



Rotary Valve and Actuation Product Catalog



Experience In Motion



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Rotary Valves and Actuators

The focus of this catalog is on quarter-turn products offered by Flowserve including:

- Atomac lined ball valves and related products
- Durco alloy and lined plug, ball and butterfly valves
- Durco Microfinish alloy ball valves
- Noble Alloy hardened metal ball valves
- Automax Valve Automation Systems, actuators and controls

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Flowserve rotary valves offer easy maintenance and automation backed by market-friendly expertise and quality heritage brands.



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Durco SleeveLine®

**Non-Lubricated Plug Valves
for Chemical Service**



The Benchmark for Quality and Value

Design Features

- Tapered plug/PTFE sleeve primary seal
- Static/self-adjusting dynamic stem seal with the unique TM/PFA reverse lip diaphragm
- Quick thru-line seal adjustment with the valve in-line and under pressure
- Bi-directional flow
- ASME (ANSI) Class 150 and 300 lb designs at pressures to 740 psi (50 bar) and vacuum to 1 micron (0.133 kPa)
- Quarter-turn operation for cost-effective actuation
- Flanged, screwed, butt and socket weld end connections
- Optional 3-way; partially or fully jacketed; chlorine service trim

Body Materials

- Ductile cast iron
- Carbon steel
- CF8 (304 ss)
- CF8M (316 ss)
- CD4M Cu (Duplex ss)
- CN7M (Alloy 20)
- CK 3MCuN (254 SMO® super austenitic ss)
- N7M (Alloy B)
- CW6M (Alloy C)
- Nickel
- Monel®
- Inconel
- Titanium
- Zirconium

Seat Materials

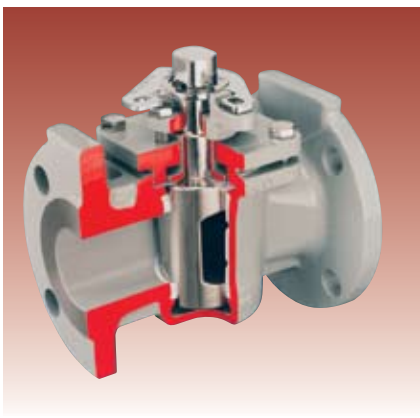
- PTFE standard
- Options
 - Durlon™ II
 - UHMWPE
 - TFEG

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See page 2.

Durco G4 Sleeved Plug

Features

- Large PTFE sleeve seal area offers positive shut-off and extended service life
- Tapered plug reduces turning torque and seat wear
- In-line seal adjustment under pressure prevents thru-line leakage. Plug adjustment is independent of stem seals. With $\pm 3/16$ in (5 mm) adjustment, plug cannot bottom out
- No cavities to accumulate product
- Sealing is both upstream and downstream
- TM/PFA reverse lip diaphragm provides static and dynamic self-adjusting stem seal
- Large port openings assure less pressure drop and higher C_v (K_v)
- Double D plug stem accepts most standard actuation equipment
- Actuator mounting pads are on the flanges for solid support
- Lockout meets OSHA and plant safety requirements

Applications

- Chemical processing
- Process equipment isolation

Sizes

- 1/2 in (15 mm) thru 18 in (450 mm)

Standards

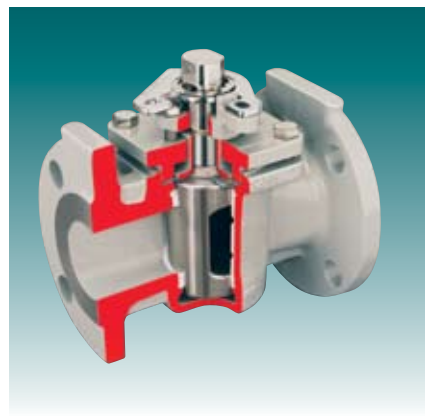
- ASME (ANSI) B16.34

Other Configurations

- G4Z fire sealed
- G4Z - HF alkylation
- TSG4 severe service
- G4B Marathon

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See page 2.

Durco G4Z Fire Sealed

Features

- Stem seal consists of Grafoil packing, metal diaphragm, TM/PFA diaphragm and Grafoil gasket
- Grafoil packing rings at the stem and Grafoil gaskets at the top cap reduce atmospheric leakage to a negligible amount should fire destroy the PTFE sleeve and diaphragm
- A stainless steel or Monel diaphragm keeps the Grafoil packing in place if the top seal is destroyed
- Line sealing is both upstream and downstream
- In-line seal adjustment under pressure prevents thru-line leakage
- Plug adjustment is independent of stem seals
- TM/PFA reverse lip diaphragm provides static and dynamic self-adjusting stem seal

Applications

- Chemical processing
- Hydrocarbon processing

Sizes

- 1/2 in (15 mm) thru 18 in (450 mm)

Standards

- ASME (ANSI) B16.34
- API 607, latest revision

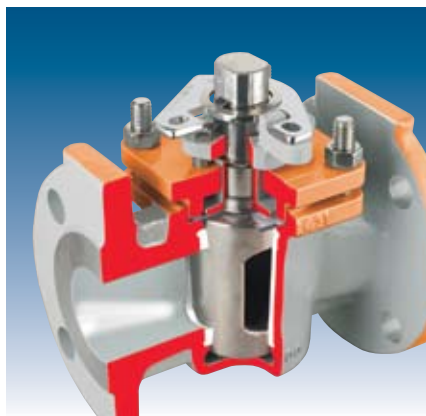
Other Configurations

- G4Z - HF alkylation
- G4BZ Marathon
- G4BZ - HF Marathon

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See page 2.

Durco G4Z-HF Alkylation



Features

- Stem seal consists of Grafoil packing, Monel diaphragm, TM/PFA diaphragm and Grafoil gasket
- Grafoil packing rings at the stem and Grafoil gaskets at the top cap reduce atmospheric leakage to a negligible amount should fire destroy the PTFE sleeve and diaphragm
- A Monel diaphragm keeps the Grafoil packing in place if the top seal is destroyed
- All Monel construction
- Non-lubricated design eliminates fouling of flow meter and instrumentation
- PTFE seats/seals provide positive shut-off - eliminate galling and seat relapping
- Vented plug accommodates the forces of fluid thermal expansion
- Quarter-turn operation can be cost - effectively actuated with rotary actuators

Applications

- HF alkylation
- Isomerization
- Blending
- Light ends
- Gas plant
- Sulfur plant
- Crude desalting

Sizes

- 1/2 in (15 mm) thru 18 in (450 mm)

Standards

- ASME (ANSI) B16.34
- API 607, latest revision
- Phillips Licensing Listed
- UOP Process Division Approved

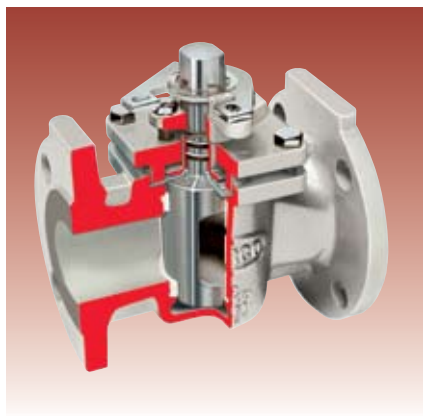
Other Configurations

- G4BZ - HF alkylation
- G4Z fire sealed
- G4BZ Marathon

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See page 2.

Durco G4B Marathon™



Features

- It is specifically designed for reliable performance in high cycle on-off or modulating services
- Fugitive emissions containment often equals that of more expensive severe or toxic service valves
- Three-year performance guarantee provides valve repair or replacement if stem seal fails within three years after installation
- Unique stem-sealing design consists of the reverse lip TM/PFA diaphragm, an integral thrust collar/alloy diaphragm and Viton O-rings with PTFE
 - Viton O-rings provide full pressure containment stem seal. Protects thrust collar from atmospheric corrosion. Kalrez® and other elastomers available.
- PTFE backup rings help prevent extrusion of elastomer O-rings under pressure
 - Hastelloy® diaphragm is welded to an alloy thrust collar. This self-sealing, dynamic bellows-like diaphragm acts as an expansion joint by allowing the TM/PFA diaphragm to adjust to plug movement and pressure changes. The Hastelloy diaphragm provides an impenetrable barrier to chlorine and many other services
- Highly polished sealing surfaces eliminate wear and enhance seal integrity

Applications

- Chemical processing
- High cycle services

Sizes

- 1/2 in (15 mm) thru 18 in (450 mm)

Standards

- ASME (ANSI) B16.34
- API 607, latest revision

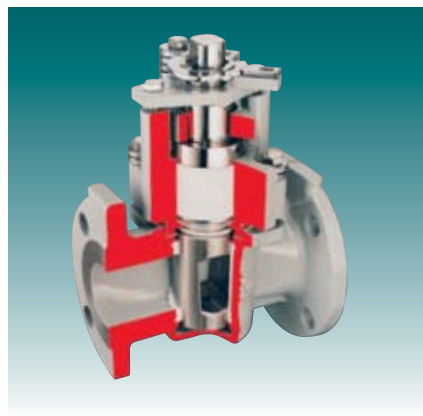
Other Configurations

- G4BZ fire sealed
- G4BZ - HF alkylation

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See page 2.

Durco TSG4 Severe Service



Features

- Meets/exceeds CAA fugitive emissions regulations at one-third to one-half the cost of bellows sealed valves
- Triple-sealed valve for lethal, toxic and sub-zero fluid services where an absolute stem seal is required
 - Primary: PTFE sleeve provides large, static seal for positive shut-off and extended service life
 - Secondary: TM/PFA reverse lip diaphragm offers static and dynamic self-adjusting stem sealing assurance
 - Tertiary: live-loaded PTFE packing set further prevents potential emissions while addressing possible permeation related leakage
- Wide range of stuffing box options with independent plug and stem seal adjustments
- Belleville washers accommodate extreme temperature fluctuations
- Leak-off connections for continuous monitoring, inert gas pad or insertion of process compatible lubricants
- Drilled and vented plug balances pressure between plug port and body cavity

Applications

- Severe chemical processing
 - Chlorine
 - Hydrochloric acid
 - Hydrofluoric acid

Sizes

- 1/2 in (15 mm) thru 8 in (200 mm)

Standards

- ASME (ANSI) B16.34

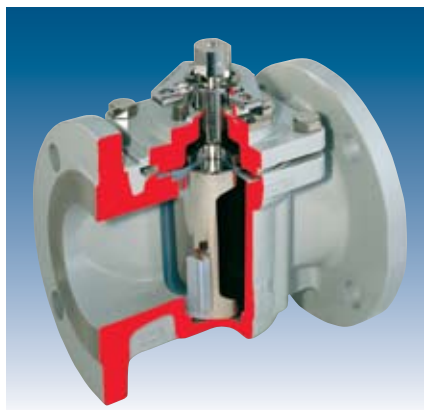
Other Configurations

- G4 SleeveLine
- G4B Marathon

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See page 2.

