# Masoneilan®
# Paramax® 36004 Series
# Control Ball Valve

Specification Data

CM36004

10/06


## Heavy-duty
## Automatic Throttling
## Control Ball Valve

DRESSER®

# Table of Contents



# Foreword

Paramax® is a heavy-duty automatic throttling control ball valve incorporating the design features listed below:

- Integrally cast raised face flanges. ANSI Class 150 or 300.
- Available in ISA S75.04 (ANSI Class 150 and 300) as well as ASME/ANSI B16.10 short pattern face-to-face dimensions (ANSI Class 150 only).
- Segmented ball provides optimum flow capacity and low torque requirements.
- Parabolic shaping of the ball's leading edge provides excellent flow characterization combined with shearing action to ensure nonclogging operation.
- MN-7 low-friction polymeric seal ring providing Class VI shutoff.
- Standard fugitive emission shaft seals.
- High temperature capabilities (600°F) (316°C) using metal seal, stellite bearings and flexible graphite packing.
- Unique seal design requires no shims, even with the metal version.
- Fully splined plug, shaft and actuator connections virtually eliminate backlash, while delivering totally reliable operation.
- Body materials of carbon steel, 316 and 317 stainless steel are standard.
- Easy maintenance. The seal ring may be changed by simply removing two machine screws on the inlet flange. Actuator removal or complete valve disassembly is not required.
- Model 33 spring return, diaphragm type.
  - Two sizes cover complete range
  - Positive fail-safe action
  - All moving parts completely enclosed
  - Highly visible position indicator
  - Field reversible with no part changes required
  - Uses all standard Masoneilan accessories

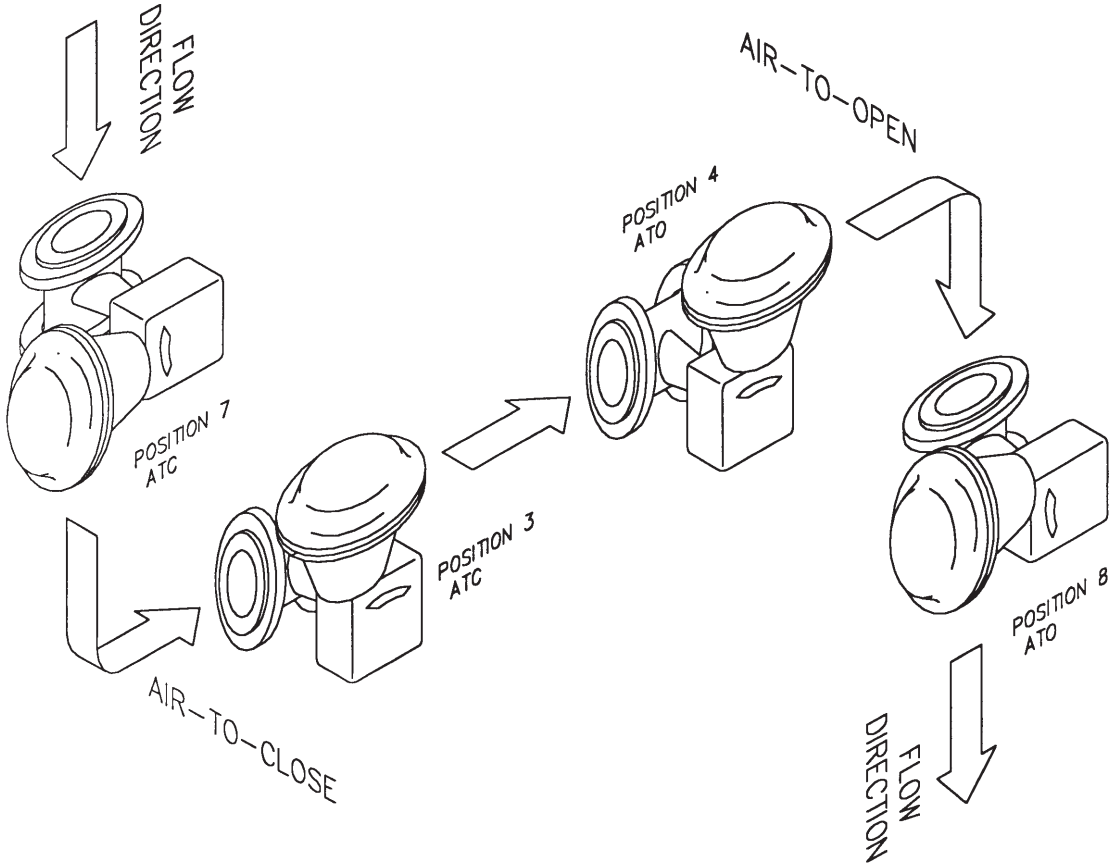
For additional information, contact your local Masoneilan Representative or Sales Office.

