FLOWSERVE

PRODUCT CATALOG

Pumps | Seals | Valves | Actuation



Experience In Motion

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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.

PUMPS 10

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.

SEALS 84

Flowserve valves are found in the world's toughest industries, where reliable performance is the only option. High temperatures, ultra-high pressures, erosion and corrosion are at the core of the dozens of leading brands that comprise our broad valve portfolio.

VALVES 140

From positioners and switches to remotely controlled, fully automated electric, hydraulic and pneumatic actuators, customers depend on the full range of intelligent automation solutions from Flowserve to help their processes run smarter, safer and more efficiently.

ACTUATION & INSTRUMENTATION 216

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

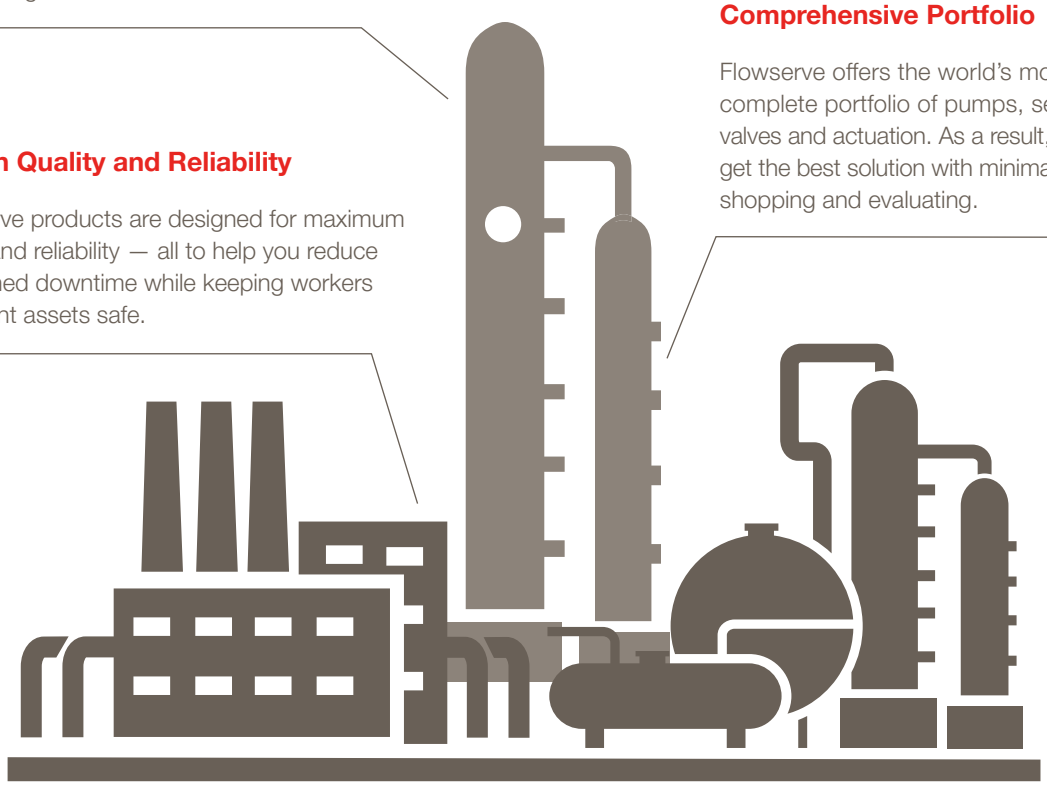
Flowserve has an unrivaled combination of technical expertise and practical experience to help you solve the toughest fluid motion control challenges.

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.

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.



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.

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 and valves; 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

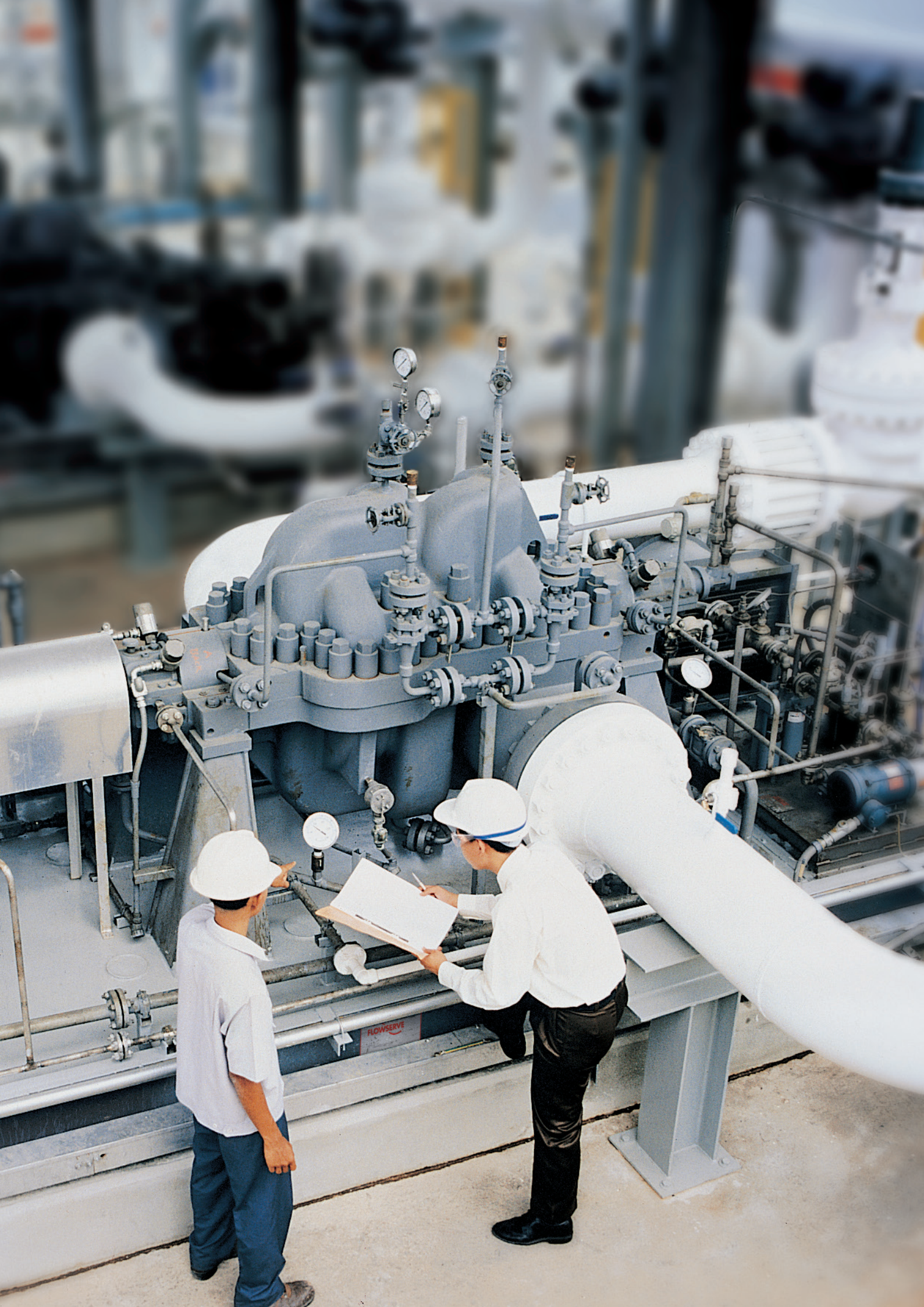
Flowserve continues to invest in capabilities and technologies to help customers realize more payback from their plant assets.

- **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 Centers** — 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.

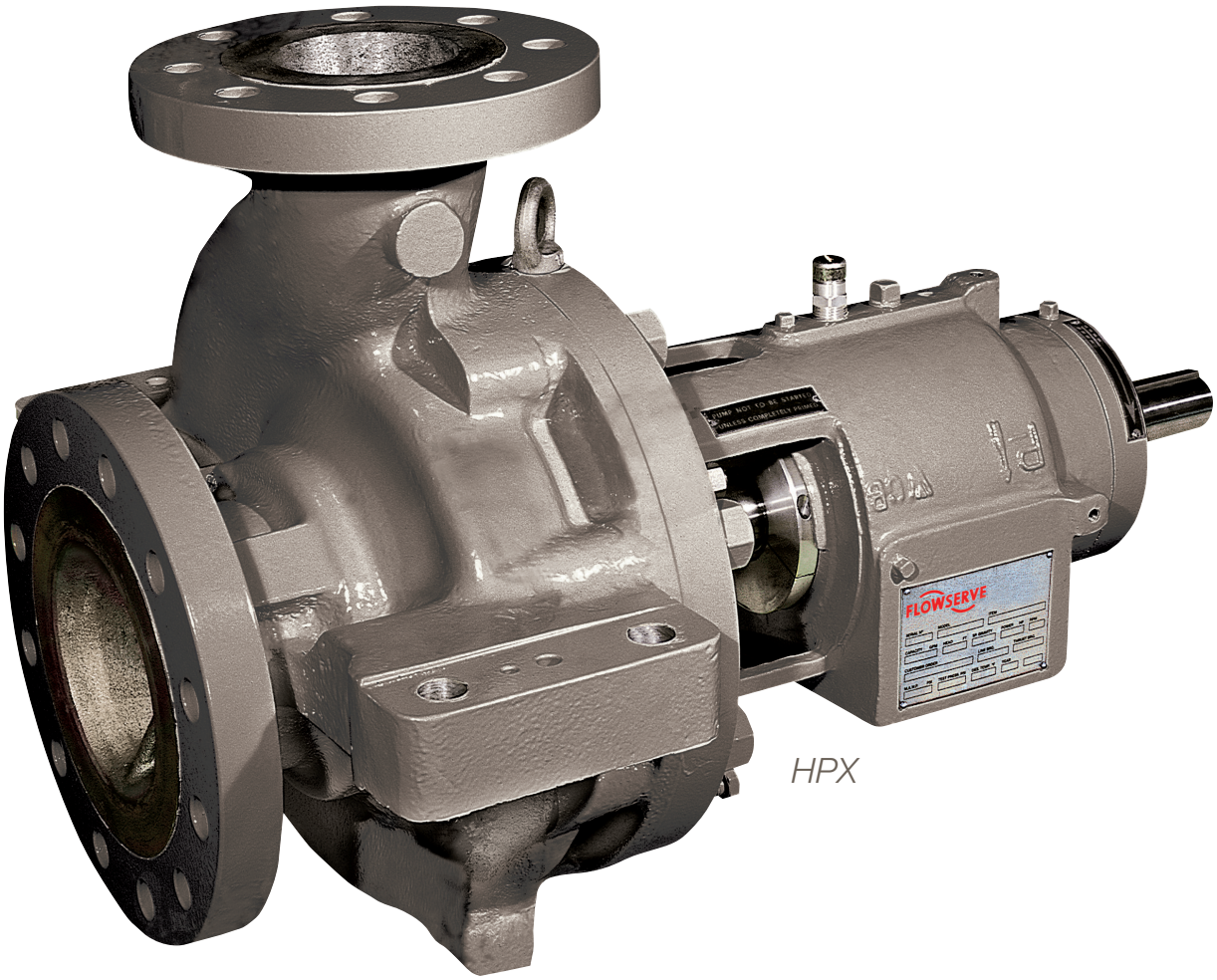

FLOWSERVE

PUMPS

The most aggressive fluids and slurries on the planet. High-volume and high-pressure applications that test the limits of hydraulic and mechanical design. That's where you'll find Flowserve pumps performing efficiently, safely and reliably. It's a legacy that goes back centuries — one we build upon every day, outperforming expectations no matter how great the demands.

Global customers can easily find configurations to precisely match the pumping requirements that drive their operations, even specialty applications most pump companies have never heard of. From small pumps that dependably process thousands of end products day-in and day-out, to massive machines that efficiently move the fluids that are the lifeblood of our industrial infrastructure, Flowserve carefully engineers the highest degrees of reliability and performance into every product. It's a commitment that ensures maximum uptime from every pump we deliver.

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HPX

OVERHUNG

Reliable, efficient performance across a full range of applications, from highly aggressive chemicals and solids to high-temperature process applications: that's what's engineered into every Flowserve overhung pump. Our global customers will find a range of metallic and non-metallic pumps built to every important global standard. Extended life is achieved through careful attention to details, from critical impeller clearances to mechanical seal operating environments to rugged power end bearing arrangements. Plus, maintenance-friendly features help get pumps back in service quickly.

Overhung – Quick Reference*

Product	Sub-Type	Flows to	Heads to	Pressures to	Temperatures
Mark 3™ ISO	Chemical Process ASME, ISO	1400 m^3/h (6160 gpm)	220 m (720 ft)	25 bar (362 psi)	-80°C to 400°C (-110°F to 750°F)
Mark 3 ASME	Chemical Process ASME, ISO	4540 m^3/h (20 000 gpm)	215 m (700 ft)	27 bar (400 psi)	-73°C to 370°C (-100°F to 700°F)
Guardian	Chemical Process ASME, ISO	375 m^3/h (1650 gpm)	215 m (700 ft)	24 bar (350 psi)	to 290°C (550°F)
TB-MAG™	Chemical Process ASME, ISO	360 m^3/h (1585 gpm)	153 m (500 ft)	25 bar (362 psi)	-29°C to 121°C (-20°F to 250°F)
U-MAG™	Chemical Process ASME, ISO	102 m^3/h (450 gpm)	50 m (165 ft)	20 bar (300 psi)	-29°C to 121°C (-20°F to 250°F)
CBE and CBM	Chemical Process ASME, ISO	650 m^3/h (2862 gpm)	150 m (492 ft)	25 bar (362 psi)	-40°C to 300°C (-40°F to 572°F)
CBT	Chemical Process ASME, ISO	2200 m^3/h (9686 gpm)	160 m (524 ft)	25 bar (362 psi)	-20°C to 350°C (-4°F to 662°F)

** Additional products shown on next two pages*

Overhung – Quick Reference, cont'd.

Product	Sub-Type	Flows to	Heads to	Pressures to	Temperatures
D800	Industrial Process	455 m³/h (2000 gpm)	150 m (500 ft)	15 bar (220 psi)	to 120°C (250°F)
MEN and MENBLOC	Industrial Process	800 m³/h (3520 gpm)	140 m (450 ft)	16 bar (230 psi)	-10°C to 120°C (15°F to 250°F)
ME	Industrial Process	3000 m³/h (13 208 gpm)	110 m (361 ft)	16 bar (230 psi)	to 120°C (250°F)
DS	Industrial Process	5700 m³/h (25 000 gpm)	110 m (350 ft)	27 bar (400 psi)	to 120°C (250°F)
ZLN, ZLK and ZLI	Industrial Process	1800 m³/h (7925 gpm)	140 m (459 ft)	16 bar (232 psi)	to 170°C (338°F)
ZTN, ZTK and ZTI	Industrial Process	1000 m³/h (4403 gpm)	95 m (311 ft)	16 bar (232 psi)	to 350°C (662°F)
ZEN, ZDN, ZHN and ZDI	Industrial Process	600 m³/h (2642 gpm)	90 m (295 ft)	40 bar (580 psi)	to 230°C (446°F)
DBS	Industrial Process	1200 m³/h (5283 gpm)	100 m (328 ft)	10 bar (145 psi)	to 110°C (230°F)
SMP	Industrial Process	135 m³/h (600 gpm)	70 m (220 ft)	12 bar (175 psi)	-40°C to 120°C (-40°F to 250°F)
F-Line	Industrial Process	500 m³/h (2200 gpm)	250 m (820 ft)	25 bar (362 psi)	to 105°C (220°F)
MVE	Industrial Process	2700 m³/h (11 890 gpm)	15 m (50 ft)	7 bar (100 psi)	to 100°C (212°F)
FRBH	Industrial Process	9085 m³/h (40 000 gpm)	100 m (330 ft)	14 bar (200 psi)	to 150°C (300°F)
MPT	Solids Handling	600 m³/h (2650 gpm)	35 m (115 ft)	5 bar (72 psi)	to 75°C (165°F)
MF and MFV	Solids Handling	600 m³/h (2650 gpm)	90 m (300 ft)	19 bar (275 psi)	to 63°C (145°F)
MN and MNV	Solids Handling	45 500 m³/h (200 000 gpm)	90 m (300 ft)	17 bar (240 psi)	to 63°C (145°F)
MSX	Solids Handling	4545 m³/h (20 000 gpm)	90 m (300 ft)	11 bar (160 psi)	to 40°C (104°F)

Product	Sub-Type	Flows to	Heads to	Pressures to	Temperatures
M	Slurry	10 000 m³/h (44 000 gpm)	90 m (300 ft)	10 bar (150 psi)	to 120°C (250°F)
R	Slurry	10 000 m³/h (44 000 gpm)	50 m (160 ft)	10 bar (150 psi)	to 110°C (225°F)
Titan-Slurry	Slurry	3600 m³/h (16 000 gpm)	90 m (300 ft)	40 bar (580 psi)	to 110°C (230°F)
LC	Slurry	8000 m³/h (35 200 gpm)	90 m (300 ft)	25 bar (360 psi)	to 140°C (285°F)
HPX	API Process	2000 m³/h (8800 gpm)	350 m (1100 ft)	80 bar (1160 psi)	-160°C to 450°C (-250°F to 842°F)
PHL	API Process	900 m³/h (3963 gpm)	400 m (1312 ft)	40 bar (600 psi)	to 450°C (842°F)
ERPN	API Process	1100 m³/h (4800 gpm)	230 m (755 ft)	60 bar (870 psi)	-50°C to 350°C (-158°F to 660°F)
PVXM	API Process	500 m³/h (2200 gpm)	275 m (900 ft)	40 bar (600 psi)	-100°C to 250°C (-148°F to 480°F)
HWMA	API Process	45 m³/h (200 gpm)	440 m (1445 ft)	64 bar (930 psi)	-46°C to 260°C (-51°F to 500°F)
PVML	API Process	500 m³/h (2220 gpm)	275 m (900 ft)	40 bar (580 psi)	-100°C to 250°C (-148°F to 480°F)
MSP	API Process	34 m³/h (150 gpm)	900 m (2955 ft)	64 bar (930 psi)	-46°C to 250°C (-51°F to 482°F)
HWX	API Process	1300 m³/h (5725 gpm)	370 m (1215 ft)	42 bar (610 psi)	-46°C to 400°C (-51°F to 750°F)
HPX6000 and HPXM6000	API Process	3409 m³/h (15 000 gpm)	244 m (800 ft)	83 bar (1200 psi)	-20°C to 400°C (-30°F to 826°F)
AFH9000	Axial Flow	34 065 m³/h (150 000 gpm)	11 m (36 ft)	10.3 bar (150 psi)	20°C to 149°C (-30°F to 300°F)

OVERHUNG

CHEMICAL PROCESS – ASME, ISO

Mark 3 ISO



Durco®

ISO 2858/5199 compliant pump for corrosive applications in chemical, hydrocarbon and pharmaceutical processing requiring unmatched reliability, outstanding hydraulic performance and increased pump availability.

- Lower total cost of pump ownership resulting from simplified maintenance and extended bearing and seal life associated with reverse vane impeller
- Increased reliability and mechanical seal life due to the ideal seal environment created by the SealSentry™ seal chamber
- Simplified maintenance with two-piece power end featuring self-contained bearing housing and external impeller adjustment mechanism
- Optimal, predictable seal chamber pressure that is established after every impeller setting

SPECIFICATIONS

Flows to: 1400 m^3/h (6160 gpm)
Heads to: 220 m (720 ft)
Press. to: 25 bar (362 psi)
Temp: -80°C to 400°C
(-110°F to 750°F)

Refer to literature PS-10-31 at flowserve.com/library.

CHEMICAL PROCESS – ASME, ISO

Mark 3 ASME



Durco

ASME B73.1 chemical process pump for corrosive applications in chemical, petrochemical, hydrocarbon and pharmaceuticals processing requiring unequaled efficiency, extended life and repeatable pump performance.

- Lower total cost of ownership from reverse vane impeller, which eases maintenance and provides renewable, high-efficiency performance over the pumps' life
- Increased reliability and mechanical seal life due to the ideal seal environment created by the SealSentry seal chamber
- Ease of maintenance resulting from optimal, predictable seal chamber pressures that are re-established after every impeller setting
- Extended mechanical seal and bearing life through robust shaft and bearing designs that also minimize shaft deflection

SPECIFICATIONS

Flows to: 4540 m^3/h (20 000 gpm)
Heads to: 215 m (700 ft)
Press. to: 27 bar (400 psi)
Temp: -73°C to 370°C
(-100°F to 700°F)

Refer to literature PS-10-13 at flowserve.com/library.

CHEMICAL PROCESS – ASME, ISO

Guardian



Durco

Metallic sealless magnetic drive pump compliant with ASME B73.1, ASME B73.3 and HI 5.1-5.6 that is designed for applications requiring efficient performance and emissions-free reliability.

- Optimal performance through a highly engineered internal lubrication flow paths designed to maximize cooling of the bushings and journals
- Ease of maintenance due to standard and contained back pullout, allowing the casing to stay in-line and piping connections to remain intact
- Higher process temperature range capabilities with the use of strong samarium cobalt rare earth magnets in the couplings
- Longer service life resulting from silicon carbide bushings and journals that resist wear and corrosion

SPECIFICATIONS

Flows to: 375 m^3/h (1650 gpm)
Heads to: 215 m (700 ft)
Press. to: 24 bar (350 psi)
Temp: to 290°C (550°F)

Refer to literature PS-10-14 at flowserve.com/library.

CHEMICAL PROCESS – ASME, ISO

TB-MAG



INNOMAG®

ASME B73.3 and ISO 2858 compliant thrust-balanced, fluoropolymer-lined, magnetic drive pump for chemical processing, metals and other industries seeking outstanding leak protection and reliability.

- Efficient performance over the entire flow range is achieved by means of a dynamic thrust balancing system that eliminates the need for thrust bearings
- Application versatility due to ability to handle solids to 30% by volume
- Expedited, lower-cost maintenance due to standard and contained back pullout, allowing the casing to stay in-line and piping connections to remain intact
- Longer service life resulting from silicon carbide back wear rings that restrict solids larger than 0.127 mm from entering the containment shell and double-sealed inner magnetic assembly to protect against corrosive permeation

SPECIFICATIONS

Flows to: 360 m^3/h (1585 gpm)
Heads to: 153 m (500 ft)
Press. to: 25 bar (362 psi)
Temp: -29°C to 121°C
(-20°F to 250°F)

Refer to literature PS-10-36 at flowserve.com/library.

CHEMICAL PROCESS – ASME, ISO

U-MAG



INNOMAG

Versatile fluoropolymer-lined, magnetic drive pump for smaller-volume applications needing exceptional safety, enhanced performance and highest purity standards.

- Application versatility derived from numerous mounting drive options to accommodate site-specific requirements, including gasoline engines for portable and remote chemical transfer, trunk unloading, or skid or cart operation
- Longer service life due to EFTE or optional ultra-high purity PFA construction that offers excellent chemical resistance
- Regulatory compliance resulting from outstanding leak protection and the CE mark, making it compliant with directives such as ATEX

SPECIFICATIONS

Flows to: 102 m^3/h (450 gpm)
Heads to: 50 m (165 ft)
Press. to: 20 bar (300 psi)
Temp: -29°C to 121°C
(-20°F to 250°F)

Refer to literature PS-10-37 at flowserve.com/library.

CHEMICAL PROCESS – ASME, ISO

CBE and CBM



SIHI®

Modular process pumps with hydraulics, closed impellers, and magnetic couplings for bare shaft (CBM) or close-coupled (CBE) configurations. Meets all ISO 5199, ISO 15783 and ISO 2858 requirements.

- Increased reliability enabled by constant cooling and lubrication flow, protected samarium cobalt magnets and containment shell
- Reduced spare parts costs derived from interchangeability of the back pullout assemblies
- Improved reliability and reduced installation cost thanks to low net positive suction head (NPSH) value
- Broad application diversity made possible by CBE heat barrier option for temperatures up to 400°C (752°F)

SPECIFICATIONS

Flows to: 650 m^3/h (2862 gpm)
Heads to: 150 m (492 ft)
Press. to: 25 bar (362 psi)
Temp: -40°C to 300°C
(-40°F to 572°F)

Refer to literature PS-10-42 at flowserve.com/library.

OVERHUNG

CHEMICAL PROCESS – ANSI, ISO

CBT



SIHI

Single-stage pump with ISO 2858/5199 design features and nominal rating. Engineered for applications in chemical, petrochemical and pharmaceuticals processing with flows beyond the range defined by ISO 2858.

- Low total cost of pump ownership from simplified maintenance enabled by a design that permits dismantling without disconnecting the pump casing from pipework
- Broad application flexibility and low inventory carrying costs from diverse material options and 21 sizes, with only four different bearing brackets for maximum interchangeability
- High-temperature performance — exceeding 200°C (392°F) — possible with centerline mounted option, which minimizes distortion and pipe loads

SPECIFICATIONS

Flows to: 2200 m^3/h (9686 gpm)
Heads to: 160 m (524 ft)
Press. to: 25 bar (362 psi)
Temp: -20°C to 350°C
(-4°F to 662°F)

INDUSTRIAL PROCESS

D800



Worthington®

Versatile and cost-effective general industry pumps with ASME B16.1 casing nozzles. Available in frame-mounted (D814) and close-coupled (D824) configurations.

- Increased uptime enabled by a precision dry-rabbet fit with one-piece adapter and seal cover to ensure positive alignment
- Easy maintenance and assembly facilitated by pre-set mechanical seal assembly on the shaft sleeve
- Improved energy efficiency due to a precision-cast, high-efficiency closed impeller that is statically and hydraulically balanced to reduce power consumption
- Low operating costs and extended pump life provided by renewable wear rings and shaft sleeves that restore worn operating clearances

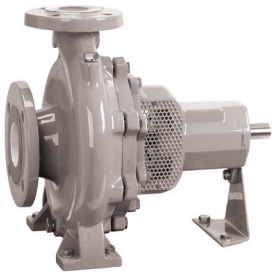
SPECIFICATIONS

Flows to: 455 m^3/h (2000 gpm)
Heads to: 150 m (500 ft)
Press. to: 15 bar (220 psi)
Temp: to 120°C (250°F)

Refer to literature PSS-10-6.1 at flowserve.com/library.

INDUSTRIAL PROCESS

MEN and MENBLOC



IDP®
Worthington

Reliable, efficient frame-mounted (MEN) and close-coupled (MENBLOC) general industry pumps for water supply and treatment, light chemical and general industry applications. Meets European Regulation No. 547/2012.

- High efficiency through a precision-cast, closed impeller with machine shrouds and balance holes that also minimize axial thrust
- Performance reliability due to an integral, one-piece cast iron bearing frame that provides excellent rigidity and concentricity to minimize vibration
- Optimized hydraulics and components meet European Regulation No. 547/2012
- Versatility through a wide hydraulic range, multiple configurations, parts interchangeability and materials options
- Ease of maintenance and inspection resulting from a back pullout design

SPECIFICATIONS

Flows to: 800 m^3/h (3520 gpm)
Heads to: 140 m (450 ft)
Press. to: 16 bar (230 psi)
Temp: -10°C to 120°C
(15°F to 250°F)

Refer to literature PS-10-2 at flowserve.com/library.

INDUSTRIAL PROCESS

ME



Flowserve®

High-capacity, reliable frame-mounted pump for water supply and treatment, light chemical and general industry applications that need high flow rates. Meets European Regulation No. 547/2012.

- Optimized for high-capacity performance via one-piece casing with tangential discharge
- High efficiency enabled by a precision-cast, closed impeller with machine shrouds and balance holes that also minimize axial thrust
- Low cost of ownership made possible by an open-seal chamber with integral vortex-breaking ribs to extend the mechanical seal life
- Ease of maintenance and inspection resulting from a back pullout design

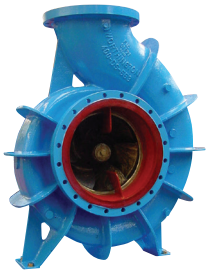
SPECIFICATIONS

Flows to: 3000 m^3/h (13 208 gpm)
Heads to: 110 m (361 ft)
Press. to: 16 bar (230 psi)
Temp: to 120°C (250°F)

Refer to literature PS-10-2 at flowserve.com/library.

INDUSTRIAL PROCESS

DS



Worthington

Versatile end suction pump for mining, water resources, power generation and general industry applications requiring lower operational and maintenance costs.

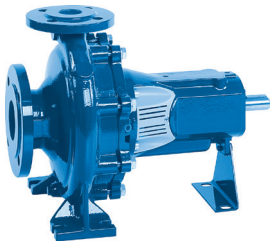
- Increased uptime made possible by a mechanically balanced, radial flow impeller that includes balance holes to minimize axial thrust and extend the life of the seal
- Higher efficiency enabled by a double volute configuration that greatly reduces radial forces over single-volute counterparts
- Flexibility provided by a seal chamber that accommodates a wide choice of sealing arrangements, from packing to mechanical seal types
- Ease of maintenance and inspection resulting from a back pullout design

SPECIFICATIONS

Flows to: 5700 m^3/h (25 000 gpm)
Heads to: 110 m (350 ft)
Press. to: 27 bar (400 psi)
Temp: to 120°C (250°F)

INDUSTRIAL PROCESS

ZLN, ZLK and ZLI



SIHI

Volute-style pumps for use with clear or turbid liquids that are free of solid particles. Available in bare shaft (ZLN), compact (ZLK) or inline (ZLI) configurations, all meeting EN 733 and ISO 9908.

- Ease of maintenance assured by design that enables key components of each unit to be removed and serviced without disturbing the attached pipe work
- Broad application flexibility enabled by more than 50 sizes, plus a wide range of material and configuration options
- Reduced operating cost via low net positive suction head (NPSH), high reliability and high efficiency

SPECIFICATIONS

Flows to: 1800 m^3/h (7925 gpm)
Heads to: 140 m (459 ft)
Press. to: 16 bar (232 psi)
Temp: to 170°C (338°F)

Refer to literature PS-10-40 at flowserve.com/library.

OVERHUNG

INDUSTRIAL PROCESS

ZTN, ZTK and ZTI



SIHI

Volute pumps developed specifically for handling mineral and synthetic heat transfer oils, compliant with dimensions and nominal rating according to EN 733. Choose from bare shaft (ZTN), compact (ZTK) or inline (ZTI) units.

- Ease of maintenance assured by design that enables key components to be removed and serviced without removing pump casing from attached pipe work
- Broad application versatility via multiple sizes, materials and configurations; ZTN usable in installations with positive or negative suction pressure
- Lower lifetime cost of ownership from space-saving and easy-to-install compact and inline designs

SPECIFICATIONS

Flows to: 1000 m^3/h (4403 gpm)
Heads to: 95 m (311 ft)
Press. to: 16 bar (232 psi)
Temp: to 350°C (662°F)

Refer to literature PS-10-40 at flowserve.com/library.

INDUSTRIAL PROCESS

ZEN, ZDN, ZHN and ZDI



SIHI

Volute casing pumps designed to meet the high demands of pumping hot water. Bare shaft (ZHN, ZDN, ZEN) or inline (ZDI) configurations available. Dimensions and nominal rating according to EN 733/EN 22858.

- Improved plant and personnel safety assured by a double heat barrier design
- Increased service life enabled by optimization of the high pressures and temperatures associated with hot water heat carrier systems, as well as the mechanical seal
- Ease of maintenance assured by designs that enable each unit type to be serviced without disturbing attached pipe work

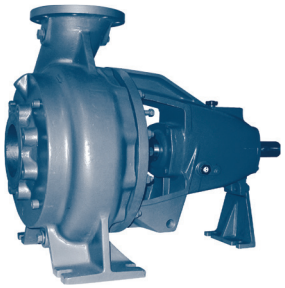
SPECIFICATIONS

Flows to: 600 m^3/h (2642 gpm)
Heads to: 90 m (295 ft)
Press. to: 40 bar (580 psi)
Temp: to 230°C (446°F)

Refer to literature EN 733/EN 22858 at flowserve.com/library.

INDUSTRIAL PROCESS

DBS



SIHI

Non-clogging, volute-casing pumps designed for pumping dirty liquids or liquids with solids, with design features and nominal rating to ISO 2858 enlarged sizes.

- High performance, with dirty liquids assured by non-clogging design
- Ease of maintenance enabled by process design that permits dismantling of complete bearing unit without disconnecting pump casing from piping
- Broad application flexibility made possible by multiple impeller shapes — including double-channel, triple-channel and free-flow — plus diverse configuration, size and material options

SPECIFICATIONS

Flows to: 1200 m^3/h (5283 gpm)
Heads to: 100 m (328 ft)
Press. to: 10 bar (145 psi)
Temp: to 110°C (230°F)

INDUSTRIAL PROCESS

SMP



IDP

Economical and reliable frame-mounted, single-stage, standard motor pump for water supply, water treatment, HVAC and chiller applications.

- Low operating costs achieved through use of high-efficiency, semi-open or closed impellers that are keyed to shaft for positive drive
- Flexibility and reduced inventory carrying costs due to use of industry-standard NEMA motors
- Reliable performance with minimal leakage enabled by a self-aligned mechanical seal that is positioned by the impeller and keeps pump fluid away from the motor
- Ease of maintenance resulting from a back pullout design that facilitates inspection and a stub shaft design that allows shaft replacement in the field

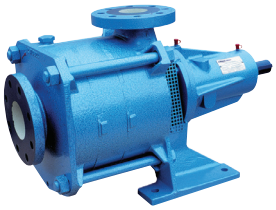
SPECIFICATIONS

Flows to: 135 m^3/h (600 gpm)
Heads to: 70 m (220 ft)
Press. to: 12 bar (175 psi)
Temp: -40°C to 120°C
(-40°F to 250°F)

Refer to literature PS-10-26 at flowserve.com/library.

INDUSTRIAL PROCESS

F-Line



Flowserve

The F-Line is a family of multistage, overhung pumps with excellent hydraulic efficiency and high suction lift capability, making them ideal for high-pressure water applications.

- Improved performance via multistage, overhung construction that enables better suction performance while simplifying pipe work layout
- Ease of maintenance with a back pullout design that facilitates inspection
- Longer service life due to an oversized shaft conservatively designed to minimize deflection and reduce wear
- Application flexibility provided by modular platform with numerous available horizontal and vertical configurations that permits accurate sizing for operating conditions and site requirements

SPECIFICATIONS

Flows to: 500 m^3/h (2200 gpm)
Heads to: 250 m (820 ft)
Press. to: 25 bar (362 psi)
Temp: to 105°C (220°F)

Simple and Accurate Pump Selection

Eliminate pump selection and sizing confusion with Affinity™ Portal. This free web-based tool gives you immediate access to the latest, most accurate data on Flowserve pumps. Use it to size a pump for a new application or get performance information for an existing unit. You can also save selections and generate technical documents specific for your hydraulic selection. **Register today at www.flowserve.com/affinity.**



OVERHUNG



TKL™

INDUSTRIAL PROCESS

MVE

High-efficiency, reliable mixed-flow, single-stage volute pump for industrial, municipal and agricultural applications requiring high suction.

- Low total cost of ownership enabled by multistage, overhung construction that enables better suction performance while simplifying pipe work layout at installation
- Increased reliability due to single-volute, symmetrical casing that features integral suction and discharge flanges for high strength to resist pipe loads
- Extended seal and bearing life made possible by mixed-flow, enclosed impeller that is mechanically balanced to prevent vibration
- Ease of maintenance resulting from a back pullout design to facilitate inspection and permit removal without disturbing piping

SPECIFICATIONS

Flows to: 2700 m^3/h (11 890 gpm)
Heads to: 15 m (50 ft)
Press. to: 7 bar (100 psi)
Temp: to 100°C (212°F)



Worthington

INDUSTRIAL PROCESS

FRBH

Heavy-duty paper stock pump designed primarily for pulp and paper applications, but also has considerable use in the chemical processing, mining, water resources, and oil and gas industries.

- High uptime and efficiency ensured by unobstructed suction, large streamlined flow channel, and semi-open impeller with back pump-out vanes, which prevent air binding and clogging, even in thick, pulpy mixtures
- Reduced maintenance provided by rigid one-piece bearing frame; ensures positive alignment and offers ample access to gland and seal chamber
- Reliable, efficient performance with a steep head-capacity curve, which prevents driver overload and minimizes changes in flow, despite changes in system head
- Low total cost of ownership resulting from high-efficiency, low-maintenance design

SPECIFICATIONS

Flows to: 9085 m^3/h (40 000 gpm)
Heads to: 100 m (330 ft)
Press. to: 14 bar (200 psi)
Temp: to 150°C (300°F)

Refer to literature PS-10-16 at flowserve.com/library.



Flowserve

SOLIDS HANDLING

MPT

Rugged self-priming, solids-handling pump designed to deliver reliable peak performance and low costs to the demanding water resources and mining industries.

- Longer service life derived from the use of rugged, heavy-duty volute casing
- Reduced downtime provided by abrasion-resistant, double mechanical seal with silicon carbide faces that prevent contaminants from entering seal chamber
- Increased uptime through the external impeller adjustment via four bushings that allow clearances to be accurately reset
- Ease of maintenance enabled by back pullout design, which includes a replaceable seal housing that facilitates maintenance without disturbing the piping

SPECIFICATIONS

Flows to: 600 m^3/h (2650 gpm)
Heads to: 35 m (115 ft)
Press. to: 5 bar (72 psi)
Temp: to 75°C (165°F)

Refer to literature PS-10-9 at flowserve.com/library.

SOLIDS HANDLING

MF and MFV



Worthington

Rugged and efficient solids-handling pump designed specifically for reliability, low cost and long life in demanding sewage handling services or where suspended solids are of particular concern.

- Ease of maintenance enabled by the removable gland, which simplifies packing adjustment and replacement, plus readily accessible lubrication points
- Broad application versatility provided by a wide variety of mechanical seal options and design of the stuffing box, which allows for either grease or water seal
- Low maintenance costs due to conservative bearing design that eliminates radial and axial play, as well as supports that minimize vibration and ensure rigidity

SPECIFICATIONS

Flows to: 600 m^3/h (2650 gpm)
Heads to: 90 m (300 ft)
Press. to: 19 bar (275 psi)
Temp: to 63°C (145°F)

Refer to literature PS-10-3 at flowserve.com/library.

SOLIDS HANDLING

MN and MNV



Worthington

Rugged, large-capacity, mixed-flow, solids-handling pump designed specifically for demanding sewage handling services or where suspended solids are of particular concern.

- Application versatility provided by a design that includes horizontal and vertical models, a variety of nozzle positions, and direct or independent motor mounting
- Increased uptime enabled by oversized shaft and reduced overhang, which minimize shaft deflection and increase packing or seal life
- High-efficiency performance enabled by adjustable, double-chrome steel wear rings
- Reduced maintenance with back pullout design, removable gland, replaceable shaft sleeves, and readily accessible lubrication points in bearing housing

SPECIFICATIONS

Flows to: 45 500 m^3/h (200 000 gpm)
Heads to: 90 m (300 ft)
Press. to: 17 bar (240 psi)
Temp: to 63°C (145°F)

Refer to literature PS-10-4 at flowserve.com/library.

SOLIDS HANDLING

MSX



IDP

The MSX solids-handling submersible pump is engineered to perform efficiently in the most challenging environments, from pumping raw sewage to moving industrial wastewater and solids-laden liquids.

- Low operating costs enabled by EPACT-rated motor and high-efficiency hydraulics that reduce energy consumption while providing predictable pumping performance
- Reliability with spike-resistant windings that provide smooth, consistent motor performance and the ability to handle voltage spikes
- Increased uptime via dynamically balanced shaft and rotor for reduced vibration and smooth operation
- Long service life provided by watertight cable entry that protects motor from moisture and contamination

SPECIFICATIONS

Flows to: 4545 m^3/h (20 000 gpm)
Heads to: 90 m (300 ft)
Press. to: 11 bar (160 psi)
Temp: to 40°C (104°F)

Refer to literature PS-50-2-E at flowserve.com/library.

OVERHUNG



Worthington

SLURRY

M

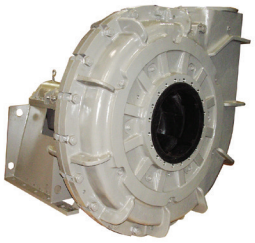
Hard-metal slurry pump designed to handle high concentrations of coarse, abrasive solids in suspension. Well-suited for the harshest applications in mining, mineral processing and metal production.

- Long service life and outstanding abrasion and corrosion resistance provided by high-chrome iron casing with tangential discharge
- Increased uptime provided by closed impeller with external pumping vanes, which extend seal life by reducing stuffing box pressure and suction recirculation
- Reliable performance with minimal maintenance facilitated by three-point external end-clearance adjustment that restores impeller clearance to optimize efficiency without shims
- Reduced inventory costs due to interchangeability among the configurations

SPECIFICATIONS

Flows to: 10 000 m^3/h (44 000 gpm)
Heads to: 90 m (300 ft)
Press. to: 10 bar (150 psi)
Temp: to 120°C (250°F)

Refer to literature PS-10-19 at flowserve.com/library.



Worthington

SLURRY

R

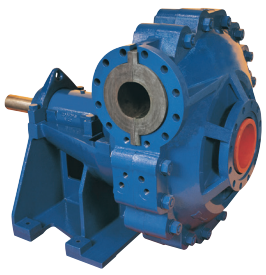
Rubber-lined slurry pump engineered to handle high concentrations of fine abrasive solids in suspension or corrosive/abrasive mixtures often found in the mining and metal processing industries.

- Long service life provided by abrasion- and corrosion-resistant rubber casing liners, which are available in multiple materials to suit application requirements
- Ease of maintenance facilitated by radially split casing, which provides easy access to liners and ample stuffing box access
- Broad application versatility due to multiple configurations, choice of materials, parts interchangeability and several shaft sealing options
- Increased uptime and reduced maintenance costs enabled by the closed impeller with pump-out vanes to reduce stuffing box pressure and suction recirculation

SPECIFICATIONS

Flows to: 10 000 m^3/h (44 000 gpm)
Heads to: 50 m (160 ft)
Press. to: 10 bar (150 psi)
Temp: to 110°C (225°F)

Refer to literature PS-10-18 at flowserve.com/library.



TKL

SLURRY

Titan-Slurry

The Titan Slurry is a single-stage pump with a tangential discharge engineered to handle high concentrations of coarse, abrasive solids in suspension. Its unique dual case design uses either a hard metal or elastomeric liner.

- Broad application versatility and maximum wear resistance enabled by use of replaceable and interchangeable hard metal or elastomeric casing liners
- Reduced maintenance and low total cost of ownership made possible by unique radially split dual-casing design, which eases liner inspection and replacement
- Reduced energy costs provided by high-efficiency, closed-vane impeller with adjustable face clearance and generous wear allowance
- Increased uptime due to extra-thick wear allowances plus oversized shafts and bearings

SPECIFICATIONS

Flows to: 3600 m^3/h (16 000 gpm)
Heads to: 90 m (300 ft)
Press. to: 40 bar (580 psi)
Temp: to 110°C (230°F)

Refer to literature PS-10-8 at flowserve.com/library.

SLURRY

LC



Flowserve

The LC pump is engineered to withstand high concentrations of abrasive and corrosive solutions, like those found in phosphoric and derived industries as well as mining and mineral processing.

- Extended service life due to thick-walled concentric casing with tangential discharge that is radially balanced and free from cavities and obstructions to minimize wear
- Increased mean time between repair enabled by impeller counter vanes that limit internal recirculation and reduce seal pressure to promote longer seal life
- Simplified maintenance with removable one-piece bearing frame
- Broad application versatility made possible by numerous shaft sealing, impeller and configuration options to meet application and installation requirements

SPECIFICATIONS

Flows to: 8000 m^3/h (35 200 gpm)
Heads to: 90 m (300 ft)
Press. to: 25 bar (360 psi)
Temp: to 140°C (285°F)

Refer to literature PS-10-11 at flowserve.com/library.

API PROCESS

HPX



IDP

Fully compliant with ISO 13709/API 610 (OH2) design criteria, the HPX pump is the workhorse of the oil and gas and hydrocarbon processing industries, boasting unequaled versatility, reliability and safety.

- Lower operating costs due to comprehensive hydraulic coverage and numerous specialty configurations that permit precise selection for best operating efficiency
- Longer service life enabled by centerline-supported casing that withstands nozzle loads beyond ISO 13709/API 610 requirements and minimizes shaft misalignment, thereby extending rotor, bearing and seal life
- Stringent emissions containment with ISO 21049/API 682 seal chamber
- Easier maintenance thanks to back pullout design, enabling service without disturbing motor or casing connections

SPECIFICATIONS

Flows to: 2000 m^3/h (8800 gpm)
Heads to: 350 m (1100 ft)
Press. to: 80 bar (1160 psi)
Temp: -160°C to 450°C
(-250°F to 842°F)

Refer to literature PS-10-5 at flowserve.com/library.

API PROCESS

PHL



Flowserve

Fully compliant with ISO 13709/API 610 (OH2), the PHL's innovative multi-channel diffuser technology allows the hydraulics to be custom-tuned to ensure best efficiency hydraulic fits while maximizing parts interchangeability.

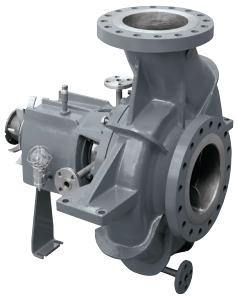
- Broad application flexibility from innovative multi-channel diffuser technology, which supports more than 170 hydraulic configurations and easily accommodates changing operating parameters
- Improved pump efficiency via diffuser tuning, which widens operational flow window and minimizes radial loads at any flow
- Extremely low total cost of ownership thanks to long MTBF, low seal emission, long mechanical seal life, low energy consumption and low NPSH
- Improved plant and personnel safety enabled by low vibration and noise levels

SPECIFICATIONS

Flows to: 900 m^3/h (3963 gpm)
Heads to: 400 m (1312 ft)
Press. to: 40 bar (600 psi)
Temp: to 450°C (842°F)

Refer to literature PSS-10-5.2 at flowserve.com/library.

OVERHUNG



Worthington

API PROCESS

ERPN

The pump of choice for severe chemical, petrochemical, refining and heavy-duty industrial service, closely following ISO 13709/API 610 (OH2), latest edition requirements.

- Greater service life enabled by centerline-supported pump casing that accommodates nozzle loads in accordance with ISO 13709/API 610 requirements, minimizing shaft misalignment and extending rotor, bearing and seal life
- Emissions containment with ISO 21049/API 682 seal chamber, which accepts all seal types, including dual-pressurized and unpressurized cartridge units
- Simplified maintenance and inspection made possible by back pullout design
- Mechanical and hydraulic design flexibility supported by a variety of configurations

SPECIFICATIONS

Flows to: 1100 m^3/h (4800 gpm)
Heads to: 230 m (755 ft)
Press. to: 60 bar (870 psi)
Temp: -50°C to 350°C
(-158°F to 660°F)

Refer to literature PS-10-20 at flowserve.com/library.



Flowserve

API PROCESS

PVXM

Compliant with ISO 13709/API 610 (OH3), the PVXM vertical in-line pump is a space-saving alternative to horizontal overhung process pumps in upstream and downstream services.

- Extra-low energy consumption resulting from precision-machined and interchangeable diffuser channels, which are customized to the hydraulic best efficiency point
- Greater durability from robust design that meets pressure, temperature, nozzle loading and safety considerations of ISO 13709/API 610 and other specifications
- High uptime enabled by stiff rotor design, guaranteeing 20% lower vibration levels than required by ISO 13709/API 610
- Emissions containment with ISO 21049/API 682 seal chamber, which accepts dual-pressurized and unpressurized cartridge seals plus barrier seal technology

SPECIFICATIONS

Flows to: 500 m^3/h (2200 gpm)
Heads to: 275 m (900 ft)
Press. to: 40 bar (600 psi)
Temp: -100°C to 250°C
(-148°F to 480°F)

Refer to literature PS-10-29 at flowserve.com/library.



IDP

API PROCESS

HWMA

With its small footprint, this low-flow, high-head process pump is a space-saving alternative to many overhung process pumps. Compliant with ISO 13709/API 610 (OH3), latest edition. Two-stage configuration HWMA2 available.

- Lower total cost of ownership from optimized hydraulic performance, reduced power consumption and low-flow stability
- Broad application versatility and low energy costs enabled by modular design that offers more than 80 best efficiency point fits in a single pump size
- Precise, repeatable hydraulic performance delivered by replaceable volute insert and Barske-type impeller that provides a continuously rising performance curve with exceptional low-flow stability
- Easy maintenance with large openings on the heavy-duty motor support head

SPECIFICATIONS

Flows to: 45 m^3/h (200 gpm)
Heads to: 440 m (1445 ft)
Press. to: 64 bar (930 psi)
Temp: -46°C to 260°C
(-51°F to 500°F)

Refer to literature PS-10-23 at flowserve.com/library.

API PROCESS

PVML



Flowserve

Compliant with ISO 13709/API 610 (OH5) and BS 4082R, the PVML vertical in-line pump is ideal for upstream and downstream applications where precision hydraulics are required but floor space is limited.

- Lower total cost of ownership from customized hydraulics that generate low vibration levels, high efficiencies and near-zero seal emissions
- Performance flexibility provided by milled and interchangeable diffuser channels, which are customized for specific duty points, enabling customers to address changing operating parameters
- Ease of maintenance enabled by direct-drive design, which does not require alignment, and cartridge seal mounting, which assures precise seal face setting

SPECIFICATIONS

Flows to: 500 m^3/h (2220 gpm)
Heads to: 275 m (900 ft)
Press. to: 40 bar (580 psi)
Temp: -100°C to 250°C
(-148°F to 480°F)

Refer to literature PS-10-28 at flowserve.com/library.

API PROCESS

MSP



Flowserve

Closely following ISO 13709/API 610 (OH4) and featuring a medium-speed induction motor, the MSP delivers peak efficiency, excellent economy, simplified installation and reduced maintenance in low-flow, high-head applications.

- Reduced energy costs achieved with variable frequency drive that delivers consistent BEP performance over a wide operating range, without throttling
- Efficient low specific speed hydraulics for low flows at high heads provided by modified concentric volute and impeller with balance holes
- Fast maintenance with rigid coupling design that provides precision shaft alignment while eliminating time-consuming manual alignment
- Easy pump installation and mechanical seal access facilitated by vertical in-line design

SPECIFICATIONS

Flows to: 34 m^3/h (150 gpm)
Heads to: 900 m (2955 ft)
Press. to: 64 bar (930 psi)
Temp: -46°C to 250°C
(-51°F to 482°F)

Refer to literature PS-10-1 at flowserve.com/library.

API PROCESS

HWX



Flowserve

Fully compliant with API 610 (OH3), this vertical, in-line pump offers a space-saving alternative for many overhung process pumps in low-temperature, high-temperature and high working pressure services.

- Robust construction to meet pressure, temperature, nozzle loading and safety considerations of ISO 13709/API 610 and other specifications
- Extensive hydraulic coverage by a family of 11 distinct designs, providing a comprehensive range of pump configurations to meet application requirements
- Stringent emissions containment with ISO 21049/API 682 seal chamber, which accommodates dual-pressurized and unpressurized cartridge seals

SPECIFICATIONS

Flows to: 1300 m^3/h (5725 gpm)
Heads to: 370 m (1215 ft)
Press. to: 42 bar (610 psi)
Temp: -46°C to 400°C
(-51°F to 750°F)

Refer to literature PS-10-27 at flowserve.com/library.

OVERHUNG

API PROCESS

HPX6000 and HPXM6000



Lawrence Pumps

HPX6000 and HPXM6000 (low-flow) are fully lined slurry pumps built to ISO 13709/API 610 (OH2) and used in heavy oil processing. They reliably handle hot, abrasive solids without the danger of pump casing erosion.

- Low life cycle cost provided by replaceable mechanically fastened liners that protect the pressure casing from erosion and abrasion
- Process flexibility made possible by interchangeable diffuser, casing liner and impeller, which allow operators to adapt performance to changing process conditions
- Extended operating life ensured by a rigid, oversized bearing frame that maintains shaft deflection below ISO/API requirements
- Casing liners are available in multiple abrasion-resistant materials and surface treatments to meet any process or operational requirement

SPECIFICATIONS

Flows to: 3409 m^3/h (15 000 gpm)
Heads to: 244 m (800 ft)
Press. to: 83 bar (1200 psi)
Temp: -20°C to 400°C
(-30°F to 826°F)

Refer to literature PS-10-33
at flowserve.com/library.

AXIAL FLOW

AFH9000



Lawrence Pumps

Axial flow elbow pump ideal for low-pressure, high-volume transfer applications, such as those frequently found in chemical and hydrocarbon processing. Typical applications include evaporators, crystallizers and heat recovery.

- Reduced downtime derived from use of large-diameter cantilevered shafts that eliminate need for internal support bearings and minimize deflection at seal chamber
- Ease of maintenance enabled by back pullout design, which simplifies inspection and maintenance of the roter without disturbing piping or motor connections
- Increased uptime derived from one-piece, 360° bearing frame with deep metal-to-metal fit that provides superior alignment compared to 180° designs

SPECIFICATIONS

Flows to: 34 065 m^3/h (150 000 gpm)
Heads to: 11 m (36 ft)
Press. to: 10.3 bar (150 psi)
Temp: -20°C to 149°C
(-30°F to 300°F)

Refer to literature PS-100-17
at flowserve.com/library.



WIKO

BETWEEN BEARINGS

Long life and high efficiency performance in the world's most critical services characterize this highly engineered range of pumps. Capable of reaching massive flow rates and pressures, single- and double-case designs are designed for continuous operation, often un-spared. Extended uptime is achieved through rugged rotor designs that carefully account for mechanical and hydraulic balance. Energy savings realized from a huge range of hydraulic options keep operating costs in check.

Between Bearings – Quick Reference*

Product	Sub-Type	Flows to	Heads to	Pressures to	Temperatures
LR	Single-Case – Axially Split	2000 m³/h (8800 gpm)	170 m (560 ft)	21 bar (300 psi)	-20°C to 150°C (-4°F to 300°F)
LNN	Single-Case – Axially Split	30 000 m³/h (132 000 gpm)	300 m (985 ft)	40 bar (580 psi)	-20°C to 140°C (-4°F to 285°F)
DVSH	Single-Case – Axially Split – API	12 000 m³/h (52 835 gpm)	565 m (1854 ft)	150 bar (2175 psi)	to 200°C (400°F)
LPN	Single-Case – Axially Split – API	15 000 m³/h (65 000 gpm)	250 m (820 ft)	50 bar (725 psi)	-80°C to 204°C (-110°F to 400°F)
UZDL	Single-Case – Axially Split – API	2950 m³/h (13 000 gpm)	685 m (2250 ft)	64 bar (910 psi)	to 200°C (400°F)
EC	Single-Case – Axially Split – Multistage	2340 m³/h (10 300 gpm)	650 m (2130 ft)	88 bar (1300 psi)	-30°C to 150°C (-20°F to 300°F)

** Additional products shown on next two pages*

Between Bearings – Quick Reference, cont'd.

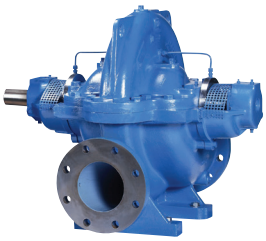
Product	Sub-Type	Flows to	Heads to	Pressures to	Temperatures
DMX	Single-Case – Axially Split – Multistage	5621 m^3/h (24 750 gpm)	2620 m (8600 ft)	275 bar (4000 psi)	to 204°C (400°F)
HDX	Single-Case – Radially Split	5000 m^3/h (22 000 gpm)	450 m (1500 ft)	100 bar (1450 psi)	to 450°C (842°F)
DVSR	Single-Case – Radially Split	6585 m^3/h (29 000 gpm)	330 m (1080 ft)	260 bar (3750 psi)	to 204°C (400°F)
HED and HED-DS	Single-Case – Radially Split	2000 m^3/h (8800 gpm)	450 m (1500 ft)	100 bar (1450 psi)	to 450°C (842°F)
WTB	Single-Case – Radially Split	1400 m^3/h (6165 gpm)	1100 m (3610 ft)	108 bar (1565 psi)	to 430°C (800°F)
HEGA	Horizontal – Multistage Single-Case	145 m^3/h (638 gpm)	390 m (1279 ft)	40 bar (580 psi)	to 194°C (380°F)
UEA	Horizontal – Multistage Single-Case	220 m^3/h (969 gpm)	280 m (918 ft)	20 bar (290 psi)	to 140°C (284°F)
TKH	Horizontal – Multistage Single-Case	350 m^3/h (1541 gpm)	185 m (607 ft)	16 bar (232 psi)	to 120°C (248°F)
WD and WDX	Horizontal – Multistage Single-Case	190 m^3/h (800 gpm)	700 m (2625 ft)	75 bar (1090 psi)	to 210°C (410°F)
WX	Horizontal – Multistage Single-Case	300 m^3/h (1320 gpm)	1200 m (3940 ft)	150 bar (2175 psi)	-50°C to 200°C (-58°F to 400°F)
CSX	Horizontal – Multistage Single-Case	1200 m^3/h (5300 gpm)	900 m (2950 ft)	100 bar (1450 psi)	—
WXH and WXM	Horizontal – Multistage Single-Case	1000 m^3/h (4500 gpm)	2750 m (9000 ft)	310 bar (4500 psi)	to 250°C (480°F)
MSL, MSM, MSC, MSH	Horizontal – Multistage Single-Case	450 m^3/h (1981 gpm)	1600 m (5249 ft)	160 bar (2320 psi)	-10°C to 180°C (14°F to 356°F)
NM	Horizontal – Multistage Single-Case	3000 m^3/h (13 210 gpm)	500 m (1640 ft)	60 bar (870 psi)	-10°C to 140°C (14°F to 285°F)

Product	Sub-Type	Flows to	Heads to	Pressures to	Temperatures
WXB and WXB-B	Horizontal – Multistage Double-Case	300 m^3/h (1320 gpm)	1560 m (5116 ft)	200 bar (2900 psi)	to 425°C (800°F)
CSB	Horizontal – Multistage Double-Case	1000 m^3/h (4500 gpm)	3650 m (12 000 ft)	427 bar (6190 psi)	to 250°C (480°F)
CHTA	Horizontal – Multistage Double-Case	3900 m^3/h (17 170 gpm)	4500 m (14 750 ft)	538 bar (7800 psi)	to 250°C (480°F)
HDB and HSB	Horizontal – Multistage Double-Case	4000 m^3/h (17 610 gpm)	4300 m (14 000 ft)	450 bar (6525 psi)	to 425°C (800°F)
BP	Horizontal – Multistage Double-Case	1050 m^3/h (4620 gpm)	3500 m (11 480 ft)	295 bar (4260 psi)	to 425°C (800°F)
WCC	Horizontal – Multistage Double-Case	1000 m^3/h (4400 gpm)	2800 m (9200 ft)	275 bar (4000 psi)	to 425°C (800°F)
HDO and HSO	Horizontal – Multistage Double-Case	4000 m^3/h (17 610 gpm)	5365 m (16 000 ft)	450 bar (6525 psi)	to 425°C (800°F)
WIK and WIKO	Horizontal – Multistage Double-Case	1600 m^3/h (7000 gpm)	7000 m (23 000 ft)	1000 bar (14 500 psi)	to 425°C (800°F)

BETWEEN BEARINGS

SINGLE-CASE – AXIALLY SPLIT

LR



Worthington

Heavy-duty, single-stage pump engineered to provide reliable, efficient performance in a wide range of applications across numerous industries. Two-stage (LLR) and vertical in-line (LRV) configurations available.

- High efficiency and optimum performance over a wide flow range due to low-NPSH enclosed impeller and casing wear rings that easily restore operating clearances
- Application versatility provided by numerous options that permit the pump to be precisely configured for service requirements
- Low inventory carrying costs made possible by parts interchangeability among sizes and configurations
- Ease of maintenance resulting from axial split-case design, which allows access to rotating element without disturbing the piping or driver

SPECIFICATIONS

Flows to: 2000 m^3/h (8800 gpm)
Heads to: 170 m (560 ft)
Press. to: 21 bar (300 psi)
Temp: -20°C to 150°C (-4°F to 300°F)

Refer to literature PS-20-3 at flowserve.com/library.

SINGLE-CASE – AXIALLY SPLIT

LNN



Worthington

The LNN boasts a broad hydraulic range with more than 200 impeller and volute combinations, resulting in quiet operation, low NPSH requirements, and high efficiency operation in all water applications.

- Optimal hydraulic balance and efficiency over its full operating range provided by double suction impeller operating in a double volute, axially split casing
- Low inventory carrying cost provided by a high degree of parts interchangeability among sizes and configurations
- Application flexibility enabled by ability to modify pump performance to meet future service conditions by changing impeller designs
- Increased uptime from double-volute design, ample shaft and 360° bearing housings, all of which minimize shaft deflection and vibration to extend bearing and seal life

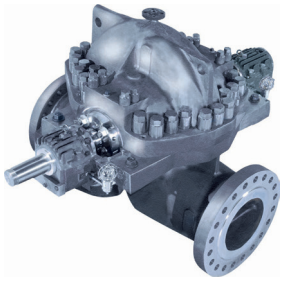
SPECIFICATIONS

Flows to: 30 000 m^3/h (132 000 gpm)
Heads to: 300 m (985 ft)
Press. to: 40 bar (580 psi)
Temp: -20°C to 140°C (-4°F to 285°F)

Refer to literature PS-20-1 at flowserve.com/library.

SINGLE-CASE – AXIALLY SPLIT – API

DVSH



Flowserve

Fully compliant with ISO 13709/API 610 (BB1), this heavy-duty, single-stage pump with side/side nozzles is well-suited for process charge, transfer and pipeline services where uncompromising reliability over a wide flow range is paramount.

- Low operating costs derived from comprehensive hydraulic coverage (more than 100 sizes), thereby permitting precise selection for best hydraulic fit and efficiency
- High uptime made possible by double suction impeller and double volute designs, which create optimal axial and radial thrust balance
- Increased reliability provided by the heavy-duty shaft design, which ensures trouble-free operation below the first critical speed
- Ease of maintenance due to suction and discharge nozzles that are integrally cast in lower casing half, permitting disassembly without disturbing piping

SPECIFICATIONS

Flows to: 12 000 m^3/h (52 835 gpm)
Heads to: 565 m (1854 ft)
Press. to: 150 bar (2175 psi)
Temp: to 200°C (400°F)

Refer to literature PS-20-2 at flowserve.com/library.

SINGLE-CASE – AXIALLY SPLIT – API

LPN



Worthington

With a double suction impeller and side-side nozzles, this medium-pressure pump is a natural solution for low NPSH applications, such as water and hydrocarbon transfer service. Designed to ISO 13709/API 610 (BB1) criteria.

- High uptime made possible by double-suction impeller and double volute designs, which create optimal axial and radial thrust balance
- Increased MTBR resulting from heavy-duty bearings and bearing lubrication system; multiple options available to suit application requirements
- Superior performance at elevated temperatures with near-centerline mounting
- Simplified maintenance enabled by the split-casing design, which permits the rotor, seals and bearings to be serviced without disturbing the piping
- Emissions control with ISO 21049/API 682 seal chambers

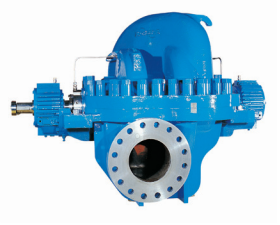
SPECIFICATIONS

Flows to: 15 000 m^3/h (65 000 gpm)
Heads to: 250 m (820 ft)
Press. to: 50 bar (725 psi)
Temp: -80°C to 204°C
(-110°F to 400°F)

Refer to literature PS-20-5
at flowserve.com/library.

SINGLE-CASE – AXIALLY SPLIT – API

UZDL



Worthington

A two-stage pump with a double suction, first-stage impeller, the UZDL is designed for water pipelines, transfer services, firefighting and high-pressure duties. ISO 13709/API 610 (BB1) compliant models available.

- Increased uptime made possible by double volute design that minimizes hydraulic radial loads, and virtually eliminates shaft deflection and vibration
- Safety and environmental compliance with ISO 21049/API 682 seal chambers
- Increased reliability provided by stiff shaft design, which ensures trouble-free operation below the first critical speed
- Ease of maintenance due to suction and discharge nozzles that are integrally cast in lower casing half, permitting disassembly without disturbing piping

SPECIFICATIONS

Flows to: 2950 m^3/h (13 000 gpm)
Heads to: 685 m (2250 ft)
Press. to: 64 bar (910 psi)
Temp: to 200°C (400°F)

Refer to literature PS-30-2
at flowserve.com/library.

Partnerships With Long-Term Value

Flowserve enterprise framework agreement (EFA) partners have access to all facets of our business, from front-end engineering to research and development to solve real-world problems. It's a total lifecycle management approach that applies to day-to-day operational challenges as well as plant expansions and greenfield projects — and it pays. One EFA partner has garnered more than $400 million in value in the first five years.



BETWEEN BEARINGS

SINGLE-CASE – AXIALLY SPLIT – MULTISTAGE

EC

This multistage, horizontal split-case pump is designed to support large flow and high head applications in mining and water transmission.



TKL

- Lower maintenance time and costs enabled by horizontally split casing and removable pump rotor, which allow access without disturbing suction and discharge connections or motor alignment
- Installation ease via pump design that can be mounted horizontally or vertically
- Longer service life from shaft sleeves that reduce friction wear and graphite-impregnated packing, which provides easy leakage adjustment

SPECIFICATIONS

Flows to: 2340 m^3/h (10 300 gpm)
Heads to: 650 m (2130 ft)
Press. to: 88 bar (1300 psi)
Temp: -30°C to 150°C
(-20°F to 300°F)

SINGLE-CASE – AXIALLY SPLIT – MULTISTAGE

DMX

With more than 10 000 units supplied, this highly reliable pump is ideal for high-flow, high-pressure applications across the gamut of industries, including oil and gas, chemical and desalination. Designed to ISO 13709/API 610 (BB3) criteria.



Flowserve

- Increased uptime enabled by opposed mounted impellers operating in a double volute casing, which provide inherent hydraulic balance over the full operating range
- Broad application versatility provided by numerous options that permit the pump to be precisely configured for service requirements
- Superior performance at elevated temperatures with near-centerline mounting
- Ease of maintenance facilitated by cap nuts on top half casing parting flange
- Emissions control with ISO 21049/API 682 seal chambers

SPECIFICATIONS

Flows to: 5621 m^3/h (24 750 gpm)
Heads to: 2620 m (8600 ft)
Press. to: 275 bar (4000 psi)
Temp: to 204°C (400°F)

Refer to literature PS-30-3
at flowserve.com/library.

SINGLE-CASE – RADIALLY SPLIT

HDX

In full compliance with ISO 13709/API 610 (BB2) standards, the HDX centerline mounted pump with single- stage, double-suction impeller and double volute casing with top nozzles is engineered for heavy process services.



IDP

- Increased uptime enabled by double suction impeller that minimizes thrust problems, reduces NPSHR, and allows mechanical seals to operate at equal and low pressure
- Excellent high-temperature performance provided by centerline mounting plus gasketing with metal-to-metal fit to ensure proper sealing and alignment
- Installation ease with top-top, side-top and side-side nozzle configurations available to meet any customer piping layout
- Safety and environmental compliance with ISO 21049/API 682 seal chambers
- Power recovery turbine configuration (HDX-TT) available

SPECIFICATIONS

Flows to: 5000 m^3/h (22 000 gpm)
Heads to: 450 m (1500 ft)
Press. to: 100 bar (1450 psi)
Temp: to 450°C (842°F)

Refer to literature PS-20-4
at flowserve.com/library.

SINGLE-CASE – RADIALLY SPLIT

DVSR



Byron Jackson

Compliant with ISO 13709/API 610 (BB2), the radially split design of the DVSR makes it ideal for applications at very high pressures or low specific gravity, such as liquefied gases, including CO_2.

- Maximum efficiency through a double-suction impeller that provides axial hydraulic thrust balance
- Higher uptime due to a double-volute design that minimizes hydraulic loads, even at minimal flow, to prolong the life of bearings, seals and wear rings
- Stringent emissions control with ISO 21049/API 682 seal chambers
- Trouble-free operation below the first critical speed ensured by the heavy-duty shaft design
- API performance testing is conducted on each pump prior to shipment

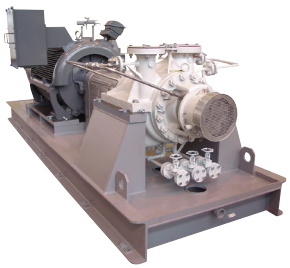
SPECIFICATIONS

Flows to: 6585 m^3/h (29 000 gpm)
Heads to: 330 m (1080 ft)
Press. to: 260 bar (3750 psi)
Temp: to 204°C (400°F)

Refer to literature PS-30-17 at flowserve.com/library.

SINGLE-CASE – RADIALLY SPLIT

HED and HED-DS



Pacific®

Two-stage, centerline mounted pump engineered for safe, reliable operation in heavy-duty process services and elevated temperatures. Fully compliant with ISO 13709/API 610 (BB2).

- Extended reliability and life made possible by heavy-duty, single- or dual-volute casings with a staggered arrangement, which ensures radial balance
- Application versatility provided by numerous options — including 50- or 60-cycle operation and top-top, side-top and side-side nozzle orientations — that permit the pump to be precisely configured for service and site requirements
- Increased reliability provided by stiff shaft design, which ensures trouble-free operation below the first critical speed
- Environmental regulatory compliance with ISO 21049/API 682 seal chambers

SPECIFICATIONS

Flows to: 2000 m^3/h (8800 gpm)
Heads to: 650 m (2100 ft)
Press. to: 120 bar (1750 psi)
Temp: to 450°C (842°F)

Refer to literature PS-30-4 at flowserve.com/library.

SINGLE-CASE – RADIALLY SPLIT

WTB



Worthington

With hydraulics between typical BB2 and BB5 pumps, the WTB is a reliable solution for niche high-temperature and high-pressure applications in refineries, chemical operations and power plants. Made in two- and three-stage designs.

- Reliable operation ensured by compliance with all key ISO 13709/API 610 requirements (two-stage unit is fully compliant)
- Stable performance with radial hydraulic balance over the pump's full operating range ensured by heavy-duty, dual-volute casing with integral crossover
- Excellent high-temperature and pressure performance enabled by centerline-supported, radially split design that prevents distortion
- Reduced operating costs provided by the double-suction, first-stage impeller, which significantly reduces NPSHR, often eliminating the need for booster units

SPECIFICATIONS

Flows to: 1400 m^3/h (6165 gpm)
Heads to: 1100 m (3610 ft)
Press. to: 108 bar (1565 psi)
Temp: to 430°C (800°F)

BETWEEN BEARINGS

HORIZONTAL – MULTISTAGE – SINGLE-CASE

HEGA

Cost-effective ring-section pumps with closed impellers, designed for power, water and wastewater, pharmaceutical and chemical applications requiring trouble-free pumping of clear or slightly dirty liquids.



SIHI

- Reduced energy costs achieved by sizing impellers for best hydraulic fit and operating efficiency
- Low installation costs enabled by movable suction head casing, which easily adapts flange position to site conditions
- Low inventory carrying costs enabled by high degree of parts interchangeability
- Reliable bearing performance provided by grease lubricated deep groove and cylindrical roller bearing, respectively meeting DIN 625 and DIN 5412
- Shaft sealing by a stuffing box or mechanical seal to suit application requirements

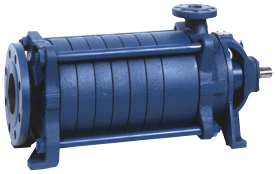
SPECIFICATIONS

Flows to: 145 m^3/h (638 gpm)
Heads to: 390 m (1279 ft)
Press. to: 40 bar (580 psi)
Temp: to 194°C (380°F)

HORIZONTAL – MULTISTAGE – SINGLE-CASE

UEA

Horizontal, self-priming multistage ring-section pump designed for pumping liquids at their boiling point. It is particularly well suited for condensates, liquefied gases, refrigerants, LPG and boiler feedwater.



SIHI

- Safe, reliable pumping of boiling liquids ensured by a special priming stage that absorbs vapor from the suction side
- Trouble-free operation under unfavorable suction conditions enabled by axial inlet with NPSH inducer stage
- Wide application range resulting from its ability to handle liquids at their boiling points as well as its low required NPSH
- Shaft sealing by a single- or double-mechanical seal to suit application requirements

SPECIFICATIONS

Flows to: 220 m^3/h (969 gpm)
Heads to: 280 m (918 ft)
Press. to: 20 bar (290 psi)
Temp: to 140°C (284°F)

Refer to literature PS-120-2 at flowserve.com/library.

HORIZONTAL – MULTISTAGE – SINGLE-CASE

TKH

Horizontal, self-priming and segmental-type centrifugal pumps with shrouded impellers for water and utility water supply, fuel handling, and chemical and petrochemical applications.



SIHI

- Reduced downtime resulting from the separation of gas before entering the first impeller
- Maximum performance via a priming stage that runs in parallel with the first liquid stage and operates according to the mixed media separation principle
- Wide range of applications due to the self-priming capability and multitude of material combinations, including shipbuilding and the construction of cooling and firefighting equipment

SPECIFICATIONS

Flows to: 350 m^3/h (1541 gpm)
Heads to: 185 m (607 ft)
Press. to: 16 bar (232 psi)
Temp: to 120°C (248°F)

HORIZONTAL – MULTISTAGE – SINGLE-CASE

WD and WDX

These radially split, high-pressure, multistage, ring section pumps are designed for a wide range of process and industrial applications.



IDP

- Optimized performance without loss of head or risk of cavitation due to low NPSHR suction impeller and fully machined diffusers
- Reliable operation at a range of duty points due to suction, discharge and stage casings that are sealed with O-rings and engineered to contain the pressures generated by the pump at the various design pressures and temperatures
- Broad application flexibility enabled by modular construction, featuring identical stages stacked axially to achieve the desired pressure output

SPECIFICATIONS

Flows to: 190 m^3/h (800 gpm)
Heads to: 700 m (2625 ft)
Press. to: 75 bar (1090 psi)
Temp: to 210°C (410°F)

HORIZONTAL – MULTISTAGE – SINGLE-CASE

WX

A radially split, centerline mounted ring section pump, the WX is available in various API 610 material combinations to suit application needs. It provides reliable, efficient performance with total lifecycle cost economy.



Worthington

- Greater hydraulic performance made possible by separate cast diffusers and channel rings, investment cast for optimum efficiency and repeatability
- Stable high-temperature operation with proper alignment due to centerline mounted, self-venting casing, which resists distortion from thermal expansion
- Improved efficiency at all operating conditions from balanced axial thrust loads enabled by a unique balance drum

SPECIFICATIONS

Flows to: 300 m^3/h (1320 gpm)
Heads to: 1200 m (3940 ft)
Press. to: 150 bar (2175 psi)
Temp: -50°C to 200°C (-58°F to 400°F)

HORIZONTAL – MULTISTAGE – SINGLE-CASE

CSX

The CSX represents the next generation of segmental ring, diffuser-style pumps. Particularly well-suited for reverse osmosis desalination systems, it provides long-term, high-efficiency operation with low lifecycle costs.



IDP

- Low energy consumption ensured by advanced hydraulic, precision-cast diffusers and channel rings, high-efficiency impellers and renewable case wear rings
- Prolonged operating life made possible by corrosion-resistant materials of construction (including proprietary Alloy 885) for wetted components
- Easy installation due to symmetrical suction and discharge heads that enable the pump nozzles to be rotated and positioned to suit a variety of piping layouts

SPECIFICATIONS

Flows to: 1200 m^3/h (5300 gpm)
Heads to: 900 m (2950 ft)
Press. to: 100 bar (1450 psi)

Refer to literature PS-30-15 at flowserve.com/library.

BETWEEN BEARINGS

HORIZONTAL – MULTISTAGE – SINGLE-CASE

WXH and WXM



IDP

These high- (WXH) and medium-pressure (WXM), utility-grade, ring section pumps are particularly well-suited for feedwater on industrial boilers from small to large sizes and in combined cycle where severe cycling is common.

- Greater reliability from radially split pressure casings, ensuring overall pump concentricity and rotor alignment
- Improved service life and tolerance to changing conditions due to precision-cast diffusers that equalize radial loads and increase bearing, wear ring and seal life
- Decreased maintenance costs and longer service intervals enabled by heavy-duty rotor with short bearing spans, which minimizes deflection
- Precise hydraulic configuration made possible by the modular segmental ring diffuser design plus numerous options

SPECIFICATIONS

Flows to: 1000 m^3/h (4500 gpm)
Heads to: 2750 m (9000 ft)
Press. to: 310 bar (4500 psi)
Temp: to 250°C (480°F)

Refer to literature PS-30-1 at flowserve.com/library.

HORIZONTAL – MULTISTAGE – SINGLE-CASE

MSL, MSM, MSC and MSH



SIHI

Next-generation, multistage, ring section pumps designed to provide the highest efficiency, long-term reliability and easy operation. Meet the technical requirements of ISO 5199/EN 25199.

- Broad application flexibility facilitated by advanced modular design that allows different hydraulic impeller and diffuser sizes to be installed in a standardized casing, enabling the pump to be configured for the exact working point required
- Low inventory carrying costs made possible by a design that maximizes interchangeability while reducing the total number of parts needed
- Ease of installation via discharge casing flange, which can be supplied radially upward, horizontal-left or horizontal-right to suit site conditions

SPECIFICATIONS

Flows to: 450 m^3/h (1981 gpm)
Heads to: 1600 m (5249 ft)
Press. to: 160 bar (2320 psi)
Temp: -10°C to 180°C (14°F to 356°F)

Refer to literature PS-30-22 at flowserve.com/library.

HORIZONTAL – MULTISTAGE – SINGLE-CASE

NM



IDP

The NM radially split, multistage, ring section pump is designed for a wide range of applications in the water, power and general industries.

- Reliable performance from low NPSH suction volute design
- Increased efficiency made possible by machined impeller shrouds
- Greater bearing and seal life due to stable operation from impeller balance holes (minimizing axial thrust) and shrouded diffusers with return guide vanes (minimizing radial thrust)
- Broad application versatility enabled by flexible design, suitable for cooling water (power), fire protection, flood control, boiler feed, water supply and distribution (water), agriculture, ground water development and irrigation

SPECIFICATIONS

Flows to: 3000 m^3/h (13 210 gpm)
Heads to: 500 m (1640 ft)
Press. to: 60 bar (870 psi)
Temp: -10°C to 140°C (14°F to 285°F)

The Business of Asset Performance

Flowserve is committed to helping customers realize more payback from their operations. Our reliability and performance engineers can help implement a range of asset management and optimization solutions — asset performance, equipment optimization, performance trend analysis and physical assessments — aimed at identifying lifecycle cost savings opportunities. The result is a self-financing road map to improved operational performance.



HORIZONTAL – MULTISTAGE – DOUBLE-CASE

WXB and WXB-B



Worthington

Based on ISO 13709/API 610 design requirements, this diffuser-casing barrel pump is the first choice for demanding applications in refineries, chemical and petrochemical plants, liquefied gas stations and boiler feed service.

- Space-saving design with minimal maintenance downtime due to compact and convenient cartridge-style construction
- Longer service life via a generous shaft diameter that results in low shaft deflection to increase bearing, mechanical seal and wear ring life
- Lower maintenance costs resulting from renewable wear rings on all casings and impellers to permit economical restoration of running clearances
- Emissions control with ISO 21049/API 682 seal chambers
- Low-flow, high head stability with Barske-style impeller (WXB-B)

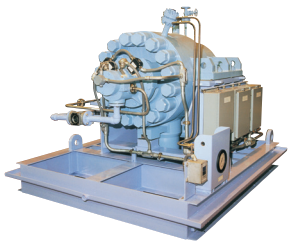
SPECIFICATIONS

Flows to: 300 m^3/h (1320 gpm)
Heads to: 1560 m (5116 ft)
Press. to: 200 bar (2900 psi)
Temp: to 425°C (800°F)

Refer to literature PS-30-6 and PSS-30-6.1 at flowserve.com/library.

HORIZONTAL – MULTISTAGE – DOUBLE-CASE

CSB



IDP

Cost-effective, diffuser-style barrel pump for boiler feed service in combined cycle and conventional steam plants. Built to ASME Section VIII, it delivers exceptionally smooth pumping in a compact, space-saving design.

- Energy efficiency and operation stability provided by a continuous crossover diffuser that precisely converts velocity to pressure
- Ease of maintenance resulting from a radially split, inner case sub-assembly that facilitates inspection and maintenance in the field
- Longer service life due to a high shaft diameter-to-bearing span ratio that results in low shaft deflection to increase bearing, mechanical seal and wear ring life
- Durability via forged barrel made from homogeneous, high-strength chromium steel for high-pressure performance and erosion-corrosion resistance

SPECIFICATIONS

Flows to: 1000 m^3/h (4500 gpm)
Heads to: 3650 m (12 000 ft)
Press. to: 427 bar (6190 psi)
Temp: to 250°C (480°F)

Refer to literature PS-30-12 at flowserve.com/library.

BETWEEN BEARINGS

HORIZONTAL – MULTISTAGE – DOUBLE-CASE

CHTA



IDP

Exceptionally reliable utility grade barrel pump for the most demanding high-energy applications. Built to ASME Section VIII, it is often applied unspared in supercritical power plants and extended service run applications.

- Smooth, reliable operation due to precision cast diffusers that are fully shrouded and 100% NDE inspected
- Longer service life via rugged rotor with in-line impellers, minimized bearing spans and heavy-duty shaft to reduce the effect of rotor contact during upsets
- Improved durability of critical clearance parts with advanced laser treatments that reduce wear
- Upset tolerance provided by a compensator gasket group that allows for expansion during thermal transients while also maintaining seal integrity

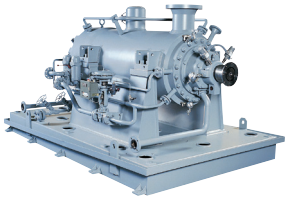
SPECIFICATIONS

Flows to: 3900 m^3/h (17 170 gpm)
Heads to: 4500 m (14 750 ft)
Press. to: 538 bar (7800 psi)
Temp: to 250°C (480°F)

Refer to literature PS-30-13 at flowserve.com/library.

HORIZONTAL – MULTISTAGE – DOUBLE-CASE

HDB and HSB



Byron Jackson®

Dual volute-type barrel pumps with axially split inner cases, the HDB and HSB are renowned for high reliability and uptime in various applications in the power generation industry.

- Operational stability and reliability are inherent to the rugged dual-volute and opposed-impeller design plus forged barrel, utility grade rotor and heavy-duty bearings
- Easy maintenance facilitated by the precision-machined axially split inner case, which requires only light bolting because it is under hydraulic compression
- Low NPSHA and excellent flow stability with an available double-suction, first-stage impeller (HDB)
- Excellent rotor dynamics due to the dynamically balanced rotor, ensuring inherently balanced axial thrust over the full operating range

SPECIFICATIONS

Flows to: 4000 m^3/h (17 610 gpm)
Heads to: 4300 m (14 000 ft)
Press. to: 450 bar (6525 psi)
Temp: to 425°C (800°F)

Refer to literature PS-30-12 at flowserve.com/library.

HORIZONTAL – MULTISTAGE – DOUBLE-CASE

BP



Niigata Worthington™

Medium-pressure, diffuser-style barrel pump for boiler feed, descaling, reactor charge and other services. Compliant with ISO 13709/API 610 (BB5) requirements.

- Optimized efficiency due to precision-cast impellers and diffusers, designed using the latest computational fluid dynamics technology
- Ease of maintenance resulting from a progressively stepped shaft that simplifies replacement of shrink-fit impellers
- Adaptable to the effects of pressure and temperature provided by spiral-wound gaskets, which are also corrosion-resistant
- Superior corrosion-resistance and reliable sealing in high-pressure and high-temperature services due to Inconel® coating on critical sealing surfaces

SPECIFICATIONS

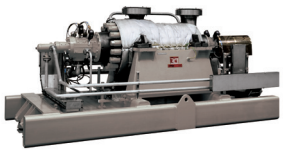
Flows to: 1050 m^3/h (4620 gpm)
Heads to: 3500 m (11 480 ft)
Press. to: 295 bar (4260 psi)
Temp: to 425°C (800°F)

Refer to literature PS-30-11 at flowserve.com/library.

HORIZONTAL – MULTISTAGE – DOUBLE-CASE

WCC

Medium-duty, diffuser-type barrel pump built to ISO 13709/API 610 (BB5) and customer specifications. Typically used in refinery services, pipeline, amine and ethylene feed, water and CO_2 injection, plus hydraulic power recovery.