Durco Mach 1™ High Performance



Features

- Two-piece primary seal is PFA with encapsulated alloy inserts to provide:
 - Lower, constant turning torques comparable to ball valves and significantly lower than other plug valves
 - Higher temperature capability more comparable to gate and triple - offset butterfly valves - to 525°F (274°C)
 - Easy seat replacement with valve in-line; no special tooling required
- In-line plug adjustment under pressure stops thru-line leakage
- PFA reverse lip diaphragm provides dynamic and static, self-adjusting stem seal
- Alloy diaphragm provides stem seal reinforcement
- Lower turning torques result in smaller, less costly actuation packages
- ISO 5211 mounting pad is a universal flange for easy, low-cost actuation (optional flange flats mounting)
- PFA alloy encapsulated full sleeve is available

Applications

- Chemical processing
- On-off or modulating service

Sizes

- 1 in (25 mm) thru 6 in (150 mm)

Standards

- ASME (ANSI) B16.34
- API 607, latest revision
- ASME (ANSI) Class 150, 300 and 600 (derated flanges)

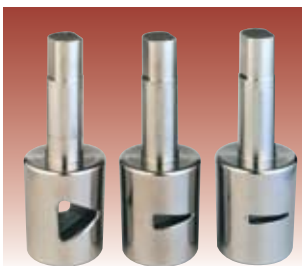
Other Configurations

- G4 SleeveLine
- G4B Marathon
- G4BZ Marathon

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See page 2.

Durco EG4 V-Port Control



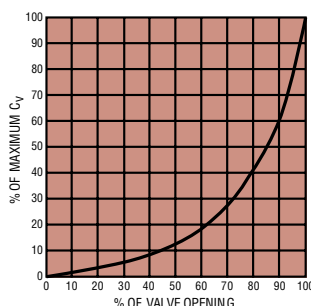
In addition to the features and benefits that have made SleeveLine the process industry's premier plug valve, Flowserve offers the EG4 V-Port valve for precise modulating control services.

Durco EG4 V-Port control valves are available in a variety of trim configurations to satisfy a user's exact flow control needs. Sizes include 1 in (25 mm) thru 6 in (150 mm) with full open C_v values of 3.0 to 400 (K_v of 2.6 to 345).

Characterized V-port SleeveLine control valves are available as follows:

- G4 - 1/2 in (15 mm) thru 6 in (150 mm)
- G4B - 1/2 in (15 mm) thru 6 in (150 mm)
- TSG4 - 1 in (25 mm) thru 3 in (80 mm)
- Mach 1 - 1 in (25 mm) thru 6 in (150 mm)

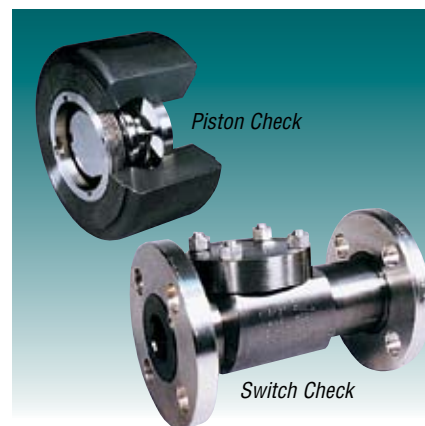
A Typical Characteristic Curve for EG4 V-Port Valves



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See page 2.

Noble Alloy Check Valve



Condor™ Piston Check Valve Design Features

- Patented constant area design for full bore flow area and assurance of low pressure loss through the valve
- Unique double guided piston for total stability even in dual phase conditions
- Installation in any position to optimize piping flexibility
- Replaceable metal or soft seats

Technical Data

- ASME Class 150 through 1500
- Sizes: 1/2 in (15 mm) to 8 in (200 mm) and 10 in (250 mm) for Class 150
- Materials: Carbon, 316SS (standard). Other materials include those for swing check valve plus ceramic for some applications

Swing Check Valve Design Features

- Disc fully clears waterway for full flow capability
- No possibility of disc separation, loss of parts downstream with riveted disc assembly
- Disc hinge pin not in flow path and designed with no external leak path
 - Integral seats; no welded-in seal rings
 - Flat seats; no angles or radius sealing
- Only two internal parts to replace

Technical Data

- ASME Class 150 through 1500
- Full or regular port
- Raised face flanged, ring-type joint, butt-weld, socket-weld and threaded end connections, in any combination
- Sizes: 1/2 in (15 mm) to 8 in (200 mm) (larger sizes on application)
- Materials: 316SS, chrome, Hastelloy, Alloy 20, Inconel, titanium, zirconium and other alloys

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See page 2.

Noble Alloy System II Precision Cast Ball



Standards

- ASME (ANSI) B16.34
- API 607, latest revision

Features

- Fully interchangeable metal or soft seats and balls to accommodate changing service conditions
- Fully bi-directional seating
- Patented metal seal for dynamic line seal
- Patented live-loaded stem seal packing design with optional Fugitive Emission Monitor (FEM)
- Nobelized (i.e., hardened) internals
- Blow-out proof stem
- V-Port control valves may be specified in 30° and 45° configurations for either metal or soft seat valves – other configurations available
- Full port, raised flange faces
- Materials include:
 - 316 SS
 - Hastelloy
 - Inconel
 - Titanium
 - Zirconium
 - Others
- Soft seat materials include: virgin or reinforced PTFE standard; other fluoropolymers, including high performance
- ASME (ANSI) Class 150 to 300

Applications

- High temperature, erosive/corrosive chemical processing
- High temperature, erosive/corrosive hydrocarbon processing

Sizes

- 1/2 in (15 mm) to 4 in (100 mm)

Other Configurations

- 3D ball
- Custom ball
- Multiport ball
- Check

Get Bulletin NAENTB0007.

See page 2.

Noble Alloy 3D Ball



Standards

- ASME (ANSI) B16.34
- API 607, latest revision

Features

- Designed for completely reliable performance in high pressure service with a choice of metal or soft seats
- Patented conical metal seating eliminates matched lapped sets, enabling virtually unlimited trim combinations including soft seats
- Bi-directional design allows easy reversal of flow direction
- Three-piece body construction simplifies in-line service or retrofit
- Nobelized (i.e., hardened) internals
- Patented live-loaded packing with back-up adjustment is standard
- V-port coated balls available
- High end alloy valves available in investment cast or forged/100% machined bodies
- ASME Class 150 thru 1500, full port

Small Bore and High End Alloy Valves

- Butt weld, socket weld and threaded end connections
- Small bore sizes: 1/4 in (6 mm), 3/8 in (10 mm), 1/2 in (15 mm), 3/4 in (20 mm) and 1 in (25 mm)
- Materials: Aluminum, Alloy 20, duplex SS, Hastelloy, Inconel, nickel, tantalum, titanium, zirconium and many others

Applications

- High pressure, high temperature, erosive/corrosive chemical processing
- High pressure, high temperature, erosive/corrosive hydrocarbon processing

Other Configurations

- System II
- Custom ball
- Multiport ball
- Check

Get Bulletin NAENTB0007.

See page 2.

Noble Alloy Custom Ball



Standards

- ASME (ANSI) B16.34
- API 607, latest revision

Features

- Made to customer specification with a virtually unlimited choice of materials and configurations
- Severe corrosive and erosive services
- Unlimited body and trim combinations
- End connections and flange sizes can be mixed
- Metal-to-metal or soft seats
- Ball and seats require no lapping/matched sets for easy field repair
- 100% machined from any forged material
- Composite flange for added strength in higher alloys
- Fugitive Emission Monitor (FEM) package available
- Nobelized (i.e., hardened) internals
- V-Port balls available
- Full or regular port
- Raised face flanged, ring-type joint, butt weld, socket weld and threaded and threaded end connections in any combination
- Materials include: aluminum, Alloy 20, duplex SS, Hastelloy, Inconel, nickel, Nitronic®, tantalum, titanium, Ultimet®, zirconium and many others
- ASME (ANSI) Class 150 thru 1500

Applications

- High pressure, high temperature, erosive/corrosive chemical processing
- High pressure, high temperature, erosive/corrosive hydrocarbon processing

Sizes

- 1/2 in (15 mm) to 18 in (450 mm)

Other Configurations

- System II
- 3D ball
- Multiport ball
- Check

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See page 2.

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© Ultimet is a registered trademark of Haynes International

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Durco Microfinish Flanged Ball



Features

- Positive stem seal even after extended cycles
 - PTFE cup and cone packing for unsurpassed seal life and cyclability
 - Smooth stem finish reduces torque and increases stem seal life
 - Glass filled PTFE thrust washer aids sealing while reducing torque
 - Belleville washers maintain constant “live” load on cup and cone packing
- Two-piece split body, full bore or regular port, in WCB or CF8M
- Duracon TFM seat standard for higher pressure and temperature applications. Virgin PTFE or carbon reinforced PTFE options and RTFE
- Minimum body cavity minimizes media retention and process contamination
- Large diameter, stainless blowout-proof stem
- Super smooth finish of stainless ball provides low torque and long seat life
- ISO 5211 mounting pad for easy, low cost actuation
- ASME (ANSI) Class 150 and Class 300

Application

- Chemical processing
- Hydrocarbon processing
- General industrial

Sizes

- 1/2 in (15 mm) thru 8 in (200 mm)

Standards

- ASME (ANSI) B16.34
- API 607, latest revision
- PED

Other Configurations

- Fire sealed flanged ball
- Threaded ball
- Fire sealed threaded ball

Get Bulletin DVENTB0060.

See page 2.

Durco Microfinish Threaded Ball



Features

- Positive stem seal even after extended cycles
 - PTFE cup and cone packing for unsurpassed seal life and cyclability
 - Smooth stem finish reduces torque and increases stem seal life
 - Glass filled PTFE thrust washer aids sealing while reducing torque
 - Belleville washers maintain constant “live” load on cup and cone packing
- Three-piece body, full bore or regular port, in WCB or CF8M
- Duracon TFM seat standard for higher pressure and temperature applications. Virgin PTFE or carbon reinforced PTFE options
- Minimum body cavity minimizes media retention and process contamination
- Large diameter, stainless blowout-proof stem
- Super smooth finish of stainless ball provides low torque and long seat life
- ASME (ANSI) Class 800

Applications

- Chemical processing
- Hydrocarbon processing
- General industrial

Sizes

- Full port - 1/2 in (15 mm), 3/4 in (20 mm), 1 in (25 mm), 1-3/4 in (40 mm)
- Regular port - 1/2 in (15 mm), 3/4 in (20 mm), 1 in (25 mm) 1-3/4 in (40 mm), 2 in (50 mm)

Standards

- ASME (ANSI) B16.34
- API 607, latest revision
- PED

Other Configurations

- Fire sealed threaded ball
- Flanged ball
- Fire sealed flanged ball

Get Bulletin DVENTB0065.

