversible design may require no additional parts.



Kämmer

- Lower maintenance costs made possible by rugged positioner and internal design that protects all moving parts against damage and dirt
- Increased plant and personnel safety enabled by multiple-spring design, improving safety of fail-safe mode
- Broad application versatility enabled by a wide variety of top-mounted options, including handwheels, proximity switches and electric switches

SPECIFICATIONS

Thrust: to 25.5 kN (5735 lbf)  
 MAWP: 1.4 to 4.2 barg (20 to 60 psig)  
 Temp: -30°C to 80°C (-22°F to 176°F)

Refer to literature KMEEBR003 at [flowserve.com/library](http://flowserve.com/library).

HYDRAULIC

## LHS and LHH

Suitable for on-off, modulating and control applications of quarter-turn valves in general and protective services. Also useable in safety services up to SIL 3 in accordance with IEC 61508.



Limitorque

- Longer service life and lower maintenance provided by proven design with 25-year life cycle and maintenance intervals up to six years
- Broad application versatility enabled by true modular design for flexible and easy field conversion
- Regulatory compliance assured by reliable design that meets a wide range of general service, protective service and safety application standards, including ESD / HIPPS and SIL Level 3 in accordance with IEC 61508
- Extreme environment performance available with polar or offshore variants

SPECIFICATIONS

Torque: to 550 kNm (405 659 ft-lb)  
 MAWP: 345 barg (5000 psig)  
 Temp: -60°C to 160°C (-76°F to 320°F)

Refer to LFENBR0003 and LFENFL0003 at [flowserve.com/library](http://flowserve.com/library).

# FLUID POWER

## DIRECT GAS

### LDG

A high-pressure pneumatic, piston-type, Scotch yoke actuator designed to operate on high-pressure pneumatic supply fluids, including pipeline gases and nitrogen. Certified for SIL 3.



*Limitorque*

- Reduced equipment footprint due to compact dimensions and design
- Improved lifespan with 25-year design life and maintenance interval up to six years, or as prescribed in EN 15714 for high-cycle applications
- Simplified on-site maintenance for standard activities such as replacement of Scotch yoke sliding block without removing the actuator from the valve
- Reduced environmental impact through Limitorque's high-pressure rated MHPC control group that minimizes gas consumption and exhaust

#### SPECIFICATIONS

Torque: to 550 kNm (405 659 ft-lb)

MAWP: 105 barg (1500 psig)

Temp: -40°C to 160°C (-40°F to 320°F)

Refer to literature LFENTB0005 at [flowserve.com/library](http://flowserve.com/library).







*Logix 3200MD*

# POSITIONERS

Dramatic improvements in process uptime, reliability and yield are facilitated at lower costs with the Flowserve portfolio of ultra-high precision positioners. Return-to-operation times are significantly reduced by advanced prognostic and diagnostic solutions that not only identify field problems, but expedite corrective actions. All models offer industry-leading embedded measurement, data reduction and diagnostic functionality, while control system-independent user interfaces facilitate performance configuration, operation and diagnosis with a single view.

## Positioners – Quick Reference\*

Product	Sub-Type	Air Capacity	Air Consumption	Repeatability	Temperatures
<b>StarPac® 3</b>	Digital	20.4 Nm <sup>3</sup> /h @ 4 bar (12 SCFM @ 60 psi)	0.5 Nm <sup>3</sup> /h @ 4 bar (<0.3 SCFM @ 60 psi)	0.25%	-40°C to 76°C (-40°F to 170°F)
<b>D3</b>	Digital	21 Nm <sup>3</sup> /h @ 6 bar (12.5 SCFM @ 87 psi)	<0.018 Nm <sup>3</sup> /h @ 6 bar (0.01 SCFM @ 87 psi) — zero bleed	<0.5%	-40°C to 80°C (-40°F to 176°F)
<b>D20</b>	Digital	7.2 Nm <sup>3</sup> /h @ 6 bar (4.2 SCFM @ 87 psi)	0.12 Nm <sup>3</sup> /h @ 6 bar (0.071 SCFM @ 87 psi)	<0.2%	-40°C to 85°C (-4°F to 185°F)
<b>D30</b>	Digital	45.6 Nm <sup>3</sup> /h @ 6 bar (29 SCFM @ 87 psi)	0.5 Nm <sup>3</sup> /h @ 6 bar (0.3 SCFM @ 87 psi)	<0.5%	-40°C to 80°C (-40°F to 176°F)
<b>Apex 9000</b>	Digital	7.2 Nm <sup>3</sup> /h @ 6 bar (4.2 SCFM @ 87 psi)	0.12 Nm <sup>3</sup> /h @ 6 bar (0.071 SCFM @ 87 psi)	<0.2%	-40°C to 85°C (-4°F to 185°F)
<b>Logix 3800</b>	Digital	30.6 Nm <sup>3</sup> /h @ 4.1 bar (18 SCFM @ 60 psi)	0.082 to 0.637 Nm <sup>3</sup> /h @ 4.1 bar (0.048 to 0.375 SCFM @ 60 psi)	≤0.25%	-52°C to 85°C (-61.6°F to 185°F)
<b>Logix MD+</b>	Digital	20.8 to 30.6 Nm <sup>3</sup> /h @ 4.1 bar (12.2 to 18 SCFM @ 60 psi)	0.082 to 0.637 Nm <sup>3</sup> /h @ 4.1 bar (0.048 to 0.375 SCFM @ 60 psi)	≤0.25%	-52°C to 85°C (-61.6°F to 185°F)
<b>Logix 420</b>	Digital	20.8 Nm <sup>3</sup> /h @ 4.1 bar (12.2 SCFM @ 60 psi)	0.082 Nm <sup>3</sup> /h @ 4.1 bar (0.048 SCFM @ 60 psi)	≤0.25%	-52°C to 85°C (-61.6°F to 185°F)

\* Additional products shown on next page

## Positioners – Quick Reference, cont'd.

Product	Sub-Type	Air Capacity	Air Consumption	Repeatability	Temperatures
<b>Logix 3200MD</b>	Digital	20.4 Nm <sup>3</sup> /h @ 4 bar (12 SCFM @ 60 psi)	0.5 Nm <sup>3</sup> /h @ 4 bar (<0.3 SCFM @ 60 psi)	<0.05%	-40°C to 80°C (-40°F to 176°F)
<b>Logix 3400MD</b>	Digital	20.4 Nm <sup>3</sup> /h @ 4 bar (12 SCFM @ 60 psi)	0.5 Nm <sup>3</sup> /h @ 4 bar (<0.3 SCFM @ 60 psi)	<0.05%	-40°C to 80°C (-40°F to 176°F)
<b>P5 and EP5</b>	Analog	25.3 to 32.4 Nm <sup>3</sup> /h @ 6 bar (14.8 to 18.8 SCFM @ 87 psi)	0.59 to 1.32 Nm <sup>3</sup> /h @ 6 bar (0.35 to 0.78 SCFM @ 87 psi)	≤0.5%	-40°C to 85°C (-40°F to 185°F)
<b>Apex 4000</b>	Analog	23.7 to 44.4 Nm <sup>3</sup> /h @ 6 bar (13.9 to 26.1 SCFM @ 87 psi)	0.53 Nm <sup>3</sup> /h @ 6 bar (0.31 SCFM @ 87 psi)	0.5%	-20°C to 85°C (-4°F to 185°F)
<b>Apex 7000</b>	Analog	25.3 to 32.4 Nm <sup>3</sup> /h @ 6 bar (14.8 to 18.8 SCFM @ 87 psi)	0.59 to 1.32 Nm <sup>3</sup> /h @ 6 bar (0.35 to 0.78 SCFM @ 87 psi)	≤0.5%	-40°C to 85°C (-40°F to 185°F)



Valtek Kammer

DIGITAL

### StarPac 3

The StarPac 3 digital positioner offers repeatability, accuracy and quick system response time with a small footprint and simple installation.

- Greater process control with built-in diagnostics compared to traditional control loop technology
- Significantly higher response time via built-in process sensors with a sample rate of 16 times per second and typical loop time of 3 milliseconds
- Greater accuracy from control valve with digital positioner, including valve position sensor and actuator pressure sensors
- Lower installation and operating costs enabled by compact design that eliminates separate line taps and long runs of straight piping

SPECIFICATIONS

Air Cap: 20.4 Nm<sup>3</sup>/h @ 4 bar  
 (12 SCFM @ 60 psi)  
 Air Con: 0.5 Nm<sup>3</sup>/h @ 4 bar  
 (<0.3 SCFM @ 60 psi)  
 Repeatability: 0.25%  
 Temp: -40°C to 76°C (-40°F to 170°F)  
 Refer to literature VLENBR0066  
 at [flowserve.com/library](http://flowserve.com/library).

DIGITAL

### D3

The D3 is suitable for linear or rotary valves, single- or double-acting actuators, and special applications. Available with general purpose, intrinsically safe and explosion-proof housings, with plug-in modules for limit switches and feedback.



PMV™

- Lower operational cost made possible by zero-bleed pneumatic relay that enables very low air consumption to minimize electricity costs and meet EPA bleed limits for natural gas applications
- Installation and configuration ease enabled by friction clutch, five simple keys and large graphic LCD display
- Broad application versatility with Hart, PROFIBUS PA, PROFIBUS DP, Foundation Fieldbus and industry-leading IEC ISA100 wireless communication technology
- ATEX, IECEx, CSA, FM and SIL 2 approvals available with some configurations

SPECIFICATIONS

Air Cap: 21 Nm<sup>3</sup>/h @ 6 bar  
 (12.5 SCFM @ 87 psi)  
 Air Con: <0.018 Nm<sup>3</sup>/h @ 6 bar (0.01 SCFM @ 87 psi) – zero bleed  
 Repeatability: <0.5%  
 Temp: -40°C to 80°C (-40°F to 176°F)  
 Refer to PMENBR0001 or PMENBR0021  
 at [flowserve.com/library](http://flowserve.com/library).

DIGITAL

### D20

This compact digital positioner suits both linear and rotary actuators in single-acting applications. Very high control precision on even the smallest valves. IS, NI and explosion-proof versions.



PMV

- Greater process control with very high precision, even on the smallest valves, plus add-in switches and 4-20 mA position feedback options
- Installation and operation ease from friction clutch, compact design, and single-button quick auto-calibration feature that tunes the D20 in seconds
- Broad application versatility made possible by flexible design that allows mounting to VDI/VDE 3845 (rotary) and VDI/VDE 3847 (linear with integrated tubing) standards
- ATEX, IECEx, CSA and FM approvals available with some configurations

SPECIFICATIONS

Air Cap: 7.2 Nm<sup>3</sup>/h @ 6 bar  
 (4.2 SCFM @ 87 psi)  
 Air Con: 0.12 Nm<sup>3</sup>/h @ 6 bar  
 (0.071 SCFM @ 87 psi)  
 Repeatability: <0.2%  
 Temp: -40°C to 85°C (-4°F to 185°F)  
 Refer to PMENBR0015 or PMENBR0021  
 at [flowserve.com/library](http://flowserve.com/library).

# POSITIONERS

## DIGITAL

### D30



PMV

The D30 is a robust, intelligent positioner with very high air capacity. Based on proven digital technology, it features a large, high-performance spool valve controlled by a unique intelligent control algorithm.

- High-volume performance enabled by robust, high-capacity design that eliminates the need for boosters
- Installation and operation ease from quick calibration and friction clutch to simplify commissioning plus a preloaded spring to eliminate play in the feedback mechanism
- Broad application versatility via modular design that suits almost any control valve — small or large, rotary or linear; options also include remote mounting of positioner
- Lower maintenance costs and downtime with ValveSight DTM predictive diagnostics

#### SPECIFICATIONS

Air Cap: 45.6 Nm<sup>3</sup>/h @ 6 bar  
(29 SCFM @ 87 psi)  
Air Con: 0.5 Nm<sup>3</sup>/h @ 6 bar  
(0.3 SCFM @ 87 psi)  
Repeatability: <0.5%  
Temp: -40°C to 80°C (-40°F to 176°F)  
Refer to PMENBR0030 or PMENBR0021 at [flowserve.com/library](http://flowserve.com/library).

## DIGITAL

### Apex 9000



Accord

The Apex 9000 is a compact digital positioner designed specifically for VDI/VDE 3845 rotary actuators. It offers excellent control at an affordable price.

- Installation and operation ease from friction clutch, compact design plus quick calibration and commissioning
- Greater process control with add-in switches and 4-20 mA position feedback options
- Increased plant and personnel safety with intrinsically safe, non-incendive, or explosion-proof FM, CSA, IECEx and ATEX options

#### SPECIFICATIONS

Air Cap: 7.2 Nm<sup>3</sup>/h @ 6 bar  
(4.2 SCFM @ 87 psi)  
Air Con: 0.12 Nm<sup>3</sup>/h @ 6 bar  
(0.071 SCFM @ 87 psi)  
Repeatability: <0.2%  
Temp: -40°C to 85°C (-4°F to 185°F)  
Refer to literature ACENBR0007 at [flowserve.com/library](http://flowserve.com/library).

## DIGITAL

### Logix 3800



Valtek  
Automax  
Kammer

Latest generation Digital HART and Foundation Fieldbus positioners designed for superior performance and reliability. The Logix 3800 Series can be easily configured using local buttons, handhelds or ValveSight software.

- SIL 3 capable, robust construction works in the harshest conditions for temperature, vibration, dirt, moisture, etc.
- High performance and precision control are provided by sensitive non-contact feedback sensor coupled with poppet-style relay. Predictive algorithms continuously monitor the health of the valve and actuator.
- Simple to use, one-button setup automatically configures the zero, span and gain of the positioner for most valves in less than 60 seconds
- Adaptable design is configurable to interface with valve, process and control system needs using HART, Foundation Fieldbus, 4-20 or discrete I/O signals

#### SPECIFICATIONS

Air Cap: 30.6 Nm<sup>3</sup>/h @ 4.1 bar  
(18 SCFM @ 60 psi)  
Air Con: 0.082 to 0.637 Nm<sup>3</sup>/h @ 4.1 bar  
(0.048 to 0.375 SCFM @ 60 psi)  
Repeatability: ≤0.25%  
Temp: -52°C to 85°C (-61.6°F to 185°F)  
Refer to literature LGENBR3100-00 at [flowserve.com/library](http://flowserve.com/library).