IDP

- Optimized hydraulic efficiency and repeatable performance due to precision-cast tandem impellers, multi-vane diffusers and advanced balance drum design
- Incredible reliability with advanced close clearance technologies, erosion- and abrasion-resistant materials in the running fits, and robust bearing system
- Reduced downtime and maintenance from the standard cartridge type construction that allows major assembly and disassembly in the workshop rather than the field
- Balanced hydraulic loads over the operating range while maximizing efficiency at duty conditions enabled by single diameter balance drum

SPECIFICATIONS

Flows to: 1000 m^3/h (4400 gpm)
Heads to: 2800 m (9200 ft)
Press. to: 275 bar (4000 psi)
Temp: to 425°C (800°F)

Refer to literature PS-30-7 at flowserve.com/library.

HORIZONTAL – MULTISTAGE – DOUBLE-CASE

HDO and HSO

Offered in both general and special purpose configurations, these volute-style barrel pumps are manufactured to customer specifications, often exceeding ISO 13709/API 610 (BB5).



Byron Jackson

- Highest reliability in critical processes assured by the volute design
- Improved hydraulic efficiency and performance repeatability provided by the precision-cast opposed impellers
- Nearly balanced axial thrust with volute-type opposed impeller design that breaks down 50% of the discharge pressure to the intermediate stage before the long crossover
- Excellent rotor dynamics due to the dynamically balanced rotor, ensuring inherently balanced axial thrust over the full operating range

SPECIFICATIONS

Flows to: 4000 m^3/h (17 610 gpm)
Heads to: 5365 m (16 000 ft)
Press. to: 450 bar (6525 psi)
Temp: to 425°C (800°F)

Refer to literature PS-30-8 at flowserve.com/library.

HORIZONTAL – MULTISTAGE – DOUBLE-CASE

WIK and WIKO

Extra heavy-duty barrel pump intended for special purpose, unspared, high-power density applications. Pumps are custom engineered to customer requirements, often exceeding ISO 13709/API 610 (BB5).



Flowserve

- Outstanding reliability assured by low static deflection, the result of a large diameter shaft and short bearing spans
- Optimized efficiency due to precision-cast, low specific speed impellers, multi-vane diffuser and milled channel collectors to ensure repeatable performance
- Smooth, stable performance with multi-vane, split diffuser and channel ring collectors that eliminate radial imbalance
- Performance tested in accordance with API and Hydraulic Institute standards
- Ease of maintenance with back pullout, cartridge-style construction

SPECIFICATIONS

Flows to: 1600 m^3/h (7000 gpm)
Heads to: 7000 m (23 000 ft)
Press. to: 1000 bar (14 500 psi)
Temp: to 425°C (800°F)

Refer to literature PS-30-9 at flowserve.com/library.



VPC

VERTICAL

The global requirement for vertical pumps is diverse. The Flowserve portfolio reliably addresses the vast majority, from general industrial products to massive systems used in power generation and oil and gas. Designed to critical global standards, these pumps meet customer energy savings goals with their extensive hydraulic options that precisely meet operating requirements. Long-life performance in aggressive media is achieved with non-metallic and erosion-resistant wet ends for many designs.

Vertical – Quick Reference*

Product	Sub-Type	Flows to	Heads to	Pressures to	Temperatures
WUJ	Wet-Pit	3000 m³/h (13 200 gpm)	2000 m (6560 ft)	200 bar (2900 psi)	-200°C to 350°C (-328°F to 660°F)
VTP	Wet-Pit	13 600 m³/h (60 000 gpm)	700 m (2300 ft)	100 bar (1450 psi)	-73°C to 200°C (-100°F to 400°F)
QL and QLQ	Wet-Pit	25 000 m³/h (110 000 gpm)	500 m (1640 ft)	70 bar (1015 psi)	-45°C to 204°C (-50°F to 400°F)
VCT	Wet-Pit	181 700 m³/h (800 000 gpm)	110 m (350 ft)	—	—
AFV	Wet-Pit	181 700 m³/h (800 000 gpm)	11 m (35 ft)	—	—
Barge VTP	Wet-Pit	1035 m³/h (5000 gpm)	120 m (400 ft)	8.6 bar (125 psi)	-18°C to 150°C (0°F to 300°F)
Molten Salt VTP	Wet-Pit	13 600 m³/h (60 000 gpm)	530 m (1740 ft)	100 bar (1450 psi)	to 600°C (1100°F)
QLC and QLQC	Double-Case	25 000 m³/h (110 000 gpm)	500 m (1640 ft)	70 bar (1015 psi)	-45°C to 204°C (-50°F to 400°F)

** Additional products shown on next page*

Vertical – Quick Reference, cont'd.

Product	Sub-Type	Flows to	Heads to	Pressures to	Temperatures
QLC and QLQC	Double-Case	25 000 m³/h (110 000 gpm)	500 m (1640 ft)	70 bar (1015 psi)	-45°C to 204°C (-50°F to 400°F)
VPC	Double-Case	13 600 m³/h (60 000 gpm)	1070 m (3500 ft)	100 bar (1450 psi)	-73°C to 230°C (-100°F to 450°F)
WUC	Double-Case	3000 m³/h (13 200 gpm)	2000 m (6560 ft)	200 bar (2900 psi)	-200°C to 350°C (-328°F to 660°F)
APKD	Double-Case	4600 m³/h (20 200 gpm)	500 m (1640 ft)	50 bar (725 psi)	-18°C to 200°C (0°F to 400°F)
Byron Jackson SUBM - H2O	Deep-Well Submersible Motor	6000 m³/h (26 415 gpm)	800 m (2625 ft)	—	—
Byron Jackson SUBM - OIL	Deep-Well Submersible Motor	6000 m³/h (26 415 gpm)	800 m (2625 ft)	—	—
MJ and MJC	Slurry	1350 m³/h (6000 gpm)	30 m (100 ft)	10 bar (150 psi)	to 110°C (225°F)
RJ and RJC	Slurry	1350 m³/h (6000 gpm)	30 m (100 ft)	10 bar (150 psi)	to 110°C (225°F)
Terra-Titan	Slurry	250 m³/h (1100 gpm)	45 m (150 ft)	5 bar (70 psi)	to 100°C (212°F)
VPL3300	Slurry	4542 m³/h (20 000 gpm)	91 m (300 ft)	—	to 593°C (1100°F)
VPL3600	Slurry	1500 m³/h (6600 gpm)	150 m (492 ft)	—	to 100°C (212°F)
MVX	Solids Handling	17 000 m³/h (75 000 gpm)	40 m (130 ft)	7 bar (100 psi)	to 40°C (104°F)
CPXV	Sump	1400 m³/h (6160 gpm)	250 m (820 ft)	25 bar (365 psi)	-40°C to 400°C (-40°F to 752°F)
ESP3	Sump	1300 m³/h (5700 gpm)	116 m (380 ft)	12 bar (175 psi)	to 180°C (350°F)
PolyChem™ VGRP	Sump	565 m³/h (2500 gpm)	110 m (350 ft)	17 bar (250 psi)	-30°C to 90°C (-20°F to 200°F)
VPL1700	Sump	182 m³/h (800 gpm)	244 m (800 ft)	—	-51°C to 52°C (-60°F to 125°F)
ECPJ	Sump	1000 m³/h (4400 gpm)	150 m (500 ft)	20 bar (285 psi)	to 350°C (660°F)



Worthington

WET-PIT

WUJ

Highly engineered heavy-duty, multistage vertical pump for wet-pit or deep well applications requiring continuous, unspared duty in a variety of severe services. Meets or exceeds ISO 13709/API 610 (VS1).

- Maximum design and operating flexibility enabled by modular design system along with mixed or radial flow hydraulics, which enable precise configuration
- Unspared reliability owing to under-critical stiff shaft design, separate axial thrust bearing assembly and pressure-containing parts certified to international standards
- Economical retention of operating efficiency and mechanical stability with casing and impeller wear rings
- Reduced maintenance with flanged spacer-type coupling that permits easy access to the thrust bearings and mechanical seals without disturbing the motor

SPECIFICATIONS

Flows to: 3000 m^3/h (13 200 gpm)
Heads to: 2000 m (6560 ft)
Press. to: 200 bar (2900 psi)
Temp: -200°C to 350°C
(-328°F to 660°F)

Refer to literature PS-40-8 at flowserve.com/library.



Flowserve

WET-PIT

VTP

Diffuser-type, single or multistage vertical turbine pump for use in wet-pit or deep well applications in a variety of industries, including oil and gas, power, water, chemical, mining and metals.

- Unsurpassed hydraulic coverage with more than 300 bowl and impeller designs to ensure optimum pump selection
- Design flexibility arising from a wide variety of configurations, constructions and materials to suit application requirements; standard and ISO 13709/API 610 (VS1) units available
- Lower operating costs from available aftermarket rebowl services that revitalize aged VTPs — including competitor models — to reduce power consumption, downtime and maintenance costs

SPECIFICATIONS

Flows to: 13 600 m^3/h (60 000 gpm)
Heads to: 700 m (2300 ft)
Press. to: 100 bar (1450 psi)
Temp: -73°C to 200°C
(-100°F to 400°F)

Refer to literature PS-40-4 at flowserve.com/library.



Worthington

WET-PIT

QL and QLQ

Double-suction, twin-volute vertical turbine pumps in single (QL) or multistage (QLQ) designs. ISO 13709/API 610 (VS2) compliant units available.

- Superior performance from innovative, double-suction impeller that produces more flow and higher head at lower NPSHR
- High uptime with sealed-for-life bottom bearing plus heavy-duty discharge head and integral line shaft bracket, which ensure shaft concentricity and alignment
- High operating efficiency promoted by renewable impeller wear rings that restore original clearances
- Reliable performance in applications containing silt or abrasive solids owing to optional enclosed lineshaft construction

SPECIFICATIONS

Flows to: 25 000 m^3/h (110 000 gpm)
Heads to: 500 m (1640 ft)
Press. to: 70 bar (1015 psi)
Temp: -45°C to 204°C (-50°F to 400°F)

Refer to literature PS-40-6 at flowserve.com/library.

VERTICAL



Flowserve

WET-PIT

VCT

Mixed-flow circulating pump designed for continuous duty wet-pit applications requiring large capacities at relatively low heads. Often used in power plants, desalination, cooling water, drainage, flood protection and water supply.

- Reliable, efficient performance assured by a five-mitered elbow discharge head designed to reduce friction loss
- Outstanding operating efficiency arising from multiple hydraulic combinations that allow precise configuration
- Longer service life due to an inner column enclosing tube that is internally pressurized to lubricate bearings and prevent shaft and bearing damage during operation
- Design flexibility with above- or below-grade discharge, pullout and non-pullout designs, plus grease, freshwater or self-lubricating column constructions

SPECIFICATIONS

Flows to: 181 700 m^3/h (800 000 gpm)
Heads to: 110 m (350 ft)

Refer to literature PS-40-6 at flowserve.com/library.



Flowserve

WET-PIT

AFV

The AFV axial flow suspended shaft vertical pump is a single-stage, propeller-type design. This pump is designed for low head movement of water for municipal, agricultural and industrial services.

- Optimal performance from a flared suction bell that provides a smooth entrance to the impeller and has integral splitters to reduce swirl and entrance losses
- Improved reliability resulting from a hydraulically balanced three- or four-vane axial flow propeller and top propeller hub wear ring to reduce axial down thrust
- Installation versatility provided by a discharge elbow that can be located above or below ground at any orientation
- Design flexibility with pullout or non-pullout construction, packing or mechanical seal, drive options, and optional enclosed lineshaft with oil or freshwater lubrication

SPECIFICATIONS

Flows to: 181 700 m^3/h (800 000 gpm)
Heads to: 11 m (35 ft)

Refer to literature PS-40-3 at flowserve.com/library.



Flowserve

WET-PIT

Barge VTP

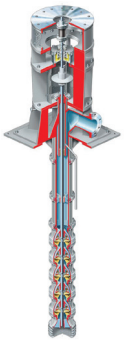
Vertical self-contained, self-priming unit designed for barge unloading and transfer operations. Innovative pollution prevention design inhibits costly oil and chemical spills.

- Reduced stripping turnaround times assured by a self-priming stripper stage that operates efficiently at extremely low submergence levels
- Fewer costly oil and chemical spills owing to a bleed off stuffing box that diverts product bypass back to the compartment via a sealed return line
- Ease of maintenance resulting from large ports that allow access to the stuffing box without removing the driver

SPECIFICATIONS

Flows to: 1035 m^3/h (5000 gpm)
Heads to: 120 m (400 ft)
Press. to: 8.6 bar (125 psi)
Temp: -18°C to 150°C (0°F to 300°F)

Refer to literature PSS-40-7.2 at flowserve.com/library.



Flowserve

WET-PIT

Molten Salt VTP

Single or multistage vertical turbine pump engineered for molten salt circulation in concentrated solar power plants. Designed using advanced thermal mapping software to ensure adequate heat dissipation and mitigate distortion.

- Increased energy generation due to low pump submergence
- Longer service life at high temperatures assured by advanced heat dissipation design that prevents distortion
- Materials engineered to equalize thermal growth
- Advanced fluid sealing system protects against fluid leakage

SPECIFICATIONS

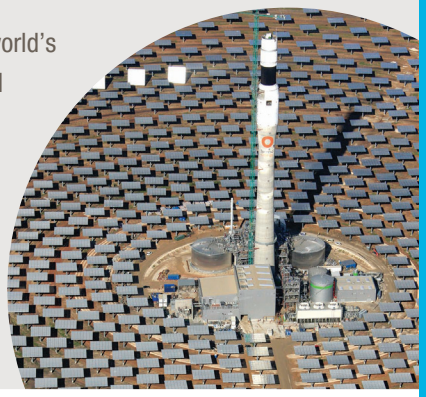
Flows to: 13 600 m³/h (60 000 gpm)
Heads to: 530 m (1740 ft)
Press. to: 100 bar (1450 psi)
Temp: to 600°C (1100°F)

Refer to literature FPD-16 at flowserve.com/library.

Harnessing the Power of the Sun

Flowserve pumps can take the heat. They play a key role at the world's first commercial concentrated solar power plant utilizing a central tower receiver with thermal storage capabilities, located in Spain. At the heart of the plant are seven Flowserve vertical turbine pumps (VTPs) specially configured to handle the molten salt heat transfer fluid at temperatures up to 600°C (1100°F) and pressures up to 100 bar (1450 psi).

Photo: Gemasolar Plant. Property of Torresol Energy © Torresol Energy





Worthington

DOUBLE-CASE

QLC and QLQC

Double-suction vertical turbine pumps in single (QLC) or multistage (QLQC) units featuring true twin volutes. ISO 13709/API 610 (VS2) compliant design available.

- Superior performance from innovative, double-suction impeller that produces more flow and higher head at lower NPSHR
- High uptime with sealed-for-life bottom bearing plus heavy-duty discharge head and integral line shaft bracket, which ensure shaft concentricity and alignment
- High operating efficiency promoted by renewable impeller wear rings that restore original clearances
- Reliable performance in applications containing silt or abrasive solids owing to optional enclosed lineshaft construction

SPECIFICATIONS

Flows to: 25 000 m³/h (110 000 gpm)
Heads to: 500 m (1640 ft)
Press. to: 70 bar (1015 psi)
Temp: -45°C to 204°C (-50°F to 400°F)

Refer to literature PS-40-4 at flowserve.com/library.

VERTICAL



Flowserve

DOUBLE-CASE

VPC

Diffuser-type, vertical turbine pump well-suited for closed system and low NPSH applications. Available in single or multistage units, as well as standard and ISO 13709/API 610 (VS6) compliant designs.

- Broad application versatility due to extensive hydraulic coverage plus wide variety of configurations, constructions and materials to suit application requirements
- Lower installation costs with low NPSH first-stage impeller that reduces suction can length
- Lower operating costs from available aftermarket rebowl services that revitalize aged VPCs — including competitor models — to reduce power consumption, downtime and maintenance costs

SPECIFICATIONS

Flows to: 13 600 m^3/h (60 000 gpm)
Heads to: 1070 m (3500 ft)
Press. to: 100 bar (1450 psi)
Temp: -73°C to 230°C
(-100°F to 450°F)

Refer to literature PS-40-2
at flowserve.com/library.



Worthington

DOUBLE-CASE

WUC

Compliant with ISO 13709/API 610 (VS6), the WUC is a highly engineered heavy-duty, multistage process vertical pump designed for continuous duty in critical applications at high pressures and temperatures.

- Maximum design and operating flexibility enabled by modular design system, along with mixed or radial flow hydraulics that enable precise configuration
- Unspared reliability owing to stiff shaft construction, a self-contained axial thrust bearing housing and pressure-containing parts certified to international standards
- Reduced maintenance with flanged spacer type coupling that permits easy access to the thrust bearings and mechanical seals
- Reliable cryogenic operation made possible by an available coffer dam system, which provides a gas barrier between pumped fluid and mechanical seal

SPECIFICATIONS

Flows to: 3000 m^3/h (13 200 gpm)
Heads to: 2000 m (6560 ft)
Press. to: 200 bar (2900 psi)
Temp: -200°C to 350°C
(-328°F to 660°F)

Refer to literature PS-40-9
at flowserve.com/library.



Flowserve

DOUBLE-CASE

APKD

The APKD is ideal for critical services with limited NPSHA. An innovative double-suction impeller in a true twin-volute design produces more flow and higher head at lower NPSHR.

- Lower energy consumption and operating costs provided by a versatile series of impeller design options that enable optimum hydraulic fit
- Wide operating range with multiple suction-specific speed options
- Reliable operation with balanced hydraulic loads owing to double-suction, twin-volute design

SPECIFICATIONS

Flows to: 4600 m^3/h (20 200 gpm)
Heads to: 500 m (1640 ft)
Press to: 50 bar (725 psi)
Temp: -18°C to 200°C (0°F to 400°F)

Refer to literature PS-40-10
at flowserve.com/library.



Byron Jackson

DEEP-WELL

Byron Jackson SUBM Pump With H2O Motor

Water-filled, wet-wound motors are environmentally friendly, provide high efficiency, and offer outstanding reliability — an exceptional value suitable for potable water applications.

- Non-toxic operation, improved cooling and extended motor life enabled by Class Y winding insulation system
- Prolonged product life enhanced by induction motor and heavy-duty, self-aligning sleeve bearings
- Ease of installation and ambient temperature flexibility with pre-filled water and antifreeze motor lubrication
- Fast delivery in one to four weeks available for sizes 6 through 10 in via H2O+ pump quick-delivery program

SPECIFICATIONS

Flows to: 6000 m^3/h (26 415 gpm)
Heads to: 800 m (2625 ft)
Motor Sizes to: 1650 kW (2200 hp)

Refer to literature PUBR000208 at flowserve.com/library.



Byron Jackson

DEEP-WELL

Byron Jackson SUBM Pump With OIL Motor

Oil-filled submersible motor pump built for the world's most demanding deep-well services. Rugged, reliable and long-lasting, the Byron Jackson SUBM offers significant total lifecycle cost savings.

- Extended motor service life enabled by induction motor plus Class H insulation system designed with vacuum-pressure impregnated epoxy, re-windable stators and internal circulation system
- Maximum pump efficiency with minimum vibration provided by dynamically balanced heavy-duty impellers and bowl cases
- Ease of installation with sealed power cable plug-in feature, which eliminates field splicing
- Precise configuration for application needs owing to numerous hydraulic, cooling, lubrication, sealing, materials and accessory options

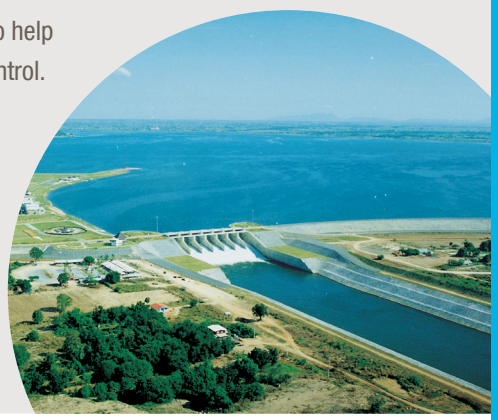
SPECIFICATIONS

Flows to: 6000 m^3/h (26 415 gpm)
Heads to: 800 m (2625 ft)
Motor Sizes to: 1650 kW (2200 hp)

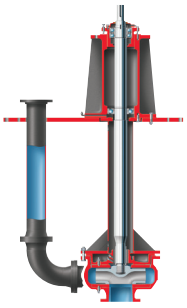
Refer to literature PUBR000208 at flowserve.com/library.

Life-Giving Water in Thailand

Thailand's Royal Irrigation Department chose Flowserve to help provide its people with dependable irrigation and flood control. For years the people living in the 3.65 million acre Pasak River Basin, north of Bangkok, suffered cycles of drought and flood. No longer. With the construction of a dam employing vertical mixed flow pumps from Flowserve, the people are protected from flooding and have adequate water to grow crops.



VERTICAL



Worthington

SLURRY

MJ and MJC

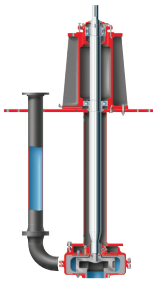
Vertical lineshaft (MJ) and cantilever (MJC) hard-metal slurry pumps designed for services containing coarse solids in suspension (to 70% by weight). Suitable for a broad range of wet- and dry-pit services.

- Increased uptime provided by extra-thick wear allowances
- Efficient operation and prolonged service life as a result of concentric casing and anti pre-rotation vanes, which reduce suction pipe swirl and impeller wear
- Extended seal and bearing life enabled by closed impeller with pump-out vanes, which reduces stuffing box pressure and suction recirculation as well as balances axial hydraulic loads
- Reduced inventory costs from parts interchangeability among related horizontal and vertical configurations

SPECIFICATIONS

Flows to: 1350 m^3/h (6000 gpm)
Heads to: 30 m (100 ft)
Press. to: 10 bar (150 psi)
Temp: to 110°C (225°F)

Refer to literature PS-10-19 at flowserve.com/library.



Worthington

SLURRY

RJ and RJC

Rubber-lined lineshaft (RJ) and cantilever (RJC) slurry pumps designed to handle services containing fine solids in suspension (to 70% by weight). Suitable for a broad range of wet- and dry-pit applications.

- Low total cost of ownership provided by replaceable rubber liners
- Extended seal and bearing life enabled by rubber-closed impeller with pump-out vanes, which reduces stuffing box pressure and suction recirculation as well as balances axial hydraulic loads
- Efficient operation and prolonged service life as a result of concentric casing and anti pre-rotation vanes, which reduce suction pipe swirl and impeller wear
- Reduced inventory costs from parts interchangeability among related horizontal and vertical configurations

SPECIFICATIONS

Flows to: 1350 m^3/h (6000 gpm)
Heads to: 30 m (100 ft)
Press. to: 10 bar (150 psi)
Temp: to 110°C (225°F)

Refer to literature PS-10-18 at flowserve.com/library.



TKL

SLURRY

Terra-Titan

This vertical cantilever shaft sump pump is ruggedly built to provide economic reliability demanded by mining, process and general industries.

- Reliable, long-lasting performance due to rigid one-piece suspended, oversized cantilever shaft design, which reduces vibration and tolerates run-dry operation
- Reduced maintenance with renewable Terraprene™ shaft sleeve that eliminates shaft wear within the casing
- Ease of maintenance and efficient operation via external impeller adjustment, which provides simple way to adjust clearances for special applications
- Application versatility provided by low-mounted motor, taper lock bushes and V-belt drive, which allow simple adaptation to suitable pump speeds

SPECIFICATIONS

Flows to: 250 m^3/h (1100 gpm)
Heads to: 45 m (150 ft)
Press. to: 5 bar (70 psi)
Temp: to 100°C (212°F)

Refer to literature PS-10-7 at flowserve.com/library.



Lawrence Pumps ®

SLURRY

VPL3300

Designed specifically for difficult titanium tetrachloride (TiCl4) applications in pigments processing, the VPL3300 pump is a true cantilever design with a rugged wet-end construction ideal for this volatile toxic slurry.

- Excellent abrasion resistance and longevity ensured by special slurry wet end made from thick-walled, high-chrome iron
- Reduced wear and recirculation delivered by an impeller that incorporates repelling vanes specifically designed for erosive services
- Durability and long pump life made possible by heavy-duty, anti-friction thrust and radial bearings located above liquid level

SPECIFICATIONS

Flows to: 4542 m^3/h (20 000 gpm)
Heads to: 91 m (300 ft)
Temp: to 593°C (1100°F)



Lawrence Pumps

SLURRY

VPL3600

Designed specifically for the coke pit maze application found in decoking units, the rugged VPL3600 vertical slurry pump provides long life in tough, erosive slurry applications. Compliant with ISO 13709/API 610 (VS4).

- Reliable operation ensured by the water-filled column with restriction bushing, which maintains a clean environment for the shaft and sleeve bearings
- Excellent abrasion resistance and longevity ensured by special slurry wet end made from thick-walled, high-chrome iron
- Reduced wear and recirculation delivered by an impeller that incorporates repelling vanes specifically designed for erosive services
- Available sparger system helps to keep coke particles in suspension to prevent silting-in of the pump; mechanical agitation systems also available

SPECIFICATIONS

Flows to: 1500 m^3/h (6600 gpm)
Heads to: 150 m (492 ft)
Temp: to 100°C (212°F)

Refer to literature PS-40-12 at flowserve.com/library.



Flowserve

SOLIDS HANDLING

MVX

The Flowserve MVX is a rugged wet-pit pump designed for use in solids-handling applications and other wet-pit services. Built and tested in accordance with Hydraulic Institute standards.

- Smooth performance with symmetrical bowl with multi-volute design that provides hydraulic balance
- Resistance to clogging from solids or stringy materials enabled by splitter guide vanes and enclosed non-clog impeller
- Longer service life provided by the enclosed lineshaft, which protects bearing surfaces from abrasion
- Smallest model passes spherical solids to 76 mm (3 in) diameter; larger models pass spherical solids to 152 mm (6 in) diameter

SPECIFICATIONS

Flows to: 17 000 m^3/h (75 000 gpm)
Heads to: 40 m (130 ft)
Press. to: 7 bar (100 psi)
Temp: to 40°C (104°F)
Motor to: 950 kW (1250 hp)

Refer to literature PS-4-5 at flowserve.com/library.

VERTICAL



IDP

SUMP

CPXV

Compliant with ISO 5199, the CPXV chemical sump pump offers efficient and reliable service in a broad range of applications. Available with many ISO 13709/API 610 compliant features for oil and gas installations.

- Highly customizable, with more than 40 hydraulic wet-ends, numerous materials, multiple mechanical seal options and column lengths to 10 m (32 ft)
- High-efficiency performance delivered by standard front vane open-style impeller
- Ease of maintenance with axial adjustment of the heavy-duty thrust bearings made above sole plate level
- Fully jacketed molten sulfur configuration available
- Increased safety with Category 1 (Zone 0) ATEX configuration for explosive atmospheres beneath the sole plate

SPECIFICATIONS

Flows to: 1400 m^3/h (6160 gpm)
Heads to: 250 m (820 ft)
Press. to: 25 bar (365 psi)
Temp: -40°C to 400°C (-40°F to 752°F)

Refer to literature PS-10-31 at flowserve.com/library.



IDP

SUMP

ESP3

This ruggedly built vertical, chemical sump pump is designed to provide improved performance, increased part standardization and reduced inventory costs.

- Increased parts standardization and reduced inventory costs from the only vertical wet-pit immersion sump pump to offer parts interchangeability with standard ASME B73.1 horizontal pumps (Durco Mark 3)
- Repeatable performance for the life of the pump due to reverse vane impeller
- Reduced maintenance and downtime in difficult process fluids owing to a wide array of wetted materials, bearing materials and flush plan options
- Low total cost of ownership made possible by many features designed to reduce costs associated with installation and maintenance

SPECIFICATIONS

Flows to: 1300 m^3/h (5700 gpm)
Heads to: 116 m (380 ft)
Press. to: 12 bar (175 psi)
Temp: to 180°C (350°F)

Refer to literature PS-10-24 at flowserve.com/library.



Durco

SUMP

PolyChem VGRP

Engineered glass-reinforced polymer composite overhung sump pump offering cost-effective corrosion resistance in a lightweight, non-galling, non-sparking and non-conductive design.

- Corrosion resistance superior to more expensive high-alloy metals, which provides a lower investment cost and long-term solution in acid- and chloride-rich applications
- High efficiencies and reduced maintenance due to externally adjustable, semi-open impeller that is inherently balanced
- Increased uptime and longer bearing life provided by shaft/bearing system, which operates well below the first critical speed and results in less whip
- Ease of maintenance due to design of pull-out bearing retainer

SPECIFICATIONS

Flows to: 565 m^3/h (2500 gpm)
Heads to: 110 m (350 ft)
Press. to: 17 bar (250 psi)
Temp: -30°C to 90°C (-20°F to 200°F)

Refer to literature PS-10-17 at flowserve.com/library.



Lawrence Pumps

SUMP

VPL1700

Designed specifically for transferring toxic liquids (e.g., chlorine, phosgene and anhydrous cyanide), the VPL1700 multistage, vertical line shaft, top-entry, tank-mounted pump is designed for maximum safety and reliability.

- Personnel safety maximized with shaft sealing and hydraulic upgrades such as emergency seals and excess flow check valves
- Highly configurable, with numerous materials of construction and optional upgrades to maximize safety, reliability and ease of maintenance
- Lowest fugitive emissions made possible by special gas seal design
- Reliability assured by an available instrumentation package that controls the flow of buffer gas to the seal chamber and monitors critical operating parameters

SPECIFICATIONS

Flows to: 182 m^3/h (800 gpm)
Heads to: 244 m (800 ft)
Temp: -51°C to 52°C
(-60°F to 125°F)



Worthington

SUMP

ECPJ

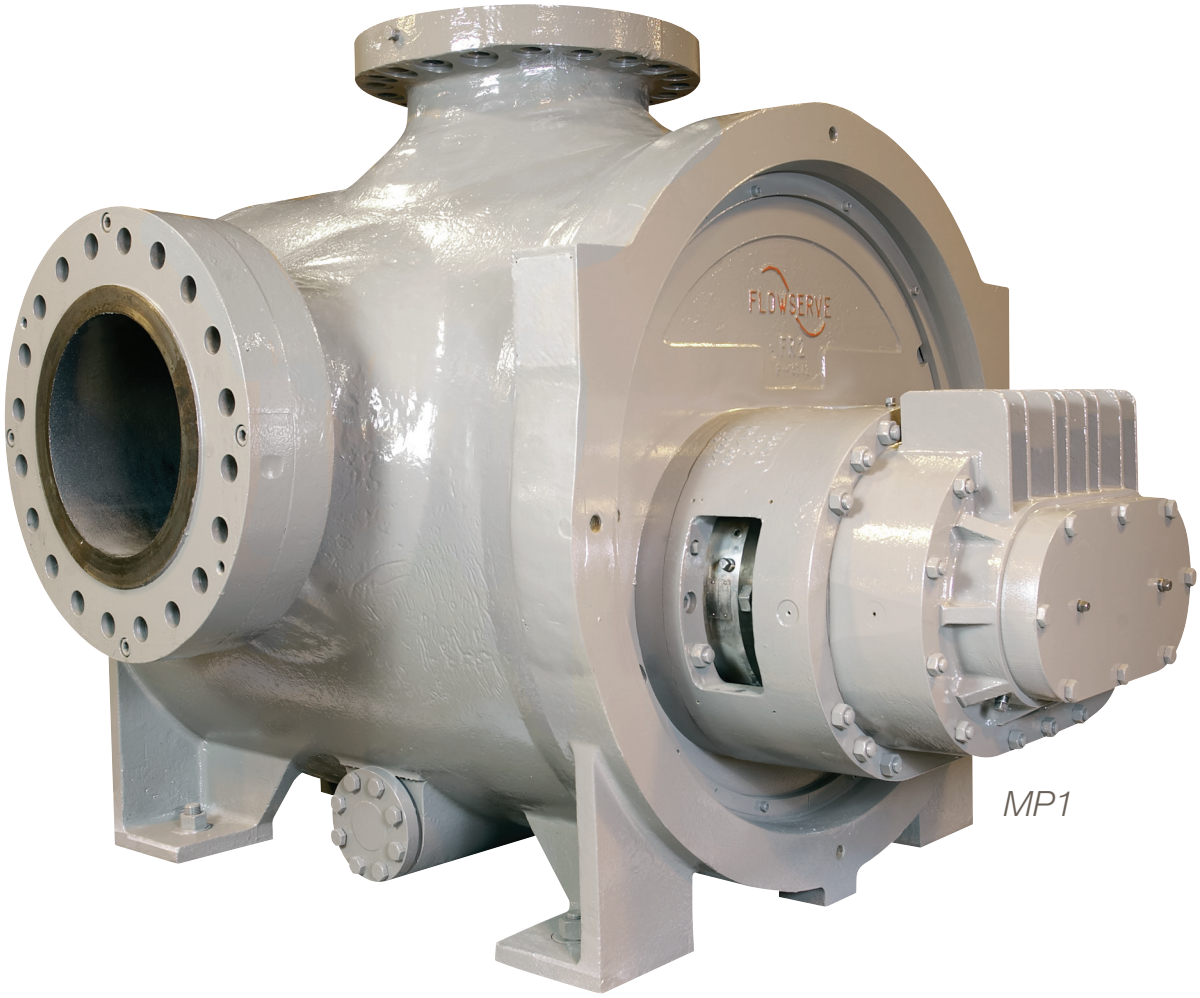
This rugged, single-stage, vertical-lineshaft sump pump is a proven performer in tough chemical and hydrocarbon processing applications. Fully compliant with ISO 13709/API 610 (VS4).

- Dependable performance and extensive mechanical and hydraulic design flexibility resulting from the ability to custom engineer each pump for its specific application
- Greater reliability with lower inventory costs enabled by thrust pot design that permits standard (non-thrust) electrical motors to be used
- Smooth operation over a wide flow range ensured by dynamically balanced precision-cast impeller
- Improved low-flow, high-head performance with available Barske-type impeller
- Steam-jacketed version for liquid sulfur service available

SPECIFICATIONS

Flows to: 1000 m^3/h (4400 gpm)
Heads to: 150 m (500 ft)
Press. to: 20 bar (285 psi)
Temp: to 350°C (660°F)

Refer to literature PS-10-10 at flowserve.com/library.



MP1

POSITIVE DISPLACEMENT

Reliable performance in tough applications is achieved through robust power transmission and heavy-duty liquid ends for every Flowserve positive displacement pump. Our versatile range of diaphragm, gear and screw configurations helps customers avoid costly upfront costs with durable, high-speed designs. Long service intervals that keep plants running are the norm, even in ultra-high viscosity and multiphase fluid applications.

Positive Displacement – Quick Reference

Product	Sub-Type	Flows to	Pressures to	Temperatures
CT6	Diaphragm	4 m^3/h (18 gpm)	—	—
GR	Gear	275 m^3/h (1200 gpm)	35 bar (500 psi)	to 350°C (650°F)
GA	Gear	27 m^3/h (120 gpm)	17 bar (250 psi)	to 175°C (350°F)
Gearex	Gear	180 m^3/h (800 gpm)	20 bar (300 psi)	-50°C to 450°C (-60°F to 842°F)
TSP	Twin Screw	2550 m^3/h (11 200 gpm)	100 bar (1450 psi)	to 450°C (842°F)
MP1	Multiphase Twin Screw	2250 m^3/h (10 000 gpm)	50 bar (720 psi)	to 450°C (850°F)

POSITIVE DISPLACEMENT



Scienco™

DIAPHRAGM

CT6

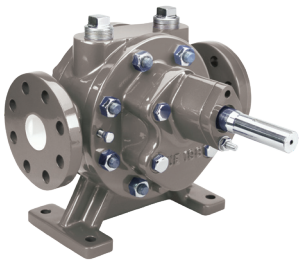
With market-leading flow rates, the CT6 self-priming diaphragm pump is the premier solution for agricultural and DEF transfer needs. For use with caged IBCs, mini bulk tanks and drums.

- Broad application versatility enabled by a variety of mounting configurations, input voltages, brackets, dip tubes, flow meters, fittings, hoses and valves to meet application needs
- Ease of use provided by a complete, out-of-the-box system and self-priming from a dry state
- Time-saving, efficient chemical transfer facilitated by market-leading flow rates
- Two-year limited warranty

SPECIFICATIONS

Flows to: 4 m^3/h (18 gpm)

Refer to literature PSS-90-20.23 and PSS-90-20.24 at flowserve.com/library.



Worthington

GEAR

GR

GR pumps provide high efficiency, pulse-free pumping, even under challenging conditions. They are designed to handle viscous fluids (up to 20 000 cP) across a broad spectrum of flows and pressures.

- Increased uptime while accommodating heavy, highly viscous loads made possible by double-helical herringbone gears and between-bearings design
- Lower operating costs provided by high-speed capability, which eliminates expensive speed reduction accessories and enables the use of off-the-shelf motors
- Application flexibility facilitated by convertible stuffing box, which allows for ample packing or mechanical seals

SPECIFICATIONS

Flows to: 275 m^3/h (1200 gpm)
Press. to: 35 bar (500 psi)
Temp to: 350°C (650°F)

Refer to literature PS-60-4 at flowserve.com/library.



Worthington

GEAR

GA

GA cast iron gear pumps have long been workhorses in highly viscous applications (to 5000 cP) within a multitude of industries due to their reliability, efficiency and low total lifecycle costs.

- Dependable, quiet, pulse-free operation made possible by superior between bearings design and external double-helical, herringbone gear design
- Lower operating costs provided by high-speed capability, which eliminates expensive speed reduction accessories and enables the use of off-the-shelf motors
- Reduced maintenance with inherently hydraulically balanced design that eliminates end thrust and the need for thrust bearings
- Convertible stuffing box, which allows for ample packing or mechanical seals

SPECIFICATIONS

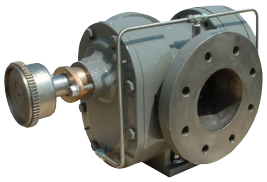
Flows to: 570 m^3/h (2500 gpm)
Press. to: 17 bar (250 psi)
Temp: 175°C (350°F)

Refer to literature PS-60-4 at flowserve.com/library.

GEAR

Gearex

Extremely rugged and unusually compact for its high capacity and range, the Gearex rotary pump is generally compliant with API 676, second edition. Handles viscosities to 20 000 cP.



Worthington

- Long, reliable operation due to precision-machined herringbone pumping gears that provide low vibration, pulseless discharge while timing gears transfer power with minimal wear
- Lower total cost of ownership derived from ability to directly connect to motors up to 1800 rpm, eliminating the need for heavy foundation, belts or reduction gears
- Increased uptime via heavy-duty ball and roller bearings, which support the rotating element to prevent contact with the housing
- Reduced downtime with split brackets facilitate seal maintenance

SPECIFICATIONS

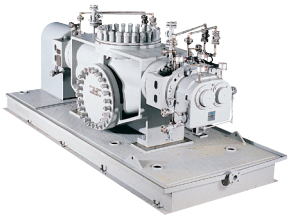
Flows to: 180 m^3/h (800 gpm)
Press. to: 20 bar (300 psi)
Temp: -50°C to 450°C (-60°F to 842°F)

Refer to literature PS-60-4 at flowserve.com/library.

TWIN SCREW

TSP

Built in accordance with API 676, the TSP double-suction, timed twin-screw pump improves upon traditional rotary pump designs by providing smoother, more constant flow.



Sier-Bath®

- Increased availability, especially in fluids that are contaminated or have poor lubricity, assured by external bearings and AGMA 11 timing gears, which are housed in separate oil reservoirs to eliminate exposure to pumped fluid
- Application versatility provided by high volumetric efficiency over a wide range of viscosities (up to 55 million cP), run-dry capability and ISO 21049/API 682 seal chamber that accommodates multiple seal types
- Ease of maintenance with split bearing brackets that provide access to the bearings and seals

SPECIFICATIONS

Flows to: 2550 m^3/h (11 200 gpm)
Diff. Press. to: 100 bar (1450 psi)
Temp: 450°C (842°F)

Refer to literature PS-60-1 at flowserve.com/library.

MULTIPHASE TWIN SCREW

MP1

Compliant with API 676, the MP1 is engineered for reliability in the toughest multiphase upstream oil field applications. Handles viscosities to 8000 cP, slurries to 70% solids by weight and gas volume fractions (GVF) to 100%



Flowserve

- Rugged and versatile operation that readily accommodates rapid changes in viscosities, gas-to-liquid ratios and GVF
- Reliable, efficient performance from one-piece integral rotor and double-suction design, which provides balanced hydraulic loads
- High availability due to external bearings and AGMA 11 timing gears, which are housed in separate oil reservoirs to eliminate exposure to pumped fluid
- Easy access to bearings and seals with split bearing brackets
- Safety and environmental compliance with ISO 21049/API 682 seal chamber

SPECIFICATIONS

Flows to: 2250 m^3/h (10 000 gpm)
Diff. Press. to: 50 bar (720 psi)
Temp: to 450°C (850°F)

Refer to literature PS-60-2 at flowserve.com/library.



AEH

SIDE CHANNEL

For problem-free, low-flow, high-head pumping under unfavorable suction conditions, our SIHI side channel pumps routinely deliver in the most difficult applications. In addition to being self-priming, innovative side channel hydraulics ensure superior process control and gas-handling capability, especially when pumping liquids at their boiling points or with entrained gas. Cost of ownership is kept low by excellent hydraulic efficiency, simplified maintenance and a high degree of parts interchangeability.

Side Channel – Quick Reference*

Product	Sub-Type	Flows to	Heads to	Pressures to	Temperatures
CEH	Side Channel	35 m^3/h (154 gpm)	354 m (1161 ft)	40 bar (580 psi)	to 180°C (356°F)
AEH	Side Channel	35 m^3/h (154 gpm)	354 m (1161 ft)	40 bar (580 psi)	to 180°C (356°F)
AKH	Side Channel	35 m^3/h (154 gpm)	242 m (794 ft)	25 bar (363 psi)	to 120°C (248°F)
AOH	Side Channel	7.5 m^3/h (33 gpm)	98 m (322 ft)	10 bar (145 psi)	to 120°C (248°F)
ASH	Side Channel	12 m^3/h (53 gpm)	288 m (945 ft)	100 bar (1450 psi)	to 120°C (248°F)
ADH	Side Channel	7.2 m^3/h (32 gpm)	400 m (1312 ft)	25 bar (362 psi)	120°C (250°F)

** Additional products shown on next page*

Side Channel – Quick Reference, cont'd.