See page 2.

Durco General Purpose WOG Threaded End Ball



Features

- WOG #1
 - One-piece body
 - Threaded NPT
 - Regular port
 - 316 SS material only
 - 304 SS locking handle
 - 800WOG
- WOG #2
 - Two-piece body
 - Threaded NPT
 - Full port
 - 316 SS material only
 - 304 SS locking handle
 - 1000WOG
- WOG #3
 - Three-piece body
 - Threaded NPT
 - Full port
 - 316 SS material only
 - 304 SS locking handle
 - Socket weld available
 - 1000WOG
 - ISO 5 and 11 mounting pad

Applications

- General purpose water, oil, gas

Sizes

- All WOG types are available in:
 - 1/4 in (6 mm)
 - 3/8 in (10 mm)
 - 1/2 in (15 mm)
 - 3/4 in (20 mm)
 - 1 in (25 mm)
 - 1-1/4 in (30 mm)
 - 1-3/4 in (40 mm)
 - 2 in (50 mm)

Standards

- 800 WOG
- 1000 WOG

Other Configurations

- Durco Microfinish threaded ball (ANSI Class 800)

Get Bulletin DVENTB0065.

See page 2.

Durco BX 2001 High Performance



Features

- PFA/Viton® energized seat provides positive, bi-directional shut-off with long cycle life on low pressure and vacuum, and high ΔP services
- Double offset disc creates an eccentric seating action which eliminates seat wear, reduces torque and allows disc to "cam" into seat for tight shut off
- Large diameter, one-piece high strength shaft reduces deflection for positive, repeatable shut-off at higher ΔP than similar valves
- PolyLube® bearings or optional severe service bearings both offer low torque and high-cycle life
- Wide choice of packing materials including adjustable and self-adjusting live-loaded with leak detection port or purge fittings for lethal, toxic or sub-zero services
- Independent packing set adjustment prevents stem seal emissions
- Blow-out proof stem complies with API 607
- Wide range of optional materials includes Alloy 20, Inconel, Monel, Hastelloy B and C and Nickel
- ASME Class 150 and Class 300; wafer and lug body designs

Applications

- Chemical processing
- Hydrocarbon processing

Sizes

- 2 in (50 mm) thru 36 in (900 mm)

Standards

- ASME (ANSI) B16.34
- API 607, latest revision
- ISO 5752

Other Configurations

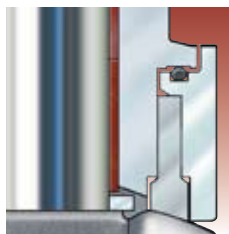
- Fire sealed
- Apex™ metal seated
- TriFlex™ metal seated

Get Bulletin DVENTB0039.

See page 2.

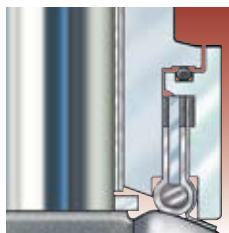
© Viton is a registered trademark of the DuPont Company

Durco BX2001 Seat Design Options



UHMWPE Seats

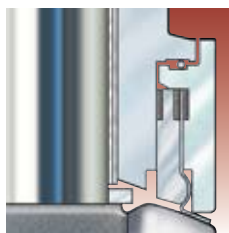
For abrasive services. BX valves with ultra high molecular weight polyethylene (UHMWPE) seats provide long-lasting performance in erosive/abrasive services. UHMWPE seats are rated for services to 200°F (93°C)



® Inconel is a registered trademark of the International Nickel Company, Inc.

Fire Sealed Valves

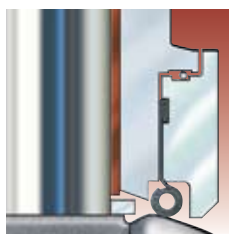
The fire sealed version BX2001 meets API 607 requirements. If a fire destroys the PFA/Viton O-ring energized primary seat, the Inconel® X750 metal backup seat activates to provide positive sealing



® Grafoil is a registered trademark of Union Carbide

Apex Metal Seated Valves

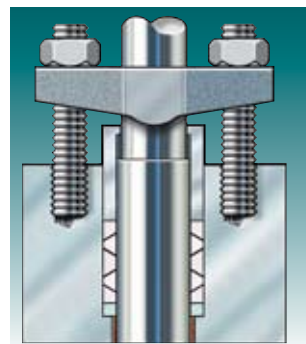
Inconel seat assures Class IV shut-off and abrasion resistance. Grafoil® gaskets provide secondary sealing. Viton ring locks retainer ring into valve body on designs to 400°F (205°C); Inconel lock wire >400°F (>205°C) to 600°F (315°C)



TriFlex Metal Seated Valves

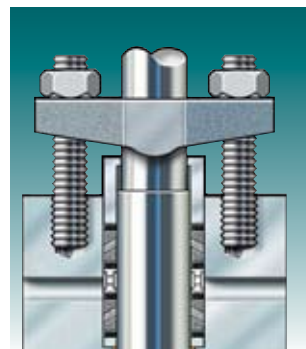
TriFlex utilizes various seat designs including the sleeve and coil action of three individual springs and an Inconel spring. The metal seat plus the energizing force of process fluid pressure provide outstanding shut-off service. These highly resilient springs also offer excellent corrosion and abrasion resistance for extended service life to 1000°F (538°C)

Durco BX 2001 Stuffing Box Packing Options



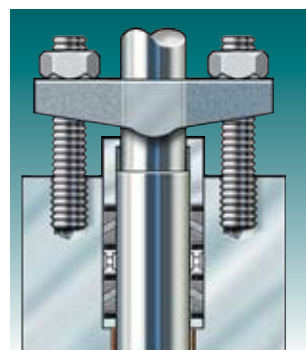
Soft Seated Valves

- Standard is single PTFE cup and cone (shown above)
- Double PTFE cup and cone with lantern ring
- Live loaded, single PTFE cup and cone (adjustable)



Fire Sealed

- Standard is single Grafoil
- Double Grafoil with lantern ring, purge ports optional (shown above)



TriFlex and Apex BX2 Metal Seated

- To 400°F (205°C) standard single PTFE cup and cone (adjustable). Optional live loading available
- To 400°F (205°C) double PTFE cup and cone with lantern ring (adjustable). Optional live loading available
- To 600°F (315°C) (TriFlex to 1000°F [538°C]) standard single Grafoil packing set
- To 600°F (315°C) (TriFlex to 1000°F [538°C]) double Grafoil with lantern ring (shown above)

www.flowserve.com

Durco BTV-2000™ Lined Butterfly



Features

- Maintenance-free, live-loaded triple seal design assures bubble-tight shut-off and leak-tight stem seals
 - Primary seal is formed at the disc hub by the spherical ball and socket/disc liner seal for a 360° contact seat seal
 - Secondary seal of PTFE covered PFA convolutions create tortuous no-leak path on the disc stem
 - Tertiary seal is provided by O-rings in the gland follower
 - Fully compressed spring keep constant pre-load on PTFE stem seal
- Extra wide spheroidal seat design provides positive shutoff. Thick - 1/8 in (3 mm) - rigid machined PTFE or UHMWPE liner is recessed in body preventing cold flow. Live-loaded elastomer seat energizer enhances sealing
- Unequaled performance in high temperature/high cycle services

Wide Choice of Materials

- Liners
 - PTFE and UMPE
 - TFM - molecularly enhanced PTFE
- Discs
 - PFA encapsulated disc (with a DCI/ENC substrate) is standard
 - Optional UHMWPE encapsulated disc
 - Optional metallic discs in most alloys including light reactive
- Bodies
 - DCI standard; 316 SS optional

Applications

- Severely corrosive-erosive chemical processing
- Pulp & paper
- Mining & metal refining

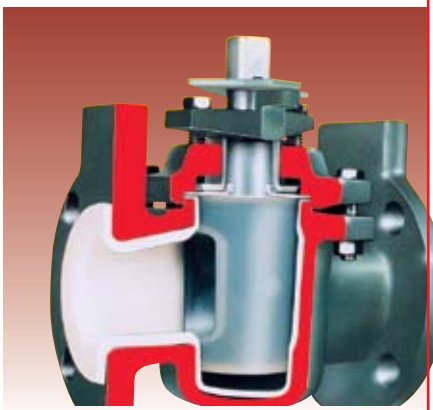
Sizes

- 2 in (50 mm) thru 24 in (600 mm)

Get Bulletin DVENTB0020.

See page 2.

Durco T-Line® T-41 and T-43 Plug



Features

- Solid one-piece PTFE lining in the body and on flange faces plus a PFA encapsulated plug maximizes corrosion resistance and virtually eliminates leak paths
- A dynamic self-adjusting, self-energizing reverse lip PFA diaphragm seal prevents stem leakage
- Stem seal at top of plug provides double protection against external stem leakage
- In-line seal adjustment under pressure prevents thru-line leakage, assures even stem seal pressure
- One-piece ductile iron body is standard for ASME (ANSI) Class 150; carbon steel is standard for ASME (ANSI) Class 300. 316 SS and other alloys available for body armor and plug insert
- Large port areas assure low pressure drop and higher C_v (K_v)
- Corrosion-resistant coating is standard on body and top cap
- V-port plugs available for modulating control (1 in [25 mm] thru 3 in [80 mm])

Applications

- Chemical processing acids, waste acids, acid brines, bath solutions and other severe corrosives

Sizes

- T-41 ASME (ANSI) Class 150 - 1/2 in (15 mm) thru 12 in (300 mm)
- T-43 ASME (ANSI) Class 300 - 1 in (25 mm) thru 6 in (150 mm)

Ratings

- T-41 rated 180 psi (12.5 bar) @ 400°F (205°C); 250 psi (17 bar) @ 100°F (38°C)
- T-43 rated 320 psi (22 bar) @ 400°F (205°C); 740 psi (51 bar) @ 100°F (38°C)

Standards

- ASME (ANSI) B16.34

Other Configurations

- Atomac AKH3 lined ball
- Durco BTV-2000 lined butterfly

Get Bulletin DVENTB0017.

See page 2.

V-Port T-Line Plug



Choose from a complete line of Automax Valve Automation Equipment for precise proportioning and on-off control...or we'll build a control package to your specification.

V-Port T-Line valves are available in 1 in (25 mm) through 3 in (80 mm) sizes with C_v values of 1 through 66.

Standard Port T-Line valves are available in 1/2 in (15 mm) through 12 in (300 mm) sizes with C_v values of 5.6 through 3200.

Durco T-Line valves are readily adaptable for automatic operation because the torque is relatively constant and lubrication is not required.

Additional information about T-Line control valves can be found in the Durco Control Valves bulletin.

Automax Inc., a Flowserve specialist in complete automation systems, markets a broad line of rack and pinion, heavy-duty, electric and linear actuators. In addition, a comprehensive line of engineered special control circuits, solenoid valves, limit switches, positioners and actuator mounting kits is offered.