DIGITAL

## Logix MD+

Digital HART positioners with state-of-the-art piezo technology for superior performance and reliability. The Logix MD+ Series can be easily configured using local buttons, HART handheld and ValveSight software.



Valtek  
Automax  
Kammer

- Greater process control enabled by fast CPU, precision components, inner loop control and advanced control algorithms
- Increased reliability via temperature and humidity sensors, which detect developing issues and prevent failures
- Greater durability from heavy-duty housing, providing tough protection from dust, liquids and impact in the most demanding environments
- Hazardous area performance assured by intrinsically safe electronics that meet ATEX, IECEx and North America (cFMus)

SPECIFICATIONS

Air Cap: 20.8 to 30.6 Nm<sup>3</sup>/h @ 4.1 bar (12.2 to 18 SCFM @ 60 psi)  
 Air Con: 0.082 to 0.637 Nm<sup>3</sup>/h @ 4.1 bar (0.048 to 0.375 SCFM @ 60 psi)  
 Repeatability: ≤0.25%  
 Temp: -52°C to 85°C (-61.6°F to 185°F)  
 Refer to literature LGENBR0109 at [flowserve.com/library](http://flowserve.com/library).

DIGITAL

## Logix 420

The Logix 420 is a compact, cost-competitive solution for the single-acting, explosion-proof, intrinsically safe and non-incendive markets. Supports HART 6 and 7 protocols.



Valtek  
Automax  
Kammer

- Installation and operation ease assured by one-button calibration, easy user interface, LCD screen and ValveSight DTM software
- Greater accuracy and reliability made possible by precision components, inner loop control and advanced control algorithms
- Comprehensive online diagnostics and intuitive health display
- Explosion-proof compliance with Class I Division 1 and ATEX Ex d installations, intrinsically safe design certified for Class I Division 1 and Ex ia applications, plus non-incendive approvals

SPECIFICATIONS

Air Cap: 20.8 Nm<sup>3</sup>/h @ 4.1 bar (12.2 SCFM @ 60 psi)  
 Air Con: 0.082 Nm<sup>3</sup>/h @ 4.1 bar (0.048 SCFM @ 60 psi)  
 Repeatability: ≤ 0.25%  
 Temp: -52°C to 85°C (-61.6°F to 185°F)  
 Refer to literature LGENBR0106 at [flowserve.com/library](http://flowserve.com/library).

DIGITAL

## Logix 3200MD

A digital HART positioner with state-of-the-art piezo technology to provide superior performance and reliability. Easily configured using local buttons, HART handheld or ValveSight software.



Valtek  
Automax  
Kammer

- Installation ease assured by automatic calibration and tuning
- Faster diagnostic feedback and summaries made possible by burst mode
- Greater process control with 4-20 mA position feedback card option

SPECIFICATIONS

Air Cap: 20.4 Nm<sup>3</sup>/h @ 4 bar (12 SCFM @ 60 psi)  
 Air Con: 0.5 Nm<sup>3</sup>/h @ 4 bar (<0.3 SCFM @ 60 psi)  
 Repeatability: <0.05%  
 Temp: -40°C to 80°C (-40°F to 176°F)  
 Refer to LGENBR3000 or LGENIM0059 at [flowserve.com/library](http://flowserve.com/library).



# POSITIONERS

## DIGITAL

### Logix 3400MD

A digital Foundation Fieldbus positioner with state-of-the-art piezo technology to provide superior performance and reliability. ITK 6.1 certified.



Valtek  
Automax  
Kammer

- Installation ease assured by automatic calibration and tuning
- Faster diagnostic feedback and summaries made possible by burst mode
- Easily configured using local buttons, FF handheld or ValveSight software
- Function blocks for AO, PID, DI, DO, input selector and output splitter

## SPECIFICATIONS

Air Cap: 20.4 Nm<sup>3</sup>/h @ 4 bar  
(12 SCFM @ 60 psi)  
Air Con: 0.5 Nm<sup>3</sup>/h @ 4 bar  
(<0.3 SCFM @ 60 psi)  
Repeatability: <0.05%  
Temp: -40°C to 80°C (-40°F to 176°F)  
Refer to LGENBR3404 or LGENBR3405  
at [flowserve.com/library](http://flowserve.com/library).

## A Worldwide Network Keeps Your Business in Motion

Flowserve actuators are known for their dependability and ruggedness. But, when you need service, every member of the Flowserve team is committed to minimizing your downtime. Quick Response Centers and Blue Ribbon Service Centers are strategically located in the Americas, China, India, Middle East, and Europe to make sure you receive premium service and expertise whenever you need it — even with very short lead times.