Product	Sub-Type	Flows to	Heads to	Pressures to	Temperatures
SC	Side Channel	65 l/min (17 gpm)	—	25 bar (362 psi)	80°C (to 176°F)
SMX	Side Channel	100 l/min (26 gpm)	—	—	-20°C to 40°C (-4°F to 104°F)
CEB	Side Channel	65 l/min (17 gpm)	—	40 bar (580 psi)	-40°C to 60°C (-40°F to 140°F)
DRV	Side Channel	2 m^3/h (17 gpm)	27 m (88 ft)	6 bar (218 psi)	100°C (212°F)
AKL and AKV	Side Channel	12 m^3/h (50 gpm)	70 m (230 ft)	16 bar (230 psi)	120°C (250°F)

SIDE CHANNEL

CEH



SIHI

A centrifugal combined system, the CEH is self-priming and provides reliable pumping under unfavorable suction conditions. It is ideal for pumping liquids under vapor pressure, such as condensates, refrigerants and liquefied gases.

- Problem-free pumping in applications with NPSHA below 0.5 m (1.64 ft) due to centrifugal-combined system construction, which employs a centrifugal inducer stage before the side channel stages to lower NPSHR
- Excellent hydraulic efficiency assured by modular side-channel system with one to eight stages which permits precise configuration for operating parameters
- Low inventory carrying costs and simplified maintenance enabled by high degree of parts interchangeability between stages

SPECIFICATIONS

Flows to: 35 m^3/h (154 gpm)
Heads to: 354 m (1161 ft)
Press. to: 40 bar (580 psi)
Temp: to 180°C (356°F)

Refer to literature PS-120-1 at flowserve.com/library.

SIDE CHANNEL

AEH



SIHI

The AEH is a self-priming pump designed per DIN EN 734. It is well-suited for a wide range of applications across industries, including pure, turbid or aggressive media as well as gas-entrained fluids.

- Excellent gas-handling capability due to segmental-type construction with open-vane wheel impellers
- Application versatility made possible by numerous options, including materials, bearing arrangements, sealing systems and couplings
- High-efficiency operation assured by modular side-channel system with one to eight stages, which permits precise sizing for BEP operation
- Reduced spare parts and ease of maintenance made possible by a high degree of parts interchangeability between stages

SPECIFICATIONS

Flows to: 35 m^3/h (154 gpm)
Heads to: 354 m (1161 ft)
Press. to: 40 bar (580 psi)
Temp: to 180°C (356°F)

Refer to literature PS-120-1 at flowserve.com/library.

SIDE CHANNEL

AKH



SIHI

The AKH provides trouble-free pumping in a broad range of medium-duty applications in the chemical, oil and general industries, plus naval applications and DAF systems.

- Superior process control due to a steep performance curve that ensures rigorous regulation of the pressure with small changes in capacity
- Application flexibility due to segmental-type construction with open-vane wheel impellers, which permits reliable self-priming and gas-handling capability
- Excellent hydraulic efficiency assured by modular side-channel system with one to six stages, which allows precise sizing for BEP operation
- Low inventory carrying costs and simplified maintenance owing to a high degree of parts interchangeability between stages

SPECIFICATIONS

Flows to: 35 m^3/h (154 gpm)
Heads to: 242 m (794 ft)
Press. to: 25 bar (363 psi)
Temp: to 120°C (248°F)

Refer to literature PS-120-1 at flowserve.com/library.

SIDE CHANNEL

SIDE CHANNEL

AOH

The AOH is designed for low-capacity applications with clear or turbid liquids without abrasive particles. It is often used in agriculture and general industries as well as naval applications.



SIHI

- Superior process control assured by a steep performance curve that ensures strict pressure regulation with nominal capacity changes
- Application flexibility arising from reliable self-priming and gas-handling capability due to segmental-type construction with open-vane wheel impellers
- Low inventory carrying costs and simplified maintenance owing to a high degree of parts interchangeability between stages

SPECIFICATIONS

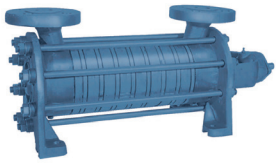
Flows to: 7.5 m^3/h (33 gpm)
Heads to: 98 m (322 ft)
Press. to: 10 bar (145 psi)
Temp: to 120°C (248°F)

Refer to literature PS-120-1 at flowserve.com/library.

SIDE CHANNEL

ASH

The ASH was developed for handling liquefied gases with vapor pressures to 80 bar (1160 psi). It is particularly well-suited for general industry applications involving CO_2 production, storage, transportation, drying, cleaning and fire suppression.



SIHI

- Superior gas handling capability due to segmental-type construction with open-vane wheel impellers
- Increased MTBF ensured by a special bearing developed to compensate for the axial forces in case of high nominal pressures

SPECIFICATIONS

Flows to: 12 m^3/h (53 gpm)
Heads to: 288 m (945 ft)
Press. to: 100 bar (1450 psi)
Temp: to 120°C (248°F)

SIDE CHANNEL

ADH

High-speed, segmental-type, horizontal side channel pump for use in boiler feed, condensate return, pressure boosting and marine service applications.



SIHI

- Application reliability provided by self-priming side channel design capable of handling gas during normal liquid duty
- Quiet operation from unshrouded vane wheel impellers
- Longer service life due to floating impellers that reduce wear and minimize axial thrust
- Optimal performance resulting from a steep performance curve that allows precise regulation of the pressure with small changes in flow

SPECIFICATIONS

Flows to: 7.2 m^3/h (32 gpm)
Heads to: 400 m (1312 ft)
Press. to: 25 bar (362 psi)
Temp: 120°C (250°F)

SIDE CHANNEL

SC

The SC is a self-priming, centrifugal combined system that provides reliable pumping under unfavorable suction conditions. It is designed for propane, butane and bottom off-loading in LPG plants.



SIHI

- Problem-free pumping in applications with NPSHA between 0.4 m and 0.65 m (1.31 ft and 2.13 ft) due to centrifugal-combined system construction, which employs a centrifugal inducer stage to lower NPSHR
- Application flexibility due to segmental-type construction with open-vane wheel impeller, which permits reliable self-priming and gas-handling capability
- Low inventory carrying costs and simplified maintenance enabled by high degree of parts interchangeability between stages

SPECIFICATIONS

Flows to: 65 l/min (17 gpm)
Diff. Press. to: 14.5 bar (210 psi)
Press. to: 25 bar (362 psi)
Temp: 80°C (to 176°F)

Refer to literature PS-120-2 at flowserve.com/library.

SIDE CHANNEL

SMX

Submersible side-channel pump ideal for LPG car-filling applications. Its innovative canned motor design makes it easy to replace other submersible pumps used in most LPG car-filling stations.



SIHI

- Reliable, continuous operation and low installation cost due to an internal bypass connection that secures minimum flow and eliminates the need for an additional bypass valve
- Energy efficiency through an optional intelligent drive that allows one pump to be used for two nozzles to reduce energy consumption by adjusting performance
- Superior process control resulting from side channel hydraulics with a steep performance curve that ensures strict pressure regulation with capacity changes

SPECIFICATIONS

Flows to: 100 l/min (26 gpm)
Diff. Press. to: 10 bar (145 psi)
Temp: -20°C to 40°C (-4°F to 104°F)

Refer to literature PS-120-2 at flowserve.com/library.

SIDE CHANNEL

CEB

Vertical, extended tank, side channel unit for pumping liquids at their boiling point or with entrained gas. It is designed for pumping liquefied petroleum gas and other liquefied gases.



SIHI

- Reliable operation in applications with poor suction conditions due to a special suction impeller and an inducer stage that significantly lower NPSHR
- Simplified installation with vertical tank pump design that enables retrofitting into most common tanks and dimensions that support submersible pump replacement
- Reduced maintenance with sealless magnetic drive design

SPECIFICATIONS

Flows to: 65 l/min (17 gpm)
Diff. Press. to: 15 bar (217 psi)
Press. to: 40 bar (580 psi)
Temp: -40°C to 60°C (-40°F to 140°F)

Refer to literature PS-120-2 at flowserve.com/library.

SIDE CHANNEL



SIHI

SIDE CHANNEL

DRV

Single-stage, vertical side channel pump with threaded flanges. Self-priming and capable of handling entrained gas, the DRV is used in general industry, agriculture, chemical and pharmaceutical applications.

- Installation flexibility owing to compact, vertical arrangement with minimal footprint; units can even be suspended when piping systems are sufficiently stable
- Excellent gas-handling capability due to segmental-type construction with open vane wheel impellers
- Superior process control resulting from a steep performance curve that allows precise regulation of the pressure with small changes in flow

SPECIFICATIONS

Flows to: 2 m^3/h (17 gpm)
Heads to: 27 m (88 ft)
Press. to: 6 bar (218 psi)
Temp: 100°C (212°F)



SIHI

SIDE CHANNEL

AKL and AKV

Horizontal (AKL) or vertical (AKV), single-stage, in-line side channel pumps used in pharmaceutical, food and beverage, air conditioning and refrigeration, chemical and petrochemical applications.

- Ease of maintenance due to an opposite-arranged suction and discharge cover that allows all parts subject to wear to be replaced without detaching the pumps from the piping system
- Cost-effective choice with low installation costs due to space-saving, light-weight, in-line design
- Low inventory carrying costs and simplified maintenance enabled by high degree of parts interchangeability between stages

SPECIFICATIONS

Flows to: 12 m^3/h (50 gpm)
Heads to: 70 m (230 ft)
Press. to: 16 bar (230 psi)
Temp: 120°C (250°F)

Refer to literature PS-120-1 at flowserve.com/library.

A Global Footprint for Local Support

Flowserve is committed to providing our customers with uncompromising support, wherever and whenever you need us. Our worldwide network of quick response centers staffed by highly skilled engineers and technicians is available around the clock, seven days a week to respond to your questions, evaluate and troubleshoot problems, and provide reliable long-term solutions.





KPH

VACUUM PUMPS & COMPRESSORS

Safe, dependable performance across a range of difficult compression applications is the hallmark of our portfolio of liquid ring vacuum pumps and compressors. Customers benefit from application flexibility that keeps operating costs down, taking advantage of a broad range of capacities and pressures, as well as numerous models that leverage common components. Trouble-free operation and maximum uptime are achieved through robust designs capable of handling entrained liquid and vapor.

Vacuum Pumps & Compressors – Quick Reference*

Product	Sub-Type	Suction Capacity to	Suction Pressure	Compression Pressure to
SIHI*dry*	Dry Vacuum Pump	1500 m³/h (900 cfm)	<0.01 mbar (<0.007 torr)	—
SIHI*boost*	Dry Vacuum Pump	8000 m³/h (4800 cfm)	<0.001 mbar (<0.0007 torr)	—
LEM and LEL	Liquid Ring Vacuum Pump	470 m³/h (276 cfm)	33 to 1013 mbar (24.7 to 760 torr)	—
LEH	Liquid Ring Vacuum Pump	5150 m³/h (3030 cfm)	33 to 1013 mbar (24.7 to 760 torr)	—
LPH	Liquid Ring Vacuum Pump	12 000 m³/h (7063 cfm)	33 to 1013 mbar (24.7 to 760 torr)	—
KPH	Liquid Ring Compressors	11 000 m³/h (6475 cfm)	—	atmospheric to 12 barg (174 psig)

* *Additional products shown on next page*

Vacuum Pumps & Compressors – Quick Reference, cont'd.

Product	Sub-Type	Suction Capacity to	Suction Pressure	Compression Pressure to
PL	Vacuum Systems	10 000 m^3/h (5886 cfm)	10^{-3} mbar ($7x10^{-4}$ torr) to atmospheric	—
PM	Membrane Systems	provided upon request	—	—
PK	Compressor Systems	10 000 m^3/h (5886 cfm)	—	atmospheric to 12 barg (174 psig)



SIHI

DRY VACUUM PUMP

SIHI*dry*

A completely dry running vertical twin-screw machine with no mechanical shaft seals. Designed for chemical, pharmaceutical, and industrial applications requiring uncontaminated vacuum, free from oil or service liquids.

- Lower life cycle cost made possible by dry operation, eliminating service liquids, lubrication and waste disposal costs
- Increased energy efficiency from intelligent drive system that performs ongoing rotor diagnostics while optimizing speed and pressure control
- Increased personnel safety enabled by low-noise, gearbox-free operation (all models), plus explosion-proof design for chemical and pharmaceutical models

SPECIFICATIONS

Suct. Cap. to: 1500 m^3/h (900 cfm)
Ult. Press. to: <0.01 mbar (<0.007 torr)

Refer to literature PS-110-4 and PS-110-5 at flowserve.com/library.



SIHI

DRY VACUUM PUMP

SIHI*boost*

Dual-stage vacuum systems that deliver deep vacuum with less power. Provides completely dry compression of gases from vacuum up to atmospheric conditions.

- Economical performance enabled by low power consumption and fast pump-down from atmosphere
- Lower maintenance costs and time from oil- and maintenance-free design with no gearbox, mechanical seals or other wearing parts
- Increased personnel safety and comfort due to low-noise operation

SPECIFICATIONS

Suct. Cap. to: 8000 m^3/h (4800 cfm)
Ult. Press. to: <0.001 mbar (<0.0007 torr)



SIHI

LIQUID RING VACUUM PUMP

LEM and LEL

Compact, single-stage liquid ring vacuum pumps featuring simple and robust construction. Typically used for handling and exhausting dry and humid gases as well as vapors and quantities of water carryover.

- Longer service life enabled by rotating parts with no metallic contact, oil/lubrication-free operation and efficient cavitation protection
- Ease of maintenance and reliable operation from integrated dirt and central drains, enabling reuse of service liquid
- Suitable for use in noise-sensitive environments due to very low noise levels and virtually vibration-free operation
- Environmental regulatory compliance assisted by non-polluting design with near-isothermal compression

SPECIFICATIONS

Suct. Cap. to: 470 m^3/h (276 cfm)
Suct. Press: 33 to 1013 mbar (24.7 to 760 torr)

VACUUM PUMPS & COMPRESSORS

LIQUID RING VACUUM PUMP

LEH

Single-stage liquid ring vacuum pump with a bare shaft design. Often applied in distilling and degassing operations in the chemical, pharmaceutical and plastics industries.



SIHI

- Easy maintenance and reliable operation with only one moving part and no internal lubrication required
- Increased personnel safety ensured by quiet, nearly vibration-free operation and liquid ring principle, ensuring the safest compression of hazardous and explosive vapors
- Broad application flexibility provided by ability to handle nearly all gases and vapors plus small quantities of entrained liquid

SPECIFICATIONS

Suct. Cap. to: 5150 m^3/h (3030 cfm)
Suct. Press: 33 to 1013 mbar (24.7 to 760 torr)

LIQUID RING VACUUM PUMP

LPH

One- or two-stage vacuum pumps for the handling and exhausting of dry and humid gases. Entrained liquid can be handled during normal duty.



SIHI

- Lower maintenance and more reliable operation thanks to standard O-ring sealing and oil-free design with no lubrication in working chamber
- Longer service life and minimized wear made possible by non-contacting parts, plus incorporated dirt and central drains
- Broad application versatility from wide range of available materials, including use as a compressor with little or no modification (depending on model)

SPECIFICATIONS

Suct. Cap. to: 12 000 m^3/h (7063 cfm)
Suct. Press: 33 to 1013 mbar (24.7 to 760 torr)

Refer to literature PS-110-1 at flowserve.com/library.

LIQUID RING COMPRESSOR

KPH

The KPH series offers efficient compression of condensable vapors and gases, using the liquid ring principle to ensure maximum safety when compressing hazardous mixtures. Single and multistage designs available.



SIHI

- Increased personnel safety from low-temperature rise of liquid ring principle, ensuring the safest compression of thermally sensitive, hazardous or explosive process gases
- Reduced electrical installation and operating costs provided by low starting torque
- Longer service life and reduced maintenance owing to non-contacting rotor design, which has only one moving part and does not require internal lubrication
- Increased flexibility in process applications made possible by ability to function at inlet pressures lower or higher than atmospheric pressure

SPECIFICATIONS

Suct. Cap. to: 11 000 m^3/h (6475 cfm)
Comp. Press: atmospheric to 12 barg (174 psig)

Refer to literature PS-110-2 at flowserve.com/library.

VACUUM SYSTEM

PL



SIHI

These tailor-made vacuum systems are individually designed for trouble-free operation in almost any application, including heavy-duty and critical applications.

- Plant and personnel safety in explosive atmospheres ensured by compliance with ATEX equipment directives and other explosion protection directives
- Broad application flexibility enabled by different pump sizes and design of multistage systems, including ejectors and roots blowers
- Design in accordance with European or American standards as well as customer specifications
- Lower maintenance costs and time owing to extremely robust, corrosion-resistant design

SPECIFICATIONS

Suct. Cap. to: 10 000 m^3/h (5886 cfm)
Suct. Press: 5 mbar (4 torr) to atmospheric

Refer to literature PS-110-3 at flowserve.com/library.

MEMBRANE SYSTEM

PM



SIHI

SIHI membrane technology efficiently separates process media from inert gas for recycling or recovery. The result is a very simple and highly effective means of pure substance recovery and emission control.

- Environmental regulatory compliance assured by membrane that allows recovery of desired element while clean inert gas passes freely to atmosphere
- Very long service life with minimal maintenance via simple, compact design requiring no regeneration
- Broad application versatility enabled by ability to process most solvents, monomers, esters, aldehydes, nitriles, aromatics or aqua
- Recovery rates up to 99%

SPECIFICATIONS

Suct. Cap. to: provided on request

For more information, refer to PS-110-3 and PS-110-6.

Refer to literature PS-110-3 and PS-110-6 at flowserve.com/library.

COMPRESSOR SYSTEM

PK



SIHI

Dependable compression makes this liquid-ring technology invaluable, even for the fiercest or thermally unstable processes.

- Plant and personnel safety in explosive atmospheres ensured by compliance with ATEX equipment directives
- Lower maintenance costs and time enabled by extremely robust, corrosion-resistant design
- Economical performance and longer service life from superior liquid, vapor and solids handling, plus effective heat exchanger

SPECIFICATIONS

Suct. Cap. to: 10 000 m^3/h (5886 cfm)
Suct. Press: atmospheric to 12 barg (174 psig)

Refer to literature PS-110-3 at flowserve.com/library.



N-Seal

SPECIALTY PRODUCTS

When customers need absolute reliability in specialty applications, they draw on our proven engineering and development capabilities. Our reputation for reliability is exemplified by a nuclear heritage that features ASME Section III, Class 1 products performing reliably in primary coolant and other essential applications globally. Energy recovery devices save desalination plants millions of dollars in operating costs. And, our proprietary systems control critical reactions and processes in refineries around the world.

Specialty Products – Quick Reference*

Product	Sub-Type	Flows to	Heads to	Pressures to	Temperatures
N-Seal	Nuclear Primary Pump Seals	—	—	150 bar (2175 psi)	—
DFSS and DVSS	Nuclear	24 500 m³/h (108 000 gpm)	250 m (820 ft)	170 bar (2500 psi)	to 300°C (580°F)
WDF	Nuclear	900 m³/h (4000 gpm)	245 m 800 ft)	41 bar (600 psi)	to 205°C (400°F)
CN	Nuclear	5100 m³/h (22 500 gpm)	750 m (2460 ft)	120 bar (1740 psi)	to 206°C (402°F)
CA	Nuclear	5225 m³/h (23 000 gpm)	4300 m (14 000 ft)	517 bar (7500 psi)	to 250°C (480°F)
RLIJ	Nuclear	109 m³/h (480 gpm)	1270 m (4160 ft)	151 bar (2200 psi)	to 250°C (480°F)

** Additional products shown on next page*

Specialty Products – Quick Reference, cont'd.

Product	Sub-Type	Flows to	Heads to	Pressures to	Temperatures
CAM	Nuclear	60 m^3/h (265 gpm)	1920 m (6300 ft)	200 bar (3000 psi)	to 120°C (250°F)
EG	Nuclear	4000 m^3/h (17 610 gpm)	60 m (200 ft)	14 bar (200 psi)	to 80°C (180°F)
MEV	Nuclear	5400 m^3/h (23 760 gpm)	50 m (160 ft)	14 bar (200 psi)	to 80°C (180°F)
LBSZ	Nuclear	400 m^3/h (235 cfm)	—	—	to 100°C (212°F)
KBSZ	Nuclear	250 m^3/h (147 cfm)	—	—	to 100°C (212°F)
KSCZ	Nuclear	650 m^3/h (2860 gpm)	350 m (1250 ft)	80 bar (1160 psi)	to 180°C (356°F)
Hydraulic Decoking Systems	Hydraulic Decoking Systems	—	—	—	—
ERT	Energy Recovery Device	1200 m^3/h (5280 gpm)	—	80 bar (1160 psi)	—
DWEER™	Energy Recovery Device	350 m^3/h (1.4 mgd) per unit	—	82 bar (1200 psi)	—
CVP	Concrete Volute	200 000 m^3/h (880 000 gpm)	60 m (197 ft); custom designs to 90 m (295 ft)	—	—
AFH9500	Polyolefin Reactor	18 180 m^3/h (80 000 gpm)	40 m (131 ft)	100 bar (1450 psi)	-45°C to 349°C (-49°F to 660°F)

NUCLEAR PRIMARY PUMP SEALS

N-Seal



Flowserve

The N-Seal primary pump seal is the nuclear industry's most advanced mechanical seal technology. Developed for all OEM reactor coolant, heat transport and recirculation pumps, it is found in NPPs around the world.

- Increased safety assured by a two- to four-stage redundant design wherein each stage is capable of handling 100% of the system pressure
- Low conversion costs, since piping and instrumentation modifications are seldom required and Design Change Package (DCP) costs are minimized
- Dramatically improved reliability and running periods with hydrodynamic seal faces with variable face topography
- Improved safety with available proprietary Abeyance Seal, a passive backup seal for loss of coolant scenarios

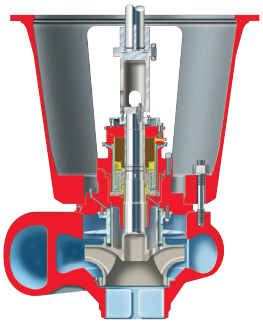
SPECIFICATIONS

Press. to: 150 bar (2175 psi)

Refer to literature PS-80-2 and FPD-2 at flowserve.com/library.

NUCLEAR

DFSS and DVSS



Byron Jackson

These ASME Section III, Class 1, radially split, single-stage pumps are designed for primary coolant, reactor recirculation and primary heat transport service in BWR, PWR and PHWR plants.

- Highly reliable one-piece pump casing features a double-volute design for BWR and PHWR applications and a diffuser with a torus-type casing for PWR service
- Increased uptime with upgraded rotating element that uses a one-piece welded shaft-impeller-journal assembly
- Improved safety with hydrostatic-pressurized radial bearing that operates submerged in radioactive system water with no external source of cooling water
- Extensive licensed and certified aftermarket support network, including hot shop and code Class 1, 2 and 3 support

SPECIFICATIONS

Flows to: 24 500 m^3/h (108 000 gpm)
Heads to: 250 m (820 ft)
Press. to: 170 bar (2500 psi)
Temp: to 300°C (580°F)

Refer to literature FPD-2 at flowserve.com/library.

NUCLEAR

WDF



IDP

Safe and reliable single-stage, diffuser-style pump for residual heat removal applications in nuclear power stations. Built to ASME Section III, it meets the requirements of advanced pressurized water reactors.

- Ease of maintenance resulting from a removable four-piece spacer coupling that allows easy access to the bearing and mechanical seal
- Extended seal and bearing life ensured by a heavy-duty motor support head that dampens vibration
- Reliability due to a cartridge-type, single mechanical seal with integral disaster bushing plus tungsten carbide and carbon seal faces
- Reduced maintenance costs through a robust rotor with a large shaft diameter and tapered fit at the coupling hub to reduce deflection and vibration

SPECIFICATIONS

Flows to: 900 m^3/h (4000 gpm)
Heads to: 245 m (800 ft)
Press. to: 41 bar (600 psi)
Temp: to 205°C (400°F)

Refer to literature PS-80-5 at flowserve.com/library.

SPECIALTY PRODUCTS

Increase Production With the IOT

Flowserve is helping clients achieve step-change increases in production by applying industrial internet principles, technologies and related reliability services to pumps and rotating equipment. By developing scalable systems that capture and make sense of equipment data, Flowserve can offer a practical and economical solution for predictive versus reactive maintenance.



NUCLEAR

CN



IDP

Radially split, single-stage, double-suction, high-speed pump that features a rugged diffuser-style barrel design engineered to meet ASME Section IV Division 1 requirements for commercial nuclear power plants.

- Ease of maintenance facilitated by replaceable casing wear rings that enable running clearances to be renewed easily
- Lower operating costs provided by precision-cast chrome steel impellers, which ensure hydraulic efficiency and performance repeatability
- Reduced downtime facilitated by 416 stainless steel shaft, which is ground in steps to minimize stresses and stress relieved in the vertical position to prevent warping

SPECIFICATIONS

Flows to: 5100 m^3/h (22 500 gpm)
Heads to: 750 m (2460 ft)
Press. to: 120 bar (1740 psi)
Temp: to 206°C (402°F)

Refer to literature PS-80-4 at flowserve.com/library.

NUCLEAR

CA



IDP

Radially split, between-bearing, multistage barrel pump designed to comply with ASME Section III Class 2 and 3 for nuclear safety injection and emergency feedwater service.

- Increased MTBR with precision-cast diffusers, which minimize bearing spans
- Increased reliability provided by serrated impeller running fits that reduce effects of rotor contact during system upsets or turning gear operation
- Ease of maintenance provided by casing rings that enable running clearances to be renewed easily
- Installation flexibility owing to suction and discharge connections that can be on the top or bottom of the barrel with flanged or weld-end designs

SPECIFICATIONS

Flows to: 5225 m^3/h (23 000 gpm)
Heads to: 4300 m (14 000 ft)
Press. to: 517 bar (7500 psi)
Temp: to 250°C (480°F)

Refer to literature PS-30-13 at flowserve.com/library.

NUCLEAR

RLIJ

Reliable nuclear pump designed to handle low-flow and high-speed operations, frequent starts and stops, and operating upsets for prolonged pump life.



Pacific

- Increased uptime provided by metal-to-metal discharge head and bearing housing, which provide improved rigidity for enhanced rotor and stator internal alignment
- Longer service life via high-strength CA625 shafting, which offers higher endurance limits, increased ductility and improved corrosion resistance
- Lower operating costs with optimized impellers and diffusers, which provide hydraulic efficiency and reduce power consumption
- Ease of installation and maintenance made possible by optional PTO cartridge seal, an integral sleeve and pumping ring for enhanced self-aligning capabilities

SPECIFICATIONS

Flows to: 109 m^3/h (480 gpm)
Heads to: 1270 m (4160 ft)
Press. to: 51 bar (2200 psi)
Temp: to 250°C (480°F)

Refer to literature PS-80-1 at flowserve.com/library.

NUCLEAR

CAM

Double-casing, multistage diffuser pump for PWR chemical and volume control charging or BWR control rod drive applications. Can be supplied in compliance with ASME Section III, Class 3 or RCC-M where required.



IDP

- Improved low-flow stability and reliability across a wide range of flows via modular impeller design that limits surging and pulsations
- Lower operating costs from ball-ball bearing arrangement that doesn't require external, force-fed lube oiling system or cooling
- Reduced maintenance requirements enabled by dry disk spacer coupling that facilitates component servicing

SPECIFICATIONS

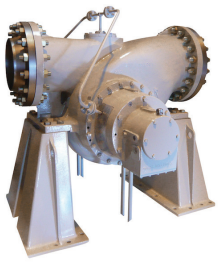
Flows to: 60 m^3/h (265 gpm)
Heads to: 1920 m (6300 ft)
Press. to: 200 bar (3000 psi)
Temp: to 120°C (250°F)

Refer to literature PS-80-6 at flowserve.com/library.

NUCLEAR

EG

Reliable single-stage, double-suction, radially split case, heavy-duty process pump specifically designed for component cooling water service in nuclear power plants. Conforms to ASME Section III, Class 3 and RCC-M.



IDP

- Equal thermal expansion enabled by centerline mounted design
- Exceeds piping requirement by twofold via suction and discharge flange connections in the top portion of the pump case
- Reduced NPSHR over the operating range of the pump through double-suction impeller design
- Lower maintenance costs with standard cartridge seals and a radially split casing, which allows access without having to disconnect suction and a discharge piping

SPECIFICATIONS

Flows to: 4000 m^3/h (17 610 gpm)
Heads to: 60 m (200 ft)
Press. to: 14 bar (200 psi)
Temp: to 80°C (180°F)

Refer to literature FPD-2 at flowserve.com/library.

SPECIALTY PRODUCTS



Flowserve

NUCLEAR

MEV

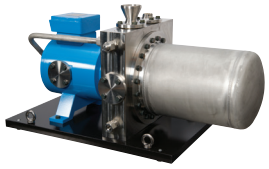
Bottom-suction, side-discharge vertical pump equipped with a mechanical seal and grease-lubricated bearings for use in water services in nuclear power plants. Conforms to ASME Section III, Class 3 and RCC-M.

- Extended service life from roller guide bearing above the seal design that minimizes motor vibration to the seal
- Functional qualifications per bottom-suction and side-discharge connections designed to meet specified piping requirements
- Lower maintenance costs via spacer coupling that facilitates bearing and seal replacement without removal of motor

SPECIFICATIONS

Flows to: 5400 m^3/h (23 760 gpm)
Heads to: 50 m (160 ft)
Press. to: 14 bar (200 psi)
Temp: to 80°C (180°F)

Refer to literature FPD-2 at flowserve.com/library.



SIHI

NUCLEAR

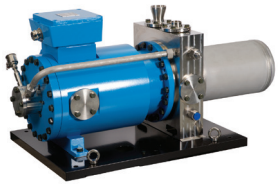
LBSZ

Sealless liquid ring vacuum systems with canned motors engineered for degassing of water within the primary loop of the reactor.

- Environmental and regulatory compliance and personnel safety ensured by the leak-free canned design guaranteed to 10^{-6} mbar/l/sec
- Extended uptime via extremely robust suction and discharge casing constructed from forged steel and designed to meet highest seismic requirements
- Reliable performance facilitated by long MTBF, which includes no oscillating parts, non-contacting parts and no axial thrust

SPECIFICATIONS

Flows to: 400 m^3/h (235 cfm)
Suct. Press. to: 125 mbar (94 torr) to atmosphere
Des. Press. to: 12 bar (174 psi)
Temp: to 100°C (212°F)



SIHI

NUCLEAR

KBSZ

Sealless liquid ring compressor systems with canned motors designed to extract waste radioactive gas from a nuclear island and deliver it to a treatment system.

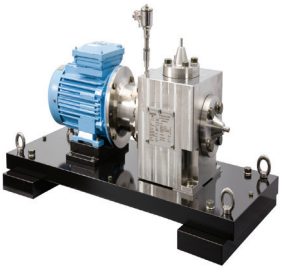
- Environmental and regulatory compliance and personnel safety ensured by the leak-free canned design guaranteed to 10^{-6} mbar/l/sec
- Extended uptime via extremely robust suction and discharge casing constructed from forged steel and designed to meet highest seismic requirements
- Reliable performance facilitated by long MTBF, which includes no oscillating parts, non-contacting parts and no axial thrust

SPECIFICATIONS

Flows to: 250 m^3/h (147 cfm)
Comp. Press. to: 8 bar (116 psi)
Des. Press. to: 30 bar (435 psi)
Temp: to 100°C (212°F)

NUCLEAR

KSCZ



SIHI

Sealless liquid systems with side channel or centrifugal hydraulics in canned motor or magnetic coupling design used for different applications in nuclear power plants.

- Environmental and regulatory compliance and personnel safety ensured by the leak-free canned design guaranteed to 10^{-6} mbar/l/sec
- Extended uptime via extremely robust suction and discharge casing constructed from forged steel and designed to meet highest seismic requirements
- Reliable performance facilitated by long MTBF, which includes no oscillating parts, non-contacting parts and no axial thrust

SPECIFICATIONS

Flows to: 650 m^3/h (2860 gpm)
Heads to: 350 m (1250 ft)
Press. to: 80 bar (1160 psi)
Temp: to 180°C (356°F)

Profit From Our Expertise

Flowserve pump training programs help plant operators, reliability specialists, engineers and maintenance personnel deepen their understanding of pumping systems. Attendees learn how to maximize plant availability, improve pump reliability and increase mean time between repair, all of which positively impact the bottom line. Courses are available at our global network of Learning Resource Centers, online and even on-site. **Get details at www.pumptraining.com.**



HYDRAULIC DECOKING SYSTEMS

Hydraulic Decoking Systems



Flowserve

Installed in more than 95% of the world's DCUs, Flowserve hydraulic decoking systems are the world's most advanced. They provide refiners with maximized unit output, increased unit reliability and unparalleled personnel safety.

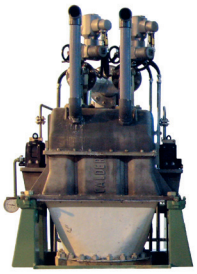
- Increased unit capacity and efficiency with automated hydraulic decoking systems that include virtually all equipment needed to operate and control the process
- Significantly improved operator safety with remote and automated system options, including AutoShift™ combination cutting tool, cutting tool enclosure, fully integrated instrumentation feedback and coke drum monitoring
- Increased unit uptime with online assurance programs that enable experts to monitor, diagnose and communicate operating solutions in real time
- Access to extensive aftermarket support

MAJOR SYSTEMS

- ISO 13709/API 610 (BB5) jet pumptrain
- Coke cutting system
- Automation, controls and instrumentation

Refer to literature PS-90-6 and PS-90-22 at flowserve.com/library.

SPECIALTY PRODUCTS



Calder™

ENERGY RECOVERY DEVICE

ERT

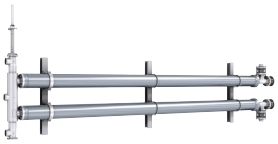
Highly efficient and reliable, Calder energy recovery turbines (ERT) are installed in nearly 1000 seawater and brackish water reverse osmosis plants worldwide, with a total installed capacity in excess of 350 MW.

- Highly efficient energy recovery over a wide range of operating pressures due to flat efficiency curve
- Repeatable performance due to adjustable nozzle assembly that allows the original operating conditions to be re-established quickly
- Reduced downtime enabled by horizontal split-case design, which provides easy access for rotor inspection without disturbing alignment
- Installation ease with standard ANSI discharge; DIN flange discharge available
- Corrosion-resistant, super duplex stainless steel or FRP construction for long life

SPECIFICATIONS

Brine Flows to: 1200 m^3/h (5280 gpm)
Efficiency: to 90%
Pressure to: 80 bar (1160 psi)

Refer to literature FPD-18 at flowserve.com/library.



Calder

ENERGY RECOVERY DEVICE

DWEER

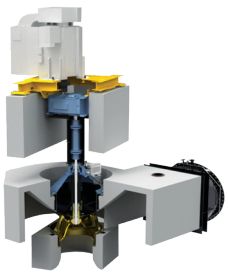
The Dual Work Exchanger Energy Recovery (DWEER) is the most efficient energy recovery technology available today. No other technology achieves higher efficiency or lower SWRO plant operating costs.

- Unmatched operational flexibility resulting from a robust isobaric design that tolerates fluctuations in flow and pressure with no loss of performance
- Precise control of the energy transfer mechanism due to the LinX™ valve
- Reduced construction costs, as the DWEER uses only a basic header design, plus its footprint and associated piping runs are easily optimized for the site
- Lower operating costs, since special flushing procedures, strainers or filtration systems are not needed
- Quiet operation so noise hoods or enclosures are not needed

SPECIFICATIONS

Brine Flows to: 350 m^3/h (1.4 MGD) per unit
Efficiency: to 98%
Pressures: 82 bar (1200 psi)

Refer to literature FPD-18 at flowserve.com/library.



Flowserve

CONCRETE VOLUTE

CVP (BSV and BCV)

Made of prefabricated concrete segments for the volute housing and intake suction bell, CVP pumps are used in a variety of high-capacity water applications in water resources, power generation and desalination.

- Reduced total lifecycle costs with concrete construction, which substantially reduces vibration and maintenance
- Significantly lower construction time and costs due to compact, prefabricated elements that reduce excavation work as compared to wet-pit pumps
- Easy inspection access through manholes; no dismantling necessary
- Efficient vortex-free operation with no dead water areas or sand deposits
- Corrosion-resistant concrete construction with the impeller, wear ring and cover being the only metallic wetted components

SPECIFICATIONS

Flows to: 200 000 m^3/h (880 000 gpm)
Heads to: 60 m (197 ft); custom designs to 90 m (295 ft)

Refer to literature FPD-18 at flowserve.com/library.



Lawrence Pumps

POLYOLEFIN REACTOR

AFH9500

Developed specifically for loop reactor circulation, the AFH9500 high-pressure axial flow pump delivers increased plant productivity, earning it a well-earned reputation as the industry's preferred pump for polyolefin production.

- Superior process control provided by propellers engineered with steep pump head curves to ensure performance requirements are met
- Unspared pump reliability ensured by conservatively engineered bearing system plus high-pressure elbow casing designed, fabricated and tested per ASME Boiler and Pressure Vessel Code, Section VIII, Division 1 and applicable international standards
- Added safety and uptime with standard triple-seal arrangement and API Plan 32/53C/52 seal support system

SPECIFICATIONS

Flows to: 18 180 m^3/h (80 000 gpm)
Heads to: 40 m (131 ft)
Press. to: 100 bar (1450 psi)
Temp: -45°C to 349°C
(-49°F to 660°F)

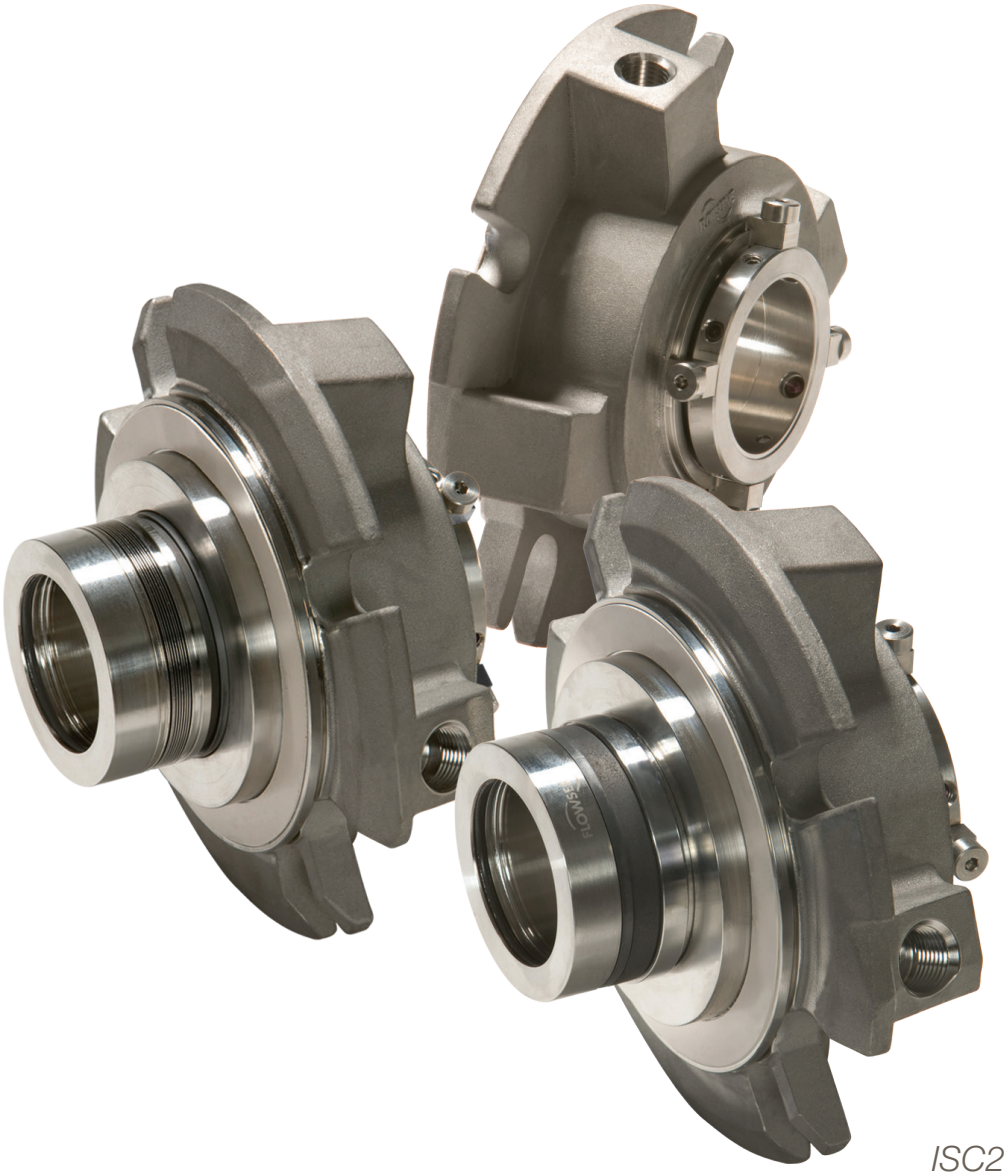
Refer to literature PS-90-23 at flowserve.com/library.


FLOWSERVE
GASPAC
buffergas toevoer 1.25 BAR a
instelwaarde =50 nl/min
buffergas toevoer 1.25 BAR a
instelwaarde =50NL/min
buffergas toevoer 1.05 BAR a
instelwaarde =40 nl/min
KROHNE
PDS-C501-21
PT-C501-20

SEALS

The applications just keep getting tougher. Higher pressures and temperatures. Highly corrosive and erosive fluids. But Flowserve continues to redefine the way mechanical seals operate by developing some of the most advanced seal modeling, design, and manufacturing capabilities in the world. These pioneering techniques have led to sophisticated seal face topographies and innovative microfeatures that can be designed to boost your bottom line by enhancing fluid film, creating lift, reducing friction, minimizing emissions, and reducing wear. All of this makes Flowserve seals the industry's top choice for the most demanding environments. The success of your application isn't just about seal design. It also depends on selecting the right model, design options, materials, arrangements, and piping plans. Flowserve engineers make sure you have the most appropriate seal and sealing system to ensure high reliability, long life and low total cost of ownership.