This expertise in the rapidly growing control valve market provides a complementary product line to the other automation products offered by Flowserve Flow Control.

Atomac AKH3 and AKH2A Lined Ball



Features

- ANSI dimensional valves
 - AKH3 regular port
 - AKH2A full port
- Solid one piece PFA or FEP lining in the body and on flange faces plus a PFA encapsulated ball maximizes corrosion resistance while eliminating potential leak paths
- Adjustable PTFE chevron packing provides stem seal integrity while maintaining low torque. Extended, live-loaded packing for additional fugitive emission protection available
- Graphite bearing prevents stem side loading and extends seal life
- Anti-blowout stem assembly even if top works disassembled
- Floating ball seat design for bubble-tight shut off across the pressure range
- Separate ball/stem connection greatly reduces side loading to extend stem seal life
- Two-piece ductile iron body with B7 fasteners is both rugged and rigid. Optional Atostar AKH lined valves available in 316 SS bodies, stem and ball inserts. A variety of metallic and non-metallic ball material options are available
- Cavity space minimizes retention of process media
- V-port control balls available
- ISO 5211 mounting pad

Applications

- Severely corrosive chemical processing

Sizes

- AKH3 regular port - 1 in (25 mm) thru 12 in (300 mm)
- AKH2A full port - 1 in (25 mm) thru 6 in (150 mm)

Standard

- ASME (ANSI) B16.5
- ASME (ANSI) B16.10

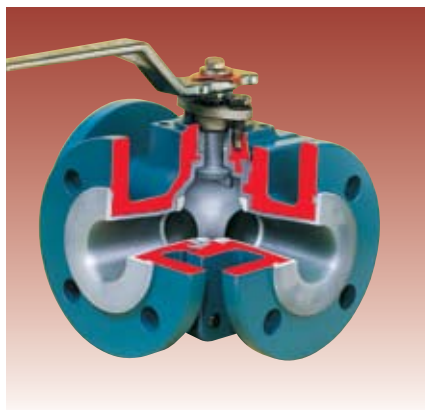
Other Configurations

- AKH2 full port, DIN dimensional
- Atostar™ AKH 316 SS armor, stem and ball inserts

Get Bulletin ATENTB0010.

See page 2.

AMP3 3-Way Lined Ball



Features

- Five ball porting options available with 90° or 180° flow combinations. Optional flow arrangements upon request
- High flow capacity with minimal pressure loss through the valve, thereby reducing plant operating cost
- Compact design permits use where space is at a premium
- Lower cost than alloy valves with equal or superior corrosion resistance in difficult services
- PFA standard material for valve lining and encapsulated ball. Rated for services to 400°F (200°C) and ambient pressures to 285 psi (19.7 bar)
- Floating ball seat design for bubble-tight shut-off across the pressure range
- Separate ball/stem connection greatly reduces side loading to extend stem seal life
- Anti-blowout stem assembly even if top works disassembled
- Adjustable PTFE chevron packing provides stem seal integrity while maintaining low turning torque
- Graphite bearing prevents stem side loading and extends seal life
- ISO 5211 mounting pad

Applications

- Severely corrosive chemical processing

Sizes

- 1 in (25 mm)
- 1-1/2 in (40 mm)
- 2 in (50 mm)
- 3 in (80 mm)
- 4 in (100 mm)

Standards

- ASME (ANSI) B16.5
- ASME (ANSI) B16.10

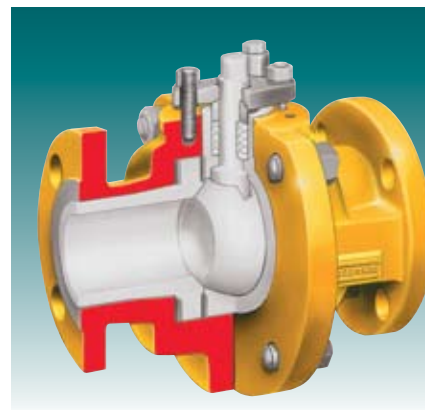
Other Configurations

- AKH3 lined ball
- AKH2A lined ball
- AKH2 lined ball

Get Bulletin ATENTB0010.

See page 2.

Atomac AKH5 Ceramic Lined Ball



Features

- Lining, ball and stem are made of solid Mg-PSZ (transformation toughened magnesium partially stabilized zirconia) for superior abrasion resistance. Excellent strength and thermal shock resistance
- Wide selection of stem material options, including 316 SS, Hastelloy C-276 or Mg-PSZ ceramic
- Mg-PSZ ceramic can be applied in services to 660° F (350°C). Temperature shock resistant to Δ+ 200° F (93°C). Its equal to the metal hardness of Rockwell 89
- PTFE chevron or graphite packing rings in the deep stuffing box protects against external leakage to atmosphere
- Stem sealing requires virtually no maintenance and provides low stem torque. Adjuster and packing gland feature a ball and socket fit for even stem sealing reliability
- Ball seals against machined seat area for bubble-tight shut-off
- Full port minimizes pressure loss and increases flow capacity to reduce energy and pumping costs
- V-port control balls available
- ISO 5211 mounting pad

Applications

- Severely abrasive/corrosive chemical processing at elevated temperatures

Sizes

- 1 in (25 mm)
- 1-1/2 in (40 mm)
- 2 in (50 mm)
- 3 in (80 mm)
- 4 in (100 mm)

Standards

- ASME (ANSI) B16.5
- ASME (ANSI) B16.10

Other Configurations

- AKH3 lined ball
- AKH2A lined ball
- AKH2 lined ball

Get Bulletin ATENTB0010.

See page 2.

Atomac AKH6 Tank Drain**Features**

- Primarily used for tank drainage. AKH6 valves are also commonly installed in place of reducing spools to downsize piping dimensions
- Designed with a larger inlet port, the valve's full port design minimizes pressure loss and increases flow capacity to reduce energy and pumping costs
- FEP and PFA liners offer both long service life and superior corrosion resistance. Liner's inert non-stick properties make it ideal for highly viscous or high purity services
- Positive stem seal with adjustable PTFE chevron packing
- Floating ball seat design for bubble-tight shut-off across the pressure range
- Anti-blowout stem assembly
- V-port control balls available
- ISO 5211 mounting pad

Applications

- Chemical processing
- Food and beverage

Sizes

- 1 in (25 mm) x 2 in (50 mm)
- 1-1/2 in (40 mm) x 3 in (80 mm)
- 2 in (50 mm) x 3 in (80 mm)
- 2 in (50 mm) x 4 in (100 mm)
- 3 in (80 mm) x 4 in (100 mm)
- 4 in (100 mm) x 6 in (150 mm)
- 6 in (150 mm) x 8 in (200 mm)

Standards

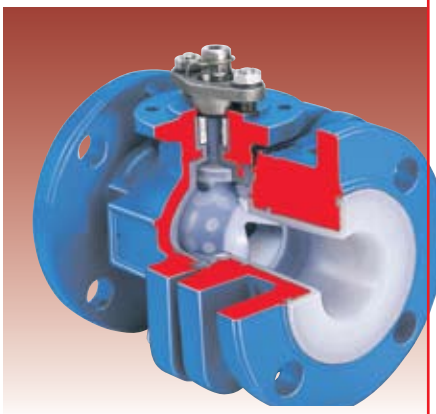
- ASME (ANSI) B16.5
- ASME (ANSI) B16.10

Other Configurations

- AKH3 lined ball
- AKH2A lined ball
- AKH2 lined ball

Get Bulletin ATENTB0010.

See page 2.

Atomac V-Port Control**Features**

- Characterized ball options
 - V-port ball control valve available for throttling services in both fluoropolymer lined and ceramic lined models
 - C-ball eliminates media build-up in ball cavity
- Low, constant and predictable torque
- Thrust bearing supported stem to eliminate side-loading of packing and subsequent leakage during cycling
- Floating ball design for bubble-tight shut-off across the pressure range
- Long-life seats to minimize downtime and maintenance
- ISO 5211 mounting pads
- Characterized ball options are available on these valve models:
 - AKH2 full port
 - AKH2A ANSI full port
 - AKH3 ANSI standard port
 - AKH5 ceramic lined
 - AKH6 tank drain

Applications

- Modulating flow control

Sizes

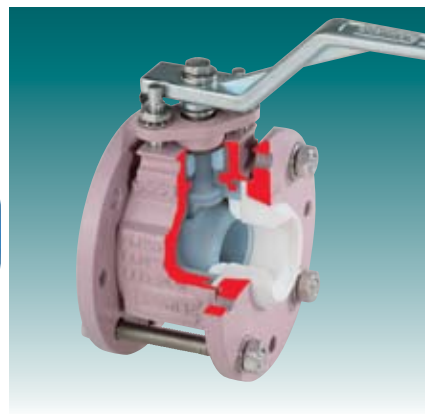
- 1 in (25 mm)
- 1-1/2 in (40 mm)
- 2 in (50 mm)
- 3 in (80 mm)
- 4 in (100 mm)

Standards

- ASME (ANSI) B16.5
- ASME (ANSI) B16.10

Get Bulletin ATENTB0010.

See page 2.

**Atomac AKH7-KP
For Glass Pipe****Features**

- Designed for easy installation in glass systems with socket/ball or plane ends according to DIN/ISO 3587 and 4704
- Molded fluorocarbon resin liners are made of either FEP or PFA, depending upon application
 - Long service life and high corrosion resistance due to uniform and blowhole-free thickness
 - Non-stick properties ideal for handling highly viscous fluids or those process applications with high purity requirements
 - Available with conductive materials for the linings, seals and gland packings
- Long-term protection against atmospheric leakage provided by adjustable PTFE chevron packing rings in the deep stuffing box and by the molded liner/seal
- Stem is internally assembled to eliminate possibility of blowout
- Floating ball seat design for bubble-tight shut-off across the pressure range
- Separate ball/stem connection greatly reduces side loading to extend stem seal life
- Anti-static device protects against potentially dangerous electrostatic discharge

Applications

- Chemical processing
- Food and beverage

Sizes

- 1 in (25 mm)
- 1-1/2 in (40 mm)
- 2 in (50 mm)
- 4 in (100 mm)

Standards

- ASME (ANSI) B16.5
- ASME (ANSI) B16.10

Other Configurations

- AKH7 - KPF for flange/glass end connections

Get Bulletin ATENTB0010.

See page 2.