## ANALOG

### P5 and EP5

Fast and accurate general purpose positioners available in pneumatic (P5) or electropneumatic (EP5) configurations. Choose from explosion-proof (EP5-EX), fail freeze (EP5-FS) and intrinsically safe (EP5-IS) options.



PMV

- Enhanced performance from high-gain, high-capacity spool valve assembly, providing very quick and accurate actuator and valve response plus simple commissioning with non-interactive, zero-span adjustment
- Longer service life assured by robust, simple design, delivering maximum reliability in all environments
- Versatility from compact, modular design, allowing for simple addition of I/P converters and F5 feedback unit; suitable for single- or double-acting applications

## SPECIFICATIONS

Air Cap: 25.3 to 32.4 Nm<sup>3</sup>/h @ 6 bar  
(14.8 to 18.8 SCFM @ 87 psi)  
Air Con: 0.59 to 1.32 Nm<sup>3</sup>/h @ 6 bar  
(0.35 to 0.78 SCFM @ 87 psi)  
Repeatability: ≤0.5%  
Temp: -40°C to 85°C (-40°F to 185°F)  
Refer to PMENBR00008 or PMENBR0006  
at [flowserve.com/library](http://flowserve.com/library).

ANALOG

## Apex 4000

A compact, lightweight and cost-efficient positioner, the Apex 4000 is suitable for all rotary or linear valves, single- and double-acting.



Accord  
Automax  
PMV

- Corrosive environment capability assured by epoxy powder-coated aluminum construction of all exposed parts, plus gold-plated spool valve
- Greater reliability from compact, rugged design with few moving parts
- Broad application versatility provided by multiple cam options
- Quick and simple calibration uses thumbwheels and requires only a flat-head screwdriver; span adjustment performed internally with external zero adjustment
- Easy field upgradability to electro-pneumatic I/P options without removing cover

SPECIFICATIONS

Air Cap: 23.7 to 44.4 Nm<sup>3</sup>/h @ 6 bar  
(13.9 to 26.1 SCFM @ 87 psi)  
Air Con: 0.53 Nm<sup>3</sup>/h @ 6 bar  
(0.31 SCFM @ 87 psi)  
Repeatability: 0.5%  
Temp: -20°C to 85°C (-4°F to 185°F)  
Refer to literature AXAPS014  
at [flowserve.com/library](http://flowserve.com/library).

ANALOG

## Apex 7000

The Apex 7000 Series provides accurate valve positioning with advanced features. Usable with 3–15 psi pneumatic control signals, or optional current-to-pressure transducer for 4–20 mA signal input.