# Numbering System

| 1st | 2nd | | 1st | 2nd | 3rd | 4th | 5th |
|---|---|---|---|---|---|---|---|
| 3 | 3 | - | 3 | 6 | | | 4 |

| Actuator Type | | Body Series | Actuator Mounting | Seal RIng | Design Series |
|---|---|---|---|---|---|
| 33 | Spring diaphragm air to extend action only, with or without auxiliary handwheel | 36 | 0. Undefined<br>3. Vertical above center, valve closes on stem extension (Air to Close)<br>4. Vertical above center, valve opens on stem extension (Air to Open)<br>7. Vertical below center, valve closes on stem extension (Air to Close)<br>8. Vertical below center, valve opens on stem extension (Air to Open) | 1. MN-7 Seal Ring<br>2. 316 St. St. Seal Ring | 4 |

Shading indicates standard mounting positions



# Specifications

**Body**

*Type*
- cast with integral bonnet

*Sizes*
- 2" - 12" (50mm-300mm)

*Ratings*
- ANSI Class 150 or 300

*Materials*
- ASTM A216 Gr WCB carbon steel
- ASTM A351 Gr CG8M type 317
- ASTM A351 Gr CF8M type 316

*Connections*
- ANSI Class 150 or 300 raised face flanges

*Packing Box*
- bolted, EF Seal standard

*Flow Characteristics*
- equal percentage

*Minimum Fluid Temperature*
- -20°F (-29°C) carbon steel
- -50°F (-45°C) stainless steel

*Maximum Fluid Temperature*
- 425°F (218°C) MN-7 seal ring (see page 5)
- 600°F (316°C) 316 stainless steel seal ring, metal bearings and flexible graphite packing

*Seat Leakage*
- ANSI/FCI 70.2 Class VI – MN-7 seal ring
- ANSI/FCI 70.2 Class IV – 316 stainless steel seal ring

*$C_V$ Ratio*
- greater than 300:1

**Trim**

*Plug*
- segmented ball with parabolic opening

*Material*
- 317 stainless steel hard chromium plated

*Seal Ring*
- MN-7 (polymeric reinforced PTFE) or 316 St. St. (optional)

*Packing*
- split ring PTFE jacketed Kevlar -50°F to 450°F (-45°C to 232°C)
- flexible graphite optional -50°F to 600°F (-45°C to 316°C)

*Shaft*
- one-piece splined both ends 17-4 PH stainless steel condition H1075 – carbon steel construction
- Nitronic 50 – stainless steel construction

*Bushings*
- 316 stainless steel with low-friction liner or Stellite No. 6 (optional)

**Actuator**

*Type*
- spring opposed diaphragm

*Sizes*
- B and C

*Spring Range*
- 7-16 psi (48-110 kPa) – Size B
- 9-16 psi (62-110 kPa) – Size C

*Action*
- air to close or air to open

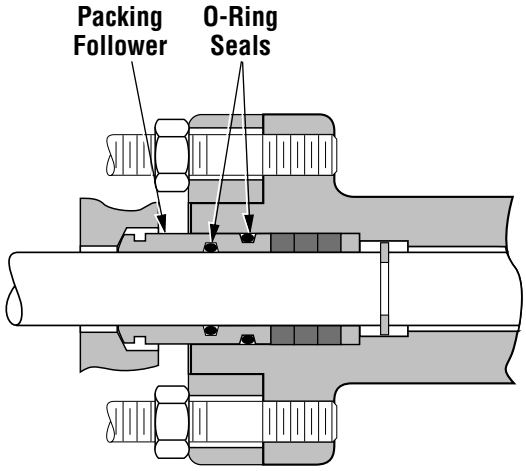
*Air Connection*
- ¼" NPT

*Handwheel*
- (optional) rising stem push type

# EF Seal® (Emission Free)

Double o-ring seal packing follower – EF Seal fugitive emission containment package.

To prevent dangerous emissions, Masoneilan provides as standard a double o-ring sealed packing box. This economical solution to fugitive emissions will not compromise control performance when it is used in environmentally sensitive applications.

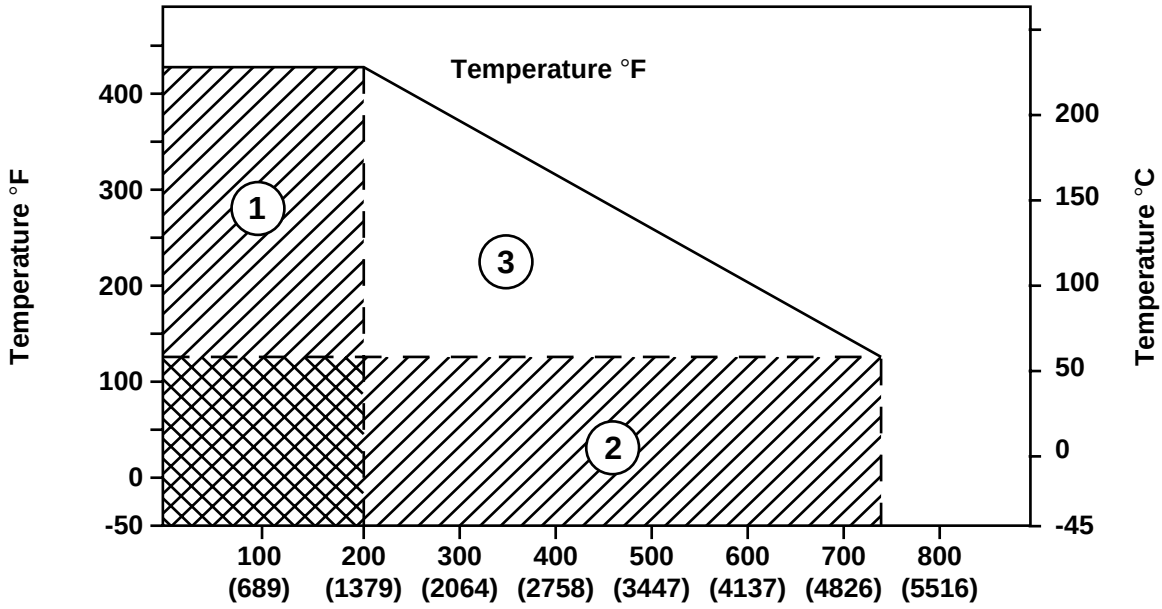


## Metal Seal Ring Temperature Limitations

A strain hardened 316 stainless steel seal ring is an available option when the MN-7 Seal is not suitable. The metal seal ring can be used with either the MN-7 lined bearings or the optional solid metal bearings. The fluid temperature is limited to 425°F (218°C) when using the MN-7 lined bearings.

A high temperature package consisting of metal seal ring, bearings and flexible graphite packing elevates fluid temperature limitations to 600°F (316°C) maximum or ANSI working pressure and temperature limitations.

## MN-7 Seal Ring Temperature Limitations

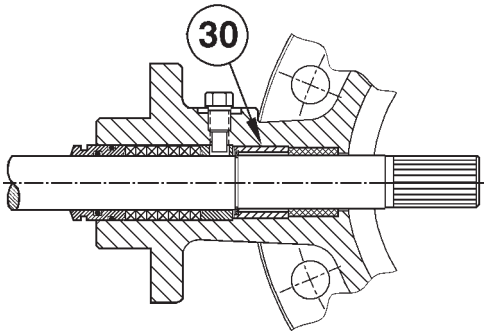



**Pressure Drop psi (kPa)**

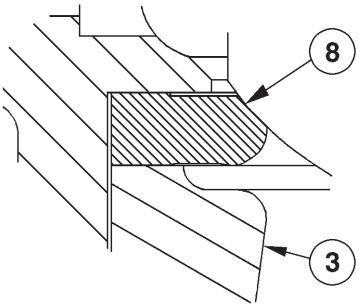
1. Zone of maximum temperature limits
2. Zone of maximum pressure limits
3. Zone of maximum interactive pressure/temperature limits

* For higher temperatures and other materials, consult Masoneilan

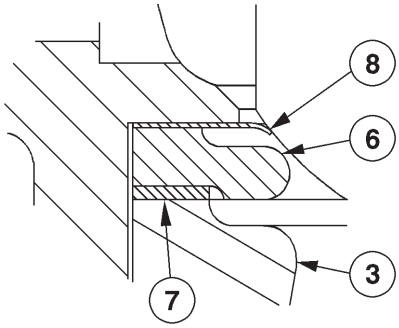
# Materials



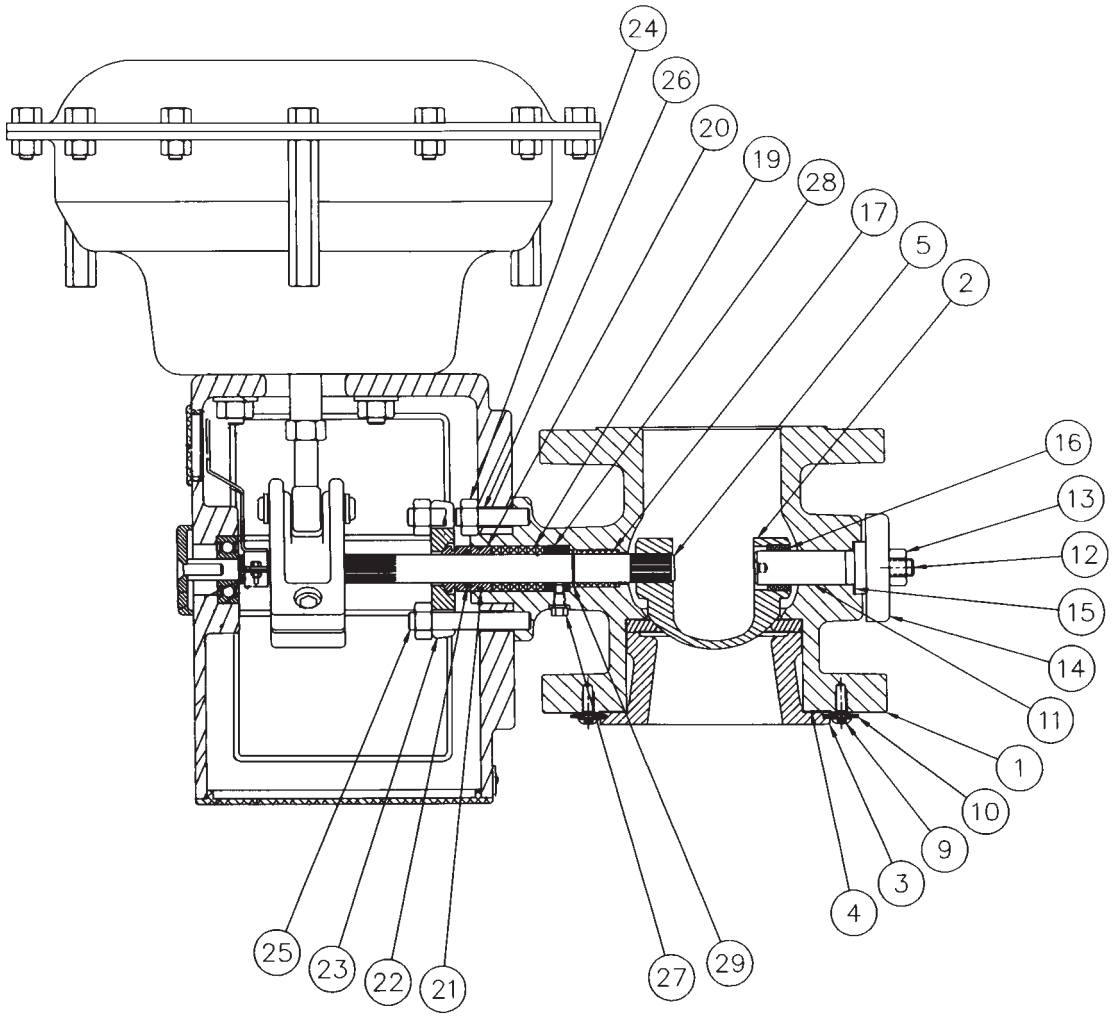

**Spacer Tube Detail (8" [200mm] only)**




**MN-7 Seal Ring**




**Metal Seal Ring**




**General Arrangement with Standard Retainer**

# Materials

| Ref. No. | Temperature Range | -50°F -45°C | -20°F -29°C | +425°F +218°C | +450°F +232°C | +600°F +316°C |
|---|---|---|---|---|---|---|
| | **Description** | **Standard Materials** | | | | |
| 1 | Body Flanged | ASTM A216 Gr WCB Carbon Steel | | | | |
| | | ASTM A351 Gr CF8M Type 316 | | | | |
| | | ASTM A351 Gr CG8M Type 317 | | | | |
| 2 | Ball Plug | ASTM A351 Gr CG8M Type 317, Hard Chromium Plated | | | | |
| 3 | Retainer Standard (ISA S75.04) | ASTM A351 Gr CG8M Type 317 | | | | |
| | Retainer Extended (ANSI B16.10) | | | | | |
| 4 | Gasket (Retainer Body) | Graphite | | | | |
| 5 | Shaft | ASTM 564 Gr 630 H1075 (Carbon Steel Body) | | | | |
| | | Nitronic 50 (Stainless Steel Body) | | | | |
| 6 | Backup RIng (Metal Seal) | 317 Stainless Steel | | | | |
| 7 | Gasket (Metal Seal) | 316 Stainless Steel / Flexible Graphite | | | | |
| 8 | Seal Ring (Metal) | 316 Stainless Steel | | | | |
| | Seal RIng | MN-7 | | | | |
| 9 | Slot Button Head Screw | Carbon Steel Plated | | | | |
| 10 | Flat Washer | Carbon Steel Plated | | | | |
| 11 | Pin Shaft | ASTM A564 Gr 630 H1075 (Carbon Steel Body) | | | | |
| | | Nitronic 50 (Stainless Steel Body) | | | | |
| 12 | Stud, End Flange | ASTM A193 Gr B8 | | | | |
| 13 | Nut, End Flange | ASTM A194 Gr 8 | | | | |
| 14 | End Flange | ASTM A36 Plated | | | | |
| 15 | Gasket (Pin Shaft) | Bluegard 3000 | | | | |
| 16 | Lower Bushing | 316 Stainless Steel / MN-7 Lined | | | | |
| | | Stellite | | | | |
| 17 | Upper Bushing | 316 Stainless Steel / MN-7 Lined | | | | |
| | | Stellite | | | | |
| 19 | Packing | Crane 285K - TFE Aramid Core | | | | |
| | | Flexible Graphite | | | | |
| 20 | Packing Follower | ASTM A582 Type 303 | | | | |
| 21 | O-ring | Viton | | | | |
| 22 | O-ring | Viton | | | | |
| 23 | Packing Box Flange | ASTM A105 Plated | | | | |
| 24 | Nut | ASTM A194 Gr 8 | | | | |
| 25 | Stud Packing Flange | ASTM A193 Gr B8 | | | | |
| 26 | Stud Bonnet | ASTM A193 Gr B8 | | | | |
| 27 | Safety Pin | ASTM A479 Type 316 | | | | |
| 28 | Packing Adapter | ASTM A479 Type 316 | | | | |
| 29 | Shaft RIng | ASTM A564 Gr 632 | | | | |
| 30 | Spacer Tube (8" [200mm] only) | 316 Stainless Steel | | | | |
| **Ref. No.** | **Temperature Range** | **-50°F -45°C** | **-20°F -29°C** | **+425°F +218°C** | **+450°F +232°C** | **+600°F +316°C** |

## Flow Coefficients $C_V$ at % Maximum Opening (90° Rotation)

| Percent (%) of Max. Opening | | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Percent (%) of Max. $C_V$ | | 1 | 5 | 8.5 | 15 | 24 | 34 | 46 | 60 | 78 | 100 |
| Valve Size | | Rated $C_V$ | | | | | | | | | |
| inches | mm | | | | | | | | | | |
| 2 | 50 | 1.1 | 5.3 | 8.9 | 15.8 | 25 | 36 | 48 | 63 | 82 | 105 |
| 3 | 80 | 2.5 | 12.5 | 21 | 38 | 60 | 85 | 115 | 150 | 195 | 250 |
| 4 | 100 | 5.1 | 26 | 43 | 77 | 122 | 173 | 235 | 306 | 398 | 510 |
| 6 | 150 | 10.3 | 52 | 88 | 155 | 247 | 350 | 474 | 618 | 803 | 1030 |
| 8 | 200 | 18.3 | 92 | 156 | 275 | 439 | 622 | 842 | 1098 | 1427 | 1830 |
| 10 | 250 | 29 | 145 | 247 | 435 | 696 | 986 | 1334 | 1740 | 2262 | 2900 |
| 12 | 300 | 43 | 213 | 361 | 638 | 1020 | 1445 | 1955 | 2550 | 3315 | 4250 |

## Valve ($F_L$) as a Function of Capacity

| Percent (%) of Max. $C_V$ | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
|---|---|---|---|---|---|---|---|---|---|---|
| $F_L$ | .88 | .86 | .82 | .78 | .73 | .68 | .65 | .63 | .61 | .60 |

## Actuators

| Valve Size | | Shaft Diameter | | Actuator Size | | Spring Range psig | Actuator Eff. Area | | Actuator Stroke | | Handwheel Diameter | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| inches | mm | inches | mm | Standard | Oversized | | sq. in. | sq. cm | inches | mm | inches | mm |
| 2 | 50 | 0.62 | 15.7 | B | | 7-16 | 70 | 452 | 2.625 | 66.5 | 10 | 254 |
| 3 | 80 | 0.62 | 15.7 | B | | 7-16 | 70 | 452 | 2.625 | 66.5 | 10 | 254 |
| 3 | 80 | 0.62 | 15.7 | | C | 9-16 | 140 | 903 | 2.625 | 66.5 | 10 | 254 |
| 4 | 100 | 0.93 | 23.7 | B | | 7-16 | 70 | 452 | 2.625 | 66.5 | 10 | 254 |
| 4 | 100 | 0.93 | 23.7 | | C | 9-16 | 140 | 903 | 2.625 | 66.5 | 10 | 254 |
| 6 | 150 | 0.93 | 23.7 | C | | 9-16 | 140 | 903 | 2.625 | 66.5 | 10 | 254 |
| 8 | 200 | 1.20 | 30.5 | C | | 9-16 | 140 | 903 | 2.625 | 66.5 | 10 | 254 |
| 10 | 250 | 1.20 | 30.5 | C | | 9-16 | 140 | 903 | 2.625 | 66.5 | 10 | 254 |
| 12 | 300 | 1.37 | 34.8 | C | | 9-16 | 140 | 903 | 2.625 | 66.5 | 10 | 254 |

# Allowable Pressure Drops (psi)

## Model 33 Actuator
## MN-7 Seal with Lined 316 Bearings

Flow Direction into Seal Ring Side
Seat Leakage per ANSI /FCI 70.2 Class VI
Required Supply Pressure: 25 psig (172 kPag)

Temperature: -50°F to +425°F
(-45°C to +218°C)

| Valve Size | | Actuator Size | Air to Open / Air to Close | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Allowable Pressure Drops (psi) by Temperature (°F) | | | | | | | | |
| inches | mm | | -50 to 0 | 0 to 125 | 150 | 200 | 250 | 300 | 350 | 400 | 425 |
| 2 | 50 | B | 750 | 750 | 700 | 600 | 510 | 420 | 340 | 250 | 200 |
| 3 | 80 | B | 750 | 750 | 700 | 600 | 510 | 420 | 340 | 250 | 200 |
| 4 | 100 | B | 440 | 750 | 700 | 600 | 510 | 420 | 340 | 250 | 200 |
| 4 | 100 | C | 750 | 750 | 700 | 600 | 510 | 420 | 340 | 250 | 200 |
| 6 | 150 | C | 530 | 720 | 700 | 600 | 510 | 420 | 340 | 250 | 200 |
| 8 | 200 | C | 210 | 450 | 450 | 450 | 450 | 420 | 340 | 250 | 200 |
| 10 | 250 | C | 60 | 225 | 225 | 225 | 225 | 225 | 225 | 225 | 200 |
| 12 | 300 | C | 0 | 110 | 110 | 110 | 110 | 110 | 110 | 110 | 110 |

## Model 33 Actuator
## St. St. Seal with Metal Bearings

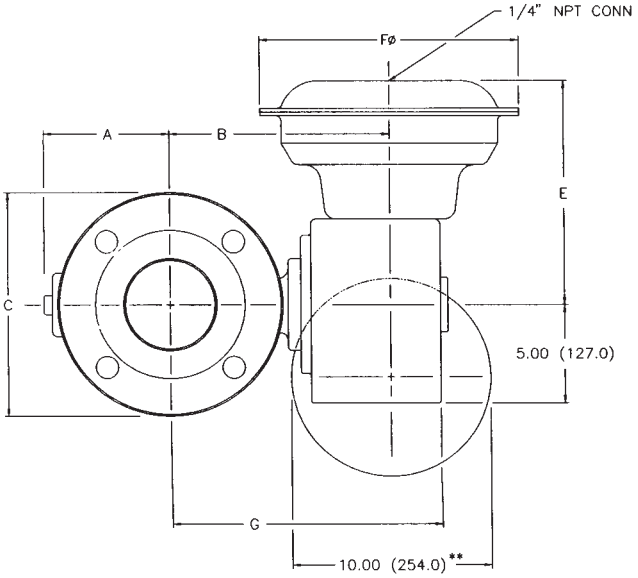
Flow Direction into Seal Ring Side
Seat Leakage per ANSI/FCI 70.2 Class IV
Required Supply Pressure: 25 psig (172 kPag)

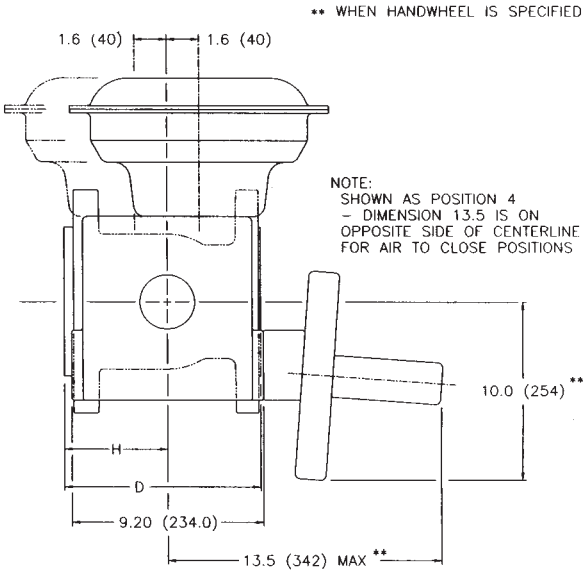
Temperature: -50°F to +600°F
(-45°C to +316°C)

| Valve Size | | Actuator Size | Air to Open / Air to Close |
|---|---|---|---|
| | | | Allowable Pressure Drops (psi) by Temperature (°F) |
| inches | mm | | |
| 2 | 50 | B | 750 |
| 3 | 80 | B | 660 |
| 3 | 80 | C | 750 |
| 4 | 100 | B | 250 |
| 4 | 100 | C | 700 |
| 6 | 150 | C | 290 |
| 8 | 200 | C | 155 |
| 10 | 250 | C | 80 |
| 12 | 300 | C | 50 |

**NOTE:** The information in these tables has been developed on the basis of testing using water and/or a dry gas. The physical characteristics of actual process fluids vary greatly and their effects should be taken into consideration. These tables are purely informational and are not a substitute for good engineering judgement.

# Dimensions




| Valve Size | | A | | | | B | | C① | | | | D (±.06) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ANSI 150 | | ANSI 300 | | | | ANSI 150 | | ANSI 300 | | Standard② | | Optional Extended③ | |
| inches | mm | in. | mm | in. | mm | in. | mm | in. | mm | in. | mm | in. | mm | in. | mm |
| 2 | 50 | 4.03 | 102.4 | 5.33 | 135.4 | 8.19 | 208.1 | 6.00 | 152.4 | 6.50 | 165.1 | 4.88 | 124.0 | 7.00 | 177.8 |
| 3 | 80 | 4.40 | 111.8 | 4.40 | 111.8 | 8.68 | 220.5 | 7.50 | 190.5 | 8.25 | 209.6 | 6.50 | 165.1 | 8.00 | 203.2 |
| 4 | 100 | 5.17 | 131.3 | 5.17 | 131.3 | 10.70 | 271.9 | 9.00 | 228.6 | 10.00 | 254.0 | 7.62 | 193.5 | 9.00 | 228.6 |
| 6 | 150 | 6.60 | 167.6 | 6.60 | 167.6 | 11.91 | 302.6 | 11.00 | 279.4 | 12.50 | 317.5 | 9.00 | 228.6 | 10.50 | 266.7 |
| 8 | 200 | 7.48 | 189.9 | 7.48 | 189.9 | 13.43 | 341.1 | 13.5 | 342.9 | 15.00 | 381.0 | 9.56 | 242.8 | 11.50 | 292.1 |
| 10 | 250 | 9.01 | 228.7 | 9.01 | 228.7 | 14.56 | 369.8 | 16.00 | 406.4 | 17.50 | 444.5 | 11.69 | 296.9 | 13.00 | 330.2 |
| 12 | 300 | 10.52 | 267.1 | 10.52 | 267.1 | 16.25 | 412.8 | 19.00 | 482.6 | 20.50 | 520.7 | 13.31 | 338.1 | 14.00 | 355.6 |

| Valve Size | | E | | F | | G | | H | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Standard② | | Optional Extended③ | |
| inches | mm | in. | mm | in. | mm | in. | mm | in. | mm | in. | mm |
| 2 | 50 | 11.50 | 292.1 | 13.00 | 330.2 | 10.88 | 276.4 | 2.59 | 65.8 | 4.56 | 115.8 |
| 3 | 80 | 11.50 | 292.1 | 13.00 | 330.2 | 11.37 | 288.8 | 3.40 | 86.4 | 4.89 | 124.2 |
| 4 | 100 | 11.50 | 292.1 | 13.00 | 330.2 | 13.39 | 340.2 | 3.96 | 100.6 | 5.34 | 135.6 |
| 6 | 150 | 15.20 | 386.1 | 17.50 | 444.5 | 14.60 | 370.9 | 4.69 | 119.1 | 6.25 | 158.8 |
| 8 | 200 | 15.20 | 386.1 | 17.50 | 444.5 | 16.12 | 409.4 | 5.02 | 127.5 | 6.97 | 177.0 |
| 10 | 250 | 15.20 | 386.1 | 17.50 | 444.5 | 17.25 | 438.2 | 6.09 | 154.7 | 7.40 | 188.0 |
| 12 | 300 | 15.20 | 386.1 | 17.50 | 444.5 | 18.94 | 481.1 | 7.11 | 180.6 | 7.80 | 198.1 |

① Conforms to ASME/ANSI Standard B16.5 - 1988 “Pipe Flanges and Flanged Fittings”
② Conforms to ISA Standard S75.04
③ Conforms to ASME Standard B16.10 - 1992 (formerly ANSI Standard B16.10 - 1973)
Short pattern ball available for ANSI 150 Class valves only.

## Weights (lbs.)

| Valve Size | | Standard Face to Face | | Extended Face to Face |
|---|---|---|---|---|
| inches | mm | ANSI 150 | ANSI 300 | ANSI 150 |
| 2 | 50 | 92 | 96 | 94 |
| 3 | 80 | 104 | 114 | 107 |
| 4 | 100 | 126 | 144 | 130 |
| 6 | 150 | 223 | 263 | 233 |
| 8 | 200 | 290 | 346 | 304 |
| 10 | 250 | 371 | 447 | 385 |
| 12 | 300 | 483 | 585 | 505 |

## Weights (Kg)

| Valve Size | | Standard Face to Face | | Extended Face to Face |
|---|---|---|---|---|
| inches | mm | ANSI 150 | ANSI 300 | ANSI 150 |
| 2 | 50 | 34 | 36 | 35 |
| 3 | 80 | 39 | 43 | 40 |
| 4 | 100 | 47 | 54 | 49 |
| 6 | 150 | 83 | 98 | 87 |
| 8 | 200 | 108 | 129 | 113 |
| 10 | 250 | 138 | 167 | 144 |
| 12 | 300 | 180 | 218 | 188 |

# Sales Office Locations

**BELGIUM**
Dresser Valves Europe
Boulevard du Souverain
207 B2 Vorstlaan,
B-1160 Brussels, Belgium
Phone: +32-2-344-0970
Fax: +32-2-344-1123

**BRAZIL**
Dresser Industria e Comercio Ltda
Divisao Masoneilan
Rua Funchal, 129 - Conj. 5A
04551-060 - Sao Paulo - SP Brazil
Phone: 55-11-2146-3600
Fax: 55-11-2146-3610

**CANADA**
Ontario
Dresser - Masoneilan
DI Canada, Inc.
835 Harrington Court, 2nd Floor
Burlington, Ontario L7N 3P3, Canada
Phone: 905-335-3529
Fax: 905-336-7628

**CHINA**
Dresser Flow Solutions
Beijing Rep. Office
Suite 1703, Capital Mansion
6 Xinyuannan Rd. Chaoyang District
Beijing 100004, China
Phone: +86-10-8486-4515
Fax: +86-10-8486-5305

**FRANCE**
Masoneilan - Dresser Produits Industriels
Energy 5
130/190 Boulevard de Verdun
92413 Courbevoie cedex, France
Phone: +33-1-4904-9000
Fax: +33-1-4904-9010

Dresser Produits Industriels S.A.S.,
Masoneilan Customer Service Centre
55 rue de la Mouche, Zone Industrielle
69540 Irigny, France
Phone: +33-4-72-39-06-29
Fax: +33-4-72-39-21-93

**GERMANY**
Dresser Valves Europe GmbH
Heiligenstrasse 75
Viersen D-41751, Germany
Phone: +49-2162-8170-0
Fax: +49-2162-8170-280

Dresser Valves Europe GmbH
Uhlandstrasse 58
60314 Frankfurt, Germany
Phone: +49-69-439350
Fax: +49-69-4970802

**INDIA**
Dresser Valve India Pvt. Ltd.
305/306, “Midas”, Sahar Plaza
Mathurdas Vasanji Road
J.B. Nagar, Andheri East
Mumbai, 400059, India
Phone: +91-22-835-4790
Fax: +91-22-835-4791

Dresser Valve India Pvt. Ltd.
205, Mohta Building
4 Bhikaiji Cama Place
New Delhi, 110 066, India
Phone: +91-11-2-616-4175
Fax: +91-11-5-165-9635

**ITALY**
Dresser Italia S.r.l.
Masoneilan Operations
Via Cassano, 77
80020 Casavatore, Napoli Italy
Phone: +39-081-7892-111
Fax: +39-081-7892-208

**JAPAN**
Niigata Masoneilan Co. Ltd. (NIMCO)
20th Floor, Marive East Tower
WBG 2-6 Nakase, Mihama-ku,
Chiba-shi, Chiba 261-7120 Japan
Phone: +81-43-297-9222
Fax: +81-43-299-1115

**KOREA**
Dresser Korea Inc.
2109 Kuk Dong Building
60-1, ChoongMoo-ro 3-ka
Joong-gu, Seoul, Korