Masoneilan*

35002 Series Camflex* II
Rotary Control Valves

Complete line of eccentric plug control valves effectively combining enhanced control performance, simplicity and long-term reliability for a broad range of applications.
Features

The Camflex II valve is a heavy-duty, automatic-throttling control valve that incorporates the following features:

• The flangeless body rating is a rugged ANSI Class 600.
• Heavy-duty guide lugs assure quick, positive alignment during installation.
• The flanged version is available in 1 in. through 12 in. (25 mm through 300 mm) sizes in 150 or 300 ANSI, and 1 in. through 8 in. (25 mm through 200 mm) in 600 ANSI.
• The optional Camflex GR (Globe Replacement) version is available in 1 in through 6 in. sizes (25mm through 150mm) in ANSI Class 150, 300, and 600 ratings and allows direct replacement of conventional reciprocating globe valves.
• Separable bonnet design is available.
• Straight through flow pattern provides greater flow capacities.
• Standard integral extension bonnet allows for a wide range of fluid temperature applications (-320°F to 750°F), (-196°C to 400°C).
• The unique self-aligning eccentric rotating plug provides tight shutoff and low dynamic forces.
• A large variety of reduced-trim options are available in all sizes.
• The triple, over-sized bearing system provides exceptional plug shaft guiding.
• The shouldered shaft design provides robust blowout prevention.
• An optional patented differential velocity device (DVD) separates compressible flowstreams into a high velocity core and a low velocity envelope flowstream. This provides up to 18 dBA noise attenuation.
• Optional alloy constructions are available.
• The powerful, low-profile, spring-diaphragm actuator guarantees positive fail-safe action.
• Splined shaft and actuator linkages, combined with low-friction techniques, contribute to reduced deadband and hysteresis.
• The valve position indicator is large and highly visible.
• The actuator linkage (purge option available) is totally enclosed.
## Numbering System

<table>
<thead>
<tr>
<th>1st</th>
<th>2nd</th>
<th>3rd</th>
<th>4th</th>
<th>5th</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>5</td>
<td></td>
<td></td>
<td>2</td>
</tr>
</tbody>
</table>

### Actuator Type
- 20 Manual Actuator
- 35 Spring-opposed rolling-diaphragm

### Body Series
- 35

### Actuator Mounting
(see guide on page 3)

1. Parallel to pipeline, valve closes on stem extension.
2. Parallel to pipeline, valve opens on stem extension.
3. Perpendicular to pipeline, valve closes on stem extension.
4. Perpendicular to pipeline, valve opens on stem extension.
5. Parallel to pipeline, valve closes on stem extension.
6. Parallel to pipeline, valve opens on stem extension.
7. Perpendicular to pipeline, valve closes on stem extension.
8. Perpendicular to pipeline, valve opens on stem extension.

### Trim Type
- 1. Metal Seat
- 2. Soft Seat
- 3. Metal Seat w/ Differential Velocity Trim
- 4. Soft Seat w/ Differential Velocity Trim

### Design Series
- 2

### Design
- SB (optional separable bonnet)
- GR (optional Globe Replacement face to face)
Actuator Mounting Guide

Camflex II Control Valves (Mounted On Horizontal Pipeline)

Actuator Position in Relation to Valve Body
Numbering System: 1 to 8

Notes:
• It is recommended that the actuator always be mounted as shown above. For other positions, consult your local sales office.
• Installation is assumed to be in the horizontal pipeline for orientation of the airset and other accessories unless specified on the order.
• Action and orientation are field reversible without additional parts.
• Operating efficiencies may vary depending on valve configuration.
• The above schematic does not reflect every possible body/actuator orientation, but should serve as an effective guide.

Notes:
2. Standard actuator mounting positions are shaded.
2. Plug positions are shown in the initial position without air on actuator.
3. The actuator must be always mounted above the pipeline.
General Data

**Body**

**Type:**
- cast with integral bonnet
- cast with separable bonnet – 1 in.-8 in.

**Flow Direction:**
flow to open or flow to close
(Differential Velocity Device trim flow to open only)

**Materials:**
- carbon steel
- 316 stainless steel (flangeless)
- 316L stainless steel (flanged)
- Hastelloy C (1 in.-4 in.) (DN 25-100)¹

**Body Pressure Rating:**
ANSI Class 600 (per B16.34) standard
(1 in.-12 in.) (DN 25-300), except for flanged construction:
valve rating is limited by flange rating

**End Connections:**
- threaded – NPT for ANSI Class 600 rated connections
  (1 in.) (DN 25)
- flangeless – clamps between ANSI Class 150, 300 or 600 rated flanges
  (flange rating must be specified for 8 in.-12 in. (DN 200-300) valve for locator lug drilling and tapping)
- flanged - bolts to ANSI Class 150 or 300 rated flanges
  (1 in.-12 in.) (DN 25-300)
- GR flanged - bolts to ANSI Class 150, 300 or 600 rated flanges (1 in. - 6 in.) (DN 25-150)

**Trim**

**Plug Type:**
self-aligning eccentrically rotating

**Materials:**
- 1 in.-2 in. (DN 25-100): solid Stellite No. 6
- 3 in.-4 in. (DN 80 & 100): solid Stellite No. 6 optional
- 3 in.-12 in. (DN 80-300): 316L stainless steel with hardfaced seating surface
- 1 in.-4 in. (DN 25-100): Hastelloy C¹

**Seat Ring:**
solid clamped

**Materials:**
- 1 in.-12 in. (DN 25-300): 316 stainless steel
- 1 in.-4 in. (DN 25-100): Hastelloy C¹
- 1 in.-12 in. (DN 150-300): 316 stainless steel with hardfaced seat
- 1 in.-4 in. (DN 25-100): solid Stellite No. 6 optional
- 1 in.-12 in. (DN 25-300): 316 stainless steel with PTFE insert (to 450°F), (232°C)²

**Retainer:**
316 Stainless Steel

**Capacity:**
full area and reduced capacity in all sizes

**Flow Characteristic:**
- standard trim: linear
- low flow trim (.036 + .07 factor): linear (requires SVI)
- differential velocity device: linear

**Cv Ratio:**
- standard trim >100:1
- low flow trim 15:1
- differential velocity device >50:1

**Actuators**

*Spring-Opposed Rolling Diaphragm*

**Size:**
- 4½ in. diameter with 3½ in. (89mm) stroke
  (1 in.-2 in. valves), (DN 25-50)
- 6 in. diameter with 5½ in. (146mm) stroke
  (3 in.-4 in. valves), (DN 80-100)
- 7 in. diameter with 7½ in. (184mm) stroke
  (6 in.-12 in. valves), (DN 150-300)
- 9 in. diameter with 7½ in. (184mm) stroke
  (6 in.-12 in. valves), (DN 150-300)

**Range:**
- 7-15 psi (1 in.-4 in.), (DN 25-100)
- 7-24 psi (6 in.-12 in.), (DN 150-300)(7 in. diameter actuator)
- 7-24 psi (6 in.-12 in.), (DN 150-300)
  (9 in. diameter actuator, Air to Close)
- 8-25 psi (6 in.-12 in.), (DN 150-300)
  (9 in. diameter actuator, Air to Open)

**Air Connection:**
1⁄4 in. NPT

**Yoke:**
cast iron

**Bearing:**
sealed radial

**Auxiliary Handwheel:**
solid disk with locking nut:
- 6½ in. diameter (1 in.-4 in. valves), (DN 25-100)
- 10 in. diameter (6 in.-12 in. valves), (DN 150-300)

**Manual Actuator**

**Type:**
Solid disk with detent anti-rotation device. Continuously connected.

**Sizes:**
- 7 in. (178mm) diameter
  (1 in.-2 in. valves), (DN 25-50)
- 8½ in. (225mm) diameter
  (3 in. & 4 in. valves), (DN 80-100)
- 16½ in. (410mm) diameter
  (6 in.-12 in. valves), (DN 150-300)

**Material:**
aluminum

**Yoke:**
cast iron

**Bearing:**
sealed radial ball

¹ See materials of construction
² Not available in .2 factor or Low Flow Trim sizes
General Data

Standard Spring Diaphragm Actuator Materials

<table>
<thead>
<tr>
<th>Description</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yoke</td>
<td>Cast Iron</td>
</tr>
<tr>
<td>Yoke Covers</td>
<td>Polycarbonate</td>
</tr>
<tr>
<td>Spring Barrel</td>
<td>Die Cast Aluminum</td>
</tr>
<tr>
<td>Diaphragm Case</td>
<td>Die Cast Aluminum</td>
</tr>
<tr>
<td>Piston</td>
<td>Die Cast Aluminum</td>
</tr>
<tr>
<td>Diaphragm</td>
<td>Buna-N with Dacron Insert</td>
</tr>
<tr>
<td>Piston Rod</td>
<td>303 St. St.</td>
</tr>
<tr>
<td>Clevis</td>
<td>Carbon Steel Zinc Dichromate Plated</td>
</tr>
<tr>
<td>Clevis Pin</td>
<td>17-4 PH (H1075) St. St.</td>
</tr>
<tr>
<td>Lever</td>
<td>Steel With Epoxy Surface</td>
</tr>
<tr>
<td>Lever Bearing</td>
<td>PTFE Filament Surface Bonded to Glass Reinforced Plastic Backing</td>
</tr>
<tr>
<td>Handwheel and Locknut</td>
<td>Aluminum</td>
</tr>
</tbody>
</table>

Standard Actuator Characteristics and Travel Times

[Measured with direct positioner at 30 psi (2 bar) supply, 4700P positioner with tubing size ¼ in.]

<table>
<thead>
<tr>
<th>Actuator Diameter</th>
<th>Diaphragm Effective Area</th>
<th>Actuator Stroke</th>
<th>Travel Time (sec.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>inches / cm</td>
<td>in. / cm</td>
<td>Increasing Instrument Signal</td>
<td>Decreasing Instrument Signal</td>
</tr>
<tr>
<td>4 1/4</td>
<td>11.4 / 14</td>
<td>3.3 / 8.9</td>
<td>1.2 / 2.4</td>
</tr>
<tr>
<td>6</td>
<td>15.2 / 24</td>
<td>5.4 / 14.6</td>
<td>3 / 6.3</td>
</tr>
<tr>
<td>7</td>
<td>17.8 / 36</td>
<td>7.4 / 18.4</td>
<td>7.6 / 9.8</td>
</tr>
<tr>
<td>9</td>
<td>22.9 / 48</td>
<td>7.4 / 18.4</td>
<td>17 / 24</td>
</tr>
</tbody>
</table>

Temperature/Seat Leakage

<table>
<thead>
<tr>
<th>Valve Size</th>
<th>Seat Type</th>
<th>Temp. Range¹</th>
<th>Max. Seat Leakage, ANSI FCI/70.2 Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>in. / DN</td>
<td></td>
<td>Min. / Max.</td>
<td></td>
</tr>
<tr>
<td>1-12</td>
<td>Metal</td>
<td>-320°F (−196°C) / +750°F (400°C)</td>
<td>IV</td>
</tr>
<tr>
<td>1-12</td>
<td>Soft Seat²</td>
<td>-320°F (−196°C) / +450°F (232°C)</td>
<td>VI</td>
</tr>
</tbody>
</table>

¹ For Stainless Steel Bodies only.
² Temperature limited by Teflon® Seal.

Temperature Gradient Across Standard Integral Bonnet

The ability of the Camflex valve to handle a wide range of process fluid temperatures is due to the long, integrally-cast bonnet. This affords ample radiation surface to normalize the packing temperatures.