Standard Cartridge 86
Pusher 90
Metal Bellows 98
Mixer 104
Compressor Seals and Systems 108
Slurry 114
Gas Barrier and Containment 118
OEM and Special Duty 122
Seal Support Systems. 128
Accessories 134



ISC2 Series

STANDARD CARTRIDGE

Nonstop operation. Off-design operation. Frequent stops and starts. No matter how hard you run your system, Flowserve ISC2 standard cartridge seals are up to the task. They're versatile enough to support hundreds of pump models from global manufacturers while meeting all international standards (ASME, DIN, ISO, JIS, and others). You'll also keep costs low with easy installation, less inventory, greater flexibility, less downtime and longer service life.

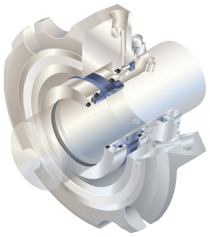
Standard Cartridge – Quick Reference

Product	Sub-Type	Pressures to	Temperatures	Speeds to	Sizes
ISC2	Industrial Process	20.6 bar (300 psi)	-40°C to 204°C (-40°F to 400°F)	23 m/s (75 fps)	25 to 200 mm (1.000 to 8.000 in)
ISC2-682	API Process	20.6 bar (300 psi)	-40°C to 204°C (-40°F to 400°F)	23 m/s (75 fps)	25 to 200 mm (1.000 to 8.000 in)
ISC2-MW	Mixer Equipment	6.9 bar (100 psi)	-40°C to 204°C (-40°F to 400°F)	1.1 m/s (3.5 fps)	25 to 200 mm (1.000 to 8.000 in)

STANDARD CARTRIDGE

INDUSTRIAL PROCESS

ISC2



The ISC2 Series provides exceptional reliability and standardization over a wide variety of industrial applications and equipment. Available in single and dual arrangement, pusher and metal bellows types.

- Lower total cost of ownership from advanced seal design features that enable superior reliability
- Broad application flexibility assured by comprehensive range of pre-engineered configurations and materials; custom solutions also available
- Reduced operating costs via standardization to ISC2 Series, which enables less inventory, greater flexibility, less downtime and longer seal life
- Increased plant and personnel safety delivered by cartridge security and compliance with all major international standards

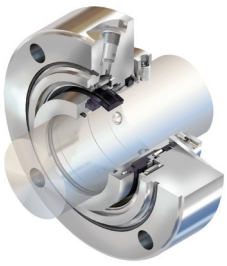
SPECIFICATIONS

Press: pusher to 20.6 bar (300 psi);
bellows to 13.8 bar (200 psi)
Temp: -40°C to 204°C (-40°F to 400°F)
Speeds to: 23 m/s (75 fps)
Sizes: pusher 25 to 200 mm
(1.000 to 8.000 in);
bellows to 95 mm (3.750 in)

Refer to literature FSD243
at flowserve.com/library.

API PROCESS

ISC2-682



The ISC2-682 Series is the versatile ISC2 family of pusher and metal bellows seals engineered to fully comply with the design and qualification requirements of API 682.

- Compliance with the sealing industry's most comprehensive best practices standard assured by machined from bar stock glands, captured gland O-ring and thick sleeves
- API 682 Category 2 met by adding multiport flush and floating throttle bushing
- Application flexibility assured by designs configurable as either Type A pusher seal or Type B metal bellows seal in Arrangements 1, 2 and 3
- Ideally suited for ASME B73.1 pumps and light-duty API 610 pumps within plants that adopt the API 682 standard

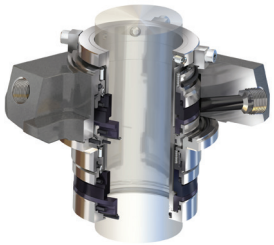
SPECIFICATIONS

Press: pusher to 20.6 bar (300 psi);
bellows to 13.8 bar (200 psi)
Temp: -40°C to 204°C (-40°F to 400°F)
Speeds to: 23 m/s (75 fps)
Sizes: pusher 25 to 200 mm
(1.000 to 8.000 in);
bellows to 95 mm (3.750 in)

Refer to literature FSD237
at flowserve.com/library.

MIXER EQUIPMENT

ISC2-MW



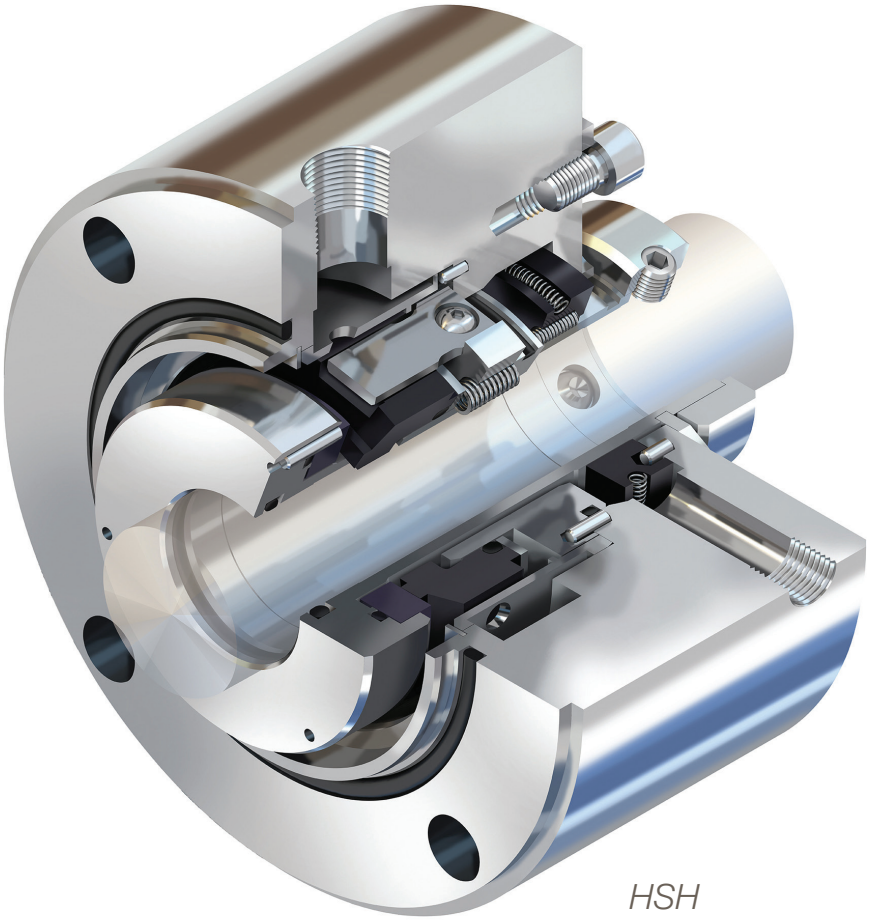
The ISC2-MW is a dual arrangement, standard cartridge pusher seal engineered for reliable, cost-effective operation in mixer service.

- Reduced installation and maintenance costs assured by economical cartridge seal designed for top- entry installation
- Increased uptime resulting from volute groove, which significantly increases barrier fluid flow to promote cool running, even at mixer speeds
- Reliable operation ensured by ISC2 thermal management technology that allows the seal to run cooler and tolerate dry-running events

SPECIFICATIONS

Press. to: 6.9 bar (100 psi)
Temp: -40°C to 204°C (-40°F to 400°F)
Speeds to: 1.1 m/s (3.5 fps)
Sizes: 25 to 200 mm
(1.000 to 8.000 in)

Refer to literature FSD104
at flowserve.com/library.



HSH

PUSHER

Popular for their cost-effective versatility, you'll find Flowserve pusher seals in a wide variety of applications and industries. From general services and light hydrocarbons to high-pressure and high-speed applications, Flowserve pusher seals provide the extended reliability and rugged durability you can count on. Even after years of operation, Flowserve pusher seals have a proven reputation for easy repairs that return them to service quickly.

Pusher – Quick Reference*

Product	Sub-Type	Pressures to	Temperatures	Speeds to	Sizes
ISC2-PX,ISC2–XP, ISC2-682PX and ISC2-682XP	Industrial Process	20.6 bar (300 psi)	-40°C to 204°C (-40°F to 400°F)	23 m/s (75 fps)	25 to 200 mm (1.000 to 8.000 in)
ISC2-PP and ISC2-682PP	Industrial Process	20.6 bar (300 psi)	-40°C to 204°C (-40°F to 400°F)	23 m/s (75 fps)	25 to 200 mm (1.000 to 8.000 in)
QB, QBS and QBU	Industrial Process	51.7 bar (750 psi)	-40°C to 204°C (-40°F to 400°F)	23 m/s (75 fps)	12.7 to 139.7 mm (0.500 to 5.500 in)
UC and UCQ	Industrial Process	27.6 bar (400 psi)	-40°C to 204°C (-40°F to 400°F)	23 m/s (75 fps)	14.1 to 148 mm (0.566 to 5.838 in)
RO	Industrial Process	20.7 bar (300 psi)	-40°C to 260°C (-40°F to 500°F)	23 m/s (75 fps)	9.5 to 115 mm (0.375 to 4.500 in)
CRO	Industrial Process	20.7 bar (300 psi)	-40°C to 260°C (-40°F to 500°F)	23 m/s (75 fps)	9.5 to 115 mm (0.375 to 4.500 in)
Europac Series	Industrial Process	25 bar (360 psi)	-40°C to 220°C (-40°F to 430°F)	23 m/s (75 fps)	10 to 100 mm (0.394 to 3.940 in)
RA and RA-C	Industrial Process	27.6 bar (400 psi)	-40°C to 177°C (-40°F to 350°F)	23 m/s (75 fps)	13 to 127 mm (0.500 to 5.000 in)

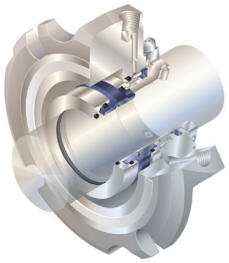
** Additional products shown on next page*

Pusher – Quick Reference, cont'd.

Product	Sub-Type	Pressures to	Temperatures	Speeds to	Sizes
QBQ and QBQ LZ	API Process	51.7 bar (750 psi)	-40°C to 204°C (-40°F to 400°F)	23 m/s (75 fps)	12.7 to 139.7 mm (0.500 to 5.500 in)
QBB and QB2B	API Process	51.7 bar (750 psi)	-40°C to 204°C (-40°F to 400°F)	23 m/s (75 fps)	20 to 121 mm (0.787 to 4.750 in)
HSH	API Process	103 bar (1500 psi)	-40°C to 260°C (-40°F to 500°F)	46 m/s (150 fps)	25.4 to 156 mm (1.000 to 6.125 in)
UO and UOP	Pipeline Process	103.4 bar (1500 psi)	-40°C to 204°C (-40°F to 400°F)	23 m/s (75 fps)	14.1 to 148 mm (0.566 to 5.838 in)
D and DP	High-Energy Process	103.4 bar (1500 psi)	-73°C to 343°C (-100°F to 650°F)	23 m/s (75 fps)	13.4 to 137 mm (0.525 to 5.400 in)
UHTW and DHTW	High-Energy Process	207 bar (3000 psi)	-40°C to 371°C (-40°F to 700°F)	76 m/s (250 fps)	25.4 to 228.6 mm (1.000 to 9.000 in)

INDUSTRIAL PROCESS

ISC2-PX, ISC2–XP, ISC2-682PX and ISC2-682XP



The ISC2-PX single cartridge pusher seal brings superior reliability to ASME, ISO and JIS pumps used in chemical, power, water, pulp and paper, and general industries. ISC2-682 versions provide full API 682 compliance.

- Increased reliability with thermal management technology that runs cooler in suboptimal conditions such as short-term dry running events
- Longer service life enabled by corrosion-resistant design and drive mechanisms that reduce wear in high-vibration applications
- Comprehensive range of pre-engineered configurations with standard flush (PX), Plan 23 cooling (XP); custom solutions available
- Increased safety delivered by throttle bushing with standard quench and drain for safe containment in the unlikely event of seal failure

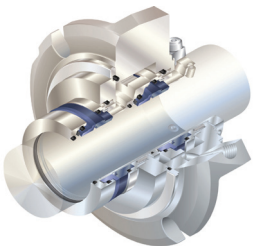
SPECIFICATIONS

Press. to: 20.6 bar (300 psi)
Temp: -40°C to 204°C (-40°F to 400°F)
Speeds to: 23 m/s (75 fps)
Sizes: 25 to 200 mm (1.000 to 8.000 in)

Refer to literature FSD243 at flowserve.com/library.

INDUSTRIAL PROCESS

ISC2-PP and ISC2-682PP



These dual cartridge pusher seals from the versatile ISC2 Series bring superior reliability to ASME, ISO, JIS and API pumps used in chemical, power, water, oil and gas, and other industries.

- Reliable operation resulting from advanced volute groove design and internal circulating devices that promote cool running
- Longer service life via a stationary face support drive mechanism that reduces wear in applications with high vibration levels, and springs and pins outside the process for reduced corrosion and clogging
- Application flexibility with double-balanced seal face geometry, allowing both pressurized and unpressurized operation; ISC2-682PP provides full API 682 compliance

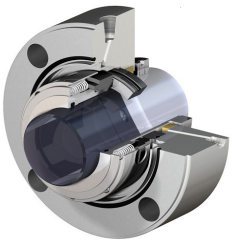
SPECIFICATIONS

Press. to: 20.6 bar (300 psi)
Temp: -40°C to 204°C (-40°F to 400°F)
Speeds to: 23 m/s (75 fps)
Sizes: 25 to 200 mm (1.000 to 8.000 in)

Refer to literature FSD243 at flowserve.com/library.

INDUSTRIAL PROCESS

QB, QBS and QBU



QB Series balanced pusher seals are ideal for medium-duty applications in power and industrial applications.

- Greater reliability and installation ease assured by rugged components, heavy-duty seal faces and cartridge seal configuration
- Combat dirty services with the clog-resistant large cross-section, single coil spring in the QBS seal
- Handle low lubricity hot water without the need for auxiliary cooling systems with the QBU seal
- Choice of throttle bushing design: fixed, floating or segmented for safe equipment operation

SPECIFICATIONS

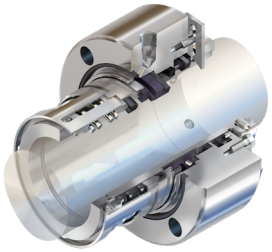
Press. to: 51.7 bar (750 psi)
Temp: -40°C to 204°C (-40°F to 400°F)
Speeds to: 23 m/s (75 fps)
Sizes: 12.7 to 139.7 mm (0.500 to 5.500 in)

Refer to literature FSD152 at flowserve.com/library.

PUSHER

INDUSTRIAL PROCESS

UC and UCQ



The UC Series is a balanced pusher seal with a substantial single coil spring that provides exceptional performance in refinery, pipeline and petrochemical services.

- Extended service life in heavy-duty applications assured by rugged single pusher seal with thick cross-section components
- Increased reliability via large, low spring rate single coil spring that tolerates axial setting dimensions while reducing opportunity for clogging and hang-up from solids
- Consistent seal face contact provided by robust U-cup seal and spring holder
- Low-emissions performance enabled by silicon carbide rotating face mounted on graphite ring, preventing shrink fit distortions and sustaining a flat seal face

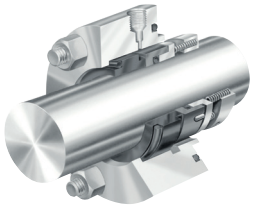
SPECIFICATIONS

Press. to: 27.6 bar (400 psi)
Temp: -40°C to 204°C (-40°F to 400°F)
Speeds to: 23 m/s (75 fps)
Sizes: 14.1 to 148 mm
(0.566 to 5.838 in)

Refer to literature FSD110
at flowserve.com/library.

INDUSTRIAL PROCESS

RO



This single, unbalanced, multi-spring component seal is usable as an inside or outside mounted seal. Suitable for abrasive, corrosive and viscous fluids in chemical services.

- Increased durability from robust rotating spring compression unit that helps to keep solids away from the seal faces and removes seal-generated heat
- Improved reliability with rotating seal ring that is independently centered on the shaft and has multiple springs and drive pins that evenly distribute the load
- Broad application flexibility enabled by completely interchangeable shaft packing materials, dimensionally interchangeable insert mounting, and compression unit availability in any machinable metallurgy

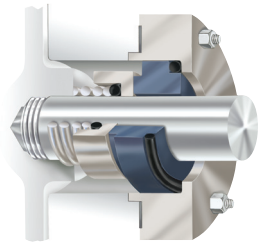
SPECIFICATIONS

Press. to: 20.7 bar (300 psi)
Temp: -40°C to 260°C (-40°F to 500°F)
Speeds to: 23 m/s (75 fps)
Sizes: 9.5 to 115 mm
(0.375 to 4.500 in)

Refer to literature FSD155
at flowserve.com/library.

INDUSTRIAL PROCESS

CRO



The CRO is an economical, single-coil spring, friction drive component seal for use in pumps with packing box seal chambers. Available in single or dual arrangements.

- Longer service life derived from rotating seal ring that self-centers around the shaft and withstands the harsh demands of cyclic operation or continuous duty
- Increased durability from robust single-coil spring that resists clogging and chemical attack
- Simplified installation and improved corrosion resistance due to a design with a minimum number of seal components with heavy cross-sections

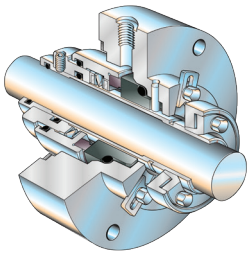
SPECIFICATIONS

Press. to: 20.7 bar (300 psi)
Temp: -40°C to 260°C (-40°F to 500°F)
Speeds to: 23 m/s (75 fps)
Sizes: 9.5 to 115 mm
(0.375 to 4.500 in)

Refer to literature FSD169
at flowserve.com/library.

INDUSTRIAL PROCESS

Europac Series



Europac single, wavy spring seals are designed for ISO pumps in a wide range of duties in chemical and general industries. Designed according to metric DIN EN 12 756 standard to L1k.

- Longer service life assured by rigid, corrosion-resistant retainer with or without integrated pumping thread
- Increased reliability delivered by X-spring with anti-axial displacement and rigid PTFE or elastomers for secondary sealing
- Broad application versatility provided by multiple arrangements, including standard design (600), balanced stepped shaft (610) and hot water services without cooling (615)

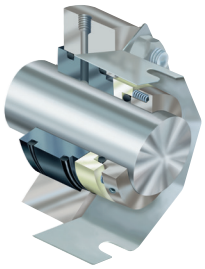
SPECIFICATIONS

Press. to: 25 bar (360 psi)
Temp: -40°C to 220°C (-40°F to 430°F)
Speeds to: 23 m/s (75 fps)
Sizes: 10 to 100 mm
(0.394 to 3.940 in)

Refer to literature FSD128
at flowserve.com/library.

INDUSTRIAL PROCESS

RA and RA-C



With its composite rotor, the RA single outside-mounted component seal is a cost-effective solution for highly corrosive chemical services. Suitable for metallic and nonmetallic equipment, such as plastic, glass and lined designs.

- Installation ease with design that attaches to the outside of the seal chamber
- Corrosive application performance and flexibility provided by seal faces and elastomers in diverse materials, plus non-wetted drive collar, springs and drive pins on the RA-C configuration to avoid the need for expensive alloys
- Greater reliability assured by flexible rotor design, hydraulically balanced to provide proper face loading
- Better process control via double O-ring mounted stator that prevents distortion

SPECIFICATIONS

Press. to: 27.6 bar (400 psi)
Temp: -40°C to 177°C (-40°F to 350°F)
Speeds to: 23 m/s (75 fps)
Sizes: 13 to 127 mm
(0.500 to 5.000 in)

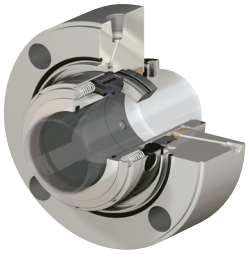
Refer to literature FSD170
at flowserve.com/library.

Learn to Visually Identify Seal Failures

Troubleshoot seal failures with the Flowserve Seal Failure Analysis app. This tool is an invaluable resource for maintenance personnel and reliability engineers tasked with maximizing equipment uptime. You'll learn the tell-tale signs for visually identifying more than 60 seal failure modes plus typical causes and options for prevention. You can also get a second opinion from a Flowserve seal expert, locate nearby Quick Response Centers, access handy reference materials and watch seal-related videos.
Find it at www.sealfailureapp.com.



PUSHER



API PROCESS

QBQ and QBQ LZ

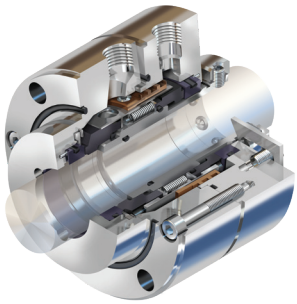
This medium- to high-pressure seal features a high balance face that meets the lowest light hydrocarbon emissions level: less than 500 ppm. Designed to suppress flashing and minimize heat generation.

- Satisfies all API 682 design and qualification test requirements for single and dual Arrangement 1 and 2 seals
- Extended equipment reliability with optimal face cooling and reduced distortion from available multiport injection
- Safety and environmental compliance assured by dual seal arrangement, which provides safety backup and emissions control in hazardous services
- Handle low vapor pressure margin with the QBQ LZ seal, featuring wave pattern precision face topography to minimize heat generation and seal face wear

SPECIFICATIONS

Press. to: 51.7 bar (750 psi)
Temp: -40°C to 204°C (-40°F to 400°F)
Speeds to: 23 m/s (75 fps)
Sizes: 12.7 to 139.7 mm
(0.500 to 5.500 in)

Refer to literature FSD152 and FSD216 at flowserve.com/library.



API PROCESS

QBB and QB2B

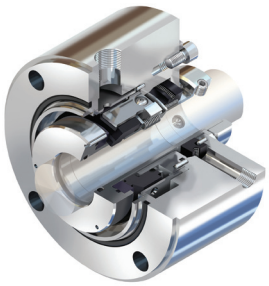
Engineered to handle reverse pressurization, the QBB and QB2B dual pressurized pusher seals are capable of zero emissions. Provides full range pressure capability for API 682 Arrangement 3 requirements.

- Increased durability from ability to handle reverse pressurization upsets with capabilities that far exceed conventional balanced seals
- All parts are mechanically or hydraulically retained in place, regardless of the direction of pressurization
- Environmental compliance with design optimized for pressurized barrier fluid
- Low to moderate pressures are handled by the QBB face-to-back configuration
- Moderate and high pressures, including Piping Plan 53B, are handled by the QB2B back-to-back configuration

SPECIFICATIONS

Press. to: 51.7 bar (750 psi)
Temp: -40°C to 204°C (-40°F to 400°F)
Speeds to: 23 m/s (75 fps)
Sizes: 20 to 121 mm
(0.787 to 4.750 in)

Refer to literature FSD152 at flowserve.com/library.



API PROCESS

HSH

HSH balanced, flexible stator cartridge seals are built for extended reliability in high-pressure, high-speed and highly viscous services such as crude oil pipeline pumps. Fully compliant with API 682 Type A, Arrangements 1, 2 and 3.

- Extended service life via high torque-capable, anti-rotation lugs that minimize distortion and wear
- Greater efficiency from standard distribution ring connected to the seal's flush port, which improves cooling efficiency by injecting flush flow 360° around seal faces
- Reliable high-speed operation and improved tolerance of misalignment enabled by flexible stator design with Alloy C-276 springs
- Decreased inventory costs and increased design flexibility owing to parts interchangeability between single and dual seal arrangements

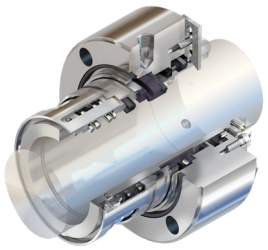
SPECIFICATIONS

Press. to: 103 bar (1500 psi)
Temp: -40°C to 260°C (-40°F to 500°F)
Speeds to: 46 m/s (150 fps)
Sizes: 25.4 to 156 mm
(1.000 to 6.125 in)

Refer to literature FSD156 at flowserve.com/library.

PUSHER

UO and UOP



The UO Series is a balanced pusher seal based on the UC Series with high-pressure features. UO Series seals are well-suited for demanding refinery, pipeline and petrochemical services.

- Extended service life in high-pressure, heavy-duty applications assured by rugged single pusher seal with thick cross-section components
- Increased reliability via large, low spring rate single coil spring that tolerates axial setting dimensions while reducing clogging and hang-up from solids
- Consistent seal face contact provided by robust U-cup seal and spring holder
- High-pressure performance enabled by engineering the seal face mounting to prevent distortions under all load conditions

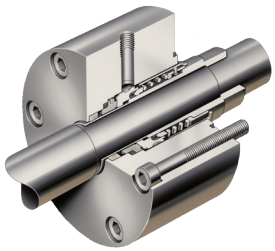
SPECIFICATIONS

Press. to: 103.4 bar (1500 psi)
Temp: -40°C to 204°C (-40°F to 400°F)
Speeds to: 23 m/s (75 fps)
Sizes: 14.1 to 148 mm
(0.566 to 5.838 in)

Refer to literature FSD255
at flowserve.com/library.

HIGH-ENERGY PROCESS

D and DP



D Series single spring, balanced pusher seals have a high-circulation integral pumping ring to ensure proper cooling. Ideal for high-temperature boiler feed water and hot hydrocarbon services.

- Cost-effective operation ensured by integrated pumping ring that eliminates the expense of cool injection systems
- Greater reliability due to the rotating face that remains flat under all conditions for very low leakage
- Consistent seal face contact provided by robust U-cup seal and spring holder
- Superior high-temperature performance enabled by large, low spring rate single coil spring that tolerates axial setting variations

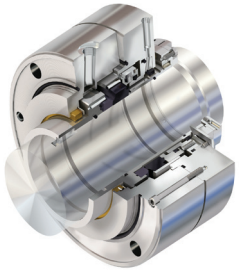
SPECIFICATIONS

Press. to: 103.4 bar (1500 psi)
Temp: -73°C to 343°C (-100°F to 650°F)
Speeds to: 23 m/s (75 fps)
Sizes: 13.4 to 137 mm
(0.525 to 5.400 in)

Refer to literature FSD153
at flowserve.com/library.

HIGH-ENERGY PROCESS

UHTW and DHTW



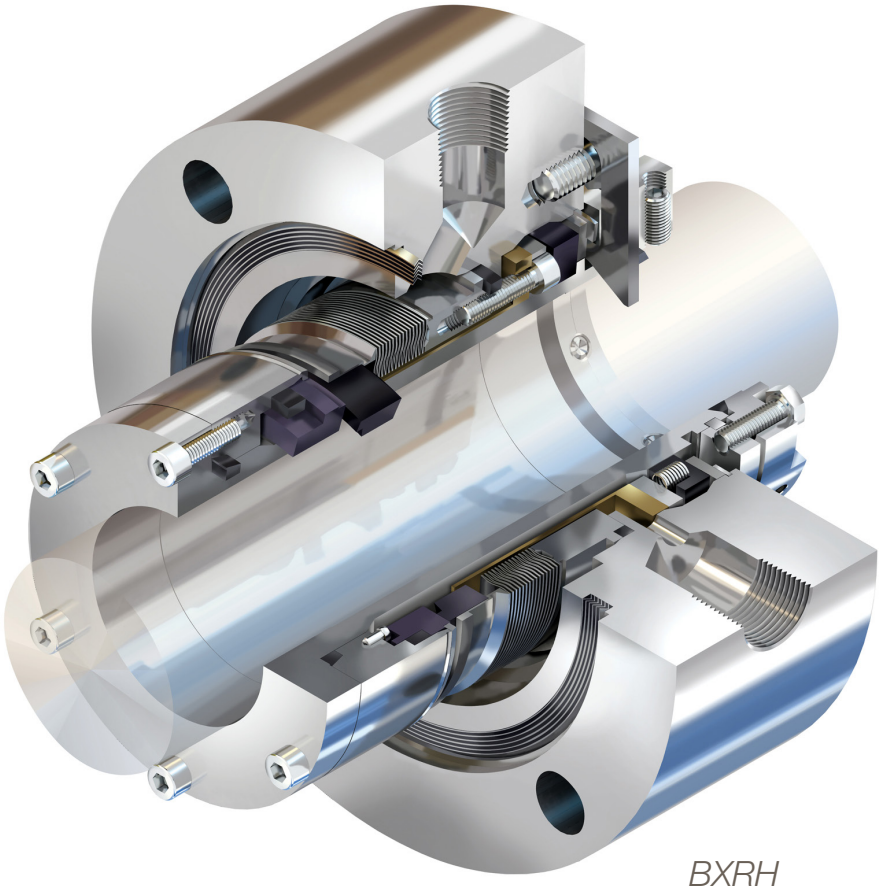
These high-speed, high-pressure balanced pusher seals are custom-engineered for high-energy applications such as boiler-feed process barrel pumps.

- Unmatched performance and extended seal life derived from FEA-designed seal faces that boast zero net deflection from thermal, hydraulic, and dynamic forces
- Superior high temperature, slow roll, and hot standby operation enabled by high performance circulating features that deliver optimum cooling at all operating speeds
- Reliable operation in high speed services achieved via precisely controlled seal face balance ratio and robust drive engagement
- Extended equipment uptime with available secondary containment options

SPECIFICATIONS

Press. to: 207 bar (3000 psi)
Temp: -40°C to 371°C (-40°F to 700°F)
Speeds to: 76 m/s (250 fps)
Sizes: 25.4 to 228.6 mm
(1.000 to 9.000 in)

Refer to literature FSD140
at flowserve.com/library.



BXRH

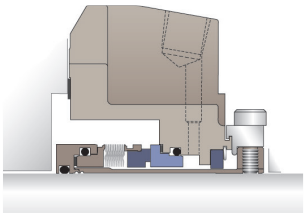
METAL BELLOWS

Flowserve metal bellows seals provide proven reliability and long-term performance in general and critical services, whether you're dealing with hazardous chemicals or refinery processing. Edge-welded, high-alloy bellows get the job done where corrosive chemicals degrade elastomers and other dynamic gaskets. Available with rotating or stationary bellows and in single, dual unpressurized or dual pressurized configurations, our global customers will find a variety of arrangements to meet their toughest sealing requirements, including full API 682 compliance.

Metal Bellows – Quick Reference

Product	Sub-Type	Pressures to	Temperatures	Speeds to	Sizes
ISC2-BX, ISC2-XB, ISC2-682BX and ISC2-682XB	Industrial Process	13.8 bar (200 psi)	-40°C to 204°C (-40°F to 400°F)	23 m/s (75 fps)	25 to 95 mm (1.000 to 3.750 in)
ISC2-BB	Industrial Process	13.8 bar (200 psi)	-40°C to 204°C (-40°F to 400°F)	23 m/s (75 fps)	25 to 95 mm (1.000 to 3.750 in)
BXLS	Industrial Process	27.6 bar (400 psi)	-40°C to 204°C (-40°F to 400°F)	23 m/s (75 fps)	16 to 100 mm (0.623 to 3.937 in)
BX, BXQ and BXB	API Process	27.6 bar (400 psi)	40°C to 204°C (-40°F to 400°F)	23 m/s (75 fps)	12.3 to 127 mm (0.483 to 5.000 in)
BXRH	API Process	20.7 bar (300 psi)	-73°C to 427°C (-100°F to 800°F)	46 m/s (150 fps)	21.8 to 127 mm (0.857 in to 5.000 in)
BXHHS and BXHHSB	API Process	20.7 bar (300 psi)	-73°C to 427°C (-100°F to 800°F)	23 m/s (75 fps)	28.2 to 128.9 mm (1.110 in to 5.073 in)
BRC and BRCSH	API Process	20.7 bar (300 psi)	-73°C to 427°C (-100°F to 800°F)	23 m/s (75 fps)	28.2 to 150 mm (1.110 to 5.906 in)

METAL BELLOWS



INDUSTRIAL PROCESS

ISC2-BX, ISC2-XB, ISC2-682BX and ISC2-682XB

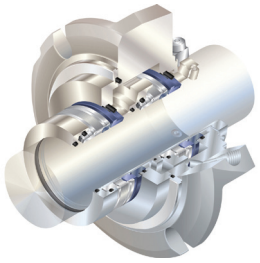
Single cartridge metal bellows seals from the versatile ISC2 Series, the ISC2-BX and ISC2-XB are ideal for a wide range of chemical and industrial applications. ISC2-682 versions provide full API 682 compliance.

- Outstanding corrosion resistance with edge-welded Alloy C-276 bellows
- Reduced hang-up due to self-cleaning rotating bellows design that maintains excellent seal face loading
- Improved tolerance to dry running events with exclusive thermal management technology
- Broad application flexibility assured by comprehensive range of pre-engineered configurations with standard flush (BX), Plan 23 cooling (XB) and API 682 compliance
- Increased safety via throttle bushing with standard quench and drain

SPECIFICATIONS

Press. to: 13.8 bar (200 psi)
Temp: -40°C to 204°C (-40°F to 400°F)
Speeds to: 23 m/s (75 fps)
Sizes: 25 to 95 mm (1.000 to 3.750 in)

Refer to literature FSD243 at flowserve.com/library.



INDUSTRIAL PROCESS

ISC2-BB and ISC2-682BB

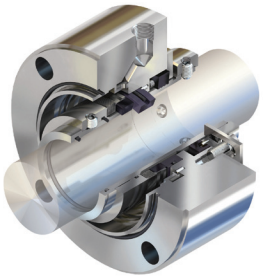
This dual cartridge metal bellows seal from the versatile ISC2 Series provides a reliable barrier against process leakage in chemical and industrial applications. The ISC2-682 BB provides full API 682 compliance.

- Reliable operation resulting from advanced volute groove design and internal circulating devices that promote cool running
- High uptime with corrosion-resistant, edge-welded Alloy C-276 bellows
- Reduced hang-up due to self-cleaning rotating bellows design
- Application flexibility with tandem and double-balanced arrangements to allow both pressurized and unpressurized operation
- Meets all major international standards and fits hundreds of pump models from global manufacturers

SPECIFICATIONS

Press. to: 13.8 bar (200 psi)
Temp: -40°C to 204°C (-40°F to 400°F)
Speeds to: 23 m/s (75 fps)
Sizes: 25 to 95 mm (1.000 to 3.750 in)

Refer to literature FSD243 at flowserve.com/library.



INDUSTRIAL PROCESS

BXLS

The BXLS is a metric-sized rotating metal bellows seal for corrosive and non-corrosive services, especially those that crystallize. Meets the seal chamber dimensions specified by DIN EN 12 756 L1k.

- Metric seal interface dimensions ideal for pumps conforming to various DIN and ISO standards, including DIN 24960 and ISO 3069
- Installation flexibility afforded by cartridge or non-cartridge seal configurations to fit the seal chamber dimensional requirements
- Reduced maintenance costs due to the absence of springs and dynamic elastomers to lessen clogging vulnerabilities
- Longer service life with 0.20 mm (0.008 in) thick standard welded metal bellows for extended resistance to corrosion, vibration and centrifugal forces

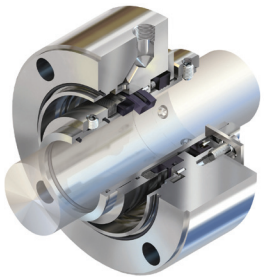
SPECIFICATIONS

Press. to: 27.6 bar (400 psi)
Temp: -40°C to 204°C (-40°F to 400°F)
Speeds to: 23 m/s (75 fps)
Sizes: 16 to 100 mm (0.623 to 3.937 in)

Refer to literature FSD109 at flowserve.com/library.

API PROCESS

BX, BXQ and BXB



BX Series balanced rotating metal bellows seals provide exceptional reliability in corrosive and non-corrosive fluids, especially those that crystallize. Fully compliant with API 682 Type B, Arrangements 1, 2 and 3.

- Longer service life with 0.20 mm (0.008 in) thick standard welded metal bellows for resistance to corrosion, shaft vibration and centrifugal forces
- Optimal performance ensured by three standard seal face balances; the BXQ seal is high balanced for flashing hydrocarbon applications
- Increased maintenance intervals due to self-cleaning rotating bellows that replace springs and dynamic elastomers
- Performance benefits of metal bellows in dual pressurized Arrangement 3 seals with the BXB seal's unique ID pressurized seal face balance

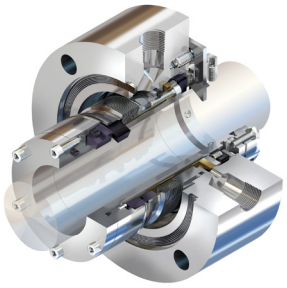
SPECIFICATIONS

Press. to: 27.6 bar (400 psi)
Temp: -40°C to 204°C
(-40°F to 400°F)
Speeds to: 23 m/s (75 fps)
Sizes: 12.3 to 127 mm
(0.483 to 5.000 in)

Refer to literature FSD109
at flowserve.com/library.

API PROCESS

BXRH



Built for temperatures beyond the limits of elastomers, the BXRH balanced stationary metal bellows seal offers reliable sealing at high speeds. Meets all API 682 Type C requirements in Arrangements 1, 2 and 3.

- Optimal performance resulting from flexible graphite gasketing in lieu of elastomers to improve temperature and chemical compatibility
- Reliability due to extra-long Alloy 718 bellows that offer superior corrosion resistance, allow more axial travel, and provide consistent spring loading
- Application flexibility arising from single and dual seal configurations as well as pressurized and unpressurized arrangements
- Reduced clogging due to absence of springs and dynamic elastomers, plus standard anti-coke device

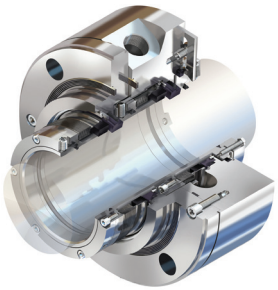
SPECIFICATIONS

Press. to: 20.7 bar (300 psi)
Temp: -73°C to 427°C
(-100°F to 800°F)
Speeds to: 46 m/s (150 fps)
Sizes: 21.8 to 127 mm
(0.857 to 5.000 in)

Refer to literature FSD111
at flowserve.com/library.

API PROCESS

BXHHS and BXHHSB



BXHHS and BXHHSB balanced rotating metal bellows seals are designed for refinery and petrochemical services at high- and low-temperature extremes. Meets API 682 Type C requirements in Arrangements 1, 2 and 3.

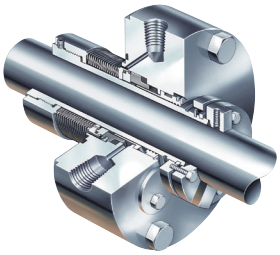
- Optimal performance resulting from flexible graphite gasketing in lieu of elastomers to improve temperature and chemical compatibility
- High uptime due to corrosion-resistant Alloy 718 bellows construction and a low-stress design
- Compact overall length designed to fit in API 610 pumps without modification
- Reliable operation ensured by extended travel bellows core that allows for extreme linear shaft growth, typical in high-temperature pumping
- Distortion-free face design maintains flatness throughout operating range

SPECIFICATIONS

Press. to: 20.7 bar (300 psi)
Temp: -73°C to 427°C
(-100°F to 800°F)
Speeds to: 23 m/s (75 fps)
Sizes: 28.2 to 128.9 mm
(1.110 to 5.073 in)

Refer to literature FSD111
at flowserve.com/library.

METAL BELLOWS



API PROCESS

BRC and BRCSH

These robust balanced metal bellows seals are designed for high-temperature hydrocarbons, heat transfer fluids and other severe services. Meet all API 682 Type C requirements in Arrangements 1, 2 and 3.

- Longer service life ensured by edge-welded, thick-plate Alloy 718 bellows that comply with NACE MR0103 criteria and withstand long-term chemical exposure
- Reliability resulting from the canned face design that eliminates shrink-fit distortions and allows low-leakage performance
- Prolonged clean operation due to steam purge baffle on stationary configurations that eliminates coking
- Application flexibility accommodates extreme shaft movement in single or dual seal arrangements

SPECIFICATIONS

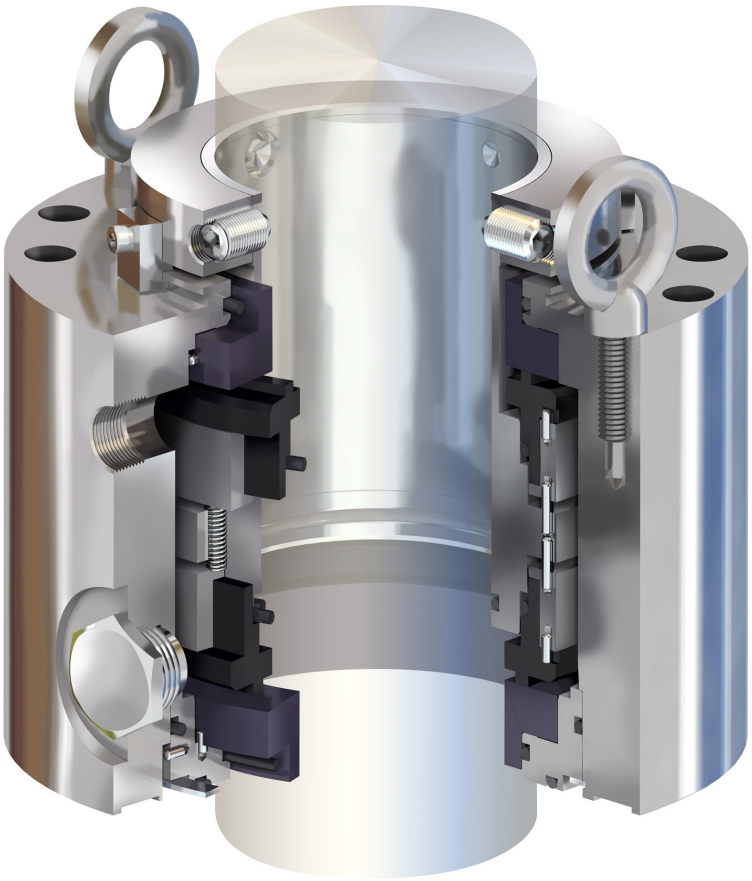
Press. to: 20.7 bar (300 psi)
Temp: -73°C to 427°C (-100°F to 800°F)
Speeds to: 23 m/s (75 fps)
Sizes: 28.2 to 150 mm (1.110 to 5.906 in)

Refer to literature FSD142 at flowserve.com/library.

The Highest Standards of Safety

Our customers find in Flowserve a partner that is closely aligned with their standards of a safe operating environment. Our overall, industry-recognized performance far exceeds our peers, rivaling that of industry award winners. It's a continuously improving part of our business, where where we've established a safety-first culture with processes that demonstrate reductions in lost time accidents, lower total recordable rates and improvements in near-miss reporting.





