FLOWSERVE

Flow Control Products for Power Generation

Valves, Actuation, Instrumentation and Steam Solutions

Experience In Motion

Nuclear. Fossil. Renewable. Around the world, around the clock.

Flow Control Solutions for the World at Work

Wherever power is produced, whatever type of cycle, you will find Flowserve flow control solutions at work around the plant.

Flowserve designs and engineers control valves, isolation valves (quarter-turn and multi-turn), actuators, positioners, diagnostic software, switches and steam/boiler control products — all of which meet the most demanding needs of today's power generation users.

With manufacturing sites and service facilities around the world and professional partnerships with leading distributors, Flowserve power customers have on-the-spot availability, experienced technical support, and unmatched service wherever flow control is required. Proven, rugged and reliable products ensure extended service life, with on-site and off-site service and rebuild options providing some of the lowest life-cycle costs in the industry.

Flowserve brings together the combined expertise of leading brand names in flow control to provide our customers with an end-to-end service that has no peer. Whether it's help designing a custom solution, meeting a critical delivery or providing total project management and 24/7 support, Flowserve Flow Control is your one-stop solution.

Engineering Efficiency

Flowserve engineers are ready to help you meet the most demanding design challenges and applications. From nuclear to toxic chemicals to potable water, we have the skill, the experience and the tools to assist our customers to whatever extent is needed.

- Project managers and engineers
- Testing
- Design/drafting
- Design analysis
- CAD/CAM
- Research and development

High-Quality Manufacturing

Flowserve Flow Control Operations has manufacturing facilities around the globe, ensuring an efficient supply chain and consistent quality, no matter where the installation.

- ISO 9000 standard
- QME-1 qualification
- International buying agreements
- "N" Stamp nuclear service rating
- Latest CNC equipment
- CE mark
- Lean manufacturing techniques
- Universal quality assurance standards
- Quick response capability

Gate, Globe and Check Valves

Reliable Shutoff

Flowserve produces Edward® and Anchor/Darling® gate, globe and check valves for high-temperature, high-pressure and severe service applications in the power industry.

For more than 100 years, Flowserve gate, globe and check valves have been used in critical services around the world. Flowserve has ISO 9001 ASME N-stamp certified manufacturing facilities supporting a worldwide network of end users, OEMs and distributors with access to the world's largest capability for the manufacturing of forged and cast steel valves.

Control Valves

Precision Flow Control

Flowserve provides the finest control valves and digital positioners in the world. Whether your need is to control pressure, temperature or flow, you will find that Flowserve Valtek®, Logix™, Gestra® and Kämmer® products are robust, responsive and will increase your revenues. Additionally, Flowserve ValveSight diagnostic solution software for control valves provides actionable advice proactively. From globe to ball valves, eccentric plug to high-performance butterfly valves, Flowserve has the control valves and digital controls for your power applications.

Actuation and Instrumentation

Solutions for the Power Industry

From actuators to positioners, switches to solenoids, Flowserve Edward and Limitorque® actuators can provide all your actuation equipment and diagnostic software needs. With the largest installed base of nuclear-qualified actuators in the industry, Flowserve continues to lead the field in actuation products. Flowserve offers:

- Commercial and nuclear-qualified electric, hydraulic and pneumatic actuators and gearboxes
- Digital, pneumatic and electro-pneumatic positioners
- Robust switches, indicators and accessories of every type
- Diagnostic software supporting predictive maintenance
- Fail-safe systems
- Automation service and repair
- Level control at very high temperatures and pressures

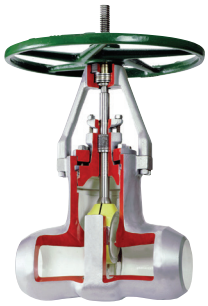
Steam Solutions

Saving Energy, Time and Money

When it comes to boiler management and control equipment, you need to look no further than Flowserve Gestra to provide the best-in-class equipment available today. A market leader in Europe with product type approvals from more than 25 inspecting authorities, Gestra offers a comprehensive product range of steam traps, non-return valves, boiler recirculation valves, steam control instrumentation, and special condensate return systems and vessels.

Gestra's knowledge of steam system technology and components is unsurpassed. Its engineers routinely partner with customers to optimize and upgrade steam and condensate systems. In addition, Gestra offers numerous maintenance training courses and demonstrations designed to help customers improve steam plant performance and operation.

Gate Valves

Brand	Edward	Edward	Edward	Anchor/Darling
				
Model	**Equiwedge™**	**Main Steam Isolation Valve (MSIV)**	**Main Feedwater Isolation Valve (MFIV)**	**Flex Wedge**
Features	• Unique two-piece disc design • Body-guided wedge • Resistant to thermal binding • Hard-faced seating surfaces	• Equiwedge gate valve with Edward gas/ hydraulic actuator	• Equiwedge gate valve with Edward gas/ hydraulic actuator	• Tapered seats • Uniform section thickness wedges • Hard-faced seating surfaces
Plant Type	• Nuclear • Ultra-supercritical • Supercritical • Combined cycle • Solar thermal	• Nuclear (PWR)	• Nuclear (PWR)	• Nuclear • Ultra-supercritical • Supercritical • Combined cycle • Solar thermal
Typical Applications	MSIV, MFIV, boiler block/ isolation valves	MSIV	MFIV	Isolation valves
Sizes	DN 65 to 975; NPS 2½ to 38	DN 500 to 975; NPS 20 to 38	DN 100 to 500; NPS 4 to 20	DN 65 to 600; NPS 2½ to 24
Body Materials	Carbon steel, stainless steel, special alloys	Carbon steel, stainless steel, special alloys	Carbon steel, stainless steel, special alloys	Carbon steel, stainless steel, special alloys
Max. Pressure Class	PN 600; Class 3600	PN 150; Class 900	PN 150; Class 900	PN 420; Class 2500
Max. Operating Pressure	249 barg @ 593°C (3620 psig @ 1100°F)	155 barg @ 315°C (2250 psig @ 600°F)	155 barg @ 315°C (2250 psig @ 600°F)	326 barg @ 315°C (4730 psig @ 600°F)
Reference Literature	EVENCT0004-02	EVENCT0004-02	EVENCT0004-02	EVENCT0004-02

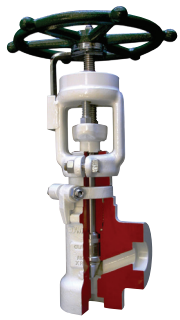
Gate Valves

Globe Valves

Brand	Anchor/Darling	Anchor/Darling	Edward	Edward
				
Model	**Double Disc**	**800 Split Wedge**	**Flite-Flow® (Y-Pattern)**	**Main Steam Isolation Valve (MSIV)**
Features	• Uniform seat wear • Low-pressure sealing • Versatile actuation • Rapid closure • Resistant to thermal binding • Ease of maintenance • Hard-faced seating surfaces	• Body-guided disc • Hardened seats • Compact design	• Body-guided disc • Y-pattern body design • Integral hard-faced seats • Integral backseat • Impactor handwheel	• Flite Flow (Y-pattern) globe valve with pneumatic actuator
Plant Type	• Nuclear	• Nuclear	• Nuclear • Ultra-supercritical • Supercritical • Combined cycle • Solar thermal	• Nuclear (BWR)
Typical Applications	MSIV, MFIV, isolation valves	Block/isolation valves	Block/isolation valves	MSIV, MFIV
Sizes	DN 15 to 600; NPS ½ to 24	DN 15 to 50; NPS ½ to 2	DN 80 to 800; NPS 3 to 32	DN 400 to 650; NPS 16 to 26
Body Materials	Carbon steel, stainless steel, special alloys	Carbon steel, stainless steel, special alloys	Carbon steel, stainless steel, special alloys	Carbon steel, stainless steel, special alloys
Max. Pressure Class	PN 420; Class 2500	PN 130; Class 800	PN 420; Class 2500	PN 150; Class 900
Max. Operating Pressure	326 barg @ 315°C (4730 psig @ 600°F)	104 barg @ 315°C (1515 psig @ 600°F)	216 barg @ 593°C (3145 psig @ 1100°F)	155 barg @ 315°C (2250 psig @ 600°F)
Reference Literature	EVENCT0004-02	EVENCT0004-02	EVENCT0002-01	EVENCT0002-01