Maximum Rated Flow Coefficients ($C_v$) and Critical Flow Factors ($F_L$) at Maximum Opening (50°)

<table>
<thead>
<tr>
<th>Valve Size</th>
<th>Factor</th>
<th>Flow to Open</th>
<th>Flow to Close</th>
</tr>
</thead>
<tbody>
<tr>
<td>inches / DN</td>
<td></td>
<td>$C_v$ / $F_L$</td>
<td>$C_v$ / $F_L$</td>
</tr>
<tr>
<td>1</td>
<td>25</td>
<td>0.036 / 5</td>
<td>0.98 / .5</td>
</tr>
<tr>
<td>1.5</td>
<td>40</td>
<td>0.4 / 12.5</td>
<td>13.2 / .88</td>
</tr>
<tr>
<td>2</td>
<td>50</td>
<td>0.4 / 18</td>
<td>20 / .88</td>
</tr>
<tr>
<td>3</td>
<td>80</td>
<td>0.4 / 48</td>
<td>54 / .88</td>
</tr>
<tr>
<td>4</td>
<td>100</td>
<td>0.4 / 78</td>
<td>92 / .88</td>
</tr>
<tr>
<td>6</td>
<td>150</td>
<td>0.4 / 181</td>
<td>200 / .88</td>
</tr>
<tr>
<td>8</td>
<td>200</td>
<td>0.4 / 308</td>
<td>340 / .88</td>
</tr>
<tr>
<td>10</td>
<td>250</td>
<td>0.4 / 486</td>
<td>700 / .88</td>
</tr>
<tr>
<td>12</td>
<td>300</td>
<td>0.4 / 684</td>
<td>1750 / .68</td>
</tr>
</tbody>
</table>

Note: Low flow trims (.036 + .07 factor) require use of SVI II AP or SVI FF digital positioners.
### Ratings and Connections

<table>
<thead>
<tr>
<th>Valve Size</th>
<th>ANSI Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>in.</td>
<td>DN 150</td>
</tr>
<tr>
<td>1-2</td>
<td>25-50</td>
</tr>
<tr>
<td>3-6</td>
<td>80-150</td>
</tr>
<tr>
<td>8</td>
<td>80-200</td>
</tr>
<tr>
<td>10-12</td>
<td>250-300</td>
</tr>
</tbody>
</table>

**Note:** For flangeless valve sizes 8 in.-12 in. (200mm-300mm), please specify ANSI Class rating.

Face to Face: ISA S75.04

### C_v and F_L Versus Travel

**Flow Direction:** Flow to Open

**Flow Characteristics:** Linear

ANSI Class: 150 through 600

Sizes: 1 in. through 12 in. (DN 25-300)

<table>
<thead>
<tr>
<th>Percent of Plug Rotation</th>
<th>10</th>
<th>20</th>
<th>30</th>
<th>40</th>
<th>50</th>
<th>60</th>
<th>70</th>
<th>80</th>
<th>90</th>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td>F_L Full Area</td>
<td>0.96</td>
<td>0.93</td>
<td>0.91</td>
<td>0.89</td>
<td>0.88</td>
<td>0.87</td>
<td>0.86</td>
<td>0.86</td>
<td>0.86</td>
<td>0.85</td>
</tr>
<tr>
<td>F_L Reduced Area (.6, .4, &amp; .2)</td>
<td>0.96</td>
<td>0.93</td>
<td>0.91</td>
<td>0.89</td>
<td>0.88</td>
<td>0.88</td>
<td>0.88</td>
<td>0.88</td>
<td>0.88</td>
<td>0.88</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Valve Size</th>
<th>Orifice Dia.</th>
<th>Act. Stem Travel</th>
<th>Rated C_v</th>
</tr>
</thead>
<tbody>
<tr>
<td>in.</td>
<td>in.</td>
<td>mm</td>
<td>in.</td>
</tr>
<tr>
<td>1</td>
<td>25</td>
<td>.321</td>
<td>8.2</td>
</tr>
<tr>
<td>1.5</td>
<td>40</td>
<td>.750</td>
<td>19.1</td>
</tr>
<tr>
<td>2</td>
<td>50</td>
<td>1.000</td>
<td>25.4</td>
</tr>
<tr>
<td>3</td>
<td>80</td>
<td>1.500</td>
<td>38.1</td>
</tr>
<tr>
<td>4</td>
<td>100</td>
<td>2.100</td>
<td>50.8</td>
</tr>
<tr>
<td>6</td>
<td>150</td>
<td>3.000</td>
<td>76.2</td>
</tr>
<tr>
<td>8</td>
<td>200</td>
<td>3.979</td>
<td>96.4</td>
</tr>
<tr>
<td>10</td>
<td>250</td>
<td>4.746</td>
<td>121</td>
</tr>
<tr>
<td>12</td>
<td>300</td>
<td>5.780</td>
<td>147</td>
</tr>
</tbody>
</table>