MD-200

MIXER

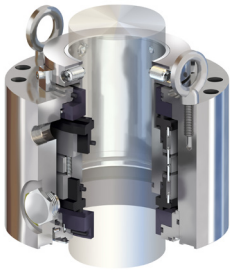
Flowserve mixer seals are designed to handle significant radial and axial shaft run-out while keeping workers safe and protecting the environment. Cost-effective performance, safety and reliability are engineered into every seal so total costs stay low. Choose from a variety of cartridge or split designs for top-, side- or bottom-entry installations or have seals custom-tailored to your specifications. Plus, every design is backed by our savvy rotating equipment specialists. They have the industry knowledge and skills to help extend the reliability of all kinds of agitating, blending, drying, filtering, separating and processing equipment.

Mixer – Quick Reference

Product	Sub-Type	Pressures	Temperatures	Speeds	Sizes
M Series	Mixer & Specialty Equipment	vacuum to 35 bar (500 psi)	to 200°C (390°F)	to 10 m/s (33 fps)	40 to 220 mm (1.575 to 9.000 in)
Mixerpac	Mixer & Specialty Equipment	vacuum to 250 bar (3600 psi)	to 200°C (390°F)	to 10 m/s (33 fps)	25 to 365 mm (1.000 to 14.400 in)
VRA	Mixer & Specialty Equipment	vacuum to 13.8 bar (200 psi)	to 121°C (250°F)	to 350 rpm	25 to 178 mm (1.000 to 7.000 in)
MSS	Mixer & Specialty Equipment	vacuum to 7 bar (100 psi)	to 150°C (300°F)	to 1740 rpm	25 to 305 mm (1.000 to 12.000 in)
ST	Mixer & Specialty Equipment	vacuum to 3.4 bar (50 psi)	-40°C to 135°C (-40°F to 275°F)	to 4 m/s (13 fps)	25.4 to 108 mm (1.000 to 4.250 in)
ISC2-MW	Mixer Equipment	to 6.9 bar (100 psi)	-40°C to 204°C (-40°F to 400°F)	to 1.1 m/s (3.5 fps)	25 to 200 mm (1.000 to 8.000 in)

MIXER

MIXER & SPECIALTY EQUIPMENT



M Series

M Series vertical shaft mixer seals easily adapt to changing production requirements. They are designed for use with mixers, agitators, filters and dryers as well as steel- or glass-lined vessels.

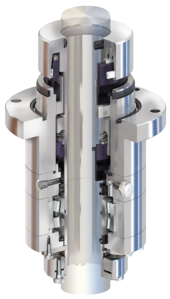
- Unprecedented application flexibility provided by cartridge canister design that enables the seal faces to be changed out to run wet (MW), dry contacting (MD) or dry non-contacting gas barrier technology (ML)
- True component standardization with reduced inventory carrying costs owing to a high degree of parts interchangeability across the product line
- Optional materials compliant with FDA CFR 21, USP Class VI, ADI Free Components and similar specifications
- Specialized solutions customized up to 480 mm (18.900 in) shaft size (MWC-200)

SPECIFICATIONS

Press: vacuum to 35 bar (500 psi)
Temp: to 200°C (390°F)
Speed: to 10 m/s (33 fps)
Sizes: 40 to 220 mm
(1.575 to 9.000 in)

Refer to literature FSD104
at flowserve.com/library.

MIXER & SPECIALTY EQUIPMENT



Mixerpac

The Mixerpac family of mixer seals is designed for top-, side- and bottom-entry installations. Configurations available for slurry, sterile, high-pressure or large shaft movement applications.

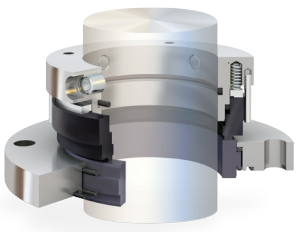
- Broad application flexibility owing to modular cartridge construction with and without bearing as well as liquid-lubricated and gas lift-off designs
- Extended seal life due to reduced friction and wear from balanced dual-pressurized design and seal faces optimized through FEA
- Reliable operation and improved safety with available reverse-pressure capability and emergency sealing solutions
- Numerous options, including cooling flange and sanitary gland/debris catcher, for applications requiring steam cleaning

SPECIFICATIONS

Press: vacuum to 250 bar (3600 psi)
Temp: to 200°C (390°F)
Speed: to 10 m/s (33 fps)
Sizes: 25 to 365 mm
(1.000 to 14.400 in)

Refer to literature FSD104
at flowserve.com/library.

MIXER & SPECIALTY EQUIPMENT



VRA

The VRA is an outside-mounted, dry-running single pusher seal designed to operate on top-entry agitators and mixers. Self-lubricating carbon or filled PTFE seal faces run completely dry without cooling.

- Cost savings provided by contacting dry-running design and two-piece collar, which respectively eliminate the need for a buffer fluid system and expensive alloys in non-wetted areas
- Optimized for high run-out requirements — up to 3.81 mm (0.150 in) FIM
- High reliability provided by flexible rotor design that compensates for misalignment and double O-ring mounted stator that prevents distortion
- Reduced downtime facilitated by optional sanitary gland that allows steam cleaning and sterilizing of the seal's interior while mounted on the equipment

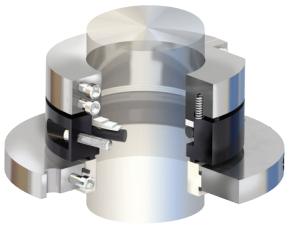
SPECIFICATIONS

Press: vacuum to 13.8 bar (200 psi)
Temp: to 121°C (250°F)
Speed: to 350 rpm
Sizes: 25 to 178 mm (1.000 to 7.000 in)

Refer to literature FSD167
at flowserve.com/library.

MIXER & SPECIALTY EQUIPMENT

MSS



The MSS is for tough mixer and vessel applications where stuffing box face, bore and OD run-out are extreme. Typically used on older equipment or where compression packing had been used.

- Easy installation, inspection and maintenance facilitated by outside seal arrangement and split design
- Fits in tight spaces with no equipment tear down; can be installed in cramped stuffing box areas where the bearing housing, gear box or coupling create obstructions
- Reliable operation owing to self-lubricating faces and design that dissipates heat from seal faces, which allows it to run dry or wet
- Product purity ensured by design that compensates for pressure reversals

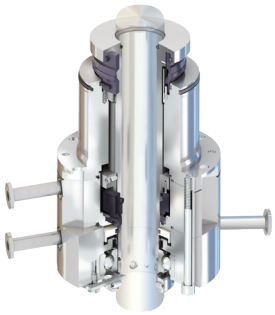
SPECIFICATIONS

Press: vacuum to 7 bar (100 psi)
Temp: to 150°C (300°F)
Speed: to 1740 rpm
Sizes: 25 to 305 mm
(1.000 to 12.000 in)

For more information,
refer to FSD162.

MIXER & SPECIALTY EQUIPMENT

ST



The ST is a bottom-entry mixer seal designed for the ruggedness and reliability necessary in sterile environments, such as bioreactors. Suitable for CIP and SIP use.

- Sterile operation ensured by sloped non-pooling, product-side design that minimizes crevices and is drainable
- Cartridge seal ensures installation ease and can be fitted with a bearing to help steady the shaft
- Highly reliable liquid-lubricated, dual-pressurized design eliminates leakage and protects process integrity
- Materials compliant with FDA CFR 21 and USP Class VI; all components are ADI free

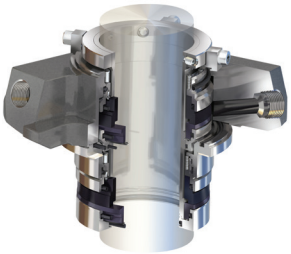
SPECIFICATIONS

Press: vacuum to 3.4 bar (50 psi)
Temp: -40°C to 135°C (-40°F to 275°F)
Speed: to 4 m/s (13 fps)
Sizes: 25.4 to 108 mm
(1.000 to 4.250 in)

For more information,
refer to FSD104 and FSD147.

MIXER EQUIPMENT

ISC2-MW



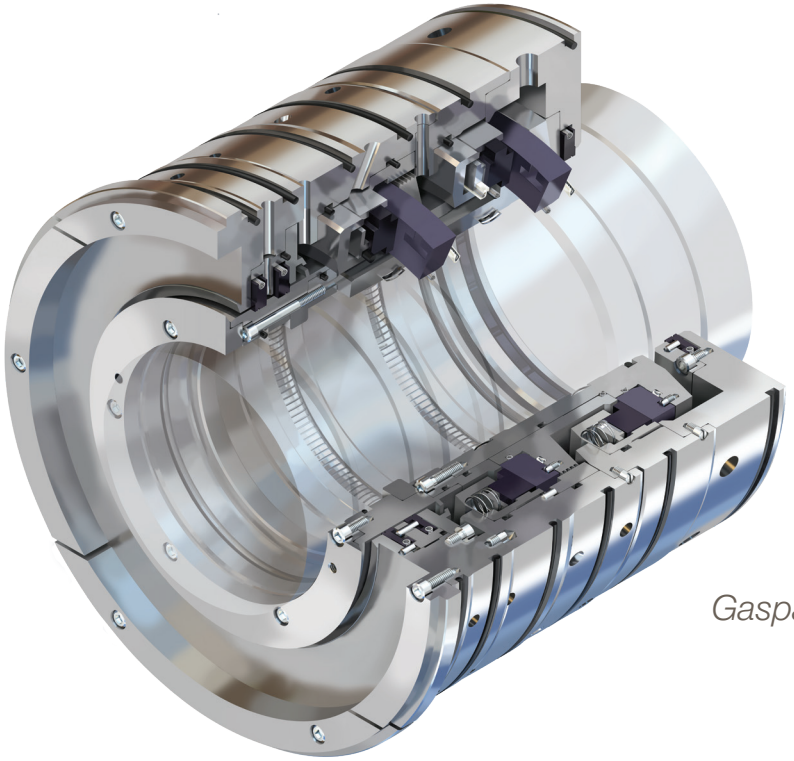
The ISC2-MW is a dual-arrangement standard cartridge pusher seal engineered for reliable, cost-effective operation in mixer service.

- Reduced installation and maintenance costs assured by economical cartridge seal design for top-entry installation
- Increased uptime resulting from volute groove, which significantly increases barrier fluid flow to promote cool running, even at mixer speeds
- Reliable operation ensured by ISC2 thermal management technology that allows the seal to run cooler and tolerate dry-running events

SPECIFICATIONS

Press: to 6.9 bar (100 psi)
Temp: -40°C to 204°C (-40°F to 400°F)
Speed: to 1.1 m/s (3.5 fps)
Sizes: 25 to 200 mm (1.000 to 8.000 in)

For more information,
refer to FSD104.



Gaspac L

COMPRESSOR SEALS AND SYSTEMS

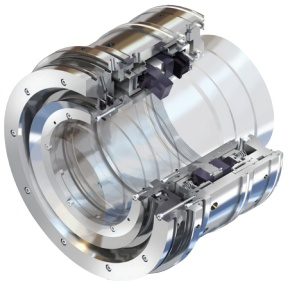
Our Gaspac, Circpac, and Turbopac seals have earned their reputation as the most advanced compressor sealing solutions available. Even more, they're backed by a global team that leads the industry in dry gas seal retrofits, high-end compressor seal troubleshooting, seal support engineering, and world-class gas conditioning systems.

By combining leading-edge technologies and service, Flowserve allows compressor customers to reach higher pressure, efficiency and profitability.

Compressor Seals and Systems – Quick Reference

Product	Sub-Type	Pressures	Temperatures	Speeds to	Sizes
Gaspac® T, L, D and S	Gas Compressor Process	650 bar (9427 psi)	to 230°C (450°F)	250 m/s (820 fps)	to 360 mm (14.125 in)
Circpac™ CB, LO and HP	Gas Compressor Process	10 bar (150 psi)	-40°C to 180°C (-40°F to 350°F)	140 m/s (460 fps)	to 280 mm (11.000 in)
Turbopac™ 378 and 2100	Gas Compressor Process	300 bar (4300 psi)	to 180°C (550°F)	100 m/s (330 fps)	40 to 260 mm (1.500 to 10.250 in)
Supplypac™	Gas Support System	414 bar (6000 psi)	to 240°C (400°F)	—	—
Cleanpac™ D, F and DL	Gas Support System	550 bar (8000 psi)	to 204°C (400°F)	—	—
Ampliflow™	Gas Support System	550 bar (8000 psi)	to 204°C (400°F)	—	—
Drypac™	Gas Support System	550 bar (8000 psi)	to 204°C (400°F)	—	—
N2 Genpac™	Gas Support System	13 bar (190 psi)	to 50°C (122°F)	—	—

COMPRESSOR SEALS AND SYSTEMS



GAS COMPRESSOR PROCESS

Gaspac T, L, D and S

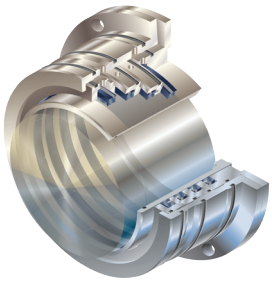
The Gaspac is a proven platform of dry gas seals for turbomachinery equipment and features either bi-directional T-Groove or Advanced Pattern Groove (APG) non-contacting seal face technologies.

- Environmental regulatory compliance and energy savings assured by controlled gas flow rates over the widest operating conditions
- Increased reliability with precision face topography that offers high film stiffness and damping, and maintains a stable gas film under slow roll and high speeds
- Application versatility from a wide range of single and dual configurations with process barrier and oil exclusion features
- Increased uptime via innovative solutions for secondary sealing, reverse rotation, reverse pressurization and component centering

SPECIFICATIONS

Press. to: 650 bar (9427 psi)
Temp: to 230°C (450°F)
Speeds to: 250 m/s (820 fps)
Sizes: to 360 mm (14.125 in)

Refer to literature FSD113 at flowserve.com/library.



GAS COMPRESSOR PROCESS

Circpac CB, LO and HP

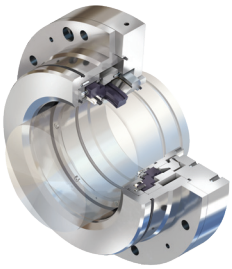
This high-performance segmented circumferential gas seal series is engineered for gas compressors as part of a Gaspac assembly (Circpac CB and LO) or as a stand-alone cartridge (Circpac HP).

- Consistent performance from carbon ring construction designed for non-contacting operation that exceeds the pressure capability of typical circumferential seals
- Increased reliability via pressure-balanced ring design and hydrodynamic surface features, resulting in low gas consumption and long life
- Enhanced application versatility enabled by multiple ring combinations with optimized purge and vent options
- Lower cost of ownership with fewer spare parts provided by bi-directional capability for reverse rotation

SPECIFICATIONS

Press. to: 10 bar (150 psi)
Temp: -40°C to 180°C (-40°F to 350°F)
Speeds to: 140 m/s (460 fps)
Sizes: to 280 mm (11.000 in)

Refer to literature FSD113 at flowserve.com/library.



GAS COMPRESSOR PROCESS

Turbopac 378 and 2100

The Turbopac is a highly dependable oil-lubricated, bi-directional mechanical seal designed for screw, turbo and high-pressure, high-speed applications.

- Increased performance and rotational speeds from stationary spring assembly
- Enhanced safety of operations during emergency shutdowns enabled by dual-acting static seal that allows for product containment under reverse pressure conditions
- Improved ease of installation via cartridge design
- Reduced leakage and added efficiency from design that minimizes oil loss
- Application flexibility owing to availability of single and double arrangements

SPECIFICATIONS

Press. to: 300 bar (4300 psi)
Temp: to 180°C (550°F)
Speeds to: 100 m/s (330 fps)
Sizes: 40 to 260 mm (1.500 to 10.250 in)

Refer to literature FSD113 at flowserve.com/library.

An Ultra-High Bar

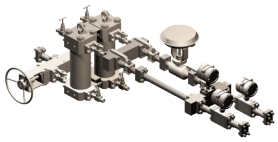
In compressor services — where higher pressure often means higher efficiency and greater profitability — Gaspac seals set the performance benchmark. Able to handle high speeds and ultra-high pressures, Gaspac seals are driving innovation, achieving ever-greater pressures. This gas-lubricated, dry-running seal employs some of the most advanced non-contacting, lift-off technology available. It also boasts unequaled reliability, outlasting multiple compressor turnaround cycles.



GAS SUPPORT SYSTEM

Supplypac

Supplypac modular-based dry gas seal support systems simplify the typical dry gas seal control panel and provide safe, reliable seal operation.



- Supplypac modular-based dry gas seal support systems simplify the typical dry gas seal control panel and provide safe, reliable seal operation.
- Functional qualifications per API 614 design criteria and ASME B31.3 certification
- Wide operating range via flow paths that are scalable for lower pressure, larger bore and higher flow rates
- Ease of installation and improved inventory management from standardization of pre-manufactured components
- Available in multiple material and gasket options to meet specific requirements

SPECIFICATIONS

Press. to: 414 bar (6000 psi)
Temp: to 240°C (400°F)

Refer to literature FSD113 at flowserve.com/library.

GAS SUPPORT SYSTEM

Cleanpac D, F and DL

The Cleanpac line of dry gas seal filtration systems includes heavy liquid removal units (Cleanpac D), pre-filter units (Cleanpac F), as well as single and dual coalescing filter units (Cleanpac DL).



- Lower operational costs and improved dry gas seal system reliability owing to filter elements with efficiency of ß(0.3) >1000 (99.9% @ 0.3µm)
- Application versatility due to wide variety of materials of construction (including 316 SS, the standard for onshore and offshore applications) as well as high-temperature and high-pressure designs
- Reduced downtime resulting from a large coalescing element that enables extended operational periods between change-outs

SPECIFICATIONS

Press. to: 550 bar (8000 psi)
Temp: to 204°C (400°F)

Refer to literature FSD113 at flowserve.com/library.

COMPRESSOR SEALS AND SYSTEMS

GAS SUPPORT SYSTEM

Ampliflow



The Ampliflow seal supply gas boosting system ensures an adequate supply of clean, filtered gas is provided to the seals during periods of low differential pressure across the compressor.

- Optimal dry gas seal performance ensured by the system's ability to maintain flow through the conditioning system or seal gas panel
- Lower operating costs made possible by eliminating process contamination — the number one cause of dry gas seal failures
- Versatility via configuration options that include a portable unit, standalone panel, or integration with a Flowserve dry gas seal control panel or filter gas conditioning panel

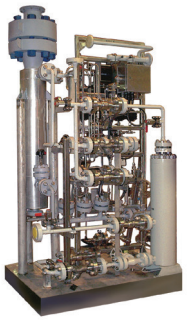
SPECIFICATIONS

Press. to: 550 bar (8000 psi)
Temp: to 204°C (400°F)

Refer to literature FSD113 at flowserve.com/library.

GAS SUPPORT SYSTEM

Drypac



The Drypac gas dryer reduces the potential of liquid formation between the seal faces as a best practice reliability improvement measure and recommended by API standards.

- Decreased liquid formation ensured by system that lowers the dew point of the gas and raises the temperature of the seal supply gas to at least 20°C (36°F) above the dew point
- Increased MTBF of dry gas seals when the dew point of the gas is a potential issue
- Low operating costs due to simplified installation, operation and maintenance
- Easily integrated within existing gas seal control panels

SPECIFICATIONS

Press. to: 550 bar (8000 psi)
Temp: to 204°C (400°F)

Refer to literature FSD113 at flowserve.com/library.

GAS SUPPORT SYSTEM

N2 Genpac



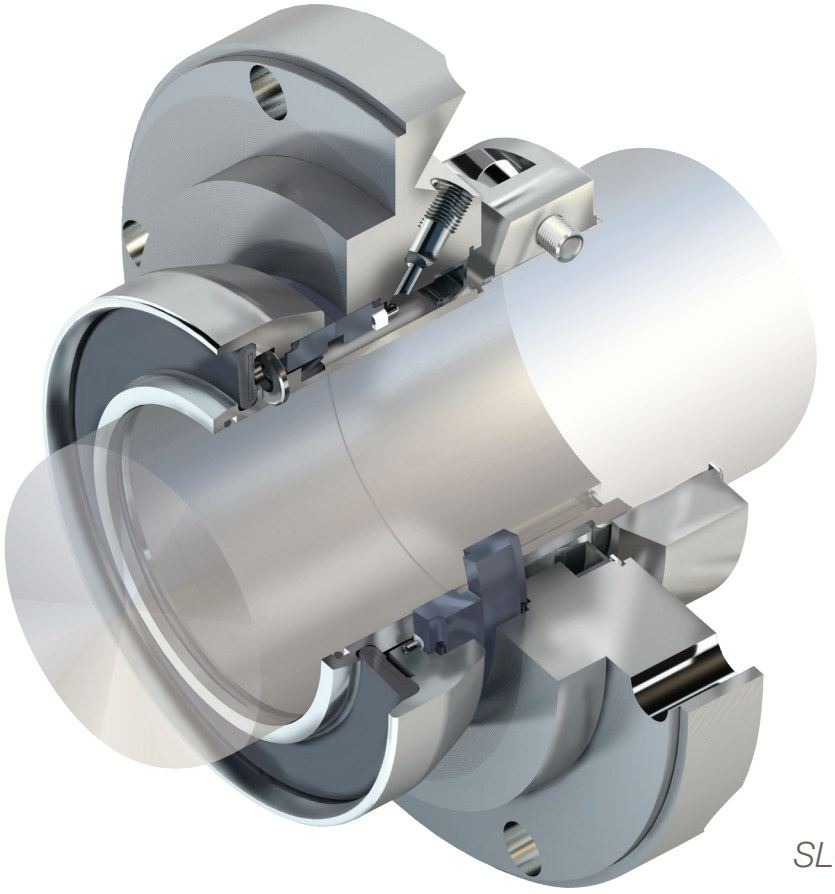
The N2 Genpac system safely generates nitrogen gas from compressed air in hazardous conditions or remote locations.

- Optimal dry gas seal performance ensured by micron fiber filtration technology that extracts nitrogen gas at purities between 97% and 99%
- Uninterrupted nitrogen flow made possible by dual parallel filtration technology
- High uptime provided by monitoring system with differential pressure indicating transmitters and inlet/outlet pressure gauges
- Application flexibility arising from system that can operate independently or integrate with the Flowserve dry gas seal panel or Cleanpac and Drypac gas conditioning systems

SPECIFICATIONS

Press. to: 13 bar (190 psi)
Temp: to 50°C (122°F)

Refer to literature FSD113 at flowserve.com/library.



SLC

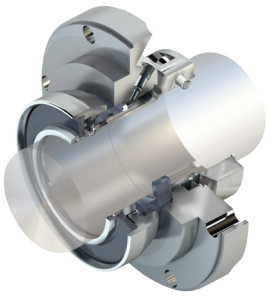
SLURRY

Abrasive. Erosive. Corrosive. Viscous. Slurry applications can be brutal on equipment, but Flowserve slurry seals are engineered to last. From economical designs for low-solids applications to rugged beasts that handle up to 60% solids content by weight, Flowserve slurry seals resist clogging with smooth geometries and non-wetted springs. Costs are controlled with engineered assemblies that fit common slurry pumps and modular components that make field repair easy. What's more, customers will find unrivaled support in our knowledgeable and experienced engineering and support teams.

Slurry – Quick Reference

Product	Sub-Type	Pressures	Temperatures	Speeds to	Sizes
SLC Series	Slurry Process	20.6 bar (300 psi)	-18°C to 110°C (10°F to 230°F)	15 m/s (50 fps)	32 to 220 mm (1.250 to 8.661 in)
SLM Series	Slurry Process	17.2 bar (250 psi)	-40°C to 149°C (-40°F to 300°F)	23 m/s (75 fps)	50 to 235 mm (2.000 to 9.250 in)
RIS	Slurry Process	10.3 bar (150 psi)	-4°C to 110°C (25°F to 230°F)	11 m/s (36 fps)	32 to 235 mm (1.250 to 9.250 in)
Allpac	Slurry Process	50 bar (725 psi)	-40°C to 220°C (-40°F to 430°F)	50 m/s (164 fps)	20 to 30 mm (0.750 to 11.750 in)

SLURRY



SLURRY PROCESS

SLC Series

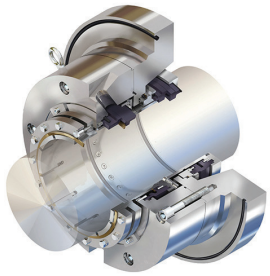
SLC seals are heavy-duty, single pusher cartridge seals built for the harshest slurry pump services found in mining, mineral and ore processing, and flue gas desulfurization. Suitable for solids to 60% by weight.

- Lower operating costs ensured by unique non-clogging, encapsulated cone spring, which increases reliability and enables flushless operation
- Maximized equipment uptime provided by abrasion-resistant metal components and silicon carbide faces that extend seal life beyond that of slurry pump components
- Economical performance via clean, open design, which operates without flush water to reduce product dilution and eliminate flush water costs
- Ease of installation resulting from cartridge design that requires no special tools or bearing housing adjustments

SPECIFICATIONS

Press. to: 20.6 bar (300 psi)
Temp: -18°C to 110°C (10°F to 230°F)
Speeds to: 15 m/s (50 fps)
Sizes: 32 to 220 mm (1.250 to 8.661 in)

Refer to literature FSD120 or FSD103 at flowserve.com/library.



SLURRY PROCESS

SLM Series

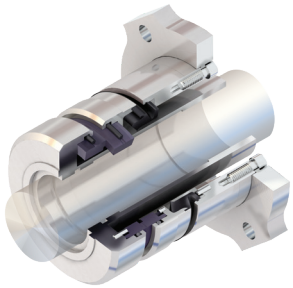
These balanced single (SLM-6000) or dual (SLM-6200) cartridge pusher seals have a flexible stator and operate without outside flush liquid to eliminate product dilution, increase plant efficiency and reduce costs.

- Increased reliability and consistent “no visible leakage” operation due to line-on-line, hydraulically balanced faces
- Extended seal life enabled by centroid-loaded monoblock rotor that helps to maintain zero net deflection, reducing leakage and wear
- Reduced maintenance costs provided by large cross-section stator O-ring, which allows maximum shaft movement while reducing the damaging effects of hang-up
- Dependable performance provided by single seals handling solids to 20%, dual seals to 60% solids, and quench options providing complete application flexibility

SPECIFICATIONS

Press. to: 17.2 bar (250 psi)
Temp: -40°C to 149°C (-40°F to 300°F)
Speeds to: 23 m/s (75 fps)
Sizes: 50 to 235 mm (2.000 to 9.250 in)

Refer to literature FSD166 or FSD103 at flowserve.com/library.



SLURRY PROCESS

RIS

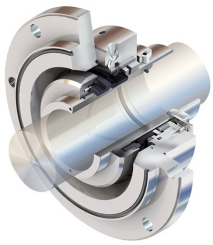
The RIS rubber-energized, component slurry seal features a unique non-clogging design that does not utilize springs or bellows. Handles solids to 50% by weight.

- Ease of installation provided by innovative adaptive components that allow the seal to be installed from the wet end and adjusted externally
- Longer MTBF from non-clogging elastomer spring design that has no dynamic O-ring to hang up
- Reliable operation ensured by the rubber-energized stationary seal face that holds the seal faces together and absorbs relative shaft movement
- Reduced operating costs and improved control made possible by flushless operation, which is especially beneficial in flue gas desulphurization

SPECIFICATIONS

Press. to: 10.3 bar (150 psi)
Temp: -4°C to 110°C (25°F to 230°F)
Speeds to: 11 m/s (36 fps)
Sizes: 32 to 235 mm (1.250 to 9.250 in)

Refer to literature FSD151 or FSD103 at flowserve.com/library.



SLURRY PROCESS

Allpac

This simple yet robust single, balanced cartridge pusher seal is a cost-effective solution for slurry processes with solids to 20% by weight.

- Increased uptime enabled by springs isolated from the process fluid and large clearances between the seal and shaft seal that prevent clogging
- Reduced operating costs made possible by a design that operates without flush
- Ease of installation from cartridge seal construction
- Broad application flexibility made possible with single- and dual-cartridge arrangements as well as single- and multiple-spring designs

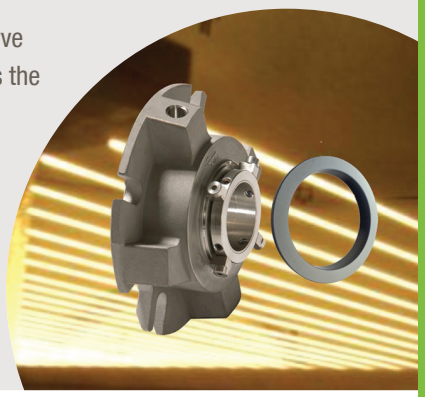
SPECIFICATIONS

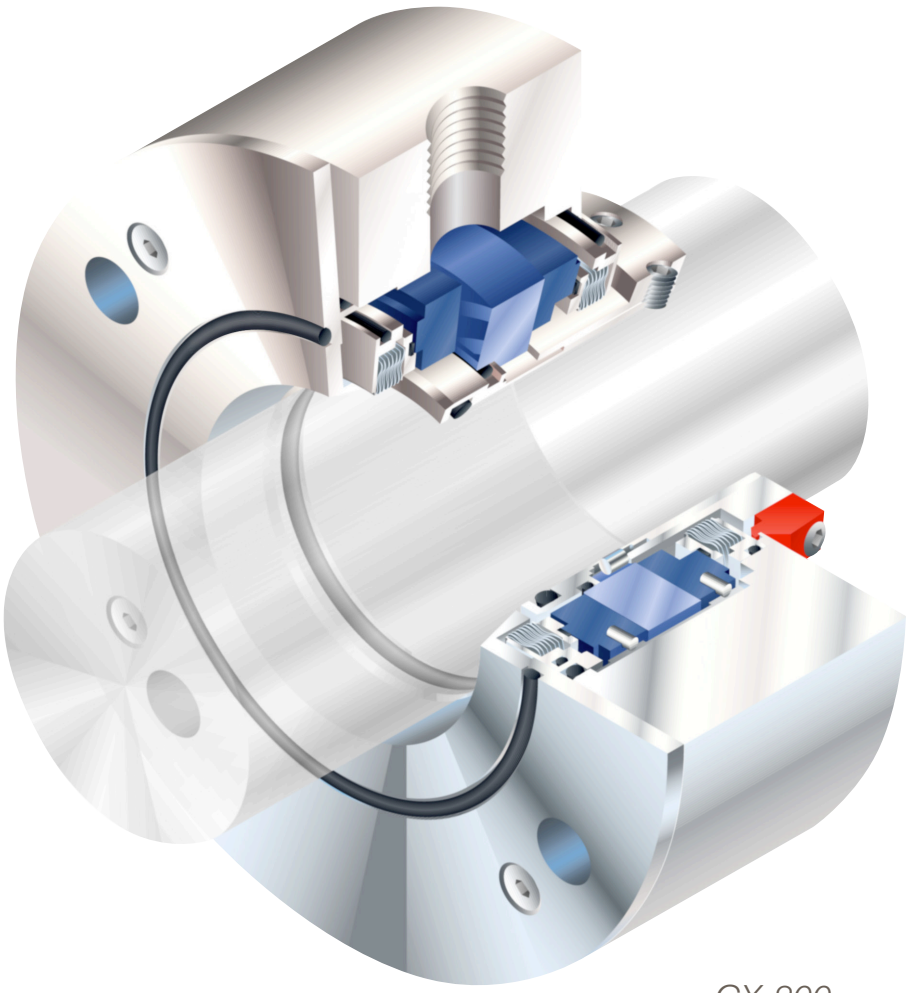
Press. to: 50 bar (725 psi)
Temp: -40°C to 220°C (-40°F to 430°F)
Speeds to: 50 m/s (164 fps)
Sizes: 20 to 30 mm (0.750 to 11.750 in)

Refer to literature FSD129 or FSD103 at flowserve.com/library.

The Virtues of Diamond

For improved reliability in applications with poor lubricity, Flowserve offers diamond-coated silicon carbide seal faces. Available across the Flowserve seal platform, Flowserve diamond-coated seal faces provide mechanical properties and performance characteristics that surpass all others. Among the benefits are: improved wear resistance; high thermal conductivity; dry-running tolerance; and low break-out torque. The upsides are significant lifecycle cost savings due to longer mechanical seal run time plus reduced cooling water and energy usage.





GX-200

GAS BARRIER AND CONTAINMENT

Running a liquid seal dry almost always means trouble, whether it's equipment failure, unwanted downtime or unsafe conditions. Flowserve gas barrier seals have non-contacting seal faces that lift off during operation, so they run safely and reliably, no matter what's happening in the seal chamber. They also use less power and employ simplified support systems. Flowserve containment seals normally run dry as a ready backup behind a liquid-lubricated inboard seal. During upset events, the containment seal takes over primary sealing responsibilities until the equipment can be safely serviced. Both designs offer significant cost and environmental advantages, either minimizing or eliminating emissions.

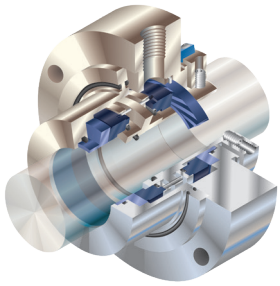
Gas Barrier and Containment – Quick Reference

Product	Sub-Type	Pressures to	Temperatures	Speeds	Sizes
GF-200	Industrial Process	34.5 bar (500 psi)	-40°C to 260°C (-40°F to 500°F)	1.3 to 25 m/s (4 to 82 fps)	25.4 to 152 mm (1.000 to 6.000 in)
GX-200	Industrial Process	13.8 bar (200 psi)	-40°C to 260°C (-40°F to 500°F)	2.5 to 35 m/s (8 to 115 fps)	25.4 to 76.2 mm (1.000 to 3.000 in)
GSL	API Process	41.4 bar (600 psi)	-40°C to 204°C (-40°F to 400°F)	1.5 to 30.5 m/s (5 to 100 fps)	20.6 to 152 mm (0.813 to 6.000 in)
GSDH	API Process	20.7 bar (300 psi)	-73°C to 427°C (-100°F to 800°F)	to 19.8 m/s (57 fps)	28.2 to 128.9 mm (1.110 to 5.073 in)
GTSP	API Process	17.2 bar (250 psi)	-73°C to 427°C (-100°F to 800°F)	3 to 46 m/s (10 to 150 fps)	47.6 to 104.8 mm (1.875 to 4.125 in)

GAS BARRIER AND CONTAINMENT

INDUSTRIAL PROCESS

GF-200



This dual pressurized non-contacting, gas barrier pusher seal is used in applications where zero emissions of hazardous pumped products can be tolerated.

- Environmental regulatory compliance assured by inert gas barrier that operates with zero process emissions
- Greater reliability enabled by spring energized O-ring technology to maintain proper seal face tracking
- Longer service life from silicon carbide seal faces using APG precision face topography, which creates a stiff, thin gas film that prevents wear
- Economical performance via non-contacting seal faces that require very low power consumption during startup and operation

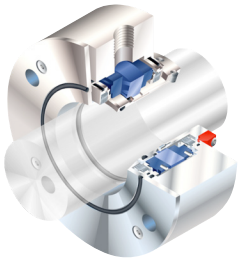
SPECIFICATIONS

Press. to: 34.5 bar (500 psi)
Temp: -40°C to 260°C (-40°F to 500°F)
Speeds: 1.3 to 25 m/s (4 to 82 fps)
Sizes: 25.4 to 152 mm
(1.000 to 6.000 in)

Refer to literature FSD137
at flowserve.com/library.

INDUSTRIAL PROCESS

GX-200



GX-200 dual metal bellows seals utilize APG non-contacting seal face technology for outstanding performance in a variety of applications. Fits standard or small bore seal chambers without modifications.

- Environmental regulatory compliance assured by inert gas barrier that operates with zero process emissions
- Long-term reliability provided by high alloy metal bellows that resist contamination and hang-up while providing pressure reversal product containment during upset events
- Lower operation and maintenance costs provided by unique design that eliminates the costs of maintaining a liquid barrier system and the risks of barrier fluid contamination
- Economical performance enabled by energy-efficient design that delivers the industry's lowest power consumption for conventional pumps

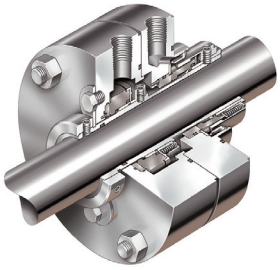
SPECIFICATIONS

Press. to: 13.8 bar (200 psi)
Temp: -40°C to 260°C (-40°F to 500°F)
Speeds: 2.5 to 35 m/s (8 to 115 fps)
Sizes: 25.4 to 76.2 mm
(1.000 to 3.000 in)

Refer to literature FSD105
at flowserve.com/library.

API PROCESS

GSL



GSL non-contacting gas seals are designed for dry running vapor containment and full pressure wet backup sealing in light hydrocarbon, crude oil and hazardous services.

- Fully compliant with API 682 Type A, Arrangement 2 containment seal requirements
- Greater reliability and service life assured by silicon carbide seal face with a bi-directional wave pattern that provides the lift necessary for non-contacting operation
- Improved plant and personnel safety from backup sealing capability to 600 psi (41.4 bar), allowing safe shutdown if primary seal fails
- Faster, trouble-free startup via cartridge assembly that simplifies installation
- Meets environmental emission limits with available nitrogen sweep auxiliary system

SPECIFICATIONS

Press. to: 41.4 bar (600 psi)
Temp: -40°C to 204°C (-40°F to 400°F)
Speeds: 1.5 to 30.5 m/s
(5 to 100 fps)
Sizes: 20.6 to 152 mm
(0.813 to 6.000 in)

Refer to literature FSD143
at flowserve.com/library.



API PROCESS

GSDH

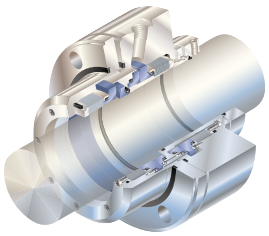
GSDH seals are dry-running metal bellows containment seals for high-temperature hydrocarbons, heat transfer fluids, and other fluids pumped beyond the temperature limits of elastomers.

- Fully compliant with API 682 Type C, Arrangement 2 containment seal requirements
- Simplified maintenance compared to liquid buffer or barrier fluid dual seals; low-pressure steam or nitrogen purge gas helps achieve near-zero emission levels
- Greater reliability via high alloy rotating metal bellows that clear convolutions and prevent accumulation of debris
- Improved safety with spring-energized graphite gasket that seals with minimal seal face distortion and offers outstanding chemical compatibility

SPECIFICATIONS

Press. to: 20.7 bar (300 psi)
Temp: -73°C to 427°C
(-100°F to 800°F)
Speeds: to 19.8 m/s (57 fps)
Sizes: 28.2 to 128.9 mm
(1.110 to 5.073 in)

Refer to literature FSD260
at flowserve.com/library.



API PROCESS

GTSP

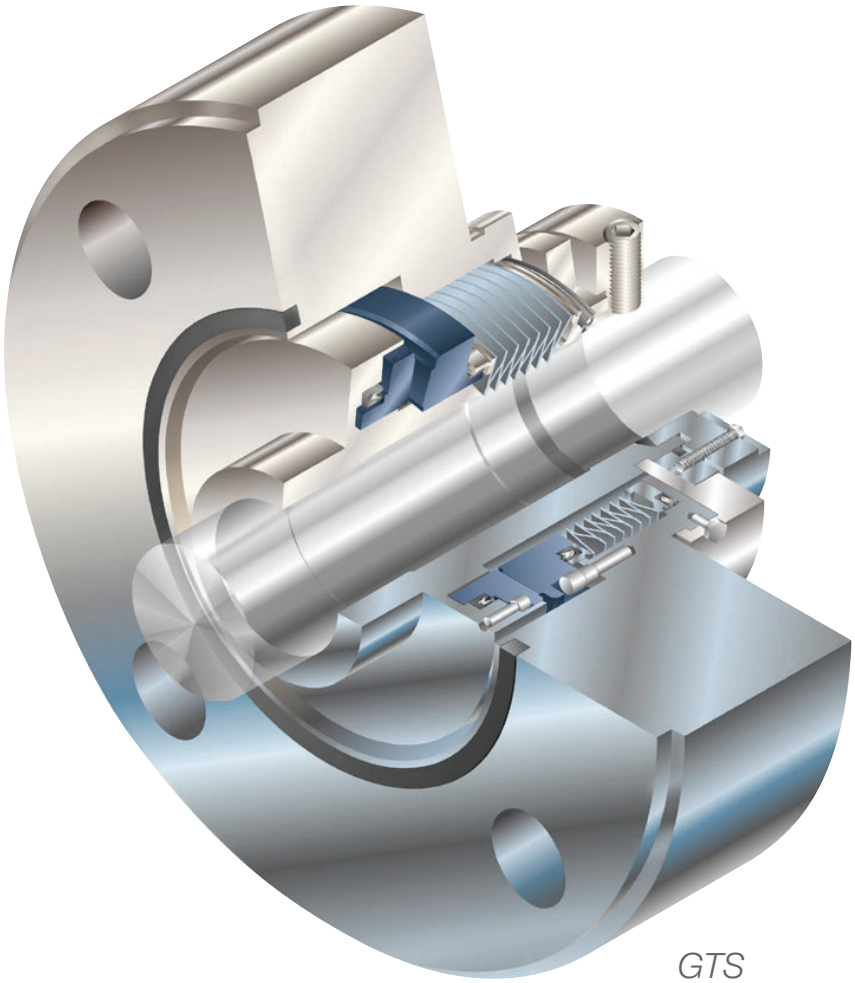
This dual pressurized, high-temperature metal bellows gas seal is engineered for the hottest process pumps found in refinery and hydrocarbon services. Qualification tested per API 682 Type C, Arrangement 3 requirements.

- Increased reliability and service life at lower cost from design that eliminates process leakage and coking problems while avoiding liquid barrier seal issues
- Lower operating costs with laser-applied precision face topography technology, creating a gas film barrier for non-contacting, low-drag, low-energy consumption
- High-temperature performance enhanced by design engineered to operate without cooling and tolerate high axial overtravel during warm-up or thermal transients
- Simplified installation on double-ended pumps via sinusoidal waves, allowing bi-directional operation

SPECIFICATIONS

Press. to: 17.2 bar (250 psi)
Temp: -73°C to 427°C
(-100°F to 800°F)
Speeds: 3 to 46 m/s (10 to 150 fps)
Sizes: 47.6 to 104.8 mm
(1.875 to 4.125 in)

Refer to literature FSD241
at flowserve.com/library.