Atomac APN Lined Sampling



Features

- APN lined sampling valves available in two models
 - APN/T lined sampling
 - APN/SG lined sampling with sight glass
- Provides safe sampling of toxic or highly corrosive media without interruption of process flow
- Manual or automatic operation for convenience or safety
- Horizontal or vertical piping installation
- FEP, PFA or conductive linings available
- Designed with a minimum of dead space
- Sample volumes between 25 and 100 ml
- Optional connections for sample bottles
- Maximum pressure to 85 psi (6 bar)
- APN/T - 180° turn of the handle captures, isolates and discharges a sample into the bottle. The process remains isolated at all times
- APN/SG - all the features of APN/T plus a borosilicate sight glass for visual monitoring of the process stream

Applications

- Chemical processing

Sizes

- APN/T - 1 in (25 mm), 2 in (50 mm), 3 in (80 mm)
- APN/SG - 1 in (25 mm), 1-1/2 in (40 mm), 2 in (50 mm), 2 and 3 in (50 and 80 mm)

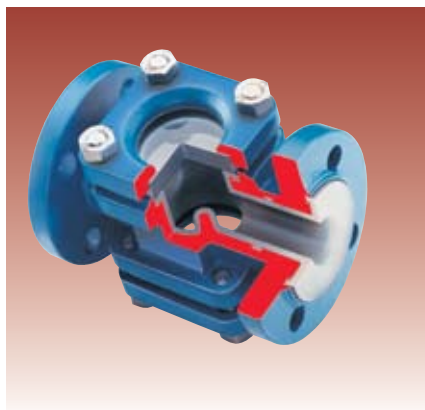
Standards

- ASME (ANSI) B16.5
- ASME (ANSI) B16.10

Get Bulletin ATENTB0010.

See page 2.

Atomac ASG Lined Sight Glass



Features

- Offers clear visual inspection from either side
- Integrated drip lip with cast core provides visual flow indication even at low velocity
- Highly corrosion resistant liners
 - All internal components (other than the glass) have same molded fluorocarbon liners
 - FEP or PFA, depending upon the application, offer long service life and high corrosion resistance due to thick, uniform blowhole-free liner
 - Non-stick and inert properties are ideal for highly viscous and high purity applications
- Borosilicate safety glass is utilized to withstand high temperatures, mechanical stress and corrosion

Applications

- Chemical processing

Sizes

- ASG
 - 1 in (25 mm)
 - 1-1/2 in (40 mm)
 - 2 in (50 mm)
 - 3 in (80 mm)
 - 4 in (100 mm)
 - 6 in (150 mm)
- ASG3 - 3-way
 - 1 in (25 mm)
 - 2 in (50 mm)
 - 3 in (80 mm)
 - 4 in (100 mm)
- ASG4 - 4-way
 - 1 in (25 mm)
 - 2 in (50 mm)

Standards

- ASME (ANSI) B16.5
- ASME (ANSI) B16.10

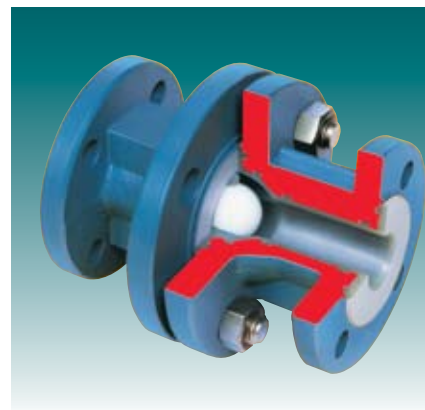
Other Configurations

- ARV/SG sight glass with integral check valve

Get Bulletin ATENTB0010.

See page 2.

Atomac AR Lined Check Valves



Features

- Three check valve configurations available
 - ARV2
 - ARV/SG with sight glass
 - ARL 45° (Y)
- Vertical or horizontal installation, depending upon application
- Solid PTFE ball has the same properties as the FEP or PFA lining material. Optional hollow PTFE ball
- Full port design offers excellent flow characteristics to minimize pressure loss
- Minimum opening pressure to unseat the ball in the vertical position is 1 psi (0.07 bar)
- Borosilicate safety glass, in accordance with DIN 7080, withstands high temperatures, mechanical stress and corrosion



Applications

- Chemical processing

Sizes

- ARV2 check valve - 1/2 in (15 mm) thru 8 in (200 mm); 10 in (250 mm) and 12 in (300 mm) valves available upon request
- ARV/SG check valve/sight glass - 1 in (25 mm) thru 4 in (100 mm)
- ARL 45° (Y) check valve - 1 in (25 mm) thru 3 in (80 mm)

Standards

- ASME (ANSI) B16.5
- ASME (ANSI) B16.10

Get Bulletin ATENTB0010.

See page 2.



Features

- Corrosion resistant filter insert
 - Consists of two perforated PTFE cylinders with an ETFE filter screen in between
- Same outstanding corrosion resistant properties as the FEP or PFA lining material
- Standard mesh is 60 (300 micron)
 - Optional mesh: 169 (100 micron)
 - 19 (1000 micron)
 - Other mesh openings on request
- Easy servicing and maintenance as the filter insert can be changed or cleaned with the strainer in-line
- Residual fluid in insert area can be evacuated by means of the PTFE drain plug prior to removal of the access flange
- Optional ball valve may be specified in place of PTFE plug for added operator safety and convenience
- Flowpath through the filter insert is a larger area than the original pipe cross-section. This minimizes pressure loss

Applications

- Chemical processing

Sizes

- 1 in (25 mm)
- 1-1/2 in (40 mm)
- 2 in (50 mm)
- 3 in (80 mm)
- 4 in (100 mm)
- 6 in (150 mm)
- 8 in (200 mm)

Standards

- ASME (ANSI) B16.5
- ASME (ANSI) B16.10

Get Bulletin ATENTB0010.

See page 2.

SuperNova B-Series Actuators



Features

- Twin piston rack and pinion actuator
- Corrosion and wear resistant hard anodized aluminum housing
- Nitride chemical conversion process for pinion corrosion resistance
- Field convertible double acting and spring return models
- 180 degree double acting
- Compliance to NAMUR VDI/VDE 3845 mounting specifications for controls and accessories
- Compliance to ISO 5211 mounting specifications for actuator to valve interface
- Field reversible fail action
- Precision die cast pistons have full length gear engagement, large cylinder bearings, and piston guide bands to ensure long life
- Flats on pinion drive shaft for manual overrides and accessories
- Upper and lower pinion bearings to ensure long cycle life
- Integral bi-directional travel stops
- Concentric-nested spring design ensures extended spring life
- 11 standard sizes

Torque Range

Up to 58,232 in-lbs (67,077 cm-kg)

Temperature Range

-55 Deg F to 300 Deg F
(-50 Deg C to +150 Deg C)

Maximum Pressure

150 psi (10 bar)

Applications

- HVAC, Mining, Water
- Chemical
- Petrochemical & Refining
- Process Industries

Standards

- ISO 5211
- NAMUR VDI/VDE 3845
- ATEX Directive 94/9/EC

Get more information:

Product catalog: AXENBR0005

Installation instructions: AXENIM0096

See page 2.

SuperNova Actuator NAMUR Accessories



- S25N Directional Valve
 - Mounts directly to SuperNova series actuators which eliminates the cost of tubing and fittings. The high 1.8 C_v spool valves are available for double acting and spring return actuators with NEMA 4, 7 and 9 or intrinsically-safe and low power solenoid operators.

For more information see bulletins (AUTO-95) AXENBR0005 and (AUTO-12) AXENIM0012
- APS1 Air Purge Module
 - Provided with the S25N solenoid valve, the APS1 diverts instrument quality exhaust air from between the pistons into the spring chamber, preventing corrosive atmospheres from being pulled into the spring chamber.

For more information see bulletins (AUTO-95) AXENBR0005 and (AUTO-15) AXENIM0015
- APS2 Air Purge Module
 - Provided for remote/line mounted solenoid valves, the APS2 diverts instrument quality exhaust air from between the pistons into the spring chamber, preventing corrosive atmospheres from being pulled into the spring chamber.

For more information see bulletins (AUTO-95) AXENBR0005 and (AUTO-16) AXENIM0016
- LV1 Lockout & Vent Valve
 - May be used with a manual override to shut off supply air and to vent actuator. May also be used as a pneumatic lockout valve which, when properly implemented, will satisfy OSHA Standard 1910.47. May be sandwich mounted with other Automax NAMUR accessories or may be used with the NPT1 adaptor.

For more information see bulletins (AUTO-95) AXENBR0005 and (AUTO-17) AXENIM0017
- FC1, FCDA and FCSR
 - Flow control modules provide compact and precise adjustment of SuperNova actuator speeds. May be sandwich mounted with other Automax accessories or may be used with the NPT1 adaptor.

Get Bulletins AXENBR0005
and AXENIM0018

See page 2.

SuperNova Actuator Accessories



- Lockouts
 - Permits easy mechanical lockout of automated valves. Lockouts can be field retrofitted and are designed to withstand the rated output torque of the actuator, with the intent to meet the requirements of OSHA Standard 1910.47 (The Control of Hazardous Energy, Lockout / Tagout)
- Gear Overrides
 - Declutchable gear overrides are options that allow local manual control of actuated valves and dampers. The gear overrides are sized for easy operation and can be combined with other control accessories
- "Pharos" NAMUR Indicator
 - Provides an economical solution for positive visual indication of the actuator position. The Pharos NAMUR Indicator, constructed of tough industrial engineered resin, can be used on actuators that utilize a NAMUR mounting interface.

For more information see bulletins (AUTO-24) AXENBR0006 and (AUTO-22) AXENIM0022
- AutoBrakits
 - Heavy-duty mounting kits are designed to close tolerances to assure consistency and proper alignment, which are essential to ensure maximum actuator and valve cycle life

Get Bulletin AXENBR0005

See page 2.

Limit Switches/Positioners



- UltraSwitch GL/XCL/PL Series Rotary Position Indicators
 - Provides a compact and economical package for both visual and remote electrical indication of valve position. Models are available in both die cast aluminum and non-metallic versions. Available with global certifications for non-hazardous, hazardous and intrinsically-safe applications.
- Aviator and BUSwitch Integrated Valve Controller with Internal Pilot Solenoid
 - Provides a truly integrated package in both aluminum or engineered resin enclosures. It can easily be converted to a BUSwitch by simply adding a Fieldbus communication printed circuit board. For overview information see bulletin (AUTO-24) AXENBR0006. For technical literature, go to www.flowserve.com and perform search using Aviator or BUSwitch as the keyword
- APEX Modular Positioner
 - Available in both aluminum and non-metallic versions. Combines precise valve positioning with advanced features. A modular manifold base allows 3-15 psi pneumatic control signals or 4-20 mA signals with the addition of the I/P module. Models are available for corrosion resistant applications and hazardous locations as defined by UL, C-UL and SAA.
 - Also available for precise control applications is the XL90 high performance positioner and the Logix digital positioners.

Get Bulletin AXENBR0006.

See page 2.