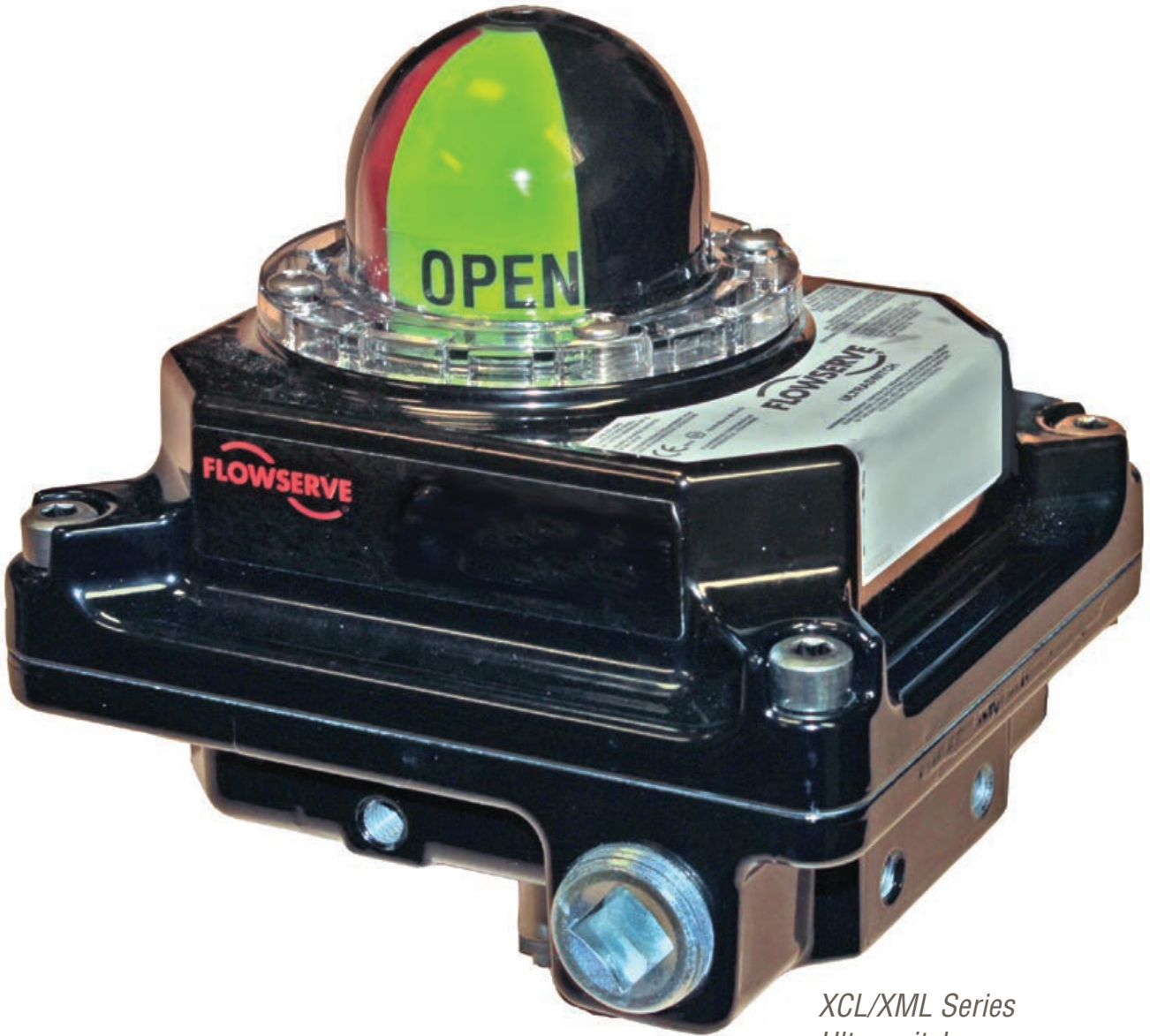


Accord  
Automax  
PMV

- Corrosive environment capability assured by epoxy powder-coated aluminum construction of all exposed parts, plus gold-plated spool valve
- Greater reliability from compact, rugged design with few moving parts
- Broad application versatility provided by multiple cam options
- Installation ease with quick and simple non-interacting, zero-span adjustment
- Easy field upgradability to electro-pneumatic I/P options without removing cover

SPECIFICATIONS

Air Cap: 25.3 to 32.4 Nm<sup>3</sup>/h @ 6 bar  
(14.8 to 18.8 SCFM @ 87 psi)  
Air Con: 0.59 to 1.32 Nm<sup>3</sup>/h @ 6 bar  
(0.35 to 0.78 SCFM @ 87 psi)  
Repeatability: ≤0.5%  
Temp: -40°C to 85°C (-40°F to 185°F)  
Refer to AXENPS0125 or AXENBR0006  
at [flowserve.com/library](http://flowserve.com/library).



*XCL/XML Series  
Ultraswitch*

## SWITCH BOXES

Flowserve switch boxes have a proven track record for accurate and reliable position signaling in linear and rotary applications. Providing both visual and remote electrical position indications, these cost-effective, compact units offer unparalleled performance with ease of installation and calibration. Rugged, corrosion-resistant enclosures have multiple switch options and meet IP66/67 and NEMA Type 4X standards. Intrinsically safe, non-incendive and explosion-proof designs ensure safe, reliable operation in hazardous environments.

### Switch Boxes – Quick Reference

Product	Sub-Type	No. of Switches	Temperatures
<b>WS/WM Series Ultraswitch®</b>	Switch Boxes	0 to 2	-40°C to 80°C (-40°F to 180°F)
<b>PS/PM Series Ultraswitch</b>	Switch Boxes	2 or 4	-40°C to 80°C (-40°F to 180°F)
<b>DS/DM Series Ultraswitch</b>	Switch Boxes	0 to 4	-55°C to 85°C (-67°F to 180°F)
<b>XCL/XML Series Ultraswitch</b>	Switch Boxes	0 to 4	-40°C to 85°C (-40°F to 180°F)
<b>F5 Series</b>	Switch Boxes	2	-40°C to 85°C (-40°F to 185°F)
<b>Aviator II Ultraswitch</b>	Switch Boxes	0 to 4	-20°C to 80°C (-4°F to 80°F)

## SWITCH BOXES

### SWITCH BOXES

## WS/WM Series Ultraswitch

Intrinsically safe and non-incendive compact switch box for chemical, petrochemical, food and beverage, municipal, wastewater and pharmaceutical applications. Meets requirements for ATEX and cCSAus hazardous locations.