GTS

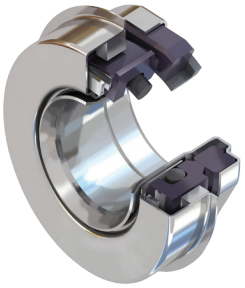
OEM AND SPECIAL DUTY

Flexibility, reliability and low total cost are fundamental to the general industrial and specialty equipment requirements of OEMs. And Flowserve delivers. Global OEM customers will find a variety of mechanical seals developed specifically with OEMs in mind. That means seals for just about anything: seals for a high-speed, high- pressure integrally geared pump; special configurations for a low- speed, high- viscosity positive displacement pump; and much more. We can even help with custom designs. Reach out to our experienced team.

OEM and Special Duty – Quick Reference

Product	Sub-Type	Pressures	Temperatures	Speeds	Sizes
Pac-Seal®	Industrial Process	to 27 bar (400 psi)	-40°C to 204°C (-40°F to 400°F)	to 25 m/s (83 fps)	15.8 to 150 mm (0.625 to 6.000 in)
PL Series	Industrial Process	Vacuum to 10.3 bar (150 psi)	-18°C to 150°C (0°F to 300°F)	to 23 m/s (60 fps)	35 to 53 mm (1.375 to 2.750 in)
PSS 4	Industrial Process	Vacuum to 30 bar (450 psi)	-18°C to 121°C (0°F to 250°F)	to 19.3 m/s (3800 fpm)	38 to 152 mm (1.500 to 6.000 in)
LS-300	High-Viscosity Process	to 10.3 bar (150 psi)	-53°C to 149°C (-65°F to 300°F)	to 3.5 m/s (12 fps)	19.1 to 76.2 mm (0.750 to 3.000 in)
GTS	Steam Turbines	to 20.7 bar (300 psi)	100°C to 343°C (212°F to 650°F)	3 to 46 m/s (10 to 150 fps)	54 to 181 mm (2.125 to 7.125 in)
GSS	Specialty Equipment	to 86.2 bar (1250 psi)	-62°C to 204°C (-80°F to 400°F)	1500 to 36 000 rpm	25.4 to 31.8 mm (1.000 to 1.250 in)
GLS	Specialty Equipment	to 86.2 bar (1250 psi)	-62°C to 204°C (-80°F to 400°F)	1500 to 36 000 rpm	25.4 to 31.8 mm (1.000 to 1.250 in)
GSG	Specialty Equipment	to 17.2 bar (250 psi)	-40°C to 204°C (-40°F to 400°F)	1500 to 36 000 rpm	to 31.8 mm (1.250 in)
Circpac MD	Specialty Equipment	Vacuum to 6.9 bar (100 psi)	-40°C to 593°C (-40°F to 1100°F)	to 46 m/s (150 fps)	25.4 to 457 mm (1.000 to 18.000 in)
Bulk-Tite™	Specialty Equipment	Vacuum to 3.3 bar (50 psi)	0°C to 121°C (32°F to 250°F)	16.6 m/s (54 fps)	12 to 152 mm (0.500 to 6.000 in)

OEM AND SPECIAL DUTY



INDUSTRIAL PROCESS

Pac-Seal

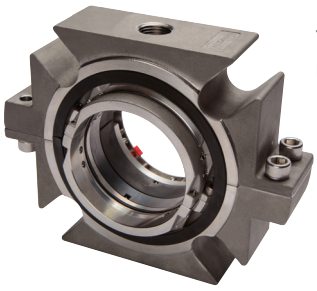
The Pac-Seal family of component seals is available in numerous designs and styles, including diaphragm elastomer bellows to fit a wide range of standard industrial and custom equipment applications.

- Low cost of ownership enabled by readily available components with multiple material options
- Excellent reliability ensured by standardized features, including crimped-head rotary units and hex-torque drive
- Easy installation with no set screws or setting clips
- Custom designs with flexible inventory, logistics and packaging solutions for high-volume OEM orders ensure the right supply requirements are fully achieved

SPECIFICATIONS

Press. to: 27 bar (400 psi)
Temp: -40°C to 204°C (-40°F to 400°F)
Speeds to: 25 m/s (83 fps)
Sizes: 15.8 to 150 mm
(0.625 to 6.000 in)

Refer to literature FSD258
at flowserve.com/library.



INDUSTRIAL PROCESS

PSS 4

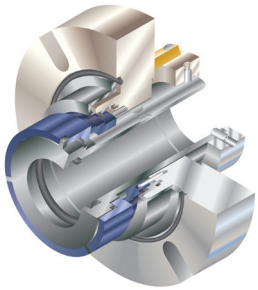
The PSS 4 semi-cartridge split seal is ideal for pump and mixer applications. With only two major components, it makes installation quick and easy without requiring equipment teardown.

- Exclusive 3D Key technology assures optimum face alignment in both axial and radial direction, reducing leakage and installation time
- Unique setting tabs eliminate all seal positioning, measuring and marking, assuring installation success
- Easily handles mixer equipment runout up to 1.5 mm (0.060 in) TIR radial shaft movement
- Fully split design installs easily around the shaft, outside the seal chamber, eliminating the need to dismantle the equipment

SPECIFICATIONS

Press.: Vacuum to 30 bar (450 psi)
Temp: -18°C to 121°C (0°F to 250°F)
Speeds: to 19.3 m/s (3800 fpm)
Sizes: 38 to 152 mm
(1.500 to 6.000 in); contact
Flowserve for larger sizes

Refer to literature FSD272
at flowserve.com/library.



INDUSTRIAL PROCESS

PL Series

PL Series seals are pre-engineered single (PL-100) and dual (PL-200) cartridge seals with non-metallic wetted components. They are a cost-effective alternative to high-alloy seals in ASME and ISO pumps in corrosive services.

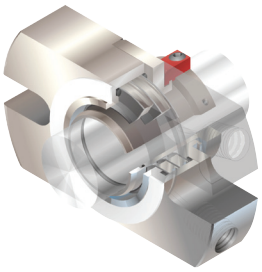
- Greater reliability from special carbon fiber reinforced PTFE construction that provides excellent corrosion resistance and mechanical properties to maintain seal integrity
- Longer service life and MTBF ensured by springs and pins that are isolated from the product to prevent clogging and chemical attack
- Reduced maintenance costs with replaceable carbon fiber PTFE liner that protects the 316 SS gland
- Affordable alternative to high-alloy single or dual metal seals

SPECIFICATIONS

Press.: Vacuum to 10.3 bar (150 psi)
Temp: -18°C to 150°C (0°F to 300°F)
Speeds: to 23 m/s (60 fps)
Sizes: 35 to 53 mm (1.375 to 2.750 in)

HIGH-VISCOSITY PROCESS

LS-300



This cartridge-style, multiple dynamic lip seal is designed for highly viscous applications in positive displacement and progressive cavity pumps.

- Greater process accuracy from seal designed to run dry, without the need for an external flush or lubricating barrier fluid
- Reliable operation ensured by triple-lip design effectively seals process from atmosphere at viscosities up to 12 000 cP
- Installation ease assured by preset cartridge
- Application flexibility enabled by design that is interchangeable between standard and universal bracket pumps with just a gasket change
- Ease of field maintenance made possible by optional repair kit

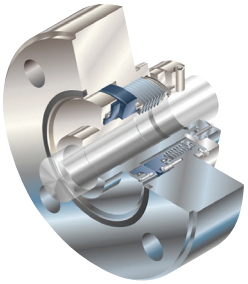
SPECIFICATIONS

Press. to: 10.3 bar (150 psi)
Temp: -53°C to 149°C (-65°F to 300°F)
Speeds to: 3.5 m/s (12 fps)
Sizes: 19.1 to 76.2 mm
(0.750 to 3.000 in)

Refer to literature FSD117
at flowserve.com/library.

STEAM TURBINES

GTS



The most reliable steam seal in the industry, the GTS is a metal bellows seal designed to bring the benefits of mechanical seals to steam turbines and handle slow roll operation.

- Significant energy savings and improved safety made possible by design that replaces carbon rings on steam turbines, significantly reducing steam leakage
- Greater reliability through precision face topography technology, ensuring non-contacting, non-clogging operation able to recover from upset conditions
- Long-lasting, high-temperature and corrosive environment performance enabled by Alloy 718 bellows
- Application versatility enabled by internal or external cartridge design, adaptable for diverse turbines

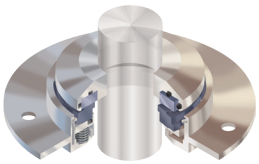
SPECIFICATIONS

Press. to: 20.7 bar (300 psi)
Temp: 100°C to 343°C (212°F to 650°F)
Speeds: 3 to 46 m/s (10 to 150 fps)
Sizes: 54 to 181 mm (2.125 to 7.125 in)

Refer to literature FSD107
at flowserve.com/library.

SPECIALTY EQUIPMENT

GSS



GSS gas-lubricated, non-contacting pusher seals provide superior reliability in high-speed, integrally geared pumps and compressors.

- Longer service life and MTBF enabled by non-contacting precision face topography, eliminating wear at near-zero power consumption
- Installation ease for startup success is provided by a standardized cartridge with a non-clamped rotating face mounted for high-speed performance
- Meets all requirements for low emission containment seals in hydrocarbon pumping applications
- Configurable as a single compressor seal, dual pressurized barrier gas seal, or dry-running containment seal

SPECIFICATIONS

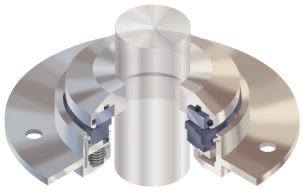
Press. to: 86.2 bar (1250 psi)
Temp: -62°C to 204°C (-80°F to 400°F)
Speeds: 1500 to 36 000 rpm
Sizes: 25.4 to 31.8 mm
(1.000 to 1.250 in)

Refer to literature FSD102
at flowserve.com/library.

OEM AND SPECIAL DUTY

SPECIALTY EQUIPMENT

GLS



The GLS is the liquid service configuration of the Flowserve GSS. It is designed to fit the unique installation envelop and operating speeds present in integrally geared pumps.

- High-pressure performance enabled by successful operation up to 86.2 bar (1250 psi) in flashing hydrocarbons
- Longer service life assured by operation with no measureable face wear or worn taper due to enhanced seal face flatness provided by the non-clamped rotating SiC face
- Meets all requirements for low emission seals in hydrocarbon pumping applications
- Configurable as a single seal, dual unpressurized seal with liquid buffer, dual unpressurized seal with gas buffer, or dual pressurized seal with liquid barrier

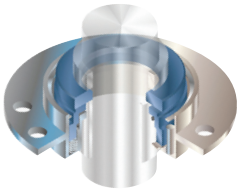
SPECIFICATIONS

Press. to: 86.2 bar (1250 psi)
Temp: -62°C to 204°C (-80°F to 400°F)
Speeds: 1500 to 36 000 rpm
Sizes: 25.4 to 31.8 mm
(1.000 to 1.250 in)

Refer to literature FSD102
at flowserve.com/library.

SPECIALTY EQUIPMENT

GSG



GSG seals are specifically designed for integrally geared pumps and compressors in high-speed, oil-flooded gearbox applications.

- Energy savings and improved safety enabled by innovative Hydrodynamic Surface Tension (HST) face topography that provides near-zero leakage performance
- Reliable high-speed operation enabled by proprietary laser-machined wavy face
- Greater durability and service life assured by seal face materials suitable for frequent starts and stops
- Upgrade ease made possible by direct replacement of existing gearbox seals without equipment modification

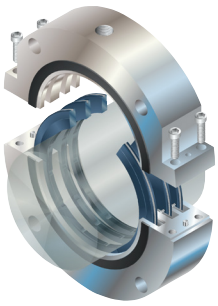
SPECIFICATIONS

Press. to: 17.2 bar (250 psi)
Temp: -40°C to 204°C (-40°F to 400°F)
Speeds: 1500 to 36 000 rpm
Sizes to: 31.8 mm (1.250 in)

Refer to literature FSD102
at flowserve.com/library.

SPECIALTY EQUIPMENT

Circpac MD



The Circpac MD is a segmented circumferential seal designed for fans, blowers, dryers, turbines, centrifuges and other rotating equipment.

- Superior performance with lower gas consumption ensured by hydraulically balanced ring design that consistently outperforms packing, bushings, labyrinths and felt seals
- Installation ease with radially split seal housing that mounts outside the seal chamber without modification or dismantling
- Increased durability provided by robust carbon rings with foul-resistant joints and large bearing pads that maintain integrity during off-design operation
- Application flexibility with multiple ring configurations that can be staged for reduced leakage, pressurized for zero process emissions, or added for emergency backup

SPECIFICATIONS

Press.: Vacuum to 6.9 bar (100 psi)
Temp: -40°C to 593°C
(-40°F to 1100°F)
Speeds to: 46 m/s (150 fps)
Sizes: 25.4 to 457 mm
(1.000 to 18.000 in)

Refer to literature FSD195
at flowserve.com/library.

SPECIALTY EQUIPMENT

BulkTite



Designed for rotating equipment handling powder and bulk solids, BulkTite seals improve sealing performance with non-wearing, low-maintenance solutions for screw conveyors, rotary airlocks, mixers, de-lumpers and more.

- Easy cartridge seal installation, minimizing downtime
- Superior seal life with 3.2 mm (0.125 in) radial shaft movement, up to 2° angular misalignment and axial shaft movement
- Minimal gas consumption for reduced operating costs

SPECIFICATIONS

Press. to: Vacuum to 3.3 bar (50 psi)
Temp: 0°C to 121°C (32°F to 250°F)
Speeds to: 16.6 m/s (54 fps)
Sizes: 12 to 152 mm
(0.500 to 6.000 in)

Refer to literature FSD267
at flowserve.com/library.



W8 Reservoir

SEAL SUPPORT SYSTEMS

Flowserve seal support systems help ensure years of safe, reliable and cost-effective mechanical seal operation. Flowserve employs a specialized engineering team with years of experience recommending or designing systems to suit specific applications, specifications and unique customer requirements. With a full range of products that meet ASME Section VII Division 1, API, PED, NR13 and numerous other regional and international standards, Flowserve fulfills the global needs of the oil and gas, chemical, power, water and general industries.

Seal Support Systems – Quick Reference

Product Type	Sub-Type	Flows to	Pressures	Temperatures	Volume
Buffer/Barrier Fluid Reservoirs	Industrial & API Process	—	to 82.3 bar (1200 psi)	to 148°C (300°F)	to 20 L (5 gal)
Bladder Accumulators	Industrial & API Process	—	to 82.3 bar (1200 psi)	to 148°C (300°F)	20 to 50 L (5 to 13 gal)
Piston Accumulators	Industrial & API Process	—	to 75.8 bar (1100 psi)	to 148°C (300°F)	to 11.4 L (3 gal)
Buffer/Barrier Gas Panels	Industrial & API Process	14.2 lpm (30 SCFH)	to 34.4 bar (500 psi)	to 93°C (200°F)	—
Circulators	Industrial & API Process	15 lpm (4 gpm)	to 27.6 bar (400 psi)	4.4°C to 60°C (40°F to 140°F)	—
682 Water Seal Coolers	API Process	—	to 275 bar (4000 psi) to 371°C (700°F) (coil)	—	—
Water Seal Coolers	Industrial Process	—	to 183 bar (2650 psi) to 95°C (200°F)	—	—
Airfin Seal Cooler	Industrial Process	—	to 80 bar (1200 psi)	to 425°C (800°F)	—

SEAL SUPPORT SYSTEMS



INDUSTRIAL & API PROCESS

Buffer/Barrier Fluid Reservoirs

Flowserve reservoirs are available for dual pressurized (Plan 53A) and dual non-pressurized (Plan 52) mechanical seals. Options are available for utilizing water or oil as barrier fluid.

- Extended seal life made possible by reliable supply of clean buffer/barrier fluid for cooling and lubrication
- Reduced maintenance and operating costs with optimal buffer/barrier fluid management
- Increased reservoir life with corrosion-resistant 304, 316 or 316L construction
- Compliance with API 682, ASME Section VIII, ASME B31.3, PED and/or TRD as required
- Application flexibility provided by configurations and instrumentation that are easily adapted to local standards as well as application and customer requirements

SPECIFICATIONS

Press: to 82.3 bar (1200 psi)
Temp: to 148°C (300°F)
Volume: to 20 L (5 gal)

Refer to literature FSD239 at flowserve.com/library.



INDUSTRIAL & API PROCESS

Bladder Accumulators

Plan 53B barrier systems are available with multiple options for accumulator sizes, coolers and piping. Compliant with API 682, ASME Section VIII, ASME B31.3, PED and/or TRD as required.

- Increased seal life at higher barrier seal pressures
- Improved reliability by preventing nitrogen entrainment in the barrier fluid
- Ease of installation provided by design that does not require connection to a plant nitrogen utility
- Application flexibility provided by configurations and instrumentation that are easily adapted to local standards as well as application and customer requirements
- Improved reliability made possible by the ability to monitor each seal individually

SPECIFICATIONS

Press: to 82.3 bar (1200 psi)
Temp: to 148°C (300°F)
Volume: 20 to 50 L (5 to 13 gal)



INDUSTRIAL & API PROCESS

Piston Accumulators

Flowserve Plan 53C piston accumulators can be built with multiple options for cooling coils, external heat exchanges and instrumentation to fit customer requirements. Compliant with ASME or PED as required.

- Improved seal life and reliability ensured by tracking barrier pressure where pump pressure fluctuates or the inboard seal pressure differential must be limited
- Lower operating costs from maintenance and barrier fluid cost savings
- Application flexibility provided by configurations and instrumentation that are easily adapted to local standards as well as application and customer requirements

SPECIFICATIONS

Press: to 75.8 bar (1100 psi)
Temp: to 148°C (300°F)
Volume: to 11.4 L (3 gal)

INDUSTRIAL & API PROCESS

Buffer/Barrier Gas Panels



Flowserve Plan 72 and 74 gas panels combine flow monitoring and control elements in a self-contained, easy-to-use unit. For use with unpressurized and pressurized Flowserve gas seals.

- Maximized seal life enabled by supply of clean barrier or buffer gas at optimal conditions
- Compliance with API 682, ASME B31.3 and PED requirements
- Low installation and commissioning costs assured by easy-to-install, self-contained units

SPECIFICATIONS

Flows to: 14.2 lpm (30 SCFH)
Press to: 34.4 bar (500 psi)
Temp: to 93°C (200°F)

INDUSTRIAL & API PROCESS

Circulators



Plan 54 circulators provide clean barrier fluid at a controlled flow rate, pressure and temperature to ensure proper seal performance.

- Optimized seal operating temperatures ensured by maximum system cooling
- Improved seal reliability with a dependable local system, eliminating the need to connect to a distant and potential unreliable pressure source
- Extended seal life enabled by improved system cleanliness that is maintained using one or more high-quality, full-flow liquid filters
- Application flexibility provided by configurations and instrumentation that are easily adapted to local standards as well as application and customer requirements

SPECIFICATIONS

Flows: to 15 lpm (4 gpm)
Press: to 27.6 bar (400 psi)
Temp: 4.4°C to 60°C (40°F to 140°F)

Refer to literature FSD122 at flowserve.com/library.

API PROCESS

682 Water Seal Coolers



Flowserve seal coolers are engineered for high-temperature refinery applications and maximized cooling capacity. Two designs available: the full-featured 682 Seal Cooler and the lower-duty LD 682 Seal Cooler.

- Process control ensured by design that isolates the process fluid from the cooling water
- Ease of commissioning with full vent and drain on both product and coolant sides
- Ease of maintenance provided by ability to quickly and easily disassemble and clean the unit without damaging the coils
- Cost-effective application flexibility with multiple corrosion-resistant material options for the coil and shell construction

SPECIFICATIONS

Press: to 275 bar (4000 psi) (coil)
Temp: 371°C (700°F) (coil)

Refer to literature FSD106 and FPD238 at flowserve.com/library.

SEAL SUPPORT SYSTEMS



INDUSTRIAL PROCESS

Water Seal Cooler

Water seal coolers lower the temperature of process/barrier fluid to improve seal reliability. Designed and manufactured in accordance with ASME Section VIII, Div 1 and PED.

- Easy installation in limited spaces due to compact design with integral mounting bracket and convenient pipe porting
- Simplified maintenance with quick access to coil, only one bolt fastening the shell, and no disturbance to piping during shell removal
- High-temperature fittings included as standard

SPECIFICATIONS

Press: to 183 bar (2650 psi) to 95°C (200°F)

Refer to literature FSD174 at flowserve.com/library.



INDUSTRIAL & API PROCESS

Airfin Seal Cooler

The Airfin seal cooler is available in natural convection and forced air designs with a cooling area of 2.5 m^2 (26.8 ft^2).

- Lower operating costs ensured by air-cooling technology that eliminates water treatment and disposal
- Improved reliability with cooling water-free design, which prevents accidental shutoff and winter freeze-up
- Minimal installation and maintenance costs with unit design that requires less piping and is less susceptible to fouling

SPECIFICATIONS

Press: to 80 bar (1200 psi)
Temp: to 425°C (800°F)

Refer to literature FSD197 at flowserve.com/library.

The Time Value of Service

Every minute of uptime counts. We get it. We're here to help with sealing technologies, systems and services that minimize downtime, improve equipment reliability and reduce operating expenses — one seal at a time or across an entire unit. And, with our global network of Quick Response Centers, you can rest easy knowing support is near, inventory can ship the same day, and engineered seal repairs can be turned around within days, if not hours.





Bearing Gard

ACCESSORIES

Flowserve accessories for mechanical seals and associated equipment help you enhance long-term reliability and safety while minimizing maintenance. Bearing isolators protect bearing housings from environmental contamination for greater equipment longevity and less downtime. DuraClear synthetic lubricants and barrier fluids provide optimal lubrication for mechanical seals and rotating equipment to extend service life by reducing friction and wear. Cyclone and magnetic separators protect seals and other components by removing entrained particulate from the coolant stream. These products are a sample of the most popular accessories for protecting seals, seal support systems and general rotating equipment.

Accessories – Quick Reference

Product Type	Sub-Type	Flows to	Pressures	Temperatures	Sizes
Bearing Gard™	Bearing Isolator	—	—	—	23 to 203 mm (0.875 to 8.000 in)
BGM	Bearing Isolator	—	—	—	to 152 mm (6.000 in)
DuraClear™	Industrial Process	—	—	—	—
Refill Cart	Industrial Process	—	to 103 bar (1500 psi)	—	76 L (20 gal)
Seal Gard™	Industrial Process	13 lpm (3.5 gpm)	25 bar (363 psi)	0°C to 100°C (32°F to 212°F)	—
Magnetic Separator	High-Energy Process	15 lpm (4 gpm)	103.4 bar (1500 psi)	to 204°C (400°F)	12.7 to 19 mm (0.500 to 0.750 in)
Cyclone Separator	Slurry Process	57 lpm (0.9 to 15 gpm)	138 bar (2000 psi)	to 455°C (850°F)	12.7 to 19 mm (0.500 to 0.750 in)
SLD	Slurry Process	—	—	to 80°C (175°F)	—

ACCESSORIES



BEARING ISOLATOR

Bearing Gard

Bearing Gard isolators improve rotating equipment reliability by protecting against contamination and improving oil retention. Applied in all industries, they satisfy IP-66, IEEE-841, API 610 and ATEX requirements.

- Increased rotating equipment life enabled by preventing the #1 reason for rotating equipment failure: contamination of bearings and lubrication
- Decreased maintenance costs made possible with design that eliminates shaft wear and fretting common with other isolator designs
- Significantly reduced oil leaks with non-contacting, non-wearing technology
- Lower inventory costs and fewer part numbers to manage, with one design that covers axial movement up to 0.63 mm (0.025 in)
- Reduced lead time with same-day shipping of made-to-order sizes

SPECIFICATIONS

Sizes: 23 to 203 mm (0.875 to 8.000 in)

Refer to literature FSD257 at flowserve.com/library.



BEARING ISOLATOR

BGM

Utilizing rare earth magnets to keep seal faces closed, the BGM completely isolates the bearing housing from contamination and effectively contains oil mist within the bearing housing.

- Increased rotating equipment life enabled by preventing the #1 reason for rotating equipment failure: contamination of bearings and lubrication
- Decreased oil mist lubrication costs with positive sealing, preventing oil mist egress
- Reduced maintenance costs provided by magnets holding the seal faces closed to minimize oil leakage while allowing high axial shaft movement

SPECIFICATIONS

Sizes: to 152 mm (6.000 in)

Refer to literature FSD149 at flowserve.com/library.



INDUSTRIAL PROCESS

DuraClear

DuraClear high-performance synthetic lubricants are specially formulated for dual mechanical seal barrier or buffer fluids to increase mean time between planned maintenance and reduce energy consumption.

- Process fluid compatibility assured by synthetic oils and oil blends readily available with food grade compliance; DuraClear Crystal 7 is chemically inert and non-reactive for the most aggressive services
- Extended seal life with reduced friction and wear, oxidation resistance, temperature stability and low volatility
- Increased drain and replenish intervals due to longer fluid life
- Increased uptime with formulations for bearing frame oil, compressor oil, gear oil, hydraulic oil, turbine oil, air tool lubricant and grease applications

SPECIFICATIONS

NSF H-1 Food Grade
ISO 5, 7 and 32 viscosities available

Refer to literature FSD123, FSD269 and FSD268 at flowserve.com/library.



INDUSTRIAL PROCESS

Refill Cart

This rugged, easy-to-use, high-capacity reservoir refill cart allows you to add barrier fluid to seal support systems.

- Reduced maintenance enabled by ability to add barrier fluid during operation, without pump downtime or fugitive emissions
- Reduced errors with optional color-coded quick disconnects to prevent adding incorrect fluid
- Ease of use provided by rugged, easy-to-maneuver cart with pneumatic tires, large reservoir tank and high-pressure hand pump

SPECIFICATIONS

Volume: to 76 L (20 gal)
Press: to 103 bar (1500 psi)



INDUSTRIAL PROCESS

Seal Gard

The Seal Gard manages seal water flow rates for single and dual seals to improve the mean time between planned maintenance of your rotary equipment by improving the environment in the seal area.

- Lower operating cost from dependable flow control that saves water costs by reducing seal water usage
- Ease of operation assured by clear-view acrylic flow meter with vertical flow tube that resists fouling and vibration-resistant pressure gauge
- Reduced downtime enabled by standard check valve that prevents backup of product into the seal water line in the event of pressure reversal

SPECIFICATIONS

Flows to: 13 lpm (3.5 gpm)
Press. to: 25 bar (363 psi)
Temp: 0°C to 100°C (32°F to 212°F)

Refer to literature FSD154 at flowserve.com/library.



HIGH-ENERGY PROCESS

Magnetic Separator

A magnetic separator installed in closed loop fluid systems removes iron oxide particles, protects equipment from contamination damage and increases system reliability.

- Minimal installation costs by inline insertion into Plan 23 piping plans or similar closed loop control lines
- Improved mechanical seal reliability enabled by strong magnetic field that effectively captures iron oxide particles to prevent seal face abrasion, hang-up or clogging
- Long-term reliability provided by large surface area of magnet capable of storing iron oxide particles through extended maintenance cycles

SPECIFICATIONS

Flows: to 15 lpm (4 gpm)
Press. to: 103.4 bar (1500 psi)
Temp: to 204°C (400°F)
Sizes: 12.7 to 19 mm (0.500 to 0.750 in)

Refer to literature FSD173 at flowserve.com/library.

ACCESSORIES



SLURRY PROCESS

Cyclone Separator

Cyclone separators are designed to efficiently remove sand, pipe scale and other abrasive particles from Plan 31 injection flow to mechanical seals.

- Increased seal reliability ensured by centrifugal effects generated by differential pressure across the cyclone that carries away abrasive particles
- Improved equipment reliability, with up to 99% separation efficiency
- Offered in several sizes to fit the application based on flow rate and pressure

SPECIFICATIONS

Flows to: 57 lpm (0.9 to 15 gpm)
Press. to: 138 bar (2000 psi)
Temp: to 455°C (850°F)
Sizes: 12.7 to 19 mm
(0.500 to 0.750 in)

Refer to literature FSD173 at flowserve.com/library.



SLURRY PROCESS

SLD

The SLD dispenses lubrication to the atmospheric side of mechanical seals. It is ideal for seals subjected to periods of dry running or cavitation when product liquid does not provide adequate film between seal faces.

- Extended seal life — particularly flushless seals in harsh slurry conditions — made possible by providing and maintaining proper lubrication
- Lower operating cost delivered by unitized system that does not require air, electricity or external water
- Increased uptime with DS-920-OG DuraClear lubricant, which resists breakdown when mixed with pumpage, water or containments
- Optional DS-460-F DuraClear lubricant is approved by USDA for incidental food contact

SPECIFICATIONS

Temp: to 80°C (175°F)

Refer to literature FSD148 at flowserve.com/library.

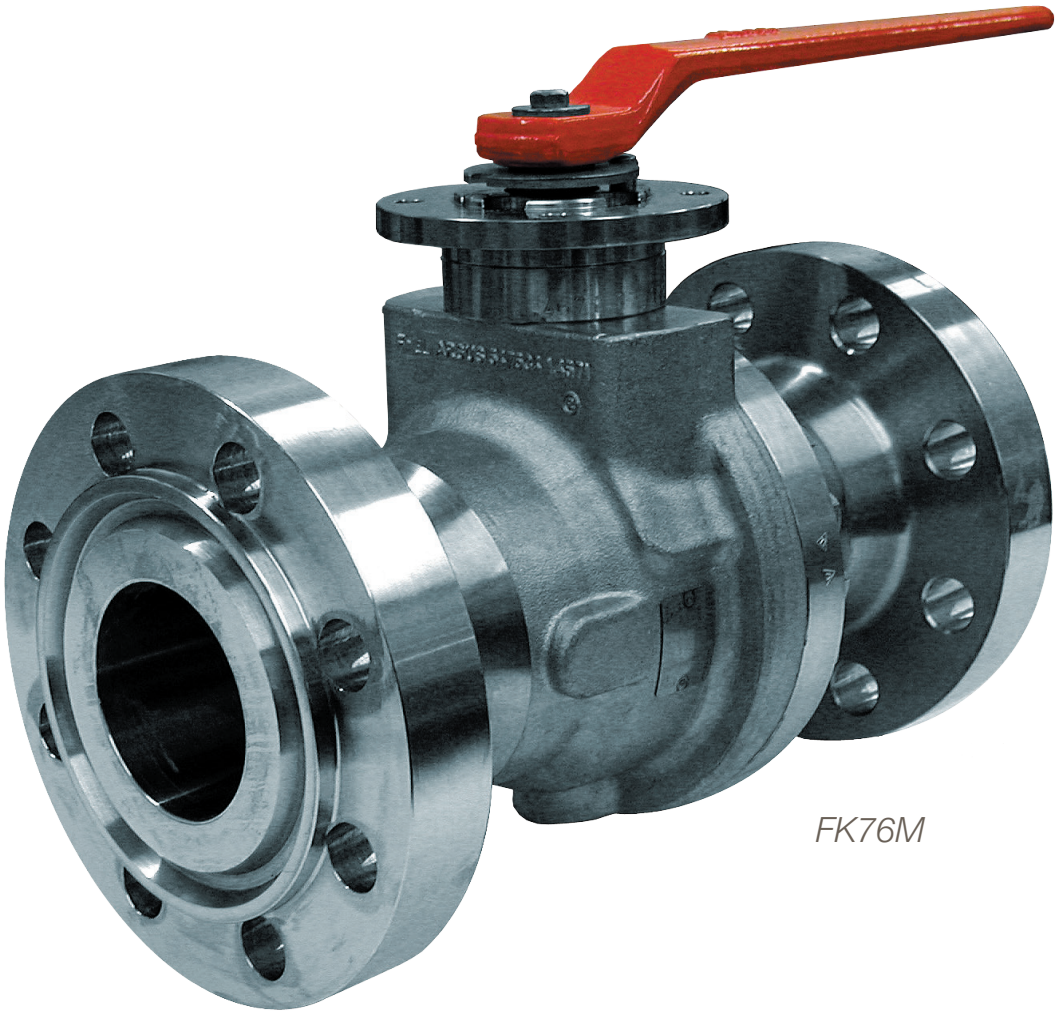

valtek
FLOWSERVE
FLOWSERVE

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.

Ball 142
Butterfly 158
Rotary Control 162
Linear Control 168
Severe Service Control 178
Gate 186
Globe 190
Check 198
Plug 206



FK76M

BALL

Long life and safe operation in tough services, from cryogens 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
FK75M	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)
FK79	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)
Duball™ DL	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)
Worcester Three-Piece Ball	Floating	DN 8 to 150 NPS ¼ to 6	PN 100 Class 600	-46°C to 230°C (-51°F to 446°F)
Worcester Flanged Ball	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)
Worcester Cryogenic Ball	Floating	DN 8 to 150 NPS ¼ to 6	PN 100 Class 600	-196°C to 82°C (-321°F to 180°F)
CryoSeal	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
ProCap Capping Valve	Segmented	DN 500 to 750 NPS 20 to 30	PN 16 Class 150	-30°C to 250°C (-22°F to 482°F)
FK76M	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)
HK35	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)
VW1	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)
VB2 and VB3	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)
Subsea	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)
Double Block and Bleed	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)
Cryogenic Ball Valve	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)
Trunnball™ DL	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)
Rising Stem Ball Valve (RSBV)	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)
AKH2	Lined	DN 15 to 350 NPS ½ to 14	PN 16 Class 150	-10°C to 200°C (14°F to 392°F)
AKH2-300	Lined	DN 25 to 150 NPS 1 to 6	PN 50 Class 300	-10°C to 200°C (14°F to 392°F)
AKH2A	Lined	NPS 1 to 6	Class 150	-10°C to 200°C (14°F to 392°F)

Product	Sub-Type	Sizes	Pressures	Temperatures
AKH3	Lined	NPS 1 to 14	Class 150	-10°C to 200°C (14°F to 392°F)
AKH5	Lined	DN 25 to 150 NPS 1 to 6	PN 16 Class 150	-10°C to 350°C (14°F to 662°F)
AKH7-KP	Lined	DN 25 to 50 NPS 1 to 2	For glass connections	-10°C to 200°C (14°F to 392°F)
AKH8	Lined	DN 15 to 150 NPS ½ to 6	PN 16 Class 150	-10°C to 200°C (14°F to 392°F)
V-Port	Lined	DN 25 to 150 NPS 1 to 6	Varies, depending on valve	Varies, depending on valve
AMP3	Lined	DN 25 to 150 NPS 1 to 6	PN 16 Class 150	-10°C to 200°C (14°F to 392°F)
Sight Glass Series	Lined	DN 25 to 150 NPS 1 to 6	PN 16 Class 150	-10°C to 200°C (14°F to 392°F)
AKH6 Fully Lined Tank Drain	Lined	DN 25x50 to 150x200 NPS 1x2 to 6x8	PN 16 Class 150	-10°C to 200°C (14°F to 392°F)
McCANNASEAL®	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)
VT1	Top-Entry	DN 50 to 1400 NPS 1 13/16 to 16¾	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

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



Argus®

- 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 ARAFL0001-W-FK75M at flowserve.com/library.

FLOATING

FK79

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.



Argus

- 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

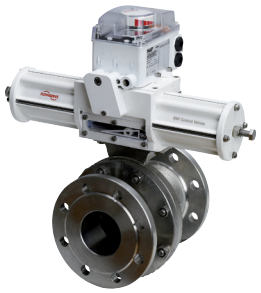
Sizes: DN 15 to 50; NPS ½ to 2
Press: PN 16 to 250; Class 150 to 2500
Temp: -105°C to 650°C
(-157°F to 1202°F)

Refer to literature ARAFL0001-W-FK79 at flowserve.com/library.

FLOATING

Duball DL

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



NAF®

- 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.

FLOATING

Worcester Three-piece Ball



Worcester

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.

FLOATING

Worcester Flanged Ball



Worcester

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.

FLOATING

Worcester Cryogenic Ball



Worcester

Worcester high-performance cryogenic shutoff valves are designed for tough applications involving all types of cryogens, including oxygen, hydrogen, methane, ammonia, nitrogen, flourine, 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 WCE-BR0013 at flowserve.com/library.

BALL

FLOATING

CryoSeal



McCANNA™

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, MESC 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.

SEGMENTED

ProCap Capping Valve



NAF

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.

TRUNNION-MOUNTED

FK76M



Argus

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.

TRUNNION-MOUNTED

HK35



Argus

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.

TRUNNION-MOUNTED

VW1



Valbart ®

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.

- 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.

TRUNNION-MOUNTED

VB2 and VB3



Valbart

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.

- 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.

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.

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.

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.

TRUNNION-MOUNTED

Trunnball DL



NAF

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.

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)



Valbart

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

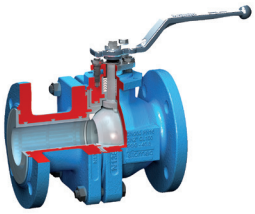
Sizes: DN 25 to 600; NPS 1 to 24
Press: PN 10 to 320; Class 150 to 2500
Temp: -196°C to 600°C
(-321°F to 1112°F)

Refer to literature VBENBR1008 at flowserve.com/library.

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

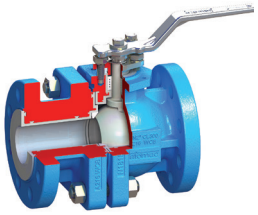
SPECIFICATIONS

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.

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

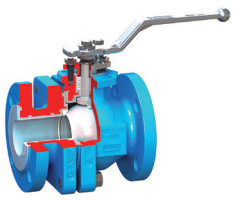
SPECIFICATIONS

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.

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

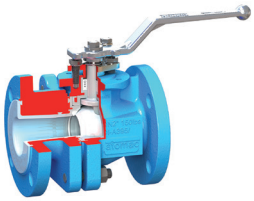
Sizes: NPS 1 to 6
Press: Class 150
Temp: -10°C to 200°C (14°F to 392°F)

Refer to literature ATETB001 or ATENTB0010 at flowserve.com/library.

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

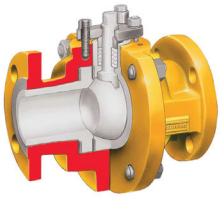
Sizes: NPS 1 to 14
Press: Class 150
Temp: -10°C to 200°C (14°F to 392°F)

Refer to ATETB001 or ATENTB0010 at flowserve.com/library.

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

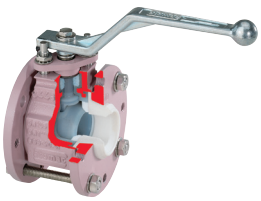
Sizes: DN 25 to 150; NPS 1 to 6
Press: PN 16; Class 150
Temp: -10°C to 350°C (14°F to 662°F)

Refer to ATETB001 or ATENTB0010 at flowserve.com/library.

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.

BALL

LINED

AKH8

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.



Atomac

- 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

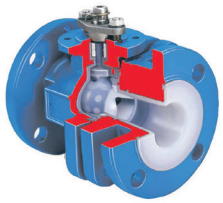
Sizes: DN 15 to 150; NPS ½ to 6
Press: PN 16; Class 150
Temp: -10°C to 200°C (14°F to 392°F)

Refer to literature ATDEENFL0007 at flowserve.com/library.

LINED

V-Port

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



Atomac

- 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

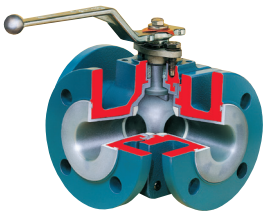
Sizes: DN 25 to 150; NPS 1 to 6
Press: Varies, depending on valve
Temp: Varies, depending on valve

Refer to literature ATENTB0010 at flowserve.com/library.

LINED

AMP3

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



Atomac

- 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

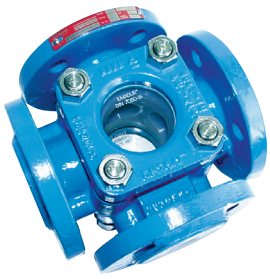
SPECIFICATIONS

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.

LINED

Sight Glass Series



Atomac

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.

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

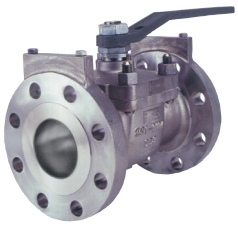
SPECIFICATIONS

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.

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.

BALL



Valbart

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

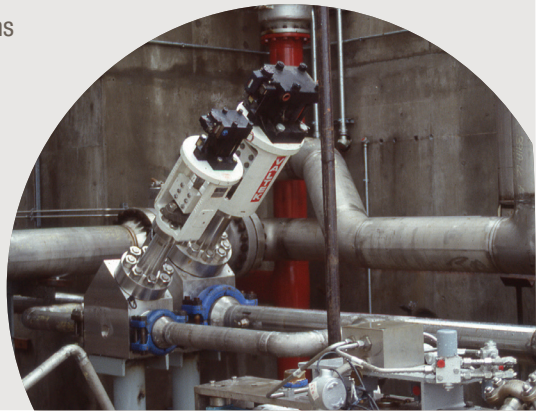
SPECIFICATIONS

Sizes: DN 50 to 1400; NPS 1 13/16 to 16 3/4
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.

Your Partner in Safety – Valves for O_2 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
Big Max® BX2001	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)
TX3	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)
Torex™	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)
BTV	Lined	DN 50 to 600 NPS 2 to 24	PN up to 10 Up to 150 psi	177°C (350°F)
Slimseal®	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



Durco

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.



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.



NAF

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.



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.



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.



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
MaxFlo® 4	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)
ShearStream™ HP	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)
Setball™	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)
Setball SF	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)
Valdisk	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)
Valdisk TX3	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)
Torex	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)
TMCBV	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)
Trunnball DL	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)
CPT	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)
Duball DL	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.

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.

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.

SEGMENTED BALL

Setball SF



NAF

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.

HIGH-PERFORMANCE BUTTERFLY

Valdisk



Valtek

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.

HIGH-PERFORMANCE BUTTERFLY

Valdisk TX3



Valtek

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.

ROTARY CONTROL

HIGH-PERFORMANCE BUTTERFLY

Torex



NAF

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.

TRUNNION-MOUNTED CONTROL BALL

TMCBV



Valbart

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

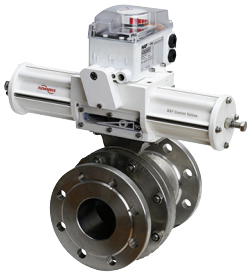
SPECIFICATIONS

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.