**Threaded** ○ Flangeless ▲ RF Flanged □ GR Flanged
# C_v and F_L Versus Travel

Flow Direction: Flow to Close  
Flow Characteristics: Linear  
ANSI Class: 150 through 600  
Sizes: 1 in. through 12 in. (DN 25-300)

<table>
<thead>
<tr>
<th>Percent of Plug Rotation</th>
<th>10</th>
<th>20</th>
<th>30</th>
<th>40</th>
<th>50</th>
<th>60</th>
<th>70</th>
<th>80</th>
<th>90</th>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td>F_L Full Area</td>
<td>0.94</td>
<td>0.91</td>
<td>0.88</td>
<td>0.83</td>
<td>0.80</td>
<td>0.77</td>
<td>0.74</td>
<td>0.72</td>
<td>0.70</td>
<td>0.68</td>
</tr>
<tr>
<td>F_L Reduced Area (.6, .4, &amp; .2)</td>
<td>0.94</td>
<td>0.91</td>
<td>0.88</td>
<td>0.83</td>
<td>0.80</td>
<td>0.77</td>
<td>0.74</td>
<td>0.72</td>
<td>0.70</td>
<td>0.7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Valve Size</th>
<th>Orifice Dia.</th>
<th>Act. Stem Travel</th>
<th>Rated C_v</th>
</tr>
</thead>
<tbody>
<tr>
<td>in. DN</td>
<td>in. mm</td>
<td>in. mm</td>
<td></td>
</tr>
<tr>
<td>1 25</td>
<td>.321 8.2</td>
<td>3.50 89</td>
<td>0.4 0.9</td>
</tr>
<tr>
<td>1 1½ 40</td>
<td>.750 19.1</td>
<td>3.50 89</td>
<td>1.0 2.3</td>
</tr>
<tr>
<td>1 1½ 40</td>
<td>.907 23.0</td>
<td>3.50 89</td>
<td>1.7 3.8</td>
</tr>
<tr>
<td>2 50</td>
<td>1.125 28.6</td>
<td>3.50 89</td>
<td>2.4 5.9</td>
</tr>
<tr>
<td>3 80</td>
<td>1.500 38.1</td>
<td>5.75 146</td>
<td>5.3 10.1</td>
</tr>
<tr>
<td>4 100</td>
<td>2.000 50.8</td>
<td>5.75 146</td>
<td>8.4 16.1</td>
</tr>
<tr>
<td>6 150</td>
<td>3.000 76.2</td>
<td>7.25 184</td>
<td>12.7 25.6</td>
</tr>
<tr>
<td>8 200</td>
<td>3.629 92.2</td>
<td>7.25 184</td>
<td>18.2 34.9</td>
</tr>
<tr>
<td>10 250</td>
<td>4.500 114</td>
<td>7.25 184</td>
<td>21.2 44.9</td>
</tr>
<tr>
<td>12 300</td>
<td>5.780 147</td>
<td>7.25 184</td>
<td>28.7 57.2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Percent of Plug Rotation</th>
<th>100</th>
<th>150</th>
<th>200</th>
<th>250</th>
<th>300</th>
</tr>
</thead>
<tbody>
<tr>
<td>F_L Full Area</td>
<td>0.77</td>
<td>0.74</td>
<td>0.72</td>
<td>0.70</td>
<td>0.68</td>
</tr>
<tr>
<td>F_L Reduced Area (.6, .4, &amp; .2)</td>
<td>0.77</td>
<td>0.74</td>
<td>0.72</td>
<td>0.70</td>
<td>0.7</td>
</tr>
</tbody>
</table>