FLOWSERVE

Globe Valves

Brand	Edward	Edward	Edward	Edward
				
Model	**Univalve®**	**Hermavalve®**	**Blow-off Valve**	**Blowdown Valve**
Features	• Body-guided, solid Stellite® disc • Y-pattern body design • Integral hard-faced seats • Integral backseat • Options: bellows-sealed, control sleeve	• Hermetically (diaphragm) sealed • Body-guided, solid Stellite disc • Y-pattern body design • Integral hard-faced seats • Integral backseat	• Y-pattern (straightway) and angle valve designs available • Integral Stellite seat • Integral backseat • Hardened stainless steel or Stellite-faced disc	• Y-pattern (straightway) and angle valve designs available • Integral Stellite seat • Integral backseat • Hardened stainless steel or Stellite-faced disc
Plant Type	• Nuclear • Ultra-supercritical • Supercritical • Combined cycle • Solar thermal	• Nuclear • Ultra-supercritical • Supercritical • Combined cycle • Solar thermal	• Supercritical • Combined cycle	• Supercritical • Combined cycle
Typical Applications	Block/isolation valves	Block/isolation valves	System blow-off, condensate release	System blowdown, condensate release
Sizes	DN 15 to 100; NPS ½ to 4	DN 15 to 65; NPS ½ to 2½	DN 40 to 65; NPS 1½ to 2½	DN 25 to 100; NPS 1 to 4
Body Materials	Carbon steel, stainless steel, special alloys	Carbon steel, stainless steel, special alloys	Carbon steel, stainless steel, special alloys	Carbon steel, stainless steel, special alloys
Max. Pressure Class	PN 760; Class 4500	PN 290; Class 1690	PN 420; Class 2500	PN 320; Class 1925
Max. Operating Pressure	248 barg @ 648°C (3600 psig @ 1200°F)	44 barg @ 537°C (650 psig @ 1000°F)	68 barg @ 537°C (1000 psig @ 1000°F)	60 barg @ 593°C (880 psig @ 1100°F)
Reference Literature	EVENCT0001-04	EVENCT0001-04	EVENCT0001-04	EVENCT0001-04

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Globe Valves

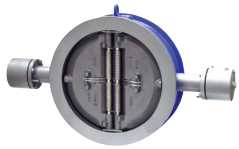
Check Valves

Brand	Anchor/Darling	Anchor/Darling	Edward	Edward
				
Model	**1878 Globe**	**800 Globe**	**Piston Check**	**Univalve Piston Check**
Features	• Body-guided disc • T-pattern or Y-pattern body design • Hardened seats • Available bellows-sealed	• Body-guided disc • T-pattern body design • Hardened seats • Available bellows-sealed	• Body-guided, solid Stellite disc • Y-pattern body design • Integral hard-faced seats • Includes equalizer pipes	• Body-guided, solid Stellite disc • Y-pattern body design • Integral hard-faced seats
Plant Type	• Nuclear	• Nuclear	• Nuclear • Ultra-supercritical • Supercritical • Combined cycle • Solar thermal	• Nuclear • Ultra-supercritical • Supercritical • Combined cycle • Solar thermal
Typical Applications	Block/isolation valves	Block/isolation valves	Pump isolation, reverse flow prevention	Pump isolation, reverse flow prevention
Sizes	DN 15 to 50; NPS ½ to 2	DN 15 to 80; NPS ½ to 3	DN 65 to 600; NPS 2½ to 24	DN 15 to 100; NPS ½ to 4
Body Materials	Carbon steel, stainless steel, special alloys	Carbon steel, stainless steel, special alloys	Carbon steel, stainless steel, special alloys	Carbon steel, stainless steel, special alloys
Max. Pressure Class	PN 325; Class 1878	PN 130; Class 800	PN 760; Class 4500	PN 760; Class 4500
Max. Operating Pressure	245 barg @ 315°C (3555 psig @ 600°F)	104 barg @ 315°C (1515 psig @ 600°F)	110 barg @ 537°C (1605 psig @ 1000°F)	248 barg @ 648°C (3600 psig @ 1200°F)
Reference Literature	EVENCT0004-02	EVENCT0004-02	EVENCT0002-01	EVENCT0001-04

Check Valves

Brand	Anchor/Darling	Anchor/Darling Edward	Anchor/Darling	Anchor/Darling
				
Model	**Swing Check**	**Tilting Disc Check**	**Lift Check**	**In-line Check**
Features	• Hard-faced seating surfaces • Tail-stopped hinges	• Quick closing • Hard-faced seating surfaces • Counterbalanced disc	• Body-guided disc • T-pattern body design • Integral hard-faced seats • Includes equalizer pipes	• Quick closing • Available hard-faced seating surfaces
Plant Type	• Nuclear	• Nuclear	• Nuclear	• Nuclear
Typical Applications	Pump isolation, reverse flow prevention	Pump isolation, reverse flow prevention	Pump isolation, reverse flow prevention	Pump isolation, reverse flow prevention
Sizes	DN 65 to 600; NPS 2½ to 24	DN 65 to 600; NPS 2½ to 24	DN 65 to 600; NPS 2½ to 24	DN 65 to 600; NPS 2½ to 24
Body Materials	Carbon steel, stainless steel, special alloys	Carbon steel, stainless steel, special alloys	Carbon steel, stainless steel, special alloys	Carbon steel, stainless steel, special alloys
Max. Pressure Class	PN 420; Class 2500	PN 420; Class 2500	PN 420; Class 2500	PN 420; Class 2500
Max. Operating Pressure	326 barg @ 315°C (4730 psig @ 600°F)	326 barg @ 315°C (4730 psig @ 600°F)	326 barg @ 315°C (4730 psig @ 600°F)	326 barg @ 315°C (4730 psig @ 600°F)
Reference Literature	EVENCT0004-02	EVENCT0004-02	EVENCT0004-02	EVENCT0004-02

Check Valves

Brand	Anchor/Darling	Anchor/Darling	Gestra	Gestra
				
Model	**1878 Swing Check**	**800 and 1878 Piston Check**	**DISCO™ Non-Return Valve RK**	**DISCOCHECK® Dual-Plate Valve BB**
Features	• Hardened seats • Tail-stopped hinges	• Body-guided disc • T-pattern or Y-pattern body design • Hardened seats	• Wafer-type check valve • Self-centering design • Fits between pipe flanges • Mounted with through bolting	• Dual-plate, lined non-return valve for abrasive and agressive fluids • Low-pressure loss • Fits between pipe flanges • Adjustable dampers to avoid water hammers
Plant Type	• Nuclear	• Nuclear	• Nuclear (BOP only) • Supercritical • Combined cycle • Solar Thermal	• Nuclear (BOP only) • Supercritical • Combined cycle • Solar thermal
Typical Applications	Pump isolation, reverse flow prevention	Pump isolation, reverse flow prevention	Pump isolation, reverse flow prevention, vacuum breaker	Pump isolation, reverse flow prevention, water treatment piping, flue gas desulphurization
Sizes	DN 15 to 50; NPS ½ to 2	DN 15 to 50; NPS ½ to 2	DN 15 to 200; NPS ½ to 8	DN 50 to 1000; NPS 2 to 40
Body Materials	Carbon steel, stainless steel, special alloys	Carbon steel, stainless steel, special alloys	Stainless steel, austenitic stainless steel	Austenitic stainless steel, duplex stainless steel; Grey cast iron (hard rubber-lined and other linings)
Max. Pressure Class	PN 325; Class 1878	PN 130 and PN 325; Class 800 and Class 1878	PN 400; Class 2500	PN 40; Class 300 PN 160; Class 900
Max. Operating Pressure	245 barg @ 315°C (3555 psig @ 600°F)	104 barg @ 315°C (1515 psig @ 600°F) 245 barg @ 315°C (3555 psig @ 600°F)	280.9 barg @ 500°C (4074.1 psig @ 932°F)	101 barg @ 550°C (1485 psig @ 1022°F)
Reference Literature	EVENCT0004-02	EVENCT0004-02	810107 (on Gestra.com)	810107 (on Gestra.com)