SXL Series Stainless Steel Actuators



Features

- Twin piston rack and pinion actuator
- Field convertible double acting and spring return models
- Compliance to NAMUR VDI/VDE 3845 mounting specifications for controls and accessories
- Compliance to ISO 5211 mounting specifications for actuator to valve interface
- Optional air purge modules available
- Flats on pinion drive shaft for manual overrides and accessories
- Upper and lower pinion bearings to ensure long cycle life
- Precision die cast pistons have full length gear engagement, large cylinder bearings, and piston guide bands to ensure long life
- Integral bi-directional travel stops
- Field reversible fail action
- Concentric-nested spring design ensures extended spring life
- Optional SST pistons and springs are available for optimum corrosion resistance
- Seven standard sizes
- Ideal for corrosive and sanitary environments

Torque Range

Up to 8,734 in-lbs (10,060 cm-kg)

Temperature Range

-55 Deg F to 300 Deg F
(-50 Deg C to +150 Deg C)

Maximum Pressure

120 psi (8 bar)

Applications

- HVAC, Mining, Water
- Chemical
- Petrochemical & Refining
- Process Industries

Standards

- ISO 5211
- NAMUR VDI/VDE 3845

Get more information:

Product catalog: AXENBR0005

Installation instructions: AXENIM0006

Product specification sheet: AXENPS0003

See page 2.

Heavy-Duty R2, R3 and R4 Scotch Yoke Actuators



Features

- Pneumatic, gas and hydraulic models
- Double acting, spring return and "fail-safe"
- On-off, multi-position and throttling
- Overrides, special controls, line break controls
- Unique one-piece housing design ensures accurate alignment of torque shaft and piston rod promoting long cycle life
- Needle bearings and seals significantly increase torque output and cycle life while providing near frictionless rotary motion.
- Piston quad seals provide dependable, trouble-free service
- Heavy-walled, hard chrome plated cylinders are honed to a micro finish
- Spring module is an easily removable, welded cartridge

Torque Range

Up to 170,000 in-lbs (195,823 cm-kg)

Temperature Range

-55 Deg F to 300 Deg F
(-50 Deg C to +150 Deg C)

Maximum Pressure

2500 psi (172 bar)

Applications

- HVAC, Mining, Water
- Chemical
- Petrochemical & Refining
- Process Industries

Standards

Flowserve

Get more information:

Product catalog:

AXENBR0005

Installation instructions:

AXENIM0009

See page 2.

Heavy-Duty R5 Scotch Yoke Actuators



Features

- Pneumatic, gas and hydraulic models
- Double acting, spring return and “fail-safe”
- On-off, multi-position and throttling
- Identical mounting pads provide easy change of fail direction
- Indicator/Output shaft has NAMUR slot and optional position indicator
- Spring module is an easily removable, welded cartridge
- Heavy-walled, hard chrome plated cylinders are honed to a micro finish

Torque Range

Up to 500,000 in-lbs (575,950 cm-kg)

Temperature Range

-55 Deg F to 300 Deg F
(-50 Deg C to +150 Deg C)

Maximum Pressure

2500 psi (172 bar)

Applications

- HVAC, Mining, Water
- Chemical
- Petrochemical & Refining
- Process Industries

Standards

Flowserve

Get more information:

Product catalog:
AXENBR0005

Installation instructions:
AXENIM0008

See page 2.

Centura Series Electric Actuators



Features

- CE Series
 - Electrical cut-off switch; captive cover bolts; Quick-Set cams; simple mounting arrangements; heavy-duty brake option; 3/4 NPT conduits standard; massive gear train; rugged single phase permanent split capacitor gearmotor, NEMA 4, 4x, 7, 9
- CPL Series
 - Captive cover bolts; Quick-Set cams; simple mounting arrangements; 3/4 NPT conduits standard; enclosed, permanently lubricated gear train; rugged single phase permanent split capacitor gearmotor; corrosion resistant engineered resin housing, NEMA 4, 4x
- E Series
 - Captive cover bolts; Quick-Set cams; 1/2-inch NPT conduits standard; permanently lubricated, precision cut, heat treated alloy steel gear train; rugged single phase permanent split capacitor gearmotor; corrosion resistant housing; manual override standard, NEMA 4
- Control Boxes
 - Available for a variety of local and remote control options, Control Boxes are available in engineered resin, carbon steel, and stainless steel enclosures with weatherproof and explosion-proof approvals

Models Available

- CE Series
 - the workhorse of the Centura series
- CPL Series
 - ideal for harsh, corrosive environments
- E Series
 - combines maximum performance and corrosion in one package

Torque Range

Up to 3500 in-lbs (4031 cm-kg) depending upon the model

Temperature Range

-40 Deg F (with heater) to 158 Deg F
(-40 Deg C to +70 Deg C) depending upon the model

Supply Voltage

- 115 VAC 50/60, 12 VDC, 24 VDC, 230 VAC 50/60, 24 VAC
- On-Off, 3-position control, and modulating options are available
- Fieldbus digital communications available in AS-i, FOUNDATION Fieldbus, and PROFIBUS DP protocols

Applications

- HVAC, Mining, Water
- Power Generation, Nuclear Service
- Oil & Gas

Standards

- NEMA 4, 4x, 7 and 9

Get more information:

Product catalog:
AXENTB0035

Installation instructions:

CE Series AXENIM0037; CPL Series AXENIM0039; E Series AXENIM0040

See page 2.

UltraSwitch GL Series**Features**

- Pharos and UltraDome visual position indicators for high contrast, wide angle viewing
- Compliance to NAMUR VDI/VDE 3845 mounting specifications eliminates coupler and maximizes interchangeability
- Captive stainless steel cover screws
- Prewired multipoint terminal strip
- Quick-Set spring loaded cams are extra wide and splined to permit tool-free limit switch calibration
- Extensive switch offering for a wide range of applications including mechanical, proximity, solid state sensor options

Description

Provides a compact and economical package for NEMA 4 visual and remote electrical indication of valve position

Housing Material

Die cast aluminum; electrostatic powder coated

Standards

NEMA 4, 4x

Hazardous Area Classifications

Class 1, Division 2, Groups A, B, C, D approvals when supplied with hermetically sealed magnetic proximity switches

Get more information:

Product catalog:
AXENBR0006

Installation instructions:
AXENIM0031

See page 2.

UltraSwitch XCL Series**Features**

- UltraDome visual position indicators for high contrast, wide angle viewing
- Compliance to NAMUR VDI/VDE 3845 mounting specifications eliminates coupler and maximizes interchangeability
- Captive stainless steel cover screws
- Prewired multipoint terminal strip
- Quick-Set spring loaded cams are extra wide and splined to permit tool-free limit switch calibration
- Extensive switch offering for a wide range of applications including mechanical, proximity, solid state, and analog feedback options

Description

Provides a heavy-duty and rugged globally-certified explosion-proof package for visual and remote electrical indication of valve position

Housing Material

Die cast aluminum; dichromate conversion undercoat; electrostatic powder top coat

Standards

NEMA 4, 4x, 7 and 9, IP65, IP67

Hazardous Area Classifications

- Explosion-Proof (UL/CSA/ATEX) mechanical switch options
- Class 1, Divisions 1 and 2, Groups C and D
- Class 2, Divisions 1 and 2, Groups E, F and G
- ATEX II 2 GD EEx d IIB T4-T6
- Explosion-Proof (UL/CSA/ATEX) proximity/solid state switch options (except NJ)
- Class 1, Division 1 and 2, Groups C and D
- Class 1, Division 2 only, Groups A, B, C and D
- Class 2, Divisions 1 and 2, Groups E, F and G
- ATEX II 2 GD EEx d IIB T4-T6

Get more information:

Product catalog: AXENBR0006

Installation instructions: AXENIM0120

Product specification: AXENPS0120

See page 2.

UltraSwitch PL Series**Features**

- Pharos and UltraDome visual position indicators for high contrast, wide angle viewing
- Compliance to NAMUR VDI/VDE 3845 mounting specifications eliminates coupler and maximizes interchangeability
- Captive stainless steel cover screws
- Prewired multipoint terminal strip
- Quick-Set spring loaded cams are extra wide and splined to permit tool-free limit switch calibration
- Extensive switch offering for a wide range of applications including mechanical, proximity, solid state, and analog feedback options

Description

Engineered resin enclosure provides excellent protection for harsh corrosive environments

Housing Material

Non-metallic engineered resin

Standards

NEMA 4, 4x

Hazardous Area Classifications

Class 1, Division 2, Groups A, B, C, D approvals when supplied with hermetically sealed magnetic proximity switches

Get more information:

Product catalog:
AXENBR0006

Installation instructions:
AXENIM0031

See page 2.

Aviator Integrated Valve Controller



Description

Designed for use with pneumatic rotary industrial valve actuators in hazardous locations. With the same features as the UltraSwitch, the Aviator provides actuator/valve control by receiving a direct solenoid voltage signal. Also provides remote indication of open and closed valve positions by completing separate electrical circuits.

Housing Material

- Aluminum (XV and CV models)
- Engineered Resin (WR model)

Standards

- NEMA 4, 4x, 7, 9 (XV model)
- ATEX EEx d IIB (CV model)
- NEMA 4, 4x (WR model)

Hazardous Area Classifications

- Class 1, Divisions 1 and 2, Groups C, D
- Class 2, Divisions 1 and 2, Groups E, F, G
- Class 1, Groups A and B
- Class 1, Division 2 only, Groups A, B, C and D when supplied with hermetically sealed magnetic proximity switches
- ATEX II 2 GD EEx d IIB T4-T6

Get more information:

Product catalog:

AXENBR0006

Installation instructions:

AXENIM0032 or for
non-metallic AXENIM0097

Product specification:

AXENPS0059 or for
non-metallic AXENPS0098

See page 2.

BUSwitch Integrated Valve Controller



Description

Designed for use with pneumatic rotary industrial valve actuators in hazardous locations with digital fieldbus communications. With the same features as the Aviator, the BUSwitch provides actuator/valve control by receiving a direct solenoid voltage signal. Also provides remote indication of open and closed valve positions by completing separate electrical circuits. Available in the following fieldbus protocols: AS-i, DeviceNet, FOUNDATION Fieldbus and PROFIBUS DP.

Housing Material

- Aluminum (XV and CV models)
- Engineered Resin (WR model)

Standards

- NEMA 4, 4x, 7, 9 (XV model)
- ATEX EEx d IIB (CV model)
- NEMA 4, 4x (WR model)

Hazardous Area Classifications

- Class 1, Divisions 1 and 2, Groups C, D
- Class 2, Divisions 1 and 2, Groups E, F, G
- Class 1, Groups A and B
- Class 1, Division 2 only, Groups A, B, C and D when supplied with hermetically sealed magnetic proximity switches
- Class 1, Divisions 1 and 2, Groups A, B, C and D Intrinsically safe for FOUNDATION Fieldbus protocol only
- ATEX II 2 GD EEx d IIB T4-T6

Get more information:

Product catalog: AXENBR0006

Installation instructions:

AXENIM0032 or for
non-metallic AXENIM0097

Product specification:

AXENPS0059 or for
non-metallic AXENPS0098

Installation instructions:

AXENIM0087 for AS-i protocol

Installation instructions:

AXENIM0048 for FOUNDATION Fieldbus
protocol

Installation instructions:

LML0012 for PROFIBUS DP protocol

See page 2.

