Optimux Control Valves
A Primer on Technological Differentiators

April, 2011
Trimteck is a family-owned American company with over thirty years of experience in engineering, manufacturing, and marketing flow control solutions and equipment for a variety of industries. Our application engineers and certified representatives are committed to personalized customer service and have an extensive line of products and technologies to draw upon when designing and specifying a solution.

With a comprehensive line of Optimux control valves – and an array of actuators, positioners, severe service trims, and other accessories – our engineers and representatives can solve the most complex flow control problems quickly and economically. Moreover, our organizational focus on implementing highly efficient sourcing, engineering, manufacturing, assembly, and distribution processes enables us to guarantee world-class quality, competitive pricing, and rapid delivery to anywhere in the world.

Welcome to Trimteck.
A Comprehensive Portfolio of Control Valves
Agenda

I. OpGL Globe Control Valve

II. Piston-Cylinder vs. Diaphragm Actuators

III. OpDX Double Eccentric Rotary Valve

IV. OpVEE V-Notch Control Valve

V. OpEXL Eccentric Plug Valve

VI. Newcomers: OpTE Triple Eccentric and OpTB Trunnion Ball Control Valves
Optimux OpGL Globe Control Valve


Technical Specifications

<table>
<thead>
<tr>
<th>Diameter</th>
<th>½”-42”: ANSI Class 150-600</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1”-24”: ANSI Class 900-4500</td>
</tr>
<tr>
<td>Body Style</td>
<td>Globe, Angle, Three-way, Steam-jacketed, Y-body</td>
</tr>
<tr>
<td>Connections</td>
<td>Integral flanges, Socketweld, Buttweld</td>
</tr>
<tr>
<td>Materials</td>
<td>Carbon steel, Stainless steel, Chrome-moly, Alloy 20, Hastelloy B&amp;C, Titanium, and others…</td>
</tr>
<tr>
<td>Bonnet Types</td>
<td>Normal, Extended, Cryogenic, Cool box extended,</td>
</tr>
<tr>
<td>Internals</td>
<td>Flow characteristics, equal percentage, linear, and quick-open. Seats available in metal or soft (for “bubble tight” shutoff)</td>
</tr>
</tbody>
</table>

- Exceptionally tight shutoff Class V Metal-to-Metal
- High-thrust piston-cylinder actuator
- Available fugitive emissions packings and bellow seals
- Top-entry design facilitates maintenance
- Top-guided robust design offsets any oscillations
- Broad selection of trims available for each size
OpGL - General Advantages

- High-performance positioner valve
- Compact, high-thrust cylinder actuator
- Designed to ANSI Class 600 (1/2”-4”)
- Double-top stem guided
- Easy maintenance
- Interchangeability of parts
Point-of-Comparison: Typical Cage-Guided Trim
OpGL – Clamped-In Seat Design
OpGL – Welded Seat Option

Integral Seat
(No Retainer)
OpGL – Three-Way Valve
OpGL – Flange and Bonnet Design

150 through 600 ANSI Class

900 through 2500 ANSI Class
OpGL – Plugs: Equal Percent, Linear, Quick Open
OpGL – Broad Selection of Trims: Full Area & Reduced
OpGL – Bonnet and Seat Ring Gaskets
OpGL – Class VI Soft-Lined Seat with Insert
OpGL – Severe Service Retainers
OpGL – ST-1 Cavitation Control Trim

- Controls cavitation by containing the cavitation away from the metal boundary layer in the valve retainer
- ST-1 is designed for low to medium cavitation in liquids
OpGL – ST-2 Severe Service Trim

- Controls cavitation in liquids up to six stages
OpGL – ST-3 Severe Service Trim

- Noise control trim
- Controls noise in liquids
- Up to 25 dBA noise attenuation
OpGL – ST-4 Severe Service Stacked-Cage Trim

• Trim can be designed and manufactured with up to 11 stages of pressure reduction of 11,000 psi PD