Automax  
PMV

- Easy installation ensured by compact housing with multiple mounting possibilities and up to four conduit entries with pre-wired switches
- Configuration flexibility due to range of domed and flat indicators plus low profile units without indicators
- Ingress protection ensured by design that meets IP66/67 and NEMA Type 4X standards
- Choice of aluminum or corrosion-resistant resin enclosures

### SPECIFICATIONS

No. of Switches: 0 to 2  
Temp: -40°C to 80°C (-40°F to 180°F)  
Refer to literature AXENBR0135 at [flowserve.com/library](http://flowserve.com/library).

### SWITCH BOXES

## PS/PM Series Ultraswitch

Intrinsically safe and non-incendive, the PS/PM features a lightweight, modular design with corrosion-resistant engineered resin enclosure. It is ideal for chemical, petrochemical, municipal, wastewater and pharmaceutical applications.



Automax  
PMV

- Large range of global IS, NI and mb certificates enables use in all major applications worldwide
- Application flexibility due to the ability to be easily and directly mounted onto actuators for both rotary and linear applications with multiple switch options
- Optional continuous position feedback and bus communication
- Ingress protection ensured by design that meets IP66/67 and NEMA Type 4X standards

### SPECIFICATIONS

No. of Switches: 2 or 4  
Temp: -40°C to 80°C (-40°F to 180°F)  
Refer to literature PMENBR0018 at [flowserve.com/library](http://flowserve.com/library).

### SWITCH BOXES

## DS/DM Series Ultraswitch

The DS/DM Ultraswitch provides reliable position signaling for the highest class Ex d IIC/Group A hazardous location areas. Available with aluminum or stainless steel enclosure for chemical, oil and gas, pharmaceutical and offshore applications.



Automax  
PMV

- Meets IP66 and NEMA Type 4X standards and is offered for general purpose, weatherproof and IIC/Group A explosion-proof hazardous locations
- Highly configurable, with numerous options for switches, housing materials and terminals, among many others
- Easy installation owing to multiple mounting possibilities, up to three conduit entries and pre-wired switches

### SPECIFICATIONS

No. of Switches: 0 to 4  
Temp: -55°C to 85°C (-67°F to 180°F)  
Refer to literature PMENBR0020 at [flowserve.com/library](http://flowserve.com/library).

SWITCH BOXES

## XCL/XML Series Ultraswitch

The XCL/XML position indicator is globally certified explosion-proof and flame-proof for oil and gas, chemical, petrochemical, food and beverage, municipal, wastewater and pharmaceutical applications.

- Ease of use provided by UltraDome™ visual indicator, which provides a wide-angle view of the valve position, and Quick-Set™ cams, which offer easy, tool-free adjustment of sensing position
- Long service life provided by durable die cast aluminum housing with dichromate undercoat and electrostatic powder topcoat for corrosion resistance
- CSA/ATEX-approved for hazardous locations
- Application versatility owing to a watertight position indicator and multiple mounting options for any rack and pinion, Scotch yoke or other rotary actuator

SPECIFICATIONS

No. of Switches: 0 to 4  
 Temp: -40°C to 85°C (-40°F to 180°F)  
 Refer to literature AXENBR0006 at [flowserve.com/library](http://flowserve.com/library).



Automax  
PMV

SWITCH BOXES

## F5 Series

Feedback system offering the ability to add switches (mechanical or proximity), a potentiometer or a 4-20 mA transmitter to the P5/EP5 analog positioners. Intrinsically safe and explosion-proof enclosure versions available.

- Reliable operation provided by a compact and sturdy design with vibration resistance
- Optimal performance resulting from a cam and spindle that are not splined to achieve 100 percent resolution, which can be critical when used on control valves
- Application versatility owing to a wide range of limit switches and modular standard or explosion-proof housings that need no special mounting pieces

SPECIFICATIONS

No. of Switches: 2  
 Temp: -40°C to 85°C (-40°F to 185°F)  
 Refer to literature PMENBR0005 at [flowserve.com/library](http://flowserve.com/library).



PMV

SWITCH BOXES

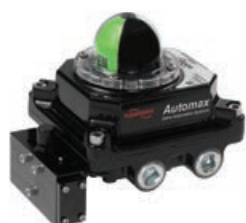
## Aviator II Ultraswitch

Integrated on-off valve controller with industry-leading capacity up to C<sub>v</sub> 4.5. Meets the corrosive, hazardous and non-hazardous location valve control and positioning needs of chemical, oil and gas, and other industries.

- Secure operation in hazardous environments ensured by an internal pilot solenoid coil that contains and protects the coil
- Longer service life due to internally vented, tapered tee spool valve that prevents the ingress of corrosive atmospheres and permits bidirectional self-cleaning
- Lower total cost of ownership resulting from the internal pilot solenoid coil that also simplifies wiring, reduces installation time and eliminates expensive explosion-proof conduit and fittings

SPECIFICATIONS

No. of Switches: 0 to 4  
 Temp: -20°C to 80°C (-4°F to 80°F)  
 Refer to literature ACENPS0100 at [flowserve.com/library](http://flowserve.com/library).