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**C_v Versus Travel**

Differential Velocity Device (DVD)

Flow Direction: Flow to Open only

Flow Characteristics: Linear

ANSI Class: 150 through 600

Sizes: 1 in. through 12 in. (DN 25-300)

---

<table>
<thead>
<tr>
<th>Valve Size</th>
<th>Orifice Dia.</th>
<th>Act. Stem Travel</th>
</tr>
</thead>
<tbody>
<tr>
<td>in.</td>
<td>DN</td>
<td>in.</td>
</tr>
<tr>
<td>1 25</td>
<td>0.579</td>
<td>14.7</td>
</tr>
<tr>
<td>1.5 40</td>
<td>0.907</td>
<td>23.0</td>
</tr>
<tr>
<td>2 50</td>
<td>1.159</td>
<td>29.4</td>
</tr>
<tr>
<td>3 80</td>
<td>1.874</td>
<td>47.6</td>
</tr>
<tr>
<td>4 100</td>
<td>2.419</td>
<td>61.4</td>
</tr>
<tr>
<td>6 150</td>
<td>3.629</td>
<td>92.2</td>
</tr>
<tr>
<td>8 200</td>
<td>4.84</td>
<td>123</td>
</tr>
<tr>
<td>10 250</td>
<td>6.05</td>
<td>154</td>
</tr>
<tr>
<td>12 300</td>
<td>7.46</td>
<td>189</td>
</tr>
</tbody>
</table>

**Note:** The differential velocity device is used for aerodynamic noise reduction. It must be used with .6 factor trim flow to open.
# Materials of Construction

## Optional Slurry Package Seal Bushings

<table>
<thead>
<tr>
<th>Number</th>
<th>Component</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Lower Guide Bushing</td>
</tr>
<tr>
<td>18A</td>
<td>Upper Guide Bushing</td>
</tr>
<tr>
<td>18B</td>
<td></td>
</tr>
</tbody>
</table>

## Standard Camflex Packing Arrangement

**EF Seal**  
(Emission Free)

**Double O-Ring Seal Packing Follower**  
Fugitive Emission Containment Package for Zero Leakage

Provides long term reliable extremely low emission shaft seal performance. This economical solution to fugitive emissions will not compromise control performance, and is suitable for use in environmentally sensitive applications.

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## Materials of Construction

### Carbon Steel Construction

<table>
<thead>
<tr>
<th>Ref. No.</th>
<th>Description</th>
<th>Temperature Range</th>
<th>Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Body</td>
<td>–20°F to –29°C</td>
<td>A216 Gr WCC</td>
</tr>
<tr>
<td>2</td>
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<td>+750°F to +400°C</td>
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<td>ASTM A479 TY 316</td>
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1Separable Bonnet version only.

### NACE Carbon Steel Construction

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<td>O-Ring Packing Follower</td>
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<td>VITON</td>
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## Materials of Construction

### Stainless Steel Construction

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<thead>
<tr>
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<th>Temperature Range</th>
<th>Materials</th>
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<td>Lower Guide + O-Ring</td>
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\* Separable Bonnet version only.
## Materials of Construction

### NACE Stainless Steel Construction

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<th>Temperature Range</th>
<th>Materials</th>
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<tbody>
<tr>
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<td>4</td>
<td>Plug</td>
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<td>Upper Guide + O-Ring</td>
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<td>O-Ring</td>
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# Materials of Construction

## Hastelloy C Construction 1 in. to 4 in.

<table>
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<th>Temperature Range</th>
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1 Material selection must be based on fluid properties and compatibility.
Dimensions and Weights

Dimensions (inches)

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<th>C</th>
<th>D</th>
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<td>Flanged Class 300</td>
<td>Flanged Class 600</td>
<td>GR Flanged Class 150</td>
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## Dimensions and Weights

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### Specific Dimensions (millimeters) for the No. 9 Actuator

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75012 PARIS
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