APEX 4000 Positioner**Description**

Compact, rugged design provides accurate valve positioning at a competitive price. Available with pneumatic and electro-pneumatic input options that can be field retrofitted.

Housing Material

Die cast aluminum; electrostatic powder coated

Features

- Low-profile visual indicator provides viewing of valve position
- Compliance to NAMUR VDI/VDE 3845 mounting specifications eliminates coupler and maximizes interchangeability
- Captive stainless steel cover screws
- Compact, rugged design has few moving parts adding to its reliability and performance
- Interchangeable I/P Modules allow positioner to be field converted for 3-15 psi or 4-20 mA input signals
- Multiple cam options allow configuration of positioner characteristics to match valve requirements
- Externally adjustable zero setting
- Gold-plated spool valves available in low or high flow versions to match actuator/valve load requirements

Standards

NEMA 4, 4x, 7 and 9

Hazardous Area Classifications

- Class 1, Divisions 1 and 2, Groups C and D
- Class 2, Groups E, F and G
- ATEX II 2 G EEx d IIC
- Intrinsically Safe ATEX II 2 G EEx ia IIC

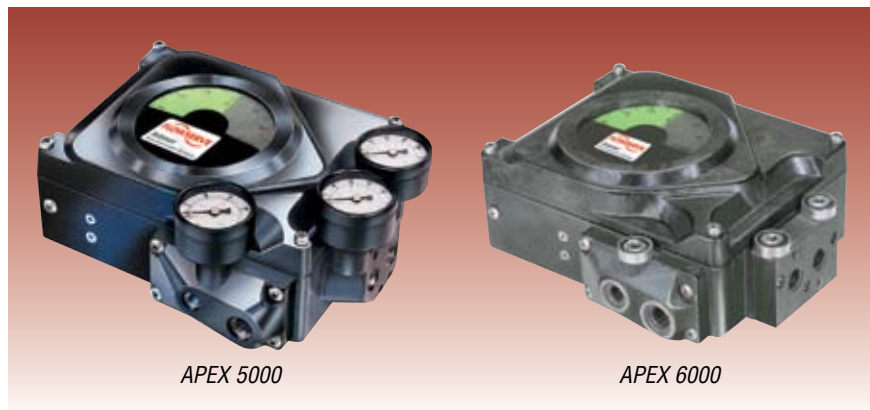
Get more information:

Product catalog:
AXENBR0006

Installation instructions:
AXENIM0036

Product specification:
AXENPS0014

See page 2.

APEX 5000/6000 Positioner

APEX 5000

APEX 6000

Description

The aluminum APEX 5000 and engineered resin APEX 6000 positioners provide accurate valve positioning with many advanced features. Pneumatic and electro-pneumatic input options available that can be field retrofitted. Also available with many advanced features such as limit switch feedback, analog feedback, NAMUR accessories, and Pharos visual position indicators.

Housing Material

APEX 5000 Die cast aluminum; electrostatic powder coated, APEX 6000 engineered resin

Features

- Optional Pharos visual position indicator for high contrast, wide-angle viewing of valve position
- Compliance to NAMUR VDI/VDE 3845 mounting specifications eliminates coupler and maximizes interchangeability
- Captive stainless steel cover screws
- Die cast aluminum enclosure (APEX 5000) with dichromate conversion undercoating and electrostatic powder topcoat. The APEX 6000 housing is a non-metallic engineered resin for maximum corrosion protection.
- Interchangeable I/P Modules allow positioner to be field converted for 3-15 psi or 4-20 mA input signals
- Multiple cam options allow configuration of positioner characteristics to match valve requirements
- Non-interactive zero and span adjustments with lockable rack and pinion reduces calibration time
- Patented adjustable gain permits positioner sensitivity adjustment without removing or replacing components
- Low flow, high flow and max flow spool valves available to match actuator/valve load requirements
- Vibration resistant low spool mass, outboard spool bearings and locking calibration adjustments provide reliable operation in high vibration applications
- Optional limit switch and analog feedback options available
- Optional NAMUR accessories available for speed control and block/bleed functions

Standards

NEMA 4, 4x, 7 and 9

Hazardous Area Classifications

- Class 1, Divisions 1 and 2, Groups C and D
- Class 2, Groups E, F and G
- Intrinsically Safe Class 1, Division 1, Groups A, B, C and D
- ATEX II 2 G EEx d IIC
- Intrinsically Safe ATEX II 2 G EEx ia IIC

Get more information:

Product catalog:
AXENBR0006

Installation instructions:
AXENIM0030 and AXENIM0066

Product specification:
AXENPS0229 and AXENPS0203

See page 2.



Description

The XL90 positioner provides extremely precise control for a wide range of valve and damper applications. The two-stage pneumatic relay provides faster, more sensitive response characteristics to meet the most demanding control objectives. Pneumatic and electro-pneumatic input options available that can be field retrofitted. Also available with many advanced features such as limit switch feedback, analog feedback and UltraDome visual position indicators.

Housing Material

Die cast aluminum with electrostatic epoxy powder coat

Features

- Optional UltraDome visual position indicator for high contrast, wide-angle viewing of valve position
- Compliance to NAMUR VDI/VDE 3845 mounting specifications eliminates coupler and maximizes interchangeability
- Captive stainless steel cover screws
- Interchangeable I/P Modules allow positioner to be field converted for 3-15 psi or 4-20 mA input signals
- Multiple cam options allow configuration of positioner characteristics to match valve requirements
- Non-interactive zero and span adjustments with lockable rack and pinion reduces calibration time
- Adjustable gain permits positioner sensitivity adjustment without removing or replacing components
- Two-stage pneumatic relay permits fast and extremely precise response to input signals for optimum control
- Vibration resistance through high natural frequency and pneumatic dampening make the XL90 unaffected by vibrations with accelerations up to 2 G's and frequencies to 500 Hz
- Optional limit switch and analog feedback options available

Standards

NEMA 4, 4x, 7 and 9

Hazardous Area Classifications

- Class 1, Divisions 1 and 2, Groups C and D
- Class 2, Divisions 1 and 2, Groups E, F and G
- Intrinsically Safe Class 1, Division 1, Groups A, B, C, D
- ATEX II 2 G EEx d IIC
- Intrinsically Safe ATEX II 2 G EEx ia IIC

Get more information:

Product catalog:

AXENBR0006

Installation instructions:

AXENIM0008

Product specification:

AXENPS0029

See page 2.

Logix 500si Digital Positioner



Description

The Logix 500si digital positioner combines state-of-the-art piezo valve technology with inner-loop feedback for extremely precise control for a wide range of valve and damper applications. The cost competitive package is ideal for weatherproof, intrinsically safe and nonincendive digital positioner applications. The Logix 510si is available as an economical 4-20 mA digital positioner. The Logix 520si is available with the industry standard HART protocol with advanced features such as dual gain tuning, 21-point custom characterization, and signatures for advanced predictive/preventive maintenance diagnostics. Also available with many advanced features such as limit switch feedback, analog feedback and UltraDome visual position indicators.

Housing Material

Die cast aluminum with electrostatic epoxy powder coat

Features

- Optional UltraDome visual position indicator for high contrast, wide-angle viewing of valve position
- Compliance to NAMUR VDI/VDE 3845 mounting specifications eliminates coupler and maximizes interchangeability
- Captive stainless steel cover screws
- Quick-Cal function provides fast, push-button automatic calibration of positioner
- Direct User Interface permits local access to positioner control and quick commissioning independent of a handheld configurator or laptop/PC
- Two-Stage control utilizes piezo technology combined with inner-loop feedback for precise control
- Local Status LED's provide instant information relating to internal diagnostic codes, indicating 36 different conditions
- 21-Point Custom Characterization permits the user to control the valve in virtually any position desired for a given input signal

- Jog Calibrate function allows users to easily calibrate the positioner on actuators without physical stroke stops
- AutoTune function and Gain Selector Switch ensures consistency and optimum performance for control applications
- Optional limit switch and analog feedback options available

Standards

NEMA 4, 4x

Hazardous Area Classifications

- Intrinsically Safe Class 1, Division 1, Groups A, B, C and D
- Nonincendive Class 1, Division 2, Groups A, B, C and D
- Intrinsically Safe ATEX II 2 G EEx ia IIC

Get more information:

Product catalog:
AXENBR0006

Product specification:
AXENPS0012

See page 2.

Logix 520SI/3200IQ Information Chart

The following information is accessible from the Logix Digital Valve Controller:

Identification

Spool identification
Air action
Tag number
Spring type
Valve style
Valve material
Valve body size
Valve serial number
Valve manufacturer
Valve pressure class

Valve end connections
Fail position
Stroke length
Flow direction
Trim number/size
Trim characteristic
Stem/shaft diameter
Trim type and material
Leakage class
Inlet/outlet pressure
Actuator size and type
Device name/description
Embedded software version
Electronic serial number
Engineering units
Message - up to 32 characters

Calibration

Stroke
4-20 mA signal
Pressure sensor
Calibration date
Calibrated by initials

Data Acquisition

Valve position
4-20 mA signal
Command signal
Clockwise actuator pressure
Counter clockwise actuator pressure

Diagnostics and Signatures

Step test
Ramp test
Internal power test

Preventive Maintenance

Actual travel
Rated travel
Travel alert
Packing style
Cycle counter
Cycle alert



Description

The Logix 3200IQ digital positioner combines state-of-the-art piezo valve technology with inner-loop feedback for extremely precise control for a wide range of valve and damper applications. The Logix 3200IQ is available in an explosion-proof and intrinsically safe enclosure for North American and European hazardous locations. With identical calibration features of the Logix 500si, the Logix 3200IQ utilizes a powerful 16-bit microprocessor and state-of-the-art piezo technology to deliver unparalleled performance. Available in the industry standard HART protocol, the Logix 3400IQ is available in the FOUNDATION Fieldbus protocol with advanced features such as dual gain tuning, 21-point custom characterization and signatures for advanced predictive/preventive maintenance diagnostics. Also available with many advanced features such as limit switch feedback, analog feedback and stainless steel enclosures.