Automax  
PMV





*ValveSight DTMs for HART or  
Fieldbus Communications*

## SOFTWARE

Make your operation more profitable and easier to manage with ValveSight software solutions, intelligent digital tools backed by more than two centuries of Flowserve fluid management expertise. Designed to be easy to use with minimal training, ValveSight enhances the entire equipment lifecycle. From easy installation and commissioning to superior operational control and maximum valve life, our software solutions help you get the most from every device while minimizing costly delays and downtime.

### Software – Quick Reference

Product	Sub-Type	Specifications
<b>ValveSight for Positioners and Switch Boxes</b>	Software	<ul style="list-style-type: none"> <li>• System Requirements: Windows XP, Windows 7, Windows 8, Windows 10</li> <li>• Compatibility: HART, PROFIBUS, Foundation Fieldbus, FDT/DTM</li> <li>• Equipment: valves, actuators, positioners and control signals</li> </ul>
<b>ValveSight DTMs for HART or Fieldbus Communications</b>	Software	<ul style="list-style-type: none"> <li>• System Requirements: Windows XP, Windows 7, Windows 8, Windows 10</li> <li>• Compatibility: Foundation Fieldbus; HART 6 and 7; FDT 1.2 and 2.0</li> <li>• Equipment: valves, actuators, positioners</li> </ul>
<b>ValveSight DTM</b>	Software	<ul style="list-style-type: none"> <li>• System Requirements: Windows XP, Windows 7, Windows 8, Windows 10</li> <li>• Compatibility: StarPac 3, FDT 2.0, Modbus</li> <li>• Major Systems: positioners, control systems</li> </ul>

# SOFTWARE

## SOFTWARE

### ValveSight for Positioners and Switch Boxes

A proactive diagnostic solution for on-off and control valves that can be seamlessly integrated into host control or plant asset management systems, improving plant efficiency without sacrificing safety and reliability.



*PMV*

- Reduced downtime enabled by early detection of emerging health issues and wear of valves, actuators and positioners, preventing costly unplanned shutdowns
- Reduced maintenance costs from proactive identification of components needing replacement
- Increased safety and efficiency via continuous online monitoring, equipment health tests, and prevention of on-off valves sticking in end positions
- Reduced startup costs from proven interoperability with numerous hosts and communication protocols; plus quick and easy local or remote commissioning

#### SPECIFICATIONS

- System Requirements: Windows XP, Windows 7, Windows 8, Windows 10
- Compatibility: HART, PROFIBUS, Foundation Fieldbus, FDT/DTM
- Equipment: valves, actuators, positioners and control signals

Refer to literature PMENBR0016 at [flowserve.com/library](http://flowserve.com/library).

## SOFTWARE

### ValveSight DTMs for HART or Fieldbus Communications

ValveSight software is designed to help engineers and maintenance personnel responsible for managing HART or Fieldbus positioners by simplifying setup, calibration, configuration and diagnostics.



*Logix*

- Decreased maintenance costs via predictive diagnostics able to identify and assess the severity of developing problems in valves, actuators, positioners or control loop configurations while the process is online and operating
- Reduced downtime made possible by real-time condition monitoring, including long-term trends, event capture, signatures, logs, hysteresis, deadband, repeatability and linearity (HDRL) testing
- Simple, accurate installation and operation enabled by integrated calibration and configuration tools and contextual help system

#### SPECIFICATIONS

- System Requirements: Windows XP, Windows 7, Windows 8, Windows 10
- Compatibility: Foundation Fieldbus; HART 6 and 7; FDT 1.2 and 2.0
- Equipment: valves, actuators, positioners

Refer to literature LGENSF0014 and VSENBRO004 at [flowserve.com/library](http://flowserve.com/library).

## SOFTWARE

### ValveSight DTM

StarPac ValveSight DTM is the software used by the revolutionary StarPac, enabling rapid flow measurement and intelligent control. Improves operations at a cost lower than conventional control systems.



*Valtek*

- Greater process control from system that gives users a unique, integrated view at a single point
- Greater efficiency with automatic PID control for fast integral adjustments to liquid flow, P1, P2, delta pressure, temperature, gas flow or auxiliary 4-20 mA signals
- Configuration and operation ease enabled by FDT/DTM 2.0 user interface with integrated help system

#### SPECIFICATIONS

- System Requirements: Windows XP, Windows 7, Windows 8, Windows 10
- Compatibility: StarPac 3, FDT 2.0, Modbus
- Major Systems: positioners, control systems

Refer to literature FLENMN0066-021 at [flowserve.com/library](http://flowserve.com/library).





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Flowserve Corporation  
5215 North O'Connor Blvd.  
Suite 2300  
Irving, Texas 75039-5421 USA  
Telephone: +1 937 890 5839

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