TRUNNION-MOUNTED CONTROL BALL

Trunnball DL



NAF

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.



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.



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.

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
Mark One™	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)
Mark One Three-Way	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)
Mark One-X	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)
Mark 100	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)
Mark 200	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)
Mark Two™	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)
Mark Eight™	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)
FlowTop™ GS	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)
FlowTop	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
HpFlow 011000 and 015000	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)
LinedFlow™ 132000	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)
TotalFlow 035000	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)
TotalFlow 335000	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)
ColdFlow 041000A	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)
ColdFlow 341000	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)
SmallFlow™ 080000	Linear Globe/Angle	NPS ¼	PN 400 Class 2500	-40°C to 700°C (40°F to 1292°F)
SmallFlow 385000	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)
CleanFlow™ 191000	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
DrainFlow 051000	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



Valtek

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

- 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.

LINEAR GLOBE/ANGLE

Mark One Three-Way



Valtek

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.

- 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.

LINEAR GLOBE/ANGLE

Mark One-X



Valtek

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.

- 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.

LINEAR CONTROL

LINEAR GLOBE/ANGLE

Mark 100



Valtek

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.

LINEAR GLOBE/ANGLE

Mark 200



Valtek

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.

LINEAR GLOBE/ANGLE

Mark Two



Valtek

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.

LINEAR GLOBE/ANGLE

Mark Eight



Valtek

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.

LINEAR GLOBE/ANGLE

FlowTop GS



Valtek

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.

LINEAR GLOBE/ANGLE

FlowTop



Valtek

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.

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 (-40°F to 482°F)

Refer to literature KMEEBR1120 at 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 reproduceable 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.



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.



Kämmer

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.



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.

LINEAR CONTROL



Kämmer

LINEAR GLOBE/ANGLE

ColdFlow 341000

Cryogenic control valves for helium liquefication 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 KMDETB4104 at 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 $6.3x10^{-5}$, 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 KMENTB8020 at 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 $6.3x10^{-5}$ 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 KMENBR5000 at 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.



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.



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
Survivor™	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)
Multi-Z	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
MegaStream™	Noise Reduction	Valtek Mark Series	DN 25 to 900 NPS 1 to 36	4 to 8737 (5 to 10 100)
Stealth™	Noise Reduction	Valtek Mark Series	DN 80 to 900 NPS 3 to 36	to 3547 (4100)
TMCBV N2 and D1	Noise Reduction	Valbart TMCBV	DN 80 to 1400 NPS 3 to 56	117 to 77 850 (135 to 90 000)
Z-Trim™	Noise Reduction	Setball, Duball DL and Trunnball DL	DN 40 to 500 NPS 1½ to 20	4 to 65 000 (5 to 75 000)
CavControl™	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
TMCBV C2 and C1	Cavitation Control	Valbart TMCBV	DN 100 to 1400 NPS 4 to 56	4 to 65 000 (5 to 75 000)
ChannelStream™	Cavitation Elimination	Valtek Mark Series	DN 40 to 900 NPS 1½ to 36	5 to 623 (6 to 720)
DiamondBack™	Cavitation Elimination	Valtek Mark Series	DN 40 to 400 NPS 1½ to 16	2 to 1773 (3 to 2050)
SideWinder™	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.



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

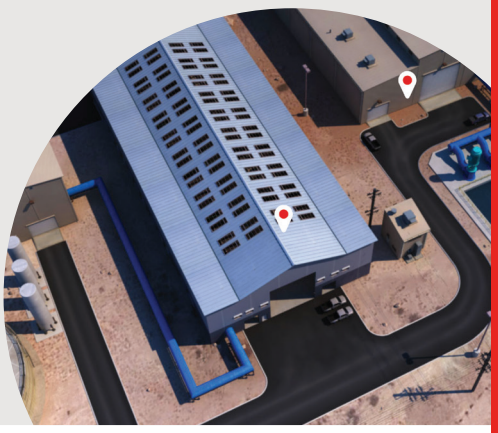
SPECIFICATIONS

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.

Explore Flowserve VirtualPlant

Quickly find the pumps, valves, seals and actuation best suited for your plant with Flowserve VirtualPlant. 3D models of various plant types within the oil and gas, chemical, power, water and general industries make it easy for you to see which Flowserve products are used in key units and applications. Quick access to product literature, videos and user instructions helps you to select the ideal products for your specific application requirements. Begin exploring now at **https://virtualplant.flowserve.com**



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_v (C_v) 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.

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

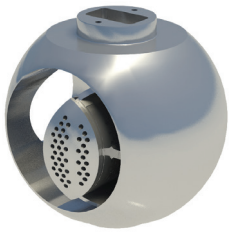
SPECIFICATIONS

Base Valve: Valtek Mark Series
Sizes: DN 80 to 900; NPS 3 to 36
K_v (C_v) Range: to 3547 (4100)
Flow Direction: Under the plug
Pressure Stages: 6 to 20

Refer to literature FCENBR0067 at 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

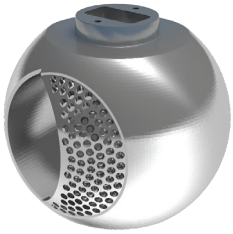
SPECIFICATIONS

Base Valve: Valbart TMCBV
Sizes: DN 100 to 1400; NPS 4 to 56
K_v (C_v) Range: 117 to 77 850 (135 to 90 000)
Pressure Stages: 1 to 4

Refer to VLENBR0067 or VBENTB0068 at flowserve.com/library.

NOISE REDUCTION

Z-Trim



NAF

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 Trunnball 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.

CAVITATION CONTROL

CavControl



Valtek

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.

- 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

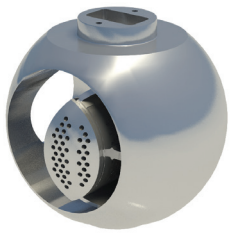
SPECIFICATIONS

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.

CAVITATION CONTROL

TMCBV C2 and C1



Valtek

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

- 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.

SEVERE SERVICE CONTROL



Valtek

CAVITATION ELIMINATION

ChannelStream

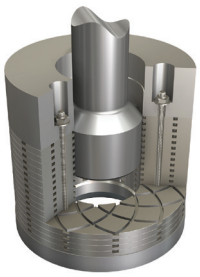
ChannelStream trim prevents cavitation from forming and minimizes hydrodynamic noise in the most severe liquid applications.

- 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_v (C_v) 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.



Valtek

CAVITATION ELIMINATION

DiamondBack

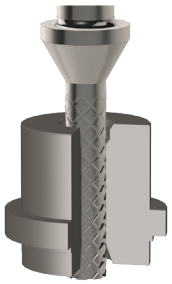
The most technologically advanced anti-cavitation design in the industry, the Valtek DiamondBack uses staged pressure drops to eliminate cavitation, even in the most demanding services.

- 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_v (C_v) 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.



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_v (C_v) 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.



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
Equiwedge™ MSIV/MFIV	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)
Equiwedge	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)
Flex Wedge	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)
Double Disk	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)
Split Wedge	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)
Slab Gate	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.



Edward

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.



Anchor/Darling®

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.

PARALLEL SLIDE

Double Disk



Anchor/Darling

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.

SPLIT WEDGE

Split Wedge



Anchor/Darling

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.

SLAB

Slab Gate



Valbart

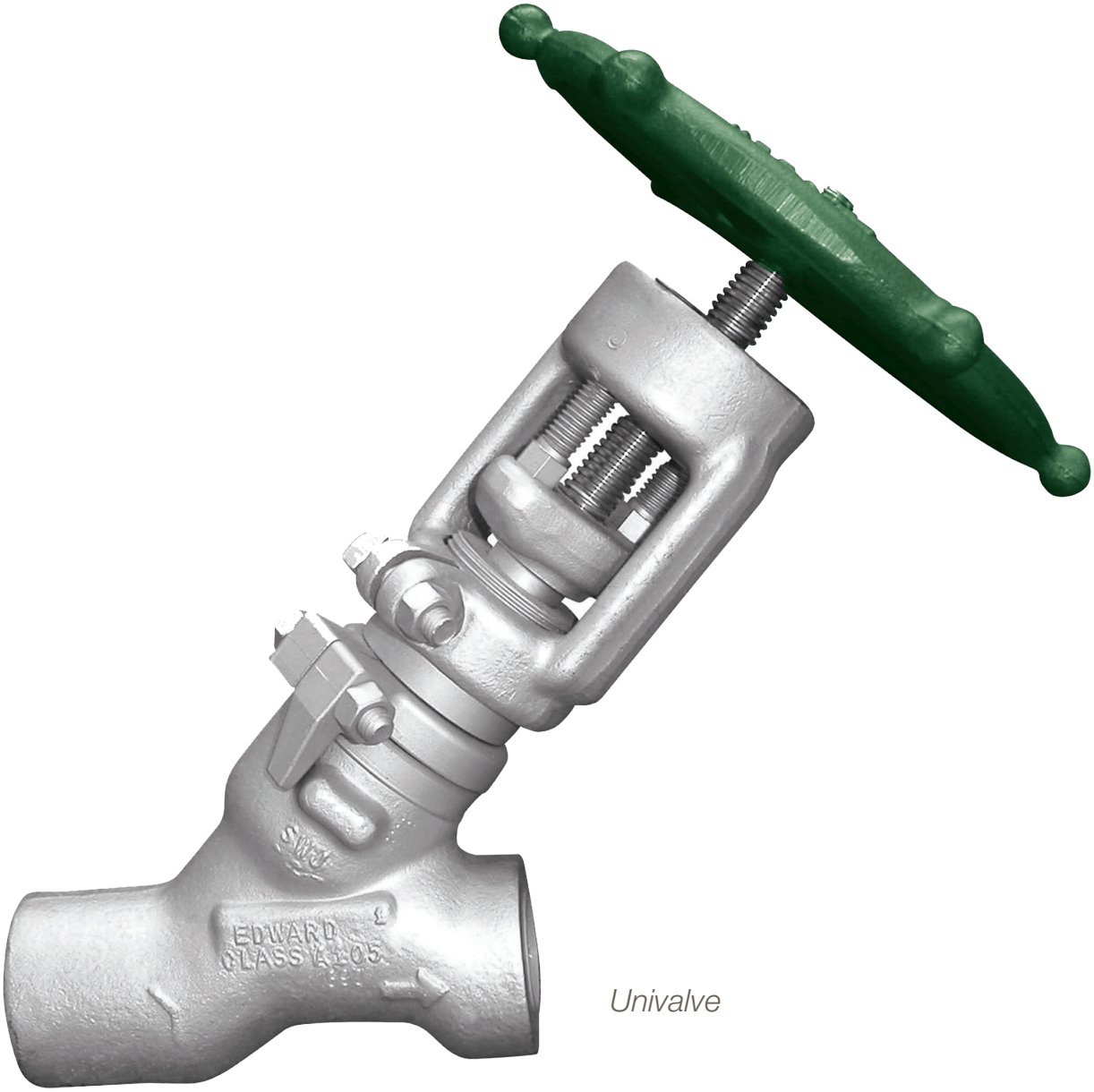
Cost-competitive, high-performance general service control valve designed for applications demanding higher rangeability, precise control and higher flow capacity.

- 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.



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
Flite-Flow® Main Steam Isolation	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)
Flite-Flow	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)
Univalve®	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)
Edward Bolted Bonnet	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)
Edward Blow-off	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)
1878 Y-Pattern	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)
Anchor/Darling Y-Pattern	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)

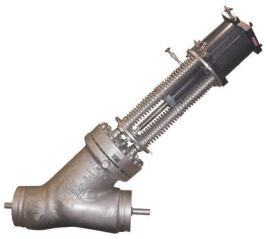
* *Additional products shown on next page*

Globe – Quick Reference, cont'd.

Product	Sub-Type	Sizes	Pressures	Temperatures
Edward Bolted Bonnet	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)
1878 T-Pattern	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)
Anchor/Darling T-Pattern	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)

Y-PATTERN

Flite-Flow Main Steam Isolation



Edward

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.

Y-PATTERN

Flite-Flow



Edward

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

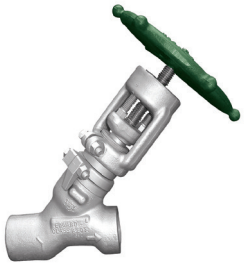
SPECIFICATIONS

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.

Y-PATTERN

Univalve



Edward

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.

GLOBE

Y-PATTERN

Edward Bolted Bonnet

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



Edward

- 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.

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.



Edward

- 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.

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.



Anchor/Darling

- 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.

Y-PATTERN

Anchor/Darling Y-Pattern



Anchor/Darling

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.

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



Edward

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.

GLOBE



Anchor/Darling

T-PATTERN

1878 T-Pattern

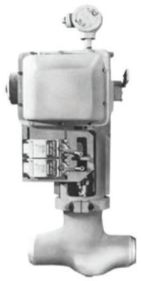
Rugged, one-piece, low-profile globe valve constructed with precision cast body/yoke assembly using the latest investment casting techniques.

- 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.



Anchor/Darling

T-PATTERN

Anchor/Darling T-Pattern

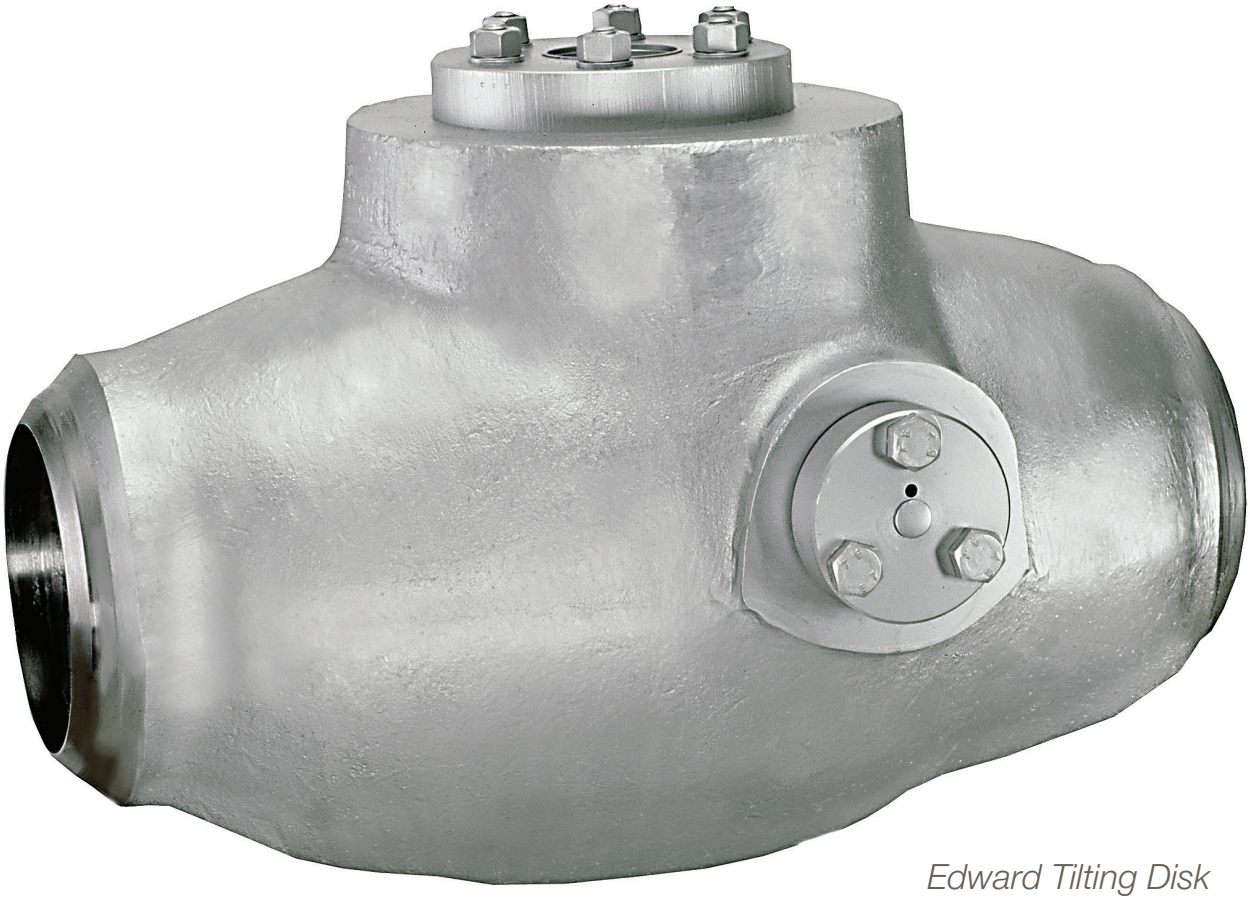
High-performance, cast-stop valve designed to minimize destructive turbulence in a variety of demanding throttling applications.

- 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.



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
Flite-Flow	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)
Univalve	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)
Edward Bolted Bonnet	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)
1878 Piston Check	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)
Anchor/Darling Piston (Lift) Check	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)
1878 Swing Check	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)
Anchor/Darling Swing Check	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*

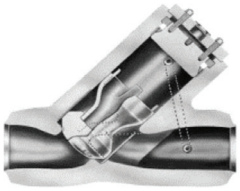
Check – Quick Reference, cont'd.

Product	Sub-Type	Sizes	Pressures	Temperatures
Edward Tilting Disk	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)
Anchor/Darling Tilting Disk	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)
NAF Check	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.

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



Anchor/Darling

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

- 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_v
- 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.

PISTON (LIFT)

Anchor/Darling Piston (Lift) Check



Anchor/Darling

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

- 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.

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.



SWING

1878 Swing Check

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



Anchor/Darling

- 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.

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.



Anchor/Darling

- 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.

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.



Edward

- 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

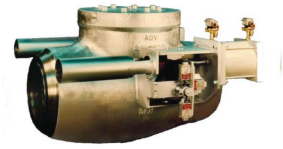
Sizes: DN 65 to 600; NPS 2½ to 24
Press: PN 110 to 760; Class 600 to 4500
Temp: -29°C to 650°C (-20°F to 1200°F)

Refer to literature EVENCT0002 at flowserve.com/library.

CHECK

TILTING DISK

Anchor/Darling Tilting Disk



Anchor/Darling

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.

- 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.

TILTING DISK

NAF Check



NAF

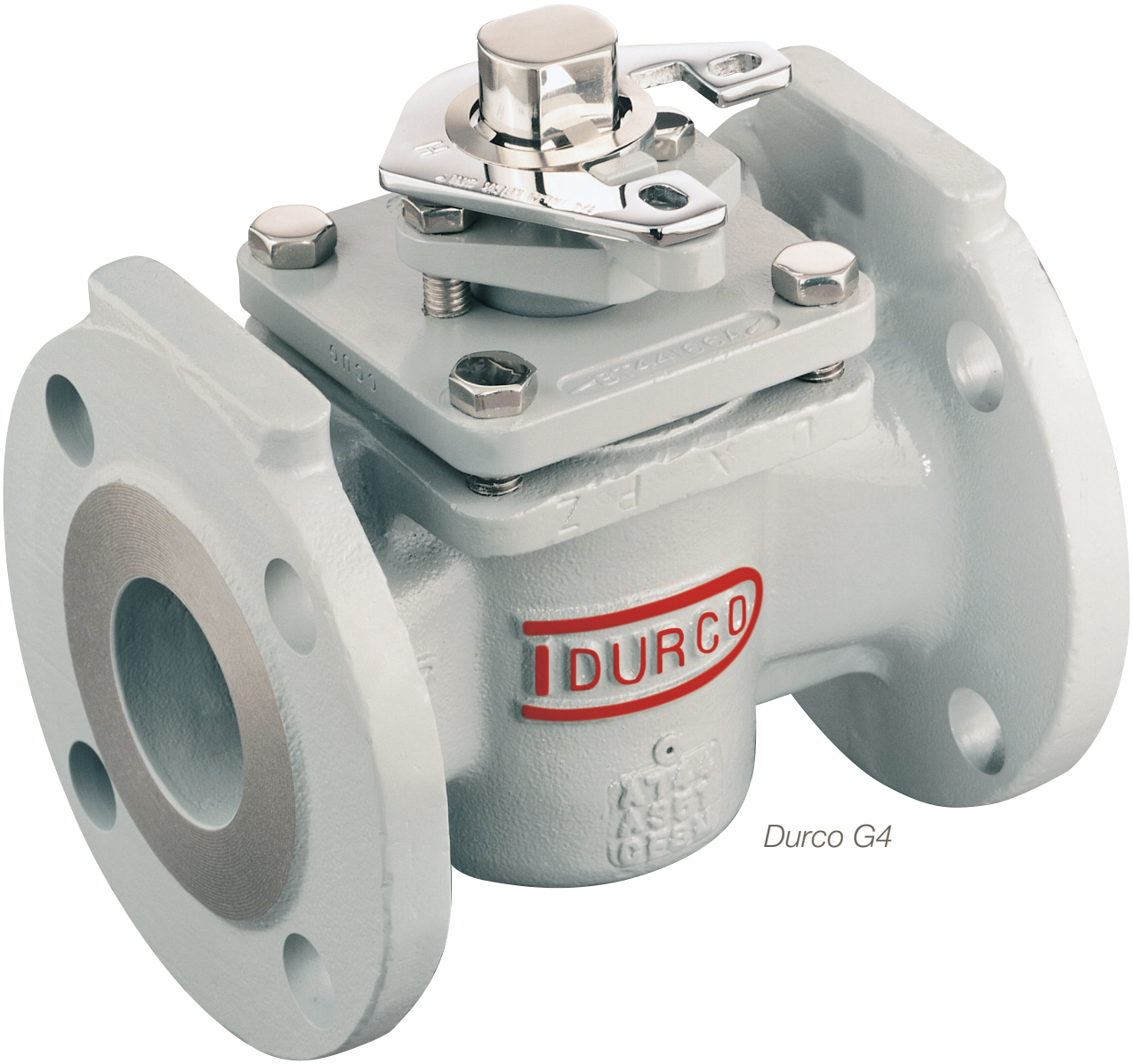
A cost-effective compact tilting disc check valve. Unique design gives excellent tightness and minimizes water-hammering.

- 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.



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
Mach 1™	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)
G4	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)
G4BZ-HF	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)
Multiport Series — Steel and Iron	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)
Super Nordstrom® — Steel	Lubricated	NPS ½ to 4 DN 15 to 100	Class 150 to 600	-29°C to 177°C (-20°F to 350°F)
Bolted Gland — Iron	Lubricated	NPS 6 to 36 DN 150 to 900	120 to 500 CWP	-29°C to 177°C (-20°F to 350°F)
Bolted Gland — Steel	Lubricated	NPS 6 to 12 DN 150 to 300	Class 150	-29°C to 177°C (-20°F to 350°F)
Dynamic Balance® — Iron	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
Dynamic Balance — Steel	Lubricated	NPS 1 to 30 DN 25 to 750	Class 150 to 2500	-46°C to 816°C (-50°F to 1500°F)
Super Nordstrom Two-Bolt Cover — Iron	Lubricated	NPS ½ to 5 DN 15 to 125	200 CWP	-29°C to 93°C (-20°F to 200°F)
Super Nordstrom Two-Bolt Cover — Steel	Lubricated	NPS ¾ to 4 DN 20 to 100	13.7 bar (200 psi)	-29°C to 93°C (-20°F to 200°F)
DIPV — Double-Isolation	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)
Double-Isolation — Steel	Lubricated	DN 50 to 300 NPS 2 to 12	Class 150 to 2500	-46°C to 232°C (-50°F to 450°F)
Screwed Gland Type — Iron	Lubricated	DN 15 to 100 NPS ½ to 4	200 to 800 CWP	-29°C to 178°C (-20°F to 353°F)
Taper Plug	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)
Super-H	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)
TIPV — Twin Isolation	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)
T4E	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)

NON-LUBRICATED

Mach 1



Durco

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.

NON-LUBRICATED

G4



Durco

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.

NON-LUBRICATED

G4BZ-HF



Durco

Reliable, HF alkylation plug value 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_2SO_4 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.

PLUG



Nordstrom

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.

- 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.



Nordstrom

LUBRICATED

Super Nordstrom – Steel

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

- 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.



Nordstrom

LUBRICATED

Bolted Gland – Iron

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

- 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.

LUBRICATED

Bolted Gland – Steel



Nordstrom

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.

LUBRICATED

Dynamic Balance – Iron



Nordstrom

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 NVENBR1003 at flowserve.com/library.

LUBRICATED

Dynamic Balance – Steel



Nordstrom

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.

PLUG

LUBRICATED

Super Nordstrom Two-Bolt Cover – Iron



Nordstrom

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

- 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.

LUBRICATED

Super Nordstrom Two-Bolt Cover – Steel



Nordstrom

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.

- 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.

LUBRICATED

DIPV – Double-Isolation



Serck Audco

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
- 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.

LUBRICATED

Double-Isolation – Steel



Nordstrom

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.

LUBRICATED

Screwed Gland Type – Iron



Nordstrom

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.

LUBRICATED

Taper Plug



Serck Audco

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.

PLUG



Serck Audco

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.



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.

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.



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.

Electric Actuation 218
Gearboxes 226
Fluid Power Actuation 230
Positioners 242
Switch Boxes 250
Software 254


DIAGNOSTICS PORT
BLUETOOTH - OK?
REMOTE
STOP
LOCAL
OPEN
(YES)
(NO)
CLOSE
Limitorque

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
L120	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)
SMB	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)
SB and SBD	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)
QX	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)
QXM	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)
MX	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.
Modbus DDC	Network Controls	Multi-drop (single ended/redundant loop for MX)	Master-Slave	19.2 Kbps	250	1200 m (without repeaters)
Modbus Ethernet TCP/IP	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)
Foundation Fieldbus H1 with DTM	Network Controls	Multi-drop, Point-to-Point, Tree	Publisher/ Subscriber	31.25 Kbps	240/network — 32/ segment (with repeater)	1900 m/segment
PROFIBUS DP V1 with Redundancy and DTM	Network Controls	Multi-drop, Point-to-Point Daisy Chain	Master-Slave	1.5 Mbps	127	1200 m (without repeaters)
PROFIBUS PA	Network Controls	Multi-drop, Point-to-Point, Tree	Master-Slave	31.25 Kbps	127 (31 per repeater)	1200 m (without repeaters)
DeviceNet	Network Controls	Multi-drop, Linear Trunkline/Dropline	Master-Slave	500 Kbps	64	500 m
Hart with DTM	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.

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.

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.

ELECTRIC

NON-INTRUSIVE, QUARTER-TURN

QX



Limitorque

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.

NON-INTRUSIVE, MULTI-TURN

QXM



Limitorque

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.

NON-INTRUSIVE, MULTI-TURN

MX



Limitorque

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.

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

Limitorque 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 Limitorque 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.

NETWORK CONTROLS

Modbus Ethernet TCP/IP

Combining the simplicity of the Modbus protocol with the widespread Ethernet standard, Limitorque 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.

NETWORK CONTROLS

Foundation Fieldbus H1 with DTM

Limitorque 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.

NETWORK CONTROLS

PROFIBUS DP V1 with Redundancy and DTM

Limitorque 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 ≤ 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.

NETWORK CONTROLS

PROFIBUS PA

Limitorque 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.

NETWORK CONTROLS

DeviceNet

Limitorque 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.

NETWORK CONTROLS

Hart with DTM

Limitorque 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.



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
V 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)
SR 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)
WG Series Worm	Quarter-Turn	442 000 Nm (326 000 ft-lb)	—	-35°C to 90°C (-31°F to 194°F)
HBC 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.

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.

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.



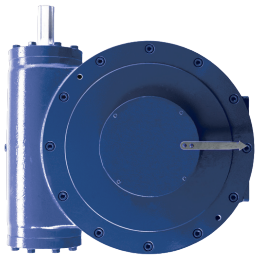
Limitorque

- 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.



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.

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
LPS	Pneumatic — Scotch Yoke	550 kNm (405 659 ft-lb)	—	12 barg (174 psig)	-60°C to 160°C (-76°F to 320°F)
LPC	Pneumatic — Scotch Yoke	5500 Nm (4057 ft-lb)	—	12 barg (174 psig)	-60°C to 160°C (-76°F to 320°F)
RG, ARG and WRG	Pneumatic — Scotch Yoke	248 kNm (2.2M in-lb)	—	10.3 barg (150 psig)	-55°C to 149°C (-67°F to 300°F)
Turnex™	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
LRP	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)
F39	Pneumatic — Rack & Pinion	7100 Nm (62 835 in-lb)	—	8.3 barg (120 psig)	-40°C to 150°C (-40°F to 302°F)
40R	Pneumatic — Rack & Pinion	7100 Nm (62 835 in-lb)	—	8.3 barg (120 psig)	-40°C to 150°C (-40°F to 302°F)
33R	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
P61	Pneumatic — Rack & Pinion	1063 Nm (9408 in-lb)	—	8.3 barg (120 psig)	-40°C to 150°C (-40°F to 302°F)
Supernova™	Pneumatic — Rack & Pinion	5005 Nm (44 294 in-lb)	—	8 barg (120 psig)	-50°C to 150°C (-55°F to 302°F)
SXL	Pneumatic — Rack & Pinion	765 Nm (6770 in-lb)	—	8.3 barg (120 psig)	-50°C to 150°C (-55°F to 302°F)
NR	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)
VR	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)
FlowAct™	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)
VL	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)
VL-C	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)
VL-ES	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)
VL-UHC	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)
Series 2 Type KP	Pneumatic — Linear	—	to 35.0 kN (7868 lbf)	6 barg (87 psig)	-40°C to 80°C (-40°F to 176°F)
Series 4 Type KA	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)
LHS and LHH	Hydraulic	550 kNm (405 659 ft-lb)		345 barg (5000 psig)	-60°C to 160°C (-76°F to 320°F)
LDG	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 LFENFL0001 at 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.

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.

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.

PNEUMATIC — RACK & PINION

LRP

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



Limitorque

- 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.

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.

PNEUMATIC — RACK & PINION

40R



Norbro®

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.

- 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.

PNEUMATIC — RACK & PINION

33R



Norbro

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

- 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.

PNEUMATIC — RACK & PINION

P61



Norbro

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.

- 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.

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

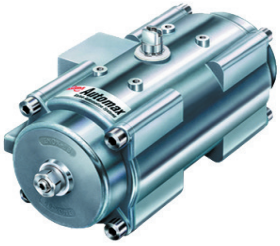
SPECIFICATIONS

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.

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.

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.

PNEUMATIC — ROTARY

VR



Valtek

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.

PNEUMATIC — LINEAR

FlowAct



Valtek

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.

PNEUMATIC — LINEAR

VL



Valtek

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.



Valtek

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.



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.



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.

PNEUMATIC — LINEAR

Series 2 Type KP



Kämmer ®

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.

- 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.

PNEUMATIC — LINEAR

Series 4 Type KA



Kämmer

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.

- 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

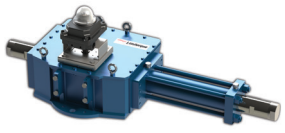
SPECIFICATIONS

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.

HYDRAULIC

LHS and LHH



Limitorque

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.

- 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.

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.



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
StarPac® 3	Digital	20.4 Nm^3/h @ 4 bar (12 SCFM @ 60 psi)	0.5 Nm^3/h @ 4 bar (<0.3 SCFM @ 60 psi)	0.25%	-40°C to 76°C (-40°F to 170°F)
D3	Digital	21 Nm^3/h @ 6 bar (12.5 SCFM @ 87 psi)	<0.018 Nm^3/h @ 6 bar (0.01 SCFM @ 87 psi) — zero bleed	<0.5%	-40°C to 80°C (-40°F to 176°F)
D20	Digital	7.2 Nm^3/h @ 6 bar (4.2 SCFM @ 87 psi)	0.12 Nm^3/h @ 6 bar (0.071 SCFM @ 87 psi)	<0.2%	-40°C to 85°C (-4°F to 185°F)
D30	Digital	45.6 Nm^3/h @ 6 bar (29 SCFM @ 87 psi)	0.5 Nm^3/h @ 6 bar (0.3 SCFM @ 87 psi)	<0.5%	-40°C to 80°C (-40°F to 176°F)
Apex 9000	Digital	7.2 Nm^3/h @ 6 bar (4.2 SCFM @ 87 psi)	0.12 Nm^3/h @ 6 bar (0.071 SCFM @ 87 psi)	<0.2%	-40°C to 85°C (-4°F to 185°F)
Logix 3800	Digital	30.6 Nm^3/h @ 4.1 bar (18 SCFM @ 60 psi)	0.082 to 0.637 Nm^3/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)
Logix MD+	Digital	20.8 to 30.6 Nm^3/h @ 4.1 bar (12.2 to 18 SCFM @ 60 psi)	0.082 to 0.637 Nm^3/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)
Logix 420	Digital	20.8 Nm^3/h @ 4.1 bar (12.2 SCFM @ 60 psi)	0.082 Nm^3/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
Logix 3200MD	Digital	20.4 Nm^3/h @ 4 bar (12 SCFM @ 60 psi)	0.5 Nm^3/h @ 4 bar (<0.3 SCFM @ 60 psi)	<0.05%	-40°C to 80°C (-40°F to 176°F)
Logix 3400MD	Digital	20.4 Nm^3/h @ 4 bar (12 SCFM @ 60 psi)	0.5 Nm^3/h @ 4 bar (<0.3 SCFM @ 60 psi)	<0.05%	-40°C to 80°C (-40°F to 176°F)
P5 and EP5	Analog	25.3 to 32.4 Nm^3/h @ 6 bar (14.8 to 18.8 SCFM @ 87 psi)	0.59 to 1.32 Nm^3/h @ 6 bar (0.35 to 0.78 SCFM @ 87 psi)	≤0.5%	-40°C to 85°C (-40°F to 185°F)
Apex 4000	Analog	23.7 to 44.4 Nm^3/h @ 6 bar (13.9 to 26.1 SCFM @ 87 psi)	0.53 Nm^3/h @ 6 bar (0.31 SCFM @ 87 psi)	0.5%	-20°C to 85°C (-4°F to 185°F)
Apex 7000	Analog	25.3 to 32.4 Nm^3/h @ 6 bar (14.8 to 18.8 SCFM @ 87 psi)	0.59 to 1.32 Nm^3/h @ 6 bar (0.35 to 0.78 SCFM @ 87 psi)	≤0.5%	-40°C to 85°C (-40°F to 185°F)

DIGITAL

StarPac 3

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



Valtek Kammer

- 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^3/h @ 4 bar (12 SCFM @ 60 psi)
Air Con: 0.5 Nm^3/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.

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^3/h @ 6 bar (12.5 SCFM @ 87 psi)
Air Con: <0.018 Nm^3/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.

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^3/h @ 6 bar (4.2 SCFM @ 87 psi
Air Con: 0.12 Nm^3/h @ 6 ba (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.

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^3/h @ 6 bar (29 SCFM @ 87 psi)
Air Con: 0.5 Nm^3/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.

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^3/h @ 6 bar (4.2 SCFM @ 87 psi)
Air Con: 0.12 Nm^3/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.

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^3/h @ 4.1 bar (18 SCFM @ 60 psi)
Air Con: 0.082 to 0.637 Nm^3/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.

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^3/h @ 4.1 bar (12.2 to 18 SCFM @ 60 psi)
Air Con: 0.082 to 0.637 Nm^3/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.

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^3/h @ 4.1 bar (12.2 SCFM @ 60 psi)
Air Con: 0.082 Nm^3/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.

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^3/h @ 4 bar (12 SCFM @ 60 psi)
Air Con: 0.5 Nm^3/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.

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^3/h @ 4 bar (12 SCFM @ 60 psi)
Air Con: 0.5 Nm^3/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.

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^3/h @ 6 bar (14.8 to 18.8 SCFM @ 87 psi)
Air Con: 0.59 to 1.32 Nm^3/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.

ANALOG

Apex 4000



Accord
Automax
PMV

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

- 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^3/h @ 6 bar
(13.9 to 26.1 SCFM @ 87 psi)
Air Con: 0.53 Nm^3/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.

ANALOG

Apex 7000



Accord
Automax
PMV

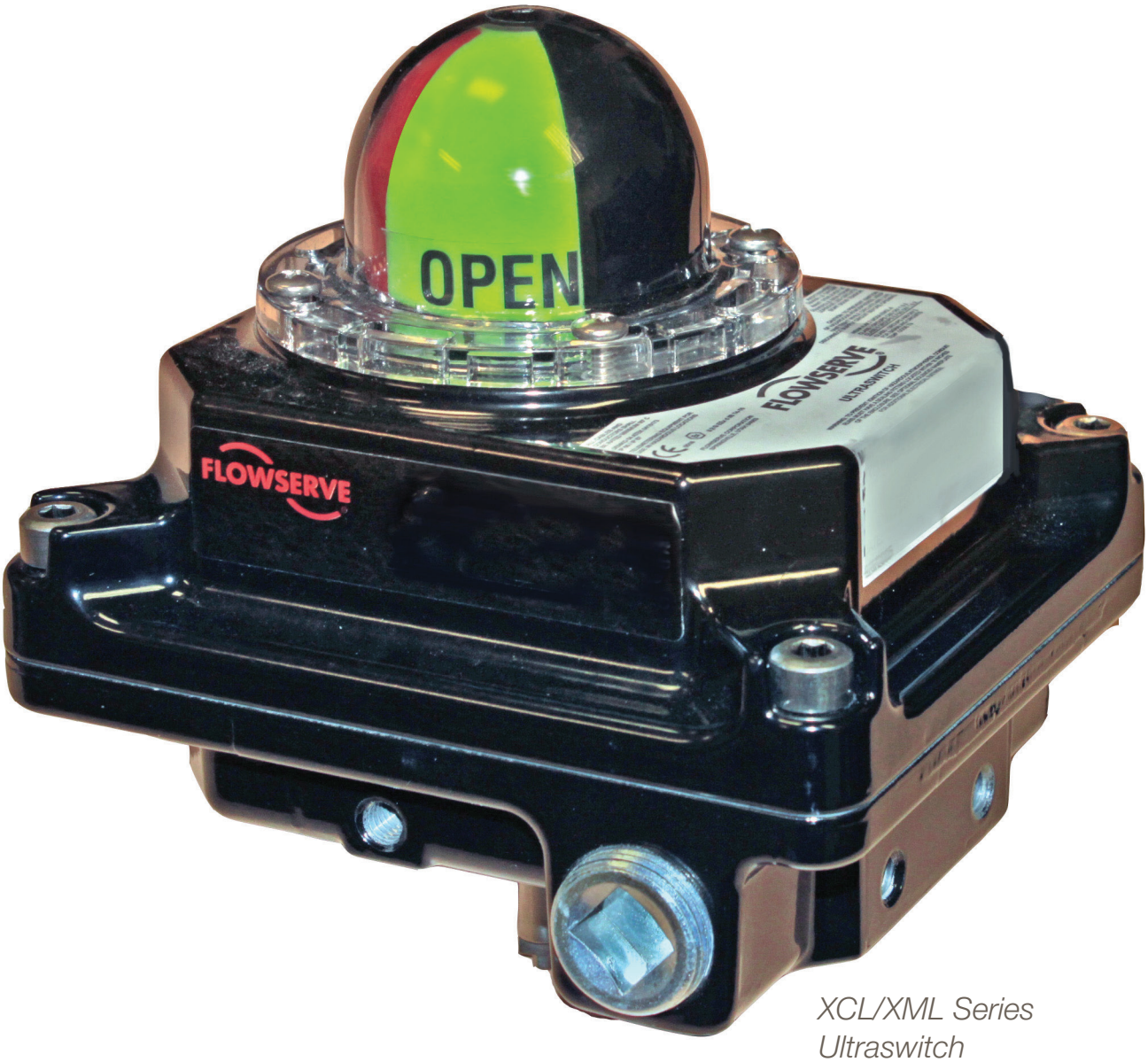
The Apex 7000 Series provides accurate valve positioning with advanced features. Usable with 3–15 psi pneumatic control signals, or optional current-to-pressure transducer for 4-20 mA signal input.

- 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^3/h @ 6 bar
(14.8 to 18.8 SCFM @ 87 psi)
Air Con: 0.59 to 1.32 Nm^3/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.



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
WS/WM Series Ultraswitch®	Switch Boxes	0 to 2	-40°C to 80°C (-40°F to 180°F)
PS/PM Series Ultraswitch	Switch Boxes	2 or 4	-40°C to 80°C (-40°F to 180°F)
DS/DM Series Ultraswitch	Switch Boxes	0 to 4	-55°C to 85°C (-67°F to 180°F)
XCL/XML Series Ultraswitch	Switch Boxes	0 to 4	-40°C to 85°C (-40°F to 180°F)
F5 Series	Switch Boxes	2	-40°C to 85°C (-40°F to 185°F)
Aviator II Ultraswitch	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.

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.

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.

SWITCH BOXES

XCL/XML Series Ultraswitch



Automax
PMV

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.

SWITCH BOXES

F5 Series



PMV

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 owning 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.

SWITCH BOXES

Aviator II Ultraswitch



Automax
PMV

Integrated on-off valve controller with industry-leading capacity up to C_v 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.



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

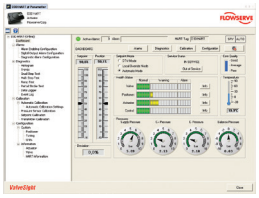
Product	Sub-Type	Specifications
ValveSight for Positioners and Switch Boxes	Software	• System Requirements: Windows XP, Windows 7, Windows 8, Windows 10 • Compatibility: HART, PROFIBUS, Foundation Fieldbus, FDT/DTM • Equipment: valves, actuators, positioners and control signals
ValveSight DTMs for HART or Fieldbus Communications	Software	• 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
ValveSight DTM	Software	• System Requirements: Windows XP, Windows 7, Windows 8, Windows 10 • Compatibility: StarPac 3, FDT 2.0, Modbus • Major Systems: positioners, control systems

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

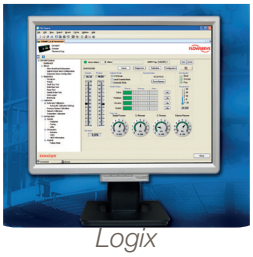
- System Requirements: Windows XP, Windows 7, Windows 8, Windows 10
- Compatibility: HART, PROFIBUS, Foundation Fieldbus, FDT/DTM
- Equipment: valves, actuators, positioners and control signals

Refer to literature PMENBR0016 at flowserve.com/library.

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 LGENSF0014 and VSENBR0004 at 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 FLENMN0066-02I at flowserve.com/library.

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