• Noise control for ANSI Class 600 or higher

• Up to 30 dba noise attenuation

• Can be used for extreme cavitation control

• Liquids & gases
OpGL – Bonnets for Every Application

Standard

Extended

Cryogenic
OpGL – Upper and Lower Packing: Teflon V-Ring
OpGL – Yoke Clamp and Gland Flange

- Packing Box Bolting
- Gland Flange
- Yoke Clamps
- Yoke Clamp Bolting
OpGL – Yoke Clamp and Gland Flange
I. OpGL Globe Control Valve

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Actuator Comparison – Piston Cylinder Pneumatic Actuator

Piston Pneumatic Actuator (PPA) Characteristics:

• These type of actuators were designed to work with high pneumatic pressures typical: 150 psi and are able to produce forces up to 100,000 Pounds

• One of the key advantages of PPA’s is their size and weight vis-à-vis equivalent Diaphragm Pneumatic Actuators (DPA) i.e. A typical PPA for a 2” valve weight 7-8 Kgs while a DPA weighs 18-20 Kgs Size differences are also substantial

• The PPA is of a simpler design than DPA and have less components and parts which makes maintenance much simpler and more cost effective in the long run

• In the past there was a perception that PPA’s were more expensive that DPA’s this was mainly due to the fact that most PPA’s need a positioner for modulating control. Improvements in aluminum castings and higher efficiencies in machining have reduced significantly the manufacturing costs of PPA’s

• In general PPA’s are used in applications that require high operating forces, high performance, fine control and velocity at low cost
The primary advantage of cylinder actuators is the higher thrust capability, size for size over comparable diaphragm actuator.

The piston with its sliding O-ring seal is much more capable of handling greater air pressure than the Diaphragm.
Actuator Comparison – Diaphragm Pneumatic Actuator

Diaphragm Pneumatic Actuator (DPA) Characteristics:

• DPAs can be modulated with air directly applied to the actuator however forces obtained are low:
  - 400-1,600 Pounds with a 3 to 15 psi signal
  - 700-4,000 Pounds with a 6 to 30 psi signal
• Maximum forces obtained with a positioner will be 45,000 Pounds
• For optimal shut off characteristics an actuator must overcome the static forces associated with the fluid. DPAs are typically oversized to be able to overcome these dynamic forces. This is specially evident in assuring total opening or total shut off in fail-position conditions
• Depending on process requirements DPAs can become large and heavy which could present a space problem for installing on the pipelines or non-compliance with seismic requirements
### Actuator Comparison – Side-by-Side

<table>
<thead>
<tr>
<th>Piston Cylinder</th>
<th>Diaphragm</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 inches²</td>
<td>60 inches²</td>
</tr>
<tr>
<td>80 psi Air Supply</td>
<td>30 psi Air Supply</td>
</tr>
<tr>
<td>2000 lbs of thrust</td>
<td>750 lbs of thrust</td>
</tr>
</tbody>
</table>

**Conclusion:** A far larger diaphragm actuator would be needed to provide the same thrust requirement as the piston cylinder actuator.
Actuator Comparison – Field Reversibility

Figure 1: Air-to-retract Cylinder Actuator

Figure 2: Air-to-extend Cylinder Actuator
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Optimux OpDX Double Eccentric Rotary Valve

Pressure-assisted seating achieves bi-directional bubble-tight shutoff and low breakout torque

Technical Specifications

<table>
<thead>
<tr>
<th>Type</th>
<th>Wafer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diameters</td>
<td>2”-36”</td>
</tr>
<tr>
<td>Nominal pressures</td>
<td>ANSI Class 150, 300, 900, 1500, 2500</td>
</tr>
<tr>
<td>Materials</td>
<td>Carbon and SS, Chrome-molly, alloy 20, Monel, Hastelloy B&amp;C, titanium, and other casting materials</td>
</tr>
<tr>
<td>Closings</td>
<td>Soft closing: Teflon TFE, Teflon, PEEK, Kel-F, Metal closing: SS 316, Inconel</td>
</tr>
<tr>
<td>Flow characteristics</td>
<td>Inherent characteristic: modified parabolic. By adding other cams, linear and equal percentage can also be obtained</td>
</tr>
</tbody>
</table>