Housing Material

Die cast aluminum with electrostatic epoxy powder coat. Optional 316 stainless steel enclosure

Features

- Compliance to NAMUR VDI/VDE 3845 mounting specifications eliminates coupler and maximizes interchangeability
- 16-Bit Microprocessor provides substantial increase in CPU speed, allowing greater onboard diagnostics and control capabilities
- Quick-Cal function provides fast, push-button automatic calibration of positioner
- Direct User Interface permits local access to positioner control and quick commissioning independent of a handheld configurator or laptop/PC
- Two-Stage control utilizes piezo technology combined with inner-loop feedback for precise control
- Local Status LED's provide instant information relating to internal diagnostic codes, indicating 36 different conditions

- 21-Point Custom Characterization permits the user to control the valve in virtually any position desired for a given input signal
- Jog Calibrate function allows users to easily calibrate the positioner on actuators without physical stroke stops
- AutoTune function and Gain Selector Switch ensures consistency and optimum performance for control applications
- Optional limit switch and analog feedback options available

Standards

NEMA 4, 4x, 7, 9

Hazardous Area Classifications

- Class 1, Division 1, Groups B, C and D
- Intrinsically Safe Class 1, Division 1, Groups A, B, C and D
- ATEX II 2 G EEx d IIC
- Intrinsically Safe ATEX II 2 G EEx ia IIC

Get more information:

Product catalog:

AXENBR0006

Installation instructions:

AXENIM3200

Product specification:

AXENPS3200

See page 2.



Description

The SoftTools software package provides all of the tools necessary to establish communications with a Logix 520si or 3200IQ digital positioner using a personal computer via HART protocol. SoftTools introduces the most advanced and comprehensive set of valve and positioner diagnostics available today including:

- Valve/Package identification including tag number, valve specifications and actuator configuration
- 21-Point Custom Characterization allows the user to adjust a 21-point characterization curve to change the response of the positioner to meet process requirements
- Positioner performance tests measure hysteresis, deadband, linearity and repeatability
- Signature comparisons can be preformed by evaluating a stored "installed" signature curve to current performance
- Dual gain tuning permits the user to make large step changes with minimum overshoot while achieving the resolution to respond to very small step changes

Get more information:

Product catalog:

AXENBR0006

Product specification:

AXENPS0028

See page 2.

Additional Information

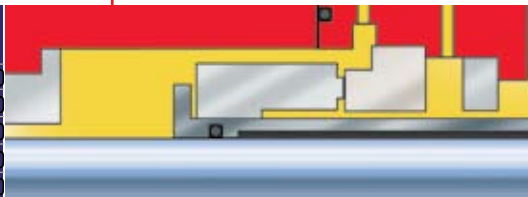
Other Flowserve Products	24-25
Global Engineered Services and Support	26
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Heritage Names of Distinction

Flowserve Flow Control is comprised of the brands listed below. This is our heritage and the basis for the respect and trust that we enjoy in the global marketplace.

Accord®
 Anchor Darling®
 Argus®
 Atomac®
 Automax® Valve Automation Systems
 Battig®
 Durco®
 Edward®
 Gestra®
 Kammer®
 Limitorque®
 McCANNA®
 MARPAC®
 NAF®
 Naval
 Noble Alloy®
 Norbro®
 Nordstrom Audco®
 P & W
 PMV®
 Schmidt Armaturen®
 Serck Audco®
 Valtek®
 Vogt®
 Worchester Controls®

		Flow (% of BEP)	
2V-7	3500	25	290
2V-10	3500	30	290
3V-10	3500	33	290
2V-13	3500	50	290
I-13/11*	3500	50	290



Providing Complete Fluid Motion Control Equipment and Services

Flowserve Seals

Flowserve manufactures and markets highly engineered mechanical shaft seals for containing corrosive, volatile, abrasive, precious or flammable fluid. They are used on pumps and other rotating equipment.

The complete seal line includes cartridge, dry-running, metal or elastomer bellows, split and zero emission gas barrier seals. Offering innovative seal design and service on demand, Flowserve is committed to the development of new technologies to further reduce maintenance and operating costs for its customers.



Flowserve Pumps

Flowserve is the driving force in the global industrial pump marketplace. No other pump company in the world has the depth or breadth of expertise in successful application of pre-engineered, engineered and special purpose pumps and systems.

Flowserve pump product lines are extensive with more than 100 distinct models and thousands of optional configurations. These are largely complementary pump types built to global standards and customer specifications.

To learn more about Flowserve Pumps and Seals, visit www.flowserve.com.



Global Engineered Services and Support

Global Engineered Services and Support

Total Cost Reduction

Asset Management

Product Life Cycle

Performance Re-rates

Site Diagnostics

Repair Services

Energy Management

Spare Parts

Maintenance Contracts

Materials Upgrades

Turnkey Services

Field Repairs

Installation

Project Supervision

Commissioning

Equipment Upgrades

Condition Monitoring

Systems Analysis

Field Machining

Service Dedication

Flowserve Engineered Services is focused on providing customers with uncompromising service and support, where and when needed. Dedicated to delivering the highest quality support, Engineered Services integrates its extensive pump and materials engineering knowledge with creative service solutions. Engineered Services fully understands the business challenges facing customers and is prepared to manage solutions to succeed as a team.

A worldwide network of service and repair centers staffed by highly skilled engineers and technicians is available around the clock, seven days a week to respond to customer queries, to evaluate and troubleshoot problems and to provide reliable solutions.

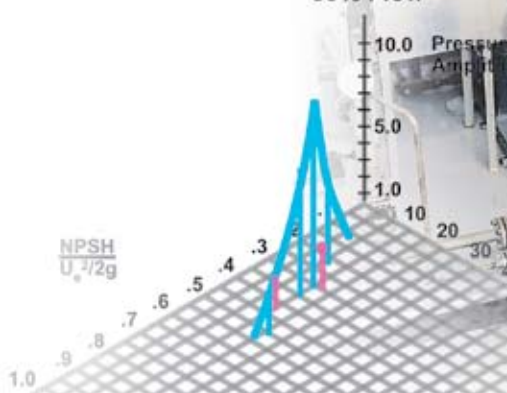
Business Partner

Flowserve partners with customers to respond to the dynamic business conditions that affect them. Flowserve will work with customers to drive efficiency, maximize throughput and control process quality. Whether user needs involve on-site technical assistance or broader project planning with full turnkey responsibility, Flowserve Engineered Services will deliver professional, reliable results.



Low Frequency Pressure Pulsations

50% Flow





To learn about industry standards pertaining to the design and performance of pumps contact the following organizations:

- American Petroleum Institute (API) www.api.org
- American Society of Mechanical Engineers (ASME – ANSI) www.asme.org
- American Society of Testing and Materials (ASTM) www.astm.org
- Instrumentation, Systems and Automation Society (ISA) www.isa.org
- International Standards Organization (ISO) www.iso.ch/iso/en/ISOonline.openpage



The AutoSize actuator sizing program offers a user friendly windows interface and features intelligent product selection screens suitable for global applications. Engineering calculations include:

- Actuator torque sizing
- Actuator torque curves
- Speed of operation (C_v , SCFM)
- Hot line distances
- Fail safe accumulator tank sizing

AutoSize is available from your local sales representative.

Flowserve Instrument Engineer's Handbook

Flowserve Instrument Engineer's Handbook for Durco Quarter-turn Control Valves is a publication devoted to the proper selection of Durco Valves for control valve applications. The formulae presented for liquids, gases, and steam are based on the ISA standard S75.01 and are divided into sections to simplify manual calculation for common sizing problems.

To obtain a copy of the Flowserve Instrument Engineer's Handbook visit www.flowserve.com.



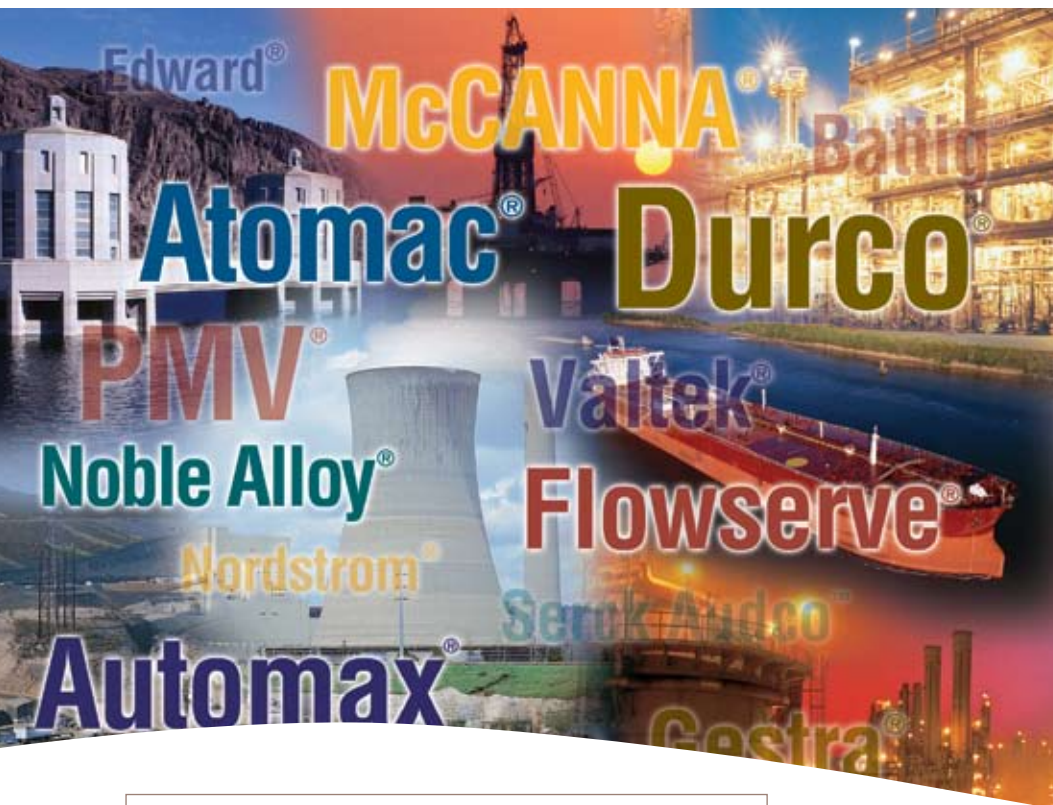
The Automax Automated Drawing System will allow you to electronically submit assembly drawing requests to our server. Your submittal will create a customized drawing and return it to you via e-mail in a matter of minutes. There is no charge for the software, service, or completed drawings and the system is available 24 hours a day, 365 days a year.

The ADS web application allows drawings to be submitted directly through the Internet, does not require downloading of files and allows for simultaneous upgrades without affecting current users. To operate the system and submit drawing requests, simply access the website below and select the items that you require in the finished drawing. After the items are chosen, select the "Submit" button and the request is submitted to the ADS server. It takes the Automated Drawing System approximately three minutes per drawing request to process the request, create the finished drawing, and e-mail the drawing back to you. The finished drawing is returned as a .PDF Adobe Acrobat file. A .DXF file is also an option for CAD users. ADS website: <http://ads.flowserve.com>

System Requirements:

- 386 or higher PC
- 4MB of RAM (8 recommended)
- Microsoft Windows 95, 98, NT or XP
- An Internet e-mail account

For technical assistance, please contact Mike Rusche (mrusche@flowserve.com).



*To find your local Flowserve representative,
visit www.flowserve.com or call USA 1 800 225 6989*

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