



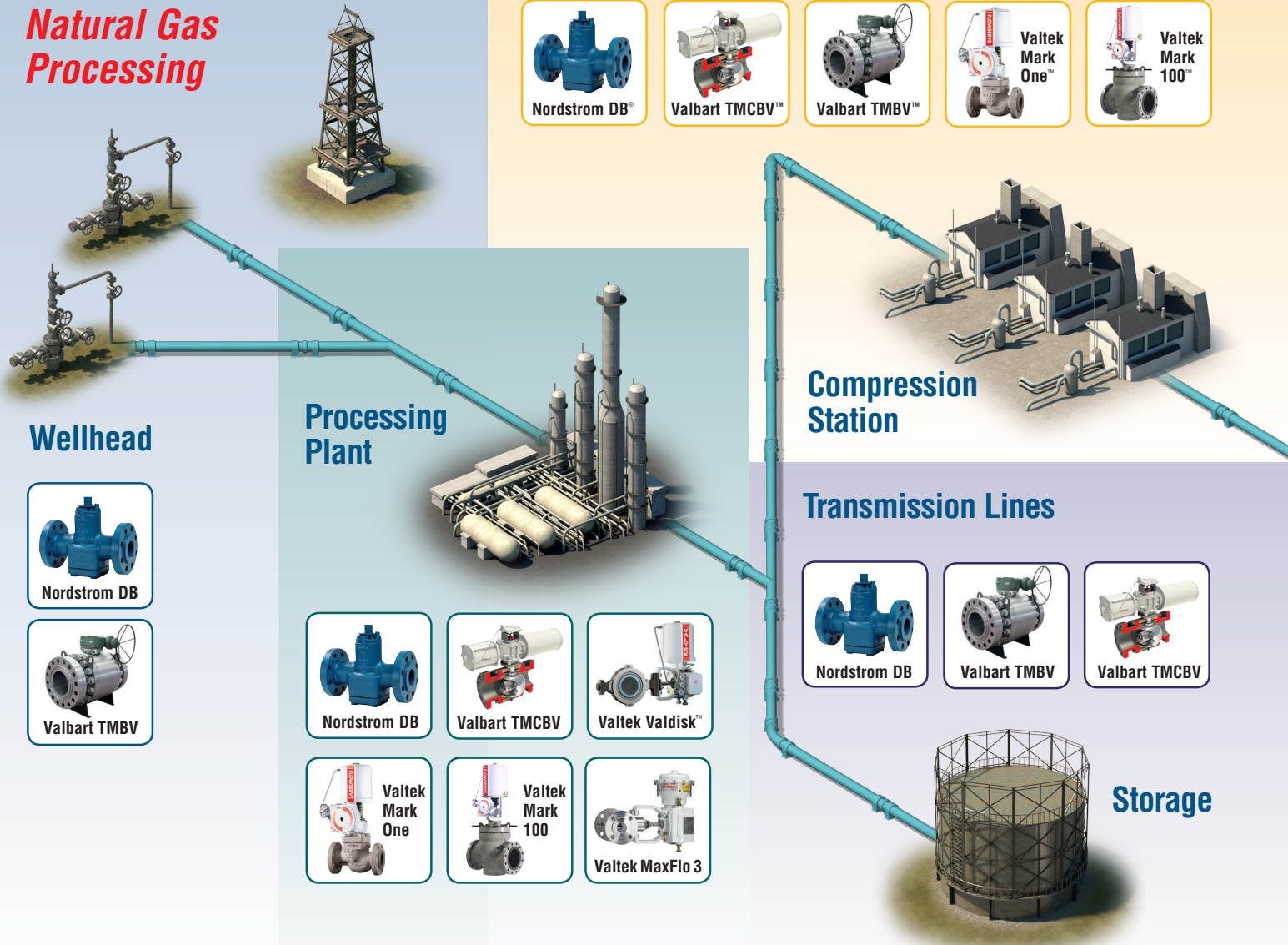
# *Natural Gas Control Valves*

From the Wellhead to the End User



*Experience In Motion*

# Natural Gas Processing



## Wellhead



## Processing Plant



## Compression Station

## Transmission Lines



## Storage

### Valves for Every Application

Global, political, commercial and technological forces have combined to encourage the expanded use of natural gas energy. The cleanest burning of all fossil fuels, natural gas is accessible and available in abundant quantity. Through its heritage brands — Nordstrom™, Valbart™ and Valtek™ — Flowserve has long provided reliable and comprehensive rotary and linear control valve solutions for every stage of natural gas production, cleaning, transmission, storage and distribution. Moreover, Flowserve valves are widely applied in combined cycle power generation.