- High Performance rotary valve
- Eccentric cam disc for accurate throttling
- Same flangeless body (wafer) serves ANSI classes 150, 300, & 600 in 2”, 3”, 4”, 6”, and 8” sizes
- Flow capacity greater than globe, plug, and V-Notch control valves
- Available with Rack & Pinion or Piston & Cylinder actuators
OpDX – Body Subassembly

ANSI Class IV - metal seal
ANSI Class VI - soft seal

Separable Disk and Shaft for lower cost design

Splined shaft with single pivot point for actuator to disk connection

Self-centering seal

Valve Centerline

Disk Centerline
OpDX – Seating Principles

Figure 3
Seating Principles
Soft seat - Flow Upstream

Figure 4
Seating Principles
Soft Seat - Flow Downstream
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Optimux OpVEE V-Notch Ball Valve

Designed to overcome problems with particle entrained processes

Technical Specifications

<table>
<thead>
<tr>
<th>Type</th>
<th>Ball valve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diameters</td>
<td>1”-16”</td>
</tr>
<tr>
<td>Nominal pressure</td>
<td>ANSI Class 150, 300, 600 for the diameters: 1”, 1.5”, 2”, 3”, 4”, 6”, 8”, 10”, and 12”</td>
</tr>
<tr>
<td>Ball valve materials</td>
<td>Stainless steel with hard chrome plating, stellite, Hastelloy C, Hastelloy B/B-2, Monel, Alloy 20, and titanium</td>
</tr>
<tr>
<td>Seat materials</td>
<td>Soft seat: PEEK, Glass-filled Teflon PTFE, Metal seat: SS 316, stellite, Monel, Inconel</td>
</tr>
<tr>
<td>Actuators</td>
<td>Flowtork rotary actuator with fail safe spring and rocking piston</td>
</tr>
</tbody>
</table>

- Wide range of applications including: Chemical, Pulp & Paper, Energy, and Oil
- 300 to 1 Rangeability
- No Shim seal needed
- Class IV & VI available
- ISO Standard shaft compatible with multiple types of actuators
OpVEE – Body Subassembly 3”-12”

- Lightweight, rugged one-piece body
- Self-centering seal
- Splined ball to shaft connection
- Stationary shaft piece
- V-notch segmented ball exceeds 300 to 1 rangeability
OpVEE – Body Subassembly 1”- 2”

- Flangeless one-piece body standard or integral flanges optional
- Shaft blowout retainer
- Seal bearings optional
OpVEE – Soft Seal Rings

Dual Ring

Soft Seal
OpVEE – Bi-directional Seal Rings

Flexible Metal Seal Rings
## Agenda

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Optimux OpEXL Eccentric Plug Valve

The ability to handle large CVs makes the OpEXL the Valve of choice for many process control engineers

Technical Specifications

<table>
<thead>
<tr>
<th>Type</th>
<th>Eccentric Plug Valve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diameters</td>
<td>1” - 8”</td>
</tr>
<tr>
<td>Nominal pressure</td>
<td>Flanges: ANSI Class 150,300 &amp; 600 &amp; Flangeless: ANSI Class 150 &amp; 300</td>
</tr>
<tr>
<td>Plug Materials</td>
<td>A 564 Gr 630 (17-4PH), 316 w/Stellite #6</td>
</tr>
<tr>
<td>Seat materials</td>
<td>Metal: AISI 316 with Stellite # 6</td>
</tr>
<tr>
<td>Actuators</td>
<td>Flowtork rotary actuator with fail safe spring and rocking piston or OpTK Fail-safe Rotary Actuator</td>
</tr>
</tbody>
</table>

- Characterized by its innovative Eccentric Plug
- Optimal performance in a wide array of process control applications
- “Not-through” shaft allows uninterrupted flow of fluid
- Maintenance cycle surpasses five years of use for most applications
OpEXL – Notable Features