Control Valves

Brand	Valtek	Valtek	Valtek	Valtek
				
Model	**GS**	**Mark One™**	**Mark 100**	**Mark 200**
Features	• Fully integrated valve-actuator-instrumentation package • Optimum performance at minimum total cost • Excellent rangeability and repeatability for the highest flow rates • Wide variety of trim and materials • Quick installation and simple setup	• Gas and liquid control • Globe, angle and 3-way body types • Compact, lightweight body and actuator package • Stiff and high-thrust cylinder actuator offers positioner accuracy, repeatability, assured response	• Gas and liquid control • Higher C_v capacity with smaller, more cost-effective valve sizes • Clamped-in, self-aligning seat ring • Easy maintenance • Numerous noise abatement and cavitation elimination trims	• Gas and liquid control • High-pressure, high-flow capacity with smaller and more cost-effective valve sizes • Economical choice among high-pressure, high-C_v, globe-style control valves • Fast, easy maintenance • Numerous noise abatement and cavitation elimination trims
Plant Type	• Nuclear • Ultra-supercritical • Supercritical • Combined cycle • Solar thermal	• Nuclear • Ultra-supercritical • Supercritical • Combined cycle • Solar thermal	• Nuclear • Ultra-supercritical • Supercritical • Combined cycle • Solar thermal	• Nuclear • Ultra-supercritical • Supercritical • Combined cycle • Solar thermal
Typical Applications	General service	General service, cavitation, noise	High flow, cavitation, noise	High pressure and high flow, cavitation, noise
Sizes	DN 15 to 150; NPS ½ to 6	DN 15 to 900; NPS ½ to 36	DN 150 to 750; NPS 6 to 30	DN 50 to 400; NPS 2 to 16
Body Materials	Carbon steel, stainless steel	Carbon steel, stainless steel, special alloys	Carbon steel, stainless steel, chrome moly alloys	Carbon steel, stainless steel, chrome moly alloys
Max. Pressure Class	PN 10 to 40; Class 150 to 300	PN 10 to 400; Class 150 to 2500	PN 10 to 63; Class 150 to 600	PN 160 to 400; Class 900 to 2500
Max. Operating Pressure	See ASME B16.34 pressure-temperature ratings for steel, nickel-base alloys, and other alloy material selections.			
Reference Literature	VLENTB0300	VLENTB0001	VLATB0100	VLENTB0200

Control Valves

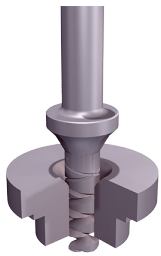
Brand	Valtek	Valtek	Worcester®	Gestra
				
Model	**MaxFlo®**	**Valdisk™**	**CPT Series**	**ZK 29**
Features	• High C_v capacity allows the use of a smaller envelope • Low breakout torque, excellent control • Disc lifts off seat immediately upon actuation, reducing wear	• Suitable for slurries, liquids, gases and steam control • High-thrust cylinder actuator • Eccentric-cammed disc • Low breakout torque • Disc lifts off seat immediately upon actuation, reducing wear and leakage	• Broad range rotary control valve • Six body style configurations, including cyrogenic and fugitive emission to ISO 15848-1 • Gas and liquid control	• Radial stage nozzle trim • Extreme wear resistance • Customizable flow capacity • Easy change trim • FCI 70-2-2006, Class VI (test procedure C) and EN 12266-1, leakage rate A
Plant Type	• Nuclear • Ultra-supercritical • Supercritical • Combined cycle • Solar thermal	• Nuclear • Ultra-supercritical • Supercritical • Combined cycle • Solar thermal	• Nuclear • Ultra-supercritical • Supercritical • Combined cycle • Solar thermal	• Nuclear (BOP only) • Ultra-supercritical • Supercritical • Combined cycle • Solar thermal
Typical Applications	General service, corrosive, erosive, noise, cavitation, tight shut-off, high rangeability	General service, slurries, corrosive, tight shut-off, high performance throttling	General service, utility, water, synthetic fuels, steam, deaerator, emergency heater drain	Cavitation and flashing in: feedwater control, drains, feedwater heater level control, soot blowing, attemperator spray, feed pump recirculation
Sizes	DN 25 to DN 300; NPS 1 to 12	DN 50 to 900; NPS 2 to 36	DN 8 to 100; NPS ¼ to 4	DN 25 to 150; NPS 1 to 6
Body Materials	Carbon steel, stainless steel	Carbon steel, stainless steel	Carbon steel, stainless steel, special alloys	Cast steel, forged alloy steel
Max. Pressure Class	PN 10 to 40; Class 150 to 300	PN 10 to 400; Class 150 to 2500	PN 10 to 63; Class 150 to 600	PN 160; Class 900
Max. Operating Pressure	See ASME B16.34 pressure-temperature ratings for steel, nickel-base alloys, and other alloy material selections.		Liquids to 34 barg (500 psig); Steam to 20 barg (300 psig)	38 barg @ 550°C (551 psig @ 1022°F)
Reference Literature	VLENTB0052	VLATB031	WCENBR1001-01	810742 (on Gestra.com)

FLOWSERVE

Control Valves

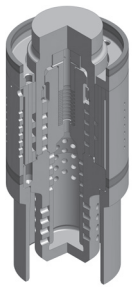
Brand	Gestra	Gestra	Gestra	Gestra
				
Model	**ZK 210 (EN)**	**ZK 213 (EN)**	**ZK 313**	**ZK 610 (EN) and ZK 613 (EN)**
Features	• Radial stage nozzle trim • Extreme wear resistance • Easy change trim • FCI 70-2-2006, Class VI (test procedure C) and EN 12266-1, leakage rate A • Customizable flow capacity	• Radial stage nozzle trim • Tandem shut-off • Extreme wear resistance • Easy change trim • FCI 70-2-2006, Class VI (test procedure C) and EN 12266-1, leakage rate A	• Radial stage nozzle trim • Tandem shut-off • Extreme wear resistance • Easy change trim • FCI 70-2-2006, Class VI (test procedure C) and EN 12266-1, leakage rate A	• Radial stage nozzle trim • Extreme wear resistance • Easy change trim • FCI 70-2-2006, Class VI (test procedure C) and EN 12266-1, leakage rate A
Plant Type	• Nuclear (BOP only) • Ultra-supercritical • Supercritical • Combined cycle • Solar thermal	• Nuclear (BOP only) • Ultra-supercritical • Supercritical • Combined cycle • Solar thermal	• Nuclear (BOP only) • Ultra-supercritical • Supercritical • Combined cycle • Solar thermal	• Nuclear (BOP only) • Ultra-supercritical • Supercritical • Combined cycle • Solar thermal
Typical Applications	Cavitation and flashing in: feedwater control, drains, feedwater heater level control, soot blowing, attemperator spray, feed pump recirculation	Cavitation and flashing in: feedwater control, drains, feedwater heater level control, soot blowing, attemperator spray, feed pump recirculation	Cavitation and flashing in: feedwater control, drains, feedwater heater level control, soot blowing, attemperator spray, feed pump recirculation	Cavitation and flashing in: feedwater control, drains, feedwater heater level control, soot blowing, attemperator spray, feed pump recirculation
Sizes	DN 25 to 80; NPS 1 to 3	DN 80 to 300; NPS 3 to 12	DN 25 to 150; NPS 1 to 6	DN 100 to 300; NPS 4 to 12
Body Materials	Forged alloy steel	Forged alloy steel, other materials on request	Forged alloy steel, other materials on request	Carbon steel, forged alloy steel, other materials on request
Max. Pressure Class	PN 250; Class 1500	PN 630; Class 3750	PN 630; Class 3750	PN 250 and 500; Class 1500 and 2500
Max. Operating Pressure	54 barg @ 550°C (783 psig @ 1022°F)	136 barg @ 530°C (1972 psig @ 986°F)	154 barg @ 650°C (2233 psig @ 1202°F)	526 barg @ 300°C (7627 psig @ 572°F)
Reference Literature	810742 (on Gestra.com)	810742 (on Gestra.com)	810742 (on Gestra.com)	810742 (on Gestra.com)

Severe Service Control Valve Trim

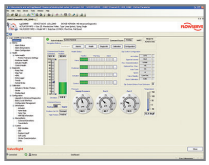
Brand	Valtek	Valtek	Valtek	Valtek
				
Model	**CavControl™**	**MicroCav™**	**ChannelStream™**	**MegaStream™**
Description	Contains the cavitating bubbles in the center of the retainer, away from metal surfaces	Effectively eliminates cavitation in control valves that require small flow rates	Prevents cavitation from forming and minimizes hydrodynamic noise in the most severe liquid applications	Decades of proven service makes this heavy-duty, drilled-hole cage one of the most common and effective solutions to control valve noise
Design	Uses a drilled hole seat retainer with stepped holes to move the bubbles contracting away from metal surfaces and into opposing streams	Utilizes a special close-guided plug with continually expanding grooves that intersect each other, thus providing staged pressure drops as the fluid impinges upon itself while expanding	Eliminates cavitation through a series of holes and channels to reduce pressure in stages. Uses small passages contraction to reduce pressure	Uses nested cylinders in place of the seat retainer. Each drilled cylinder represents a stage of pressure reduction
Plant Type	• Nuclear • Ultra-supercritical • Supercritical • Combined cycle • Solar thermal	• Nuclear • Ultra-supercritical • Supercritical • Combined cycle • Solar thermal	• Nuclear • Ultra-supercritical • Supercritical • Combined cycle • Solar thermal	• Nuclear • Ultra-supercritical • Supercritical • Combined cycle • Solar thermal
Applications	Low to mild cavitation	Exceptionally low flow cavitation capabilities	Moderate to severe cavitation	Noise attenuation up to 28 dBa
Fits In	Valtek Mark Series	Valtek Mark Series	Valtek Mark Series	Valtek Mark Series
Size Range	DN 25 to 600; NPS 1 to 24	DN 25, 40 and 50; NPS 1, 1½ and 2	DN 40 to 900; NPS 1½ to 36	DN 25 to 900; NPS 1 to 36
Reference Literature	FCENBR0068	FCENBR0068	FCENBR0068	FCENBR0067

FLOWSERVE

Severe Service Control Valve Trim

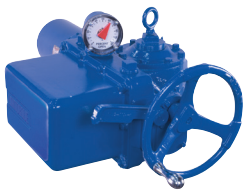
Brand	Valtek	Valtek	Gestra	Kämmer Valtek
				
Model	**TigerTooth™**	**Stealth™**	**ZK Radial Stage Nozzle™**	**Multi-Z™**
Description	One of the most effective cavitation elimination and noise reduction trims available	The most sophisticated noise attenuation design available	Designed to eliminate erosion and cavitation; excellent wear resistance in flashing applications	Exclusively for Multi-Z linear valves to accommodate dirty service applications and high-pressure drops
Design	Stacked discs with concentric rows of teeth that increase in size provide sudden expansions and contractions to drop the pressure in stages and slow velocity	Gradual reduction of pressure without generating high velocities reduces process line noise; small outlet holes leverage frequency shifting to raise the frequency and lower the noise	Tight shut-off achieves multiple pressure drops in the radial stage nozzle; adjustable C_v values and characteristics; special trim designs promote tight shut-off, e.g., double seat trims (tandem seat)	Manage high-pressure drops in applications where intermittent and continuous streams of large particles are entrained in the process media
Plant Type	• Nuclear • Ultra-supercritical • Supercritical • Combined cycle • Solar thermal	• Nuclear • Ultra-supercritical • Supercritical • Combined cycle • Solar thermal	• Nuclear (BOP only) • Ultra-supercritical • Supercritical • Combined cycle • Solar thermal	• Ultra-supercritical • Supercritical • Combined cycle • Solar thermal
Applications	High-pressure drops; attenuates noise up to 30 dBa	Effectively reduces sound pressure levels by as much as 40 dBa in the most demanding applications	Flashing water; high-pressure drops	Dirty services with excessive noise, cavitation, erosion and high-pressure drops
Fits In	Valtek Mark Series	Valtek Mark Series	Gestra ZK Series	Kämmer and Valtek Multi-Z Valves
Size Range	DN 38 to 900; NPS 1½ to 36	DN 25 to 900; NPS 1 to 36	DN 25 to 300; NPS 1 to 12	DN 25 to 400 NPS 1 to 16
Reference Literature	FCENBR0067	FCENBR0067	810742 (on Gestra.com)	KMEEBR1613

Positioners

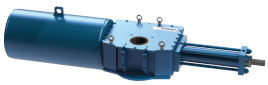
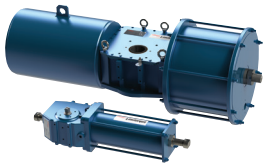
Brand	Valtek	Valtek	Valtek	Valtek
				
Model	**Logix™ 3200MD/3400MD**	**Logix 500MD+**	**Logix 420**	**ValveSight™**
Features	• Dual-stage piezoelectric technology and inner loop control • Explosion-proof aluminum or stainless steel housings • Single push-button calibration and DIP switch configuration • Balanced spool design converts from 3-way to 4-way operation in field • Mounting for linear and rotary actuators	• Dual-stage piezoelectric technology • Mounting for linear and rotary actuators • Increased C_v allows quicker response without flow boosters • Single push-button calibration • Single-acting, low bleed poppet design • Single/dual action spool design • Optional backlit LCD	• Dual-stage piezoelectric technology • Integral Valtek FlowTop and GS mounting eliminates tubing • Suitable for use with both linear and rotary single-acting actuators • Increased C_v allows quicker response without flow boosters • Single push-button calibration • Optional backlit LCD	• Stand-alone or portable system for real-time monitoring of valve, actuator and positioner performance • DCS or asset management tools that support FDT/ DTM technology • Recognizes and evaluates deviations immediately • Help screens offer probable causes and solutions to alarms
Plant Type	• Nuclear • Ultra-supercritical • Supercritical • Combined cycle • Solar thermal	• Nuclear • Ultra-supercritical • Supercritical • Combined cycle • Solar thermal	• Nuclear • Ultra-supercritical • Supercritical • Combined cycle • Solar thermal	• Nuclear • Ultra-supercritical • Supercritical • Combined cycle • Solar thermal
Typical Applications	Explosion-proof, non-incendive, intrinsically safe	Non-incendive, intrinsically safe	Explosion-proof, non-incendive, intrinsically safe	Runs on any DCS system with certified FDT frame
Certifications	FM/CSA/IECEx/ATEX, KOSHA, InMetro, GOST R	FM/CSA/IECEx/ATEX	FM/CSA/IECEx/ATEX	FDT 1.2 certified
Operating Pressure	10 barg (150 psig)	Single-acting: 6 barg (87 psig) Double-acting: 10 barg (150 psig)	6 barg (87 psig)	N/A
Input Signal	4-20 mA; HART® versions 5 and 6; and Foundation Fieldbus™	4-20 mA; HART versions 5, 6 and 7	4-20 mA; HART versions 6 and 7	N/A
Reference Literature	LGENIM0059, LGENIM3404	LGENIM0105	LGENIM0106	VSENSF0003

FLOWSERVE

Actuation

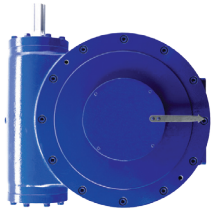
Brand	Limitorque	Limitorque	Limitorque	Limitorque
				
Model	**MX**	**QX**	**SMB**	**L120**
Description	Non-intrusive, electronic multi-turn actuator	Non-intrusive, electronic quarter-turn actuator	Electro-mechanical, multi-turn actuator with integral controls	Electro-mechanical, multi-turn actuator with integral controls
Features	• Non-intrusive, smart multi-turn electronic actuator with Built In Self-Test (BIST) absolute encoder • Configured in 11 languages • Double-sealed terminal compartment • Global explosion-proof certifications and submersible to IP68 • Up to SIL-3 certification compliant • Complies with CE mark for relevant European Directives	• Non-intrusive, smart quarter-turn electronic actuator with Built In Self-Test (BIST) absolute encoder • Configured in 11 languages • Double-sealed terminal compartment • Global explosion-proof certifications and submersible to IP68 • Complies with CE mark for relevant European Directives	• Nuclear-qualified to IEEE 323, 344 and 382 for inside containment, safety-related service • Nuclear, weatherproof, and explosion-proof constructions • Spring compensation packages for high temperature or high speed applications for torque-seated valves • Gear-driven limit switches	• Weatherproof, explosion-proof and submersible constructions • Spring compensation packages for high-temperature or high-speed applications for torque-seated valves • Integral control packages for on/off and modulating service • Network control in five protocols (Modbus®, Foundation Fieldbus, PROFIBUS DP™, PROFIBUS PA™, DeviceNet™)
Plant Type	• Nuclear (BOP only) • Ultra-supercritical • Supercritical • Combined cycle • Solar thermal	• Nuclear (BOP only) • Ultra-supercritical • Supercritical • Combined cycle • Solar thermal	• Nuclear • Ultra-supercritical • Supercritical • Combined cycle • Solar thermal	• Nuclear (BOP only) • Ultra-supercritical • Supercritical • Combined cycle • Solar thermal
Typical Applications	Gate, globe, check, butterfly, ball and plug valves; dampers	Butterfly, ball and plug valves	Gate, globe, check, butterfly, ball and plug valves; dampers; slide gate	Gate, globe, check, butterfly, ball and plug valves; dampers; slide gate
Sizes	Available in seven sizes	Available in five sizes	Available in nine sizes	Available in nine sizes
Torque Output Range	46 Nm (34 ft-lb) to 2307 Nm (1700 ft-lb)	54 Nm (40 ft-lb) to 2033 Nm (1500 ft-lb)	122 Nm (90 ft-lb) to 81 350 Nm (60 000 ft-lb)	136 Nm (100 ft-lb) to 81 350 Nm (60 000 ft-lb)
Thrust Output Range	35 kN (8000 lb) to 333 kN (75 000 lb)	N/A	35 kN (8000 lb) to 2224 kN (500 000 lb)	35 kN (8000 lb) to 2224 kN (500 000 lb)
Reference Literature	LMENBR2302	LMENBR3302	LMENBR1400	LMENBR1200

Actuation

Brand	Limitorque	Limitorque	Limitorque	Limitorque
				
Model	**CEA**	**LHS**	**LPS and LPC**	**Master Station III**
Description	Electronic, rotary control actuator	Hydraulic, Scotch yoke, quarter-turn, heavy-duty actuator	Pneumatic, Scotch yoke, quarter-turn actuator — heavy-duty (LPS) and compact (LPC)	Network controller for electronic actuators
Features	• Manual override • Self-locking worm gear drive train • BLDC motor with 12-bit position encoder • User-friendly HMI with auto calibration • Multiple network communications, including Foundation Fieldbus, PROFIBUS PA™, HART and Modbus®	• Symmetrical and canted Scotch yoke types • Spring return and double acting • -60°C (-76°F) to 160°C (320°F) operating temperature range • 90° ± 5° of travel adjustment • On/Off, modulating and control valve application in general service, protective service and safety applications (ESD/HIPPS)	• Symmetrical and canted Scotch yoke types • Spring return and double acting • -60°C (-76°F) to 160°C (320°F) operating temperature range • 90° ± 5° of travel adjustment • On/Off, modulating and control valve application in general service, protective service and safety applications (ESD/HIPPS)	• Network control of up to 250 devices • Industry standard Modbus RTU and TCP/IP protocols • Hot-swappable redundant design • Multilingual support includes English, Spanish, German, French, Italian • Web application for control, monitoring and diagnostics
Plant Type	• Combined cycle • Solar thermal	• Nuclear (BOP only) • Ultra-supercritical • Supercritical • Combined cycle • Solar thermal	• Nuclear (BOP only) • Ultra-supercritical • Supercritical • Combined cycle • Solar thermal	• Nuclear (BOP only) • Ultra-supercritical • Supercritical • Combined cycle • Solar thermal
Typical Applications	Butterfly, ball, plug and choke valves; dampers	Butterfly, ball and plug valves; dampers	Butterfly, ball and plug valves; dampers	Gate, globe, check, butterfly, ball and plug valves; dampers
Sizes	Available in seven sizes	Available in six sizes	LPS: Available in six sizes LPC: Available in two sizes	Available in rack, wall, free-standing mount
Torque Output Range	17 Nm (12 ft-lb) to 1700 Nm (1254 ft-lb)	4000 Nm (2950 ft-lb) to 250 000 Nm (184 390 ft-lb)*	LPS: 4000 Nm (2950 ft-lb) to 250 000 Nm (184 390 ft-lb)* LPC: 24 Nm (17 ft-lb) to 1600 Nm (1180 ft-lb)*	N/A
Max. Allowable Working Pressure	N/A	207 barg (3000 psig)	12 barg (174 psig)	N/A
Reference Literature	LMENBR2080	LFENBR0003	LPS: LFENBR0001 LPC: LFENBR0002	LMENFL5100

*Contact the factory for higher torque applications.

Gearboxes

Brand	Limitorque	Limitorque	Limitorque	Limitorque
				
Model	**WG**	**V**	**SR**	**HBC**
Description	Worm gear, quarter-turn and multi-turn gearbox	Bevel gear, multi-turn gearbox	Spur gear, multi-turn gearbox	Worm gear, quarter-turn and multi-turn gearbox
Features	• Meets AWWA C504 and C542 when motorized with MX, L120 or SMB actuators • Available for 360° operation • Available for buried service and submersible to IP68 • Worm gears available in ductile iron or bronze • Self-locking gearing	• Weatherproof and submersible designs • Motorized with Limitorque SMB, L120 and MX actuators • Top-entry, splined, bronze alloy stem nut, removable from the drive sleeve • Bearing-supported input shaft and drive sleeve	• Weatherproof and submersible designs • Motorized with Limitorque SMB, L120, and MX actuators • Top-entry, splined, bronze alloy stem nut, removable from the drive sleeve • Bearing-supported input shaft and drive sleeve	• Weatherproof, buried service and submersible designs • Nuclear qualified for inside containment, safety-related service when coupled to SMB electric actuators • Motorized with Limitorque SMB, L120 and MX electric actuators • Available in 90° and 360° designs for quarter-turn valves or dampers
Plant Type	• Nuclear (BOP only) • Ultra-supercritical • Supercritical • Combined cycle • Solar thermal	• Nuclear (BOP only) • Ultra-supercritical • Supercritical • Combined cycle • Solar thermal	• Nuclear (BOP only) • Ultra-supercritical • Supercritical • Combined cycle • Solar thermal	• Nuclear • Ultra-supercritical • Supercritical • Combined cycle • Solar thermal
Typical Applications	Butterfly, ball and plug valves; dampers	Gate, globe and check valves; slide gates	Gate, globe and check valves; slide gates	Butterfly, ball and plug valves; dampers
Sizes	Available in 14 sizes	Available in 16 sizes	Available in three sizes	Available in eight sizes
Torque Output Range	700 Nm (516 ft-lb) to 610 000 Nm (449 910 ft-lb)	600 Nm (442 ft-lb) to 42 000 Nm (30 979 ft-lb)	5200 Nm (3835 ft-lb) to 13 000 Nm (9588 ft-lb)	605 Nm (445 ft-lb) to 126 100 Nm (93 000 ft-lb)
Thrust Output Range	N/A	127 kN (28 551 lb) to 5450 kN (1 225 180 lb)	400 kN (89 920 lb) to 2310 kN (519 300 lb)	N/A
Reference Literature	LMENFL2102	LMENFL3602	LMENFL3702	LMENBR3500

Steam Traps

Brand	Gestra	Gestra	Gestra	Gestra
				
Model	**BK 212 BiMetallic Steam Trap**	**BK 29 BiMetallic Steam Trap**	**BK 28 BiMetallic Steam Trap**	**BK 37 BiMetallic Steam Trap**
Features	• Corrosion-resistant Thermovit® bimetallic plates regulator • Internal strainer • Automatic air-venting • DIN/EN and ASME compliant designs • Zero steam loss • Unaffected by water hammer and resistant to freezing	• Corrosion-resistant Thermovit bimetallic plates regulator • Internal strainer • Automatic air-venting • DIN/EN and ASME compliant designs • Zero steam loss • Unaffected by water hammer and resistant to freezing	• Corrosion-resistant Thermovit bimetallic plates regulator • Internal strainer • Automatic air-venting • DIN/EN and ASME compliant designs • Zero steam loss • Unaffected by water hammer and resistant to freezing	• Corrosion-resistant Thermovit bimetallic plates regulator • Internal strainer • Automatic air-venting • DIN/EN and ASME compliant designs • Zero steam loss • Unaffected by water hammer and resistant to freezing
Plant Types	• Ultra-supercritical • Supercritical • Combined cycle	• Ultra-supercritical • Supercritical • Combined cycle	• Ultra-supercritical • Supercritical • Combined cycle	• Ultra-supercritical • Supercritical • Combined cycle
Typical Applications	Drainage of steam lines, turbines and air vents	Drainage of steam lines, turbines and air vents	Drainage of steam lines, turbines and air vents	Drainage of steam lines, turbines and air vents
Sizes	DN 15 to 25; NPS ½ to 1	DN 15 to 25; NPS ½ to 1	DN 15 to 25; NPS ½ to 1	DN 15 to 25; NPS ½ to 1
Hot Condensate Capacity	300 kg/h (650 lb/h)	950 kg/h (2094 lb/h)	900 kg/h (1984 lb/h)	550 kg/h (1212 lb/h)
Max. Body Pressure	PN 630; Class 2500	PN 160; Class 900	PN 100; Class 600	PN 63; Class 400
Max. Differential Pressure	275 barg (3625 psig)	110 barg (1595 psig)	85 barg (1232 psig)	45 barg (662 psig)
Reference Literature	810124 (on Gestra.com)	810124 (on Gestra.com)	810124 (on Gestra.com)	810124 (on Gestra.com)

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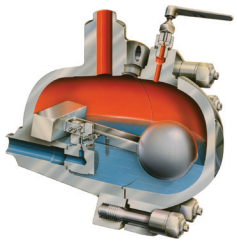
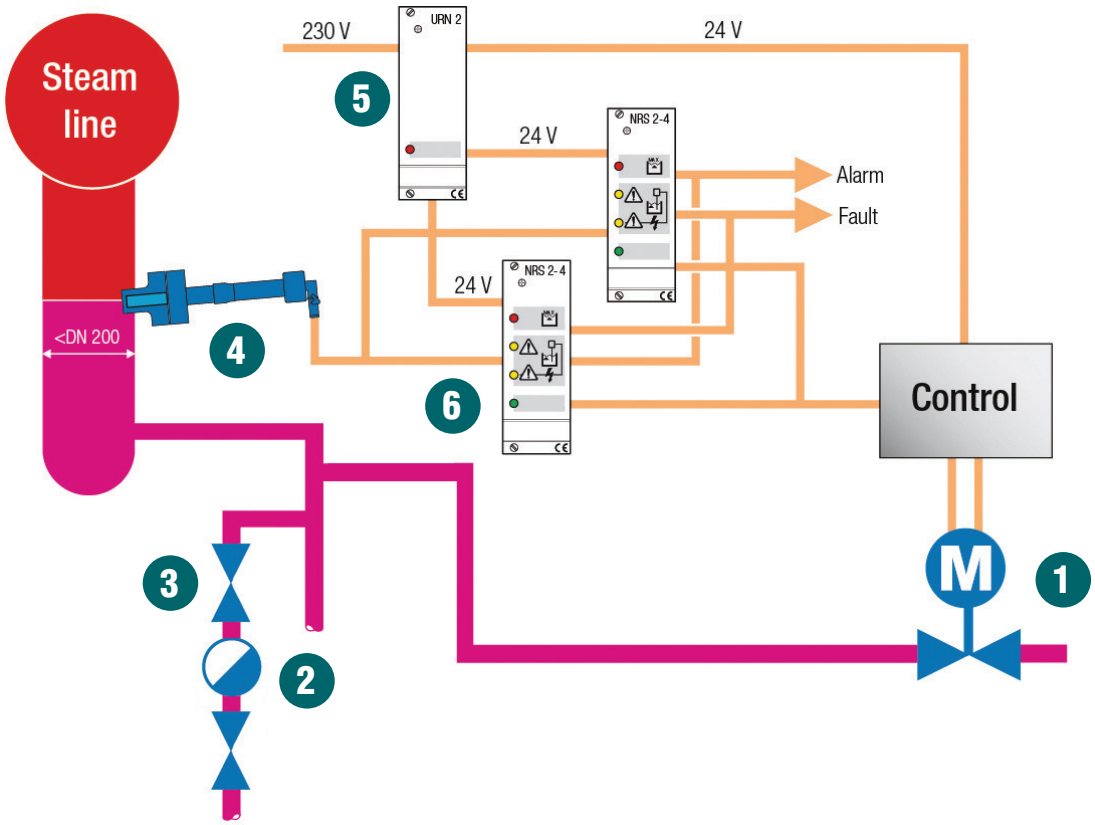
Steam Traps

Brand	Gestra	Gestra	Gestra
			
Model	**UNA 39 Ball Float Trap**	**UNA 38 Ball Float Trap**	**UNA 27 Ball Float Trap**
Features	• Operates without backing up • Corrosion-resistant, SIMPLEX controller for superheated steam • Manual air-venting • DIN/EN and ASME compliant materials • Zero steam loss • Max controller for high flow rates	• Operates without backing up • Corrosion-resistant, SIMPLEX controller for superheated steam; DUPLEX controller for saturated steam deaeration • Manual air-venting • DIN/EN and ASME compliant materials • Zero steam loss	• Operates without backing up • Corrosion-resistant, SIMPLEX controller for superheated steam; DUPLEX controller for saturated steam deaeration • Manual air-venting • DIN/EN and ASME compliant materials • Zero steam loss
Plant Types	• Ultra-supercritical • Supercritical • Combined cycle	• Ultra-supercritical • Supercritical • Combined cycle	• Ultra-supercritical • Supercritical • Combined cycle
Typical Applications	Heat exchanger, steam line and turbine drainage	Heat exchanger, steam line and turbine drainage	Heat exchanger, steam line and turbine drainage
Sizes	DN 15 to 50; NPS ½ to 2	DN 15 to 50; NPS ½ to 2	DN 25 to 50; NPS 1 to 2
Hot Condensate Capacity	310 to 6000 kg/h (684 to 13 227 lb/h)	550 to 5500 kg/h (1212 to 12 125 lb/h)	4800 kg/h (10 582 lb/h)
Max. Body Pressure	PN 160; Class 900	PN 100; Class 600	PN 63; Class 400/600
Max. Differential Pressure	140 barg (2023 psig)	80 barg (1156 psig)	45 barg (650 psig)
Reference Literature	810124 (on Gestra.com)	810124 (on Gestra.com)	810124 (on Gestra.com)

Steam Monitoring and Control



Item	Application	Recommended Valves	Page No.
1	Actuated steam line drain valve	Gestra ZK 29, ZK 313, or ZK613 with Limitorque electric actuators	11, 12
2	Steam trap	Gestra UNA and BK series “zero loss” steam traps	19, 20
3	Stop valve	Edward Univalve	6
4	Level probe	Gestra NRG 211	Not listed in bulletin
5	Power supply	Gestra URN2	Not listed in bulletin
6	Level switch	Gestra NRS 2-4	Not listed in bulletin

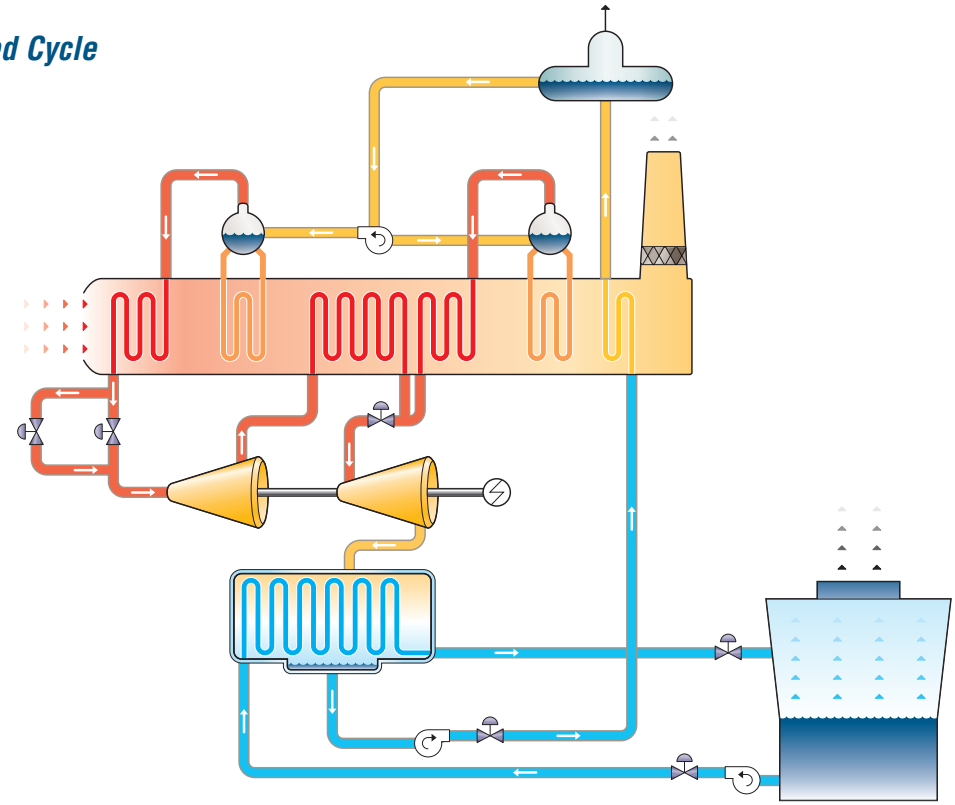
Critical Piping Drainage System in Power Plants

Accumulation of condensed steam is a potential source of severe damage to the steam turbine, and can lead to an unplanned outage. Piping drainage must be applied to maintain steam quality and protect the steam equipment from damage by water hammer.

The figure above shows a controlled steam line drainage system that includes level-sensing devices, high-level switches, digital controller, motorized valve and steam traps. Flowserve Gestra provides most critical drainage control elements for steam conditions to Class 1900 with temperatures to 550°C (1022°F) and pressures to 230 barg (3336 psig).

Gestra offers plant operators reliable and low-maintenance steam solutions. When used in high-risk piping sections (e.g., cold reheat lines), drainage control is designed with level sensing and level switching elements. The steam trap and the control valve in corresponding drain systems are very robust, quick opening, and unaffected by superheat. They also boast high-volume discharge and fully automatic monitoring capabilities.

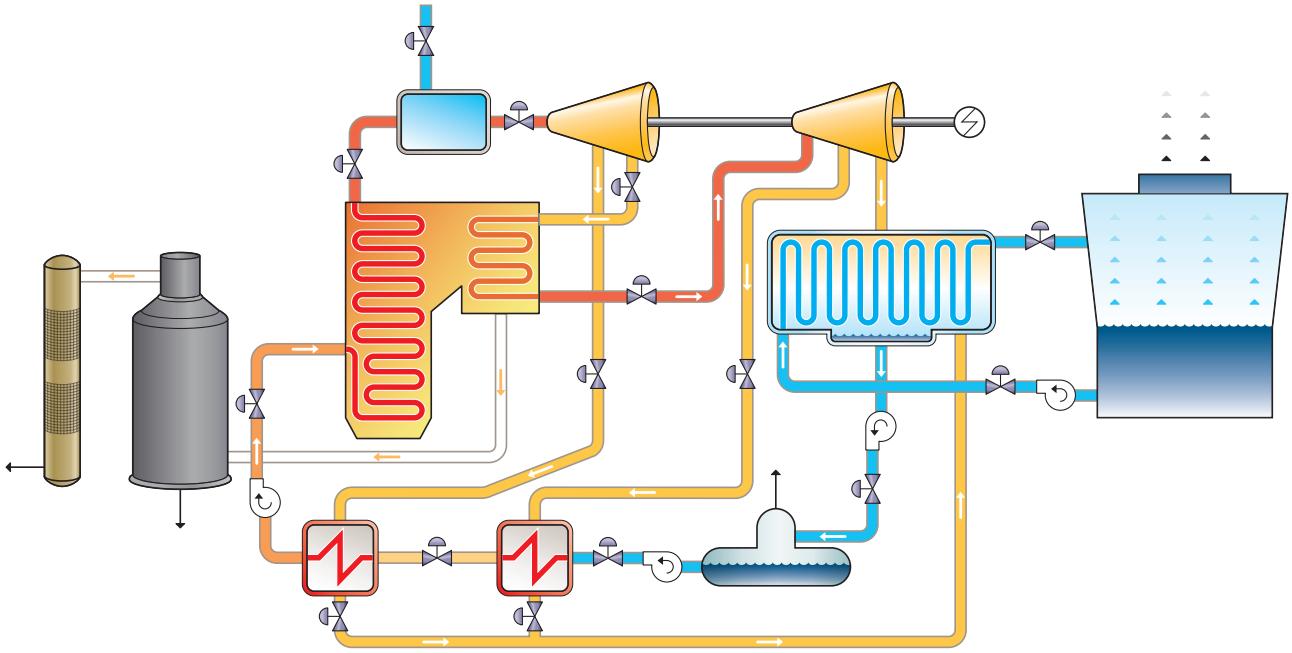
Combined Cycle



Application	Recommended Valves	Page No.
Feedwater stop and check valves	Edward Flite-Flow, Edward Piston Check	5, 7
Main steam stop valve	Edward Equiwedge	4
Main steam non-return valve	Edward Flite-Flow	5
Reheat stop valve	Edward Equiwedge	4
Blowdown and blow-off valves	Edward Blow-off, Edward Blowdown	6
Start-up/steam bypass valves	Edward Univalve	6
Control valves	Valtek Mark One, Valtek Mark 100, Gestra ZK 29	10, 11
Boiler drain valves	Gestra ZK series, Gestra BK series	11, 12, 19
Spray water control valves	Gestra ZK series, Valtek Mark series	10, 11, 12
Turbine drain valves	Gestra ZK series, Gestra BK series	11, 12, 19
Steam line drain valves	Gestra ZK series, Gestra BK series	11, 12, 19
Feed pump recirculation valves	Gestra ZK series, Valtek Mark series	10, 11, 12

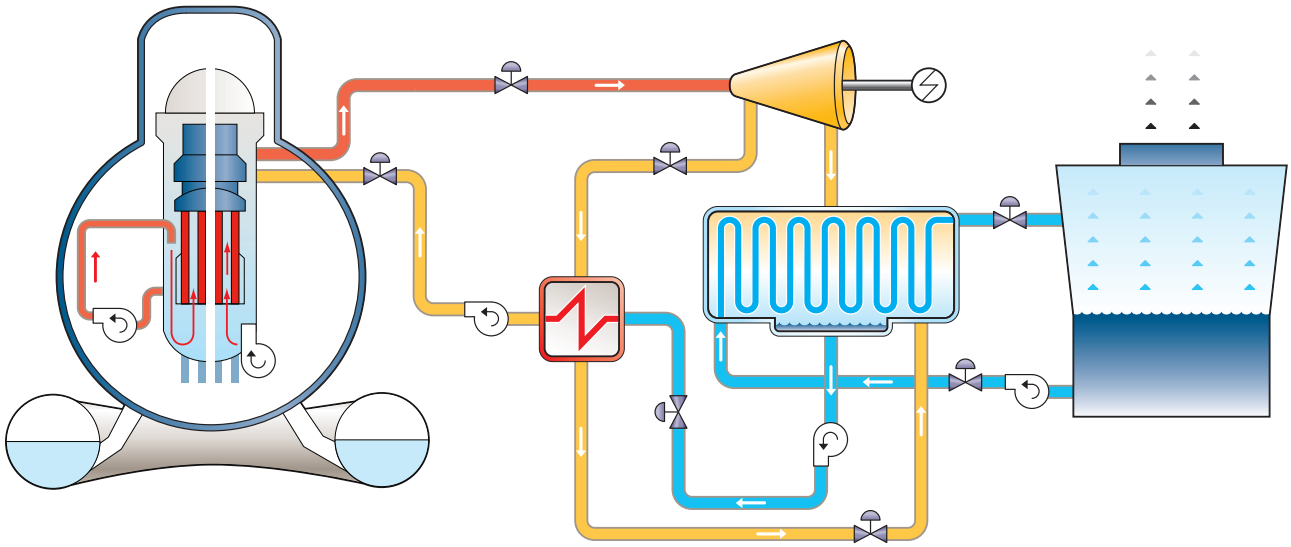
Fossil

Super-Critical



Application	Recommended Valves	Page No.
Feedwater stop and check valves	Edward Flite-Flow, Edward Piston Check	5, 7
Main steam stop valve	Edward Equiwedge	4
Main steam non-return valve	Edward Flite-Flow	5
Reheat stop valve	Edward Equiwedge	4
Startup/steam bypass valves	Edward Univalve	6
Control valves	Valtek Mark One, Valtek Mark 100, Gestra ZK 29	10, 11
Soot blower steam control valve	Gestra ZK series	11, 12
Boiler drain valves	Gestra ZK series, Gestra BK series	11, 12, 19
Spray water control valves	Gestra ZK series, Valtek Mark series	10, 11, 12
Turbine drain valves	Gestra ZK series, Gestra BK series	11, 12, 19
Steam line drain valves	Gestra ZK series, Gestra BK series	11, 12, 19
Feed pump recirculation valves	Gestra ZK series, Valtek Mark series	10, 11, 12

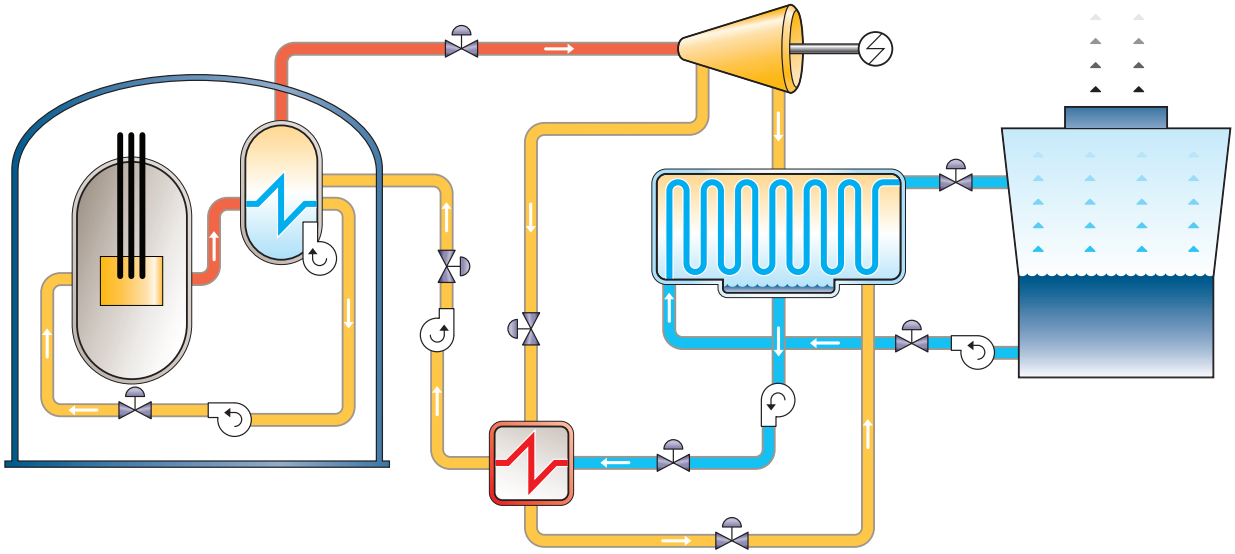
BWR



Application	Recommended Valves	Page No.
MSIV	Edward Flite-Flow	5
Containment isolation	Anchor/Darling flex wedge, Anchor/Darling swing check	4, 8
HPCI and RCIC	Anchor/Darling flex wedge, Anchor/Darling swing check	4, 8
Feedwater check	Anchor/Darling swing check	8
Control valves	Valtek Mark One, Valtek Mark 100, Gestra ZK 29	10, 11
Drains	Anchor/Darling 1878 globe	7
Rad waste	Durco T4E plug	Not listed in bulletin
Turbine drain valves	Gestra ZK series, Gestra BK series	11, 12, 19
Steam line drain valves	Gestra ZK series, Gestra BK series	11, 12, 19

Nuclear

PWR



Application	Recommended Valves	Page No.
MSIV and MFIV	Edward MSIV, Edward MFIV	4, 5
Containment isolation	Anchor/Darling flex wedge, Anchor/Darling swing check	4, 8
HPCI and RCIC	Anchor/Darling flex wedge, Anchor/Darling swing check	4, 8
Feedwater check	Anchor/Darling swing check	8
Control valves	Valtek Mark One, Valtek Mark 100, Gestra ZK 29	10, 11
Drains	Anchor/Darling 1878 globe	7
Turbine drain valves	Gestra ZK series, Gestra BK series	11, 12, 19
Steam line drain valves	Gestra ZK series, Gestra BK series	11, 12, 19

Service

Keeping Power Flowing 24/7

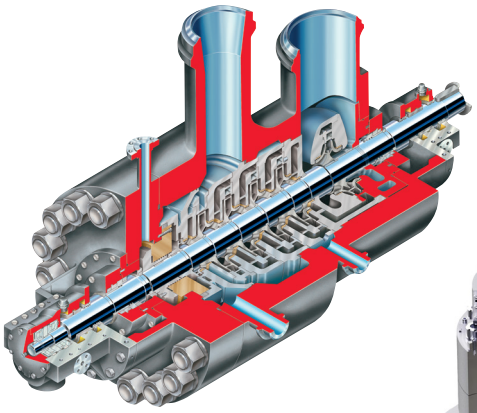
Flowserve products and services are found across the power generation industry—the infrastructure that keeps our world working. Day and night, Flowserve flow control solutions keep the wheels of commerce turning, the halls of government ringing, city lights burning and country homes supplied with electricity. Wherever you are, whatever you are doing, chances are that Flowserve products and services are helping you get it done.

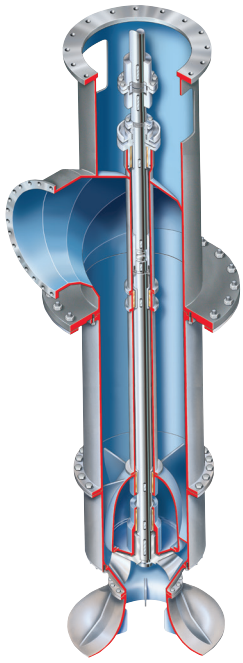
No organization is better suited to provide total product service and support for all of your maintenance needs. With asset management programs, mobile machine shops, Quick Response Centers strategically located around the globe, field repairs, training and in-house service, Flowserve has the tools, the experience and the attitude to keep your facility running at peak efficiency around the clock.

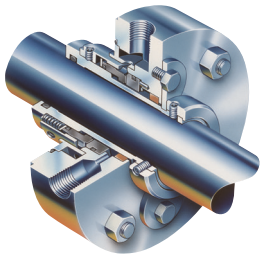
Pumps and Seals for Complete Power Solutions

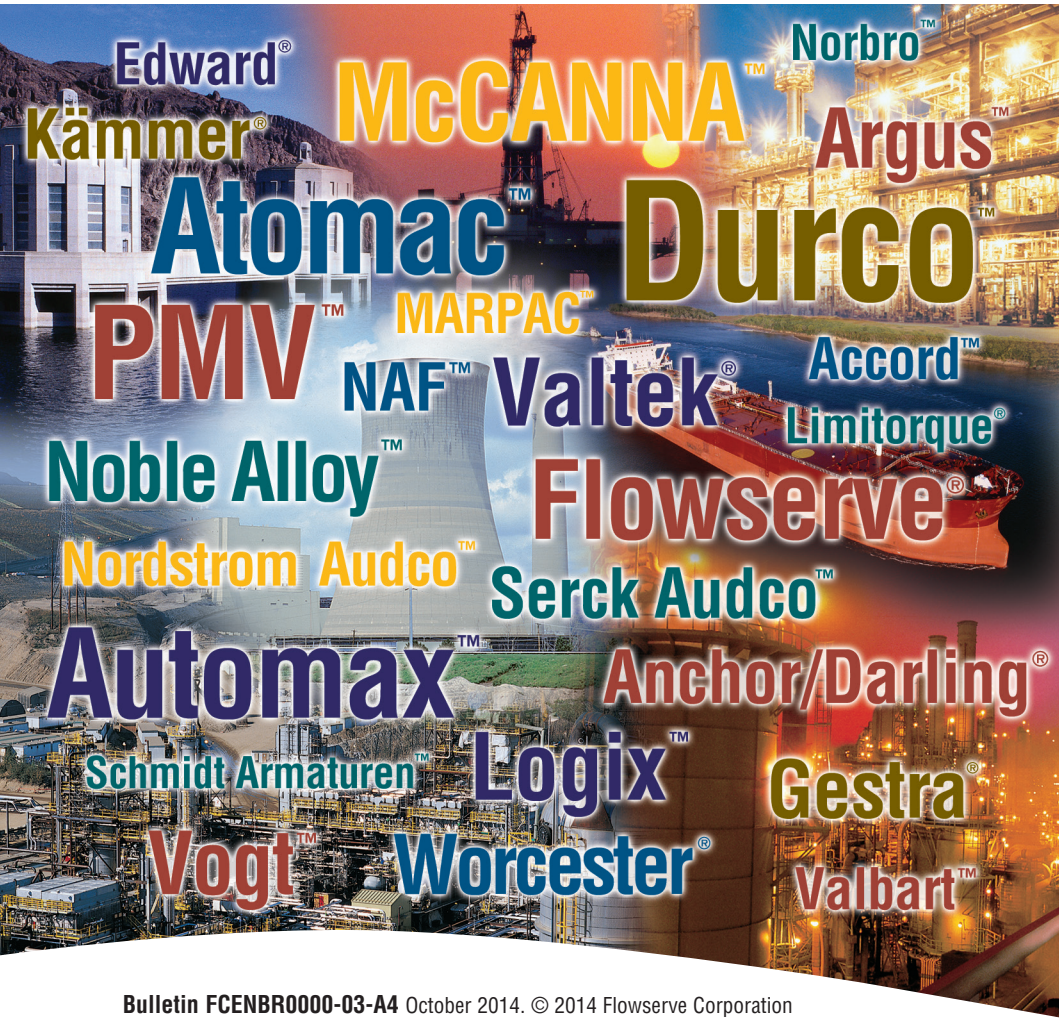
Flowserve is the driving force in the global industrial flow control marketplace. No other company in the world has the depth or breadth of expertise in the successful application of pre-engineered, engineered and special purpose pumps, valves, actuation systems and mechanical seals for power applications.

Throughout its history, Flowserve has been closely identified with power generation. From the 1840 introduction of the first direct-acting steam pump to the installation of Class 1, 2, 3 and BOP pumps in more than 300 nuclear power plants around the globe, Flowserve has helped power the power generation industry.









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