#### Valbart TMBV

Valbart API 6D trunnion-mounted ball valves are full port valves which provide double block and bleed service to simultaneously seal both seats while bleeding off entrapped cavity pressure. All customary actuators are available, including gas over oil types.

#### Valbart TMCBV

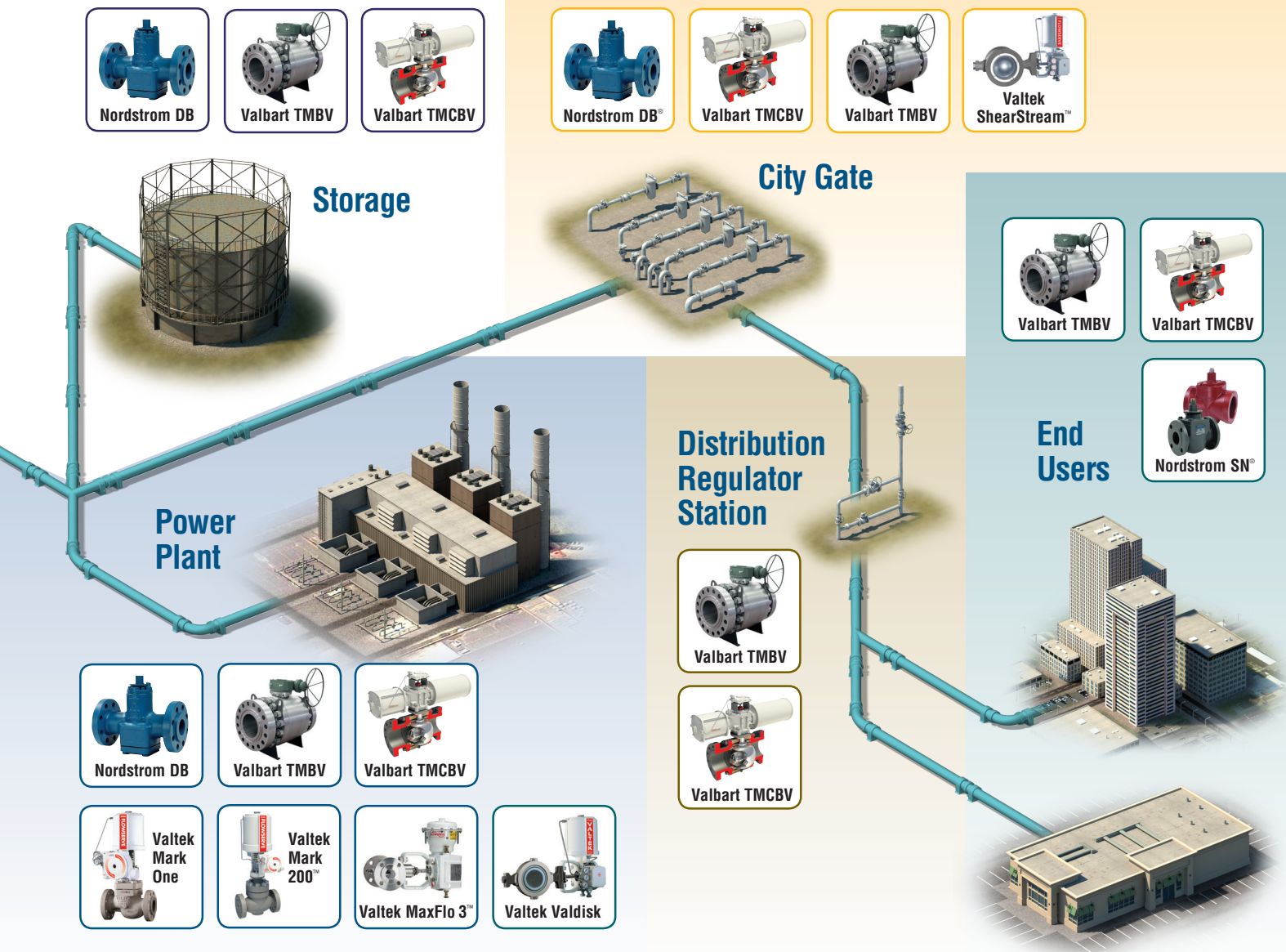
Valbart trunnion-mounted control ball valves offer greater capacity than comparable globe valves, thereby achieving required flow with smaller-sized valves and actuators. Flowserve digital positioners provide precision flow control, and a pneumatically controlled, no bleed option is also available. A variety of noise reduction and cavitation control trims are available.