- Eccentric rotary plug; decreased seat wear
- Large diameter shaft; higher allowable pressure drops than typical rotary valves
- Non-rotating post; locking cone, washer, and screw prevent rotation
- Blowout protection; two mechanisms provide blowout prevention
- Variety of actuation alternatives
- Excellent rangeability; greater than 160:1
- Higher Cv than conventional through-shaft eccentric plug valves like Masoneilan’s Camflex or Fisher’s V500

<table>
<thead>
<tr>
<th>Valve Size (Inches)</th>
<th>Optimux OpEXL</th>
<th>Masoneilan Camflex</th>
<th>Fisher BV500</th>
<th>Cashco Ranger</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>18</td>
<td>14</td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td>1.5</td>
<td>47</td>
<td>33</td>
<td>30</td>
<td>25</td>
</tr>
<tr>
<td>2</td>
<td>80</td>
<td>50</td>
<td>45</td>
<td>71</td>
</tr>
<tr>
<td>3</td>
<td>254</td>
<td>135</td>
<td>107</td>
<td>170</td>
</tr>
<tr>
<td>4</td>
<td>408</td>
<td>230</td>
<td>195</td>
<td>325</td>
</tr>
</tbody>
</table>
OpEXL – Construction and Seating

Figure 2: Valve Open

Figure 3: Post Bearing
OpEXL – Marketing Strategies

• Designed as replacement of Camflex’s large installed base
• Directly competes with: Masoneilan’s Camflex, Fisher’s V500 or CV500, Cashco’s Ranger QCT, Valtek’s Maxflow III
• Aimed at highly competitive industries: Chemical, Oil & Gas, Food & Beverage, Pulp & Paper, Water Treatment
• High-performance but competitively-priced
• Quoting strategies:
  • Higher Cvs
  • Alternative to larger diameter globe
  • Slurry processes
• New Rack & Pinion actuator line added to expand our traditional Piston-Cylinder option
OpEXL – Electric Actuator

• Excellent alternative to piston cylinder actuators
• Field reversible
• Adequate torque for most applications
• Extremely long cycle life
• 658 – 11,375 in-lbs
OpEXL – OpTK Rocking Piston-Cylinder Actuator

- Shaft-linkage Connection
- Linkage design
- Actuator style, sizes and weights
- Adjustable travel stops
- Allowable throttling drops
- Easy maintenance
- Accuracy of throttling control on/off control
- Field-reversibility
- Stroking speeds
- Lack of fail-safe springs
OpEXL – Other Actuation Options

- OpRPA Series – Rack and Pinion
- OpRGA Series – Rack and Gear
- Electro-Hydraulic
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Optimux OpTE Triple Eccentric Butterfly Valve

High torque and triple offset design ensures zero leakage

General Characteristics

- Sealing ring uniformly wedges onto seat due to elasticity of composite materials
- Elasticity of sealing ring creates spring-like effect ensuring zero leakage
- Lack of body cavity impedes build-up of solids, unlike in Gate Valves
- High torque seal ensures persistent two-way zero leakage
- The OpTE right-angle rotation design assures zero friction between the seat and the disc
- Long life even under high repetition process cycles
- Easy maintenance
- ISO5752, ASME B16.10 and API609 face-to-face dimensions, allows for easy replacement of other high-performance butterfly and other type valves
- Fireproof
- Anti-blowout stem feature conforming to API609
- One-piece shaft connected to disc by key or pin-key combination, allows for differential temperature expansion
OpTE Triple Eccentric Butterfly Valve
Optimux OpTB Trunnion Ball Valve

Legendary robustness and reliability with added flexibility

General Characteristics
- Rugged three-piece and two-piece construction
- API 6D Standard
- Fire Safe tested to API 607 and 6FA
- Sphere tolerance of the balls: 0.0008” surpassed
- Lower operating torques
- Positive position indication
- Meet NACE MR01.75 for Sulfide cracking resistance
- Suitable for block and bleed applications
- Forged and cast models
- Class 150, 300, 600, 900, 1500
Thank you for your attention, for more information please visit us at trimteck.com