#### Valtek Mark One

Valtek Mark One globe control valves offer superior performance in liquid and gaseous services while permitting easy, fast and inexpensive maintenance. Compact, lightweight body and actuator package offers reliable position accuracy, repeatability and assured response.

#### Valtek Mark 100

Valtek Mark 100 globe control valves provide significant economy, as their high flow capacities permit use of smaller, less costly valves. Offering extra-fine process control and easy maintenance, they are available in a wide variety of noise abatement and anti-cavitation trims.



**Valtek Mark 200**

Valtek Mark 200 globe control valves are intended for severe service, high-pressure, maximum capacity applications often found in combined cycle power generation. By delivering the highest flow capacity of any valve in its class, end users can install smaller-size valves or even replace multiple control valves with a single Mark 200.

**Valtek MaxFlo 3**

Valtek MaxFlo 3 double-offset eccentric rotary plug control valves offer superior performance for applications requiring precise control with higher repeatability and flow capacity than alternative valve designs. Low breakout torque prolongs service life; blow-out proof shaft ensures safety.

**Valtek Valdisk**

Valtek Valdisk heavy-duty, double-offset butterfly valves are designed for high-capacity and low-pressure loss services. Low breakout torque assures accurate throttling. Eccentric-cammed disc lifts out of the seat immediately upon actuation, avoiding seat and disc wear.

**Valtek ShearStream**

Valtek ShearStream segmented V-notch ball valves solve long-standing issues traditionally associated with ball valves, including piping forces that unevenly load the seal, low rangeability due to limited orifice characterization and unsatisfactory shutoff capabilities. Features high flow capacity and rangeability characteristics.

**Nordstrom DB**

Nordstrom Double Balance (DB) plug valves are found in critical applications throughout all phases of natural gas production/transmission/distribution as well as in combined cycle power generation. The metal to metal seat provides customers a rugged, long-lasting valve. A pressure-balanced plug assures positive shutoff and predictable torque, even under high pressure differential, vibration and thermal cycling.

**Nordstrom SN**

Super Nordstrom (SN) plug valves are widely employed by end users for low-cost gas distribution service. Design features include a mechanically balanced plug for predictable torque and tamper-proof integral stop and locking device. Factory Mutual Approved models available.

## VALBART VALVES



### TMBV *Valbart*

The Valbart Trunnion-Mounted Ball Valve (TMBV) is versatile in both design and application. Outside the processing plant, it will be found in both upstream and downstream NG services. All TMBVs are of the double block and bleed design to seal off both seats simultaneously while allowing blowdown of center cavity pressure (DBB) with the ball in the closed position. This also makes it possible to flush the valve under pressure and verify seat sealing integrity.

#### Features

- Low emissions/stem packing
- Independent ball and stem minimize side thrust
- Floating, self-relieving seat rings assure bi-directional sealing (Single Piston Effect or Double Piston Effect available)
- Soft (ISO 5208 Rate A) or metal (ISO 5208 Rate D) seat options
- Emergency stem sealant injection
- Gas over oil actuators for ESDV, SDV, BDV, MOV, GOV, and HIPPS services as well as electric, pneumatic and hydraulic types

#### Standards

- API 6D and API 6A
- Fire safe to ISO 10497/API 6FA, API 607

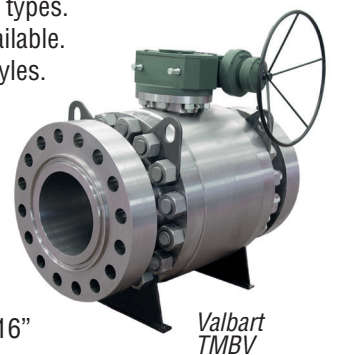
#### Configurations

Flanged RF or RTJ, plus other types. Butt-weld ends and others available. Full and reduced bore body styles.

- Bolted body side entry
- Welded body
- Top entry

#### Specifications

- API 6D Size: 2" – 56" (50 mm – 1400 mm)
- API 6A Size: 1-13/16" – 7-1/16" (46 mm – 180 mm)
- Pressure: PN 20 – PN 420; ASME Class 150 – 2500; API 2000 – 15000
- Temperature: -196°C – 450°C (-320°F – 842°F)
- For higher temperature and cryogenic services, consult factory
- Material: Carbon steel; stainless steel; nickel alloys



*Valbart TMBV*

## VALBART VALVES

### TMCBV *Valbart*

Built upon the robust TMBV platform, the Valbart Trunnion-Mounted Control Ball Valve (TMCBV) is an integrated Flowserve solution. No other manufacturer provides the valve, actuator, and positioner of their own design and manufacture. A true single-source solution backed by Flowserve. Designed to operate at high pressures while minimizing operating torque. The standard metal seats are spring-loaded and process-energized for ASME Class IV or Class V shutoff at any pressure; soft seats for ASME Class VI shutoff. The TMCBV's flow capacity is greater than that of a comparable globe valve. This allows the use of a smaller size TMCBV with a smaller and less expensive actuator and lighter, less expensive piping supports. The TMCBV incorporates advanced Flowserve technologies for characterized flow control, cavitation control and noise attenuation.

#### Features

- Wide range of trim designs based on industry-proven technologies, including MegaStream, CavControl, Channel-Stream, Z-trim, and others. Trims can be custom-engineered for unique applications.
- Metal-to-metal, tungsten carbide-coated seats provide ASME Class IV and Class V shutoff up to PN 420/ASME Class 2500. (Soft seats achieve ASME Class VI shutoff.)
- Very high rangeability in excess of 300:1 for a wide range of control.
- Superior finish machining of stem sealing surfaces ensures compliance with the most stringent pollution control regulations.
- Very tight tolerances maintained in stem-to-ball and stem-to-actuator connections. Eliminates wear and improves response.
- The Flowserve high-cycle life actuator with quad seals and wear rings on piston plus a precisely machined guide bar to withstand lateral loads.

- Logix and PMV brand digital positioners equipped with advanced diagnostics features can be seamlessly integrated into a host control and/or plant asset management program, thus allowing for predictive and preventive maintenance.
- QUICK-CAL™ button, DIP switches, Jog buttons and variable gain selector allow setup and calibration in minutes.

#### Standards

- Designed to API 6D/6A standards
- Fire safe to API 6FA, API 607, ISO 10497

#### Configurations

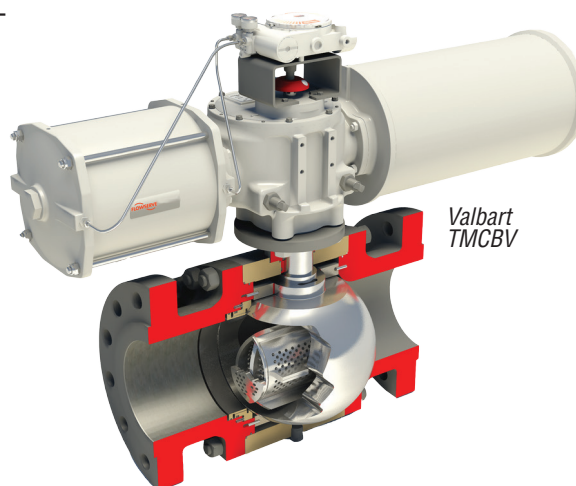
RF or RTJ flanges, hub connections, butt-weld ends or other types available. Full bore and reduced bore designs available.

#### Valve Styles

- Bolted body side entry
- Welded body side entry
- Top entry

#### Specifications

- Size: 100 mm – 1400 mm (4 in – 56 in)
- Pressure: PN 10 – PN 420; ASME Class 150 – 2500; API 2000 – 15000
- Temperature: -196° – 450°C (-320°F – 842°F)
- Material: Carbon steel; stainless steel; nickel alloys



## VALBART VALVES

### Trims

Flowserve has been the industry leader in anticavitation and noise attenuation technology for over 30 years. Advanced Flowserve technologies have been merged with the robust, industry-leading, Valbart Trunnion-Mounted Ball Valve.

#### Cavitation-control Trims

- C1** Covers the entire port so that the trim protects against cavitation damage at every valve position.
- C2** When more capacity is required in a given size, C2 is partially open, characterized to suit the contrasting needs for high capacity and cavitation protection.
- C3** A true velocity-control, cavitation-prevention trim which presents many small, gentle pressure drops to the flow so that cavitation cannot occur. C3 trim is characterized.

#### Noise-control Trims

- N1** Controls velocity as it stages the pressure drop across flat plates in the bore of the ball, progressively decreasing the resistance as the flow encounters fewer plates as the valve is opened. Up to 20 dB attenuation can be expected.
- N2** Controls velocity as it stages the pressure drop across flat plates in the bore of the ball, progressively decreasing the resistance as the flow encounters fewer plates as the valve is opened. Up to 30 dB attenuation can be expected.
- Z1 and Z2** Angled plates give a progressive, continuous characteristic while forcing the flow through multiple self-cleaning stages. Z-trims serve for cavitation control prevention and for noise attenuation up to 15 dB.

### Actuation

Actuator type: Flowserve Limitorque™ double-acting, pneumatic/hydraulic cylinder, fail-safe spring-return, single-acting spring return or electric modulating

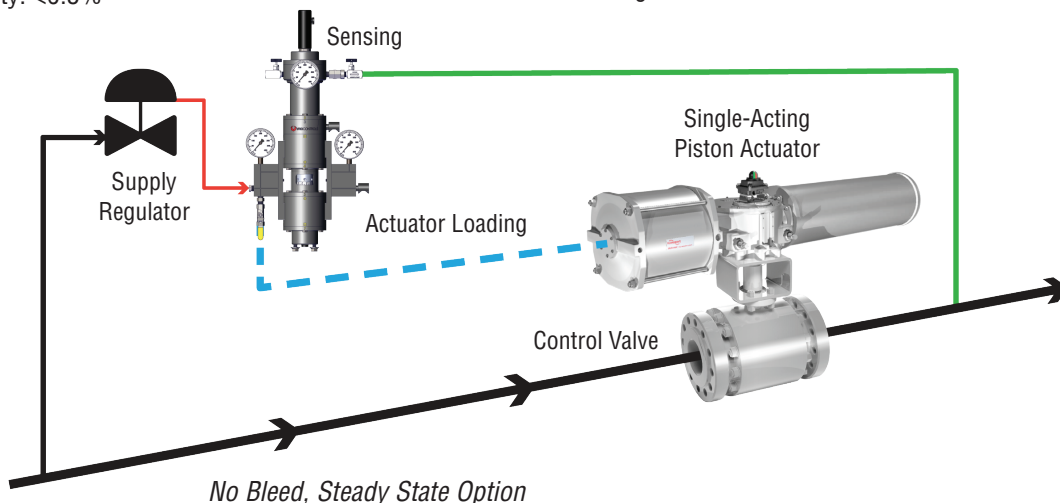
- Manual overrides: Jack screw, bevel gear, de-clutchable worm gear, hydraulic and pneumatic
- Fail-safe action: Fail-to-open or fail-to-close (field reversible fail last, or in-place) pneumatic/hydraulic cylinder; electric modulating
- Positioner: Intrinsically safe, explosion-proof HART, Foundation Fieldbus
- Deadband < 1%
- Repeatability < 0.5%
- Linearity: <0.5%

#### No Bleed Steady State Option

The "no bleed" option with pneumatic control provides superior performance and ZERO steady state emissions to meet natural gas industry needs. This schematic shows a Valbart trunnion-mounted control ball valve configured for active pressure control.

#### Features

- Exceeds EPA Subpart 0000 (Quad 0) requirements
- Environmentally friendly design
- Highly accurate
- Reliable operation
- Long life



## VALTEK CONTROL VALVES

### Mark One *Valtek*

The Valtek Mark One control valve is the NG industry choice for a simple, reliable, tough globe valve. It offers superior performance in liquid and gaseous service, while also permitting easy, fast and inexpensive maintenance. Combined with a spring-cylinder actuator, the compact Mark One control valve is smaller, lighter, and easier to handle and install than alternative control valve packages.

#### Features

- Double top-stem guides on large diameter stem virtually eliminate galling and sticking problems.
- Clamped-in seat and top entry trim permits easy, quick maintenance.
- Spring-cylinder actuator provides stiffness and maintains high positioning accuracy, repeatability, controlled high speed and faithful response.
- Spring, supply air pressure and fluid pressure combine for exceptionally tight shutoff.

#### Configurations

Integral or separable RF flanges, plus RTJ and other types

- Globe-style
- Angle-style
- Three-way
- Steam jacketed

#### Specifications

- Size: 15 mm – 900 mm (½ in – 36 in)
- Pressure: PN 10 – PN 400 (ASME Class 150 – 2500)
- Temperature: -196°C – 815°C (-320°F – 1500°F)
- Materials: Carbon steel, stainless steel, special alloys



*Valtek Mark One*

### Mark 100 *Valtek*

The Valtek Mark 100 control valve offers the highest flow capacity of any comparable globe valve in its class. Its ultra-high capacity permits end users to achieve the flows they need in a smaller, less expensive valve size. The pressure-balanced plug allows use of smaller, more economical actuators. And its longer stroke lengths provide finer control. The Mark 100 was designed specifically for use with severe service trim options.

#### Features

- Higher  $K_v$  ( $C_v$ ) capacity allows for smaller, more cost-effective valve sizes
- Easy maintenance, multiple design options with clamped-in, self-aligning seat ring
- Wide variety of noise abatement and anti-cavitation trims

#### Standards

- ISA 75.03 flanged
- ISA 75.05 butt-weld

#### Configurations

- Flanged RF or RTJ, plus other types; butt-weld

#### Specifications

- Size: 150 mm – 750 mm (6 in – 30 in)
- Pressure: PN 10 – PN 63 (ASME Class 150 – 600)
- Temperature: -196°C – 815°C (-320°F – 1500°F)
- Material: Carbon steel; stainless steel

#### Trim Types

- Standard — equal percentage, linear, quick-open
- Low noise — MegaStream, TigerTooth, Stealth
- Anti-cavitation — CavControl, ChannelStream, TigerTooth



*Valtek Mark 100*

## VALTEK CONTROL VALVES

### Mark 200 *Valtek*

Expanding on the overall design of the Mark One, the Valtek Mark 200 linear globe valve is ideal for applications requiring high pressure, high-pressure drops, high  $K_v$  ( $C_v$ ), noise abatement and cavitation control. Compared with alternative valve designs, its maximum flow capacity offers better control and less error, while its longer stroke offers greater resolution for finer control.

#### Features

- High pressure, maximum capacity with smaller, more cost-effective valve sizes
- Competitive, economical choice among high-pressure, high flow globe control valves
- Long stroke lengths for finer control
- Clamped, self-aligning seat ring creates extremely tight shutoff
- Wide variety of noise abatement and anti-cavitation trims
- Reliable, easy to maintain actuators offer higher thrust, longer strokes, faster speeds, low-cost maintenance

#### Configurations

- Flanged RF or RTJ
- Butt-weld ends
- Globe-style body
- Angle-style body

#### Specifications

- Size: 50 mm – 400 mm (2 in – 16 in)
- Pressure: PN 160 – PN 400 (ASME Class 900 – 2500)
- Temperature: -196°C – 815°C (-320°F – 1500°F)
- Material: Carbon steel; chrome moly; stainless steel

#### Trim Types

- Standard — equal percentage, linear parabolic plug; modified characteristic
- Low noise — MegaStream, TigerTooth, Stealth
- Anti-cavitation — CavControl, ChannelStream, TigerTooth



*Valtek Mark 200*

### MaxFlo 3 *Valtek*

The Valtek MaxFlo 3 is a high-performance, yet economical, eccentric rotary plug control valve. It is intended for applications demanding higher rangeability, precise control and higher flow capacity. Rangeability is up to 160:1, compared to 50:1 for typical globe valves and 20:1 for most butterfly valves.

#### Features

- High  $K_v$  ( $C_v$ ) capacity allows use of more compact control valve package
- Low breakout torque with excellent control
- Lifts immediately off the seat, decreasing seat wear

#### Standards

- Short style — EN558- ½ Series 36; IEC 60534-3-2 (Standard); ASME/ISA-75.08.02
- Long style — DIN Globe 3202-F1; EN558-½ Series 1
- Long style — EN558-½ Series 37-38; IEC 60534-3-1; ASME/ISA Globe-75.08.01

#### Configurations

Flanged and flangeless; (RTJ with flanged on selected sizes)

#### Specifications

- Size: 25 mm – 3200 mm (1 in – 12 in)
- Pressure: DN PN 10, 16, 25, 40 and 63; ASME Class 150, 300, 600
- Temperature: -100°C – 400°C (-148°F – 750°F)
- Material: Carbon steel; stainless steel

#### Trims

Wide range of trims available in all sizes. Noise reduction plates optional; consult factory.

#### Actuators

Choices of diaphragm, spring cylinder and rack and pinion actuators. Logix digital positioner with best-in-class accuracy.



*Valtek MaxFlo 3*



## VALTEK CONTROL VALVES

### Valdisk *Valtek*

The Valtek Valdisk rotary control, heavy-duty double offset butterfly valve is designed for high capacity and low pressure loss. It achieves bi-directional, bubble-tight shutoff while maintaining low breakout torque — at both high- and low-pressure drops.

#### Features

- High-thrust cylinder actuator coupled with eccentric-cammed disc allows for high performance throttling, even in large pressure drops close to the seat.
- Low breakout torque assures accurate throttling, even close to the seat.
- Disc lifts out of the seat immediately upon actuation, avoiding seat and disc wear.

#### Configurations

Water body. Class IV shutoff with metal seat; Class VI with soft seat

#### Specifications

- Size: 50 mm – 750 mm (2 in – 30 in)
- Pressure: PN 10 – 400; ASME 150 – 2500
- Temperature: -29°C – 649°C (-20°F – 1200°F)
- Material: Carbon steel; stainless steel; special alloys



Valtek Valdisk

### ShearStream *Valtek*

The Valtek ShearStream high-pressure control ball valve provides excellent shutoff capabilities while providing accurate, reliable control. The lightweight one-piece, tight shutoff seats and self-centering ball deliver Class IV performance with metal seats and Class VI with soft seats. The segmented V-notch ball exceeds 300:1 rangeability.

#### Features

- High capacity and large turndown
- Heavy-duty seats provide tight shutoff and reliability for applications requiring high-pressure drops.
- Lightweight valve reduces pipe loads that unevenly load the seal and is paired with a compact, field-reversible, double-acting cylinder actuator.

#### Configurations

Flangeless body standard. Separable and integral flanges optional.

#### Specifications

- Size: 25 mm – 400 mm (1 in – 16 in)
- Pressure: PN 10, PN 40, PN 100; ASME Class 150, 300, 600
- Temperature: -46°C – 316°C (-50°F – 600°F)
- Material: Carbon steel; stainless steel; other alloys



Valtek ShearStream

## NORDSTROM VALVES

### Dynamic Balance (DB)

The Nordstrom Dynamic Balance (DB) valve turns easily every time and shuts off with the proven dependability of a plug valve, while eliminating problems generally associated with conventional plug valves. Available in iron or carbon steel construction, the DB with its metal-to-metal seats has been fire-tested in conformance with API 607 and 6FA standards.

#### Features

- Balance holes maintain equal pressure above and below the plug and in the port to prevent plug jamming caused by line pressure.
- A plug-balancing spring pre-loads the plug to prevent vibration and thermal cycling from wedging it into the body taper.
- Ground and lapped tapers on body and plug for drop-tight shutoff
- Preloaded, pressure-energized stem packing for zero leakage

#### Standards

- Iron MSS SP-78
- Steel ISO/API 6D. NACE and other special construction available.

### Configurations

- Iron: Regular and short pattern, flanged
- Steel: Short, regular and venture patterns in most types of flanged, threaded and weld-end connections as well as special connections

### Specifications

#### Iron

- Size: 100 mm – 500 mm (4 in – 20 in)
- Pressure: PN, ASME Class
- Temperature: -29°C – 177°C (-20°F – 350°F)

#### Steel

- Size: 25 mm – 750 mm (1 in – 30 in)
- Pressure: PN 20 – 400; ASME 150 – 2500; API 3000 (20.7 MPa) – 5000 (34.5 MPa)
- Temperature: Standard construction: -29°C – 232°C (-20°F – 450°F); Special construction: -46°C – 816°C (-46°F – 1500°F)



*Nordstrom DB*

### Super Nordstrom (SN)

Super Nordstrom (SN) gas distribution valves are available in a variety of materials and configurations to meet virtually all service requirements and capital budgets. The controlled-balance plug delivers predictable torque with no plug sticking/wedging. Bubble-tight shutoff is assured with the proven Nordstrom tapered plug design, metal-to-metal seating and sealant injection capability.

#### Features

- Mechanically balanced plug for lower and predictable operating torques
- Integral stop and locking device in both 4-bolt and 2-bolt covers
- Internal stops eliminate trash pockets for maximum environmental corrosion protection

#### Standards

##### Iron

- CSA certified models that meet the requirements of CAN/CGA 3.11-M88 are available.
- Meets or exceeds 49CFR Part 192.145 requirements

##### Steel

- ISO/API 6D and ISO/ASME B16.34
- ISO/API 6FA fire tested and qualified

### Configurations

#### Iron:

- Flanged and threaded; short and regular pattern

#### Steel

- Flanged and threaded (4-bolt cover); short, regular pattern
- Socket-welding, butt-welding, flanged by butt-welding (2-bolt cover); short and regular pattern

### Specifications

#### Iron

- Size: 15 mm – 125 mm (½ in – 5 in)
- Pressure: 13.8 bar (200 CWP)
- Temperature: 2-bolt cover: -29°C – 93°C (-20°F – 200°F)

#### Steel

- Size: 15 mm – 100 mm (½ in – 4 in)

#### Pressure:

- 4-bolt cover PN 20 – PN 100; ASME Class 150 – 600
- 2-bolt cover 13.8 bar (200 CWP)

#### Temperature:

- 2-bolt cover: -29°C – 93°C (-20°F – 200°F)
- 4-bolt cover: -29°C – 177°C (-20°F – 350°F)



*Nordstrom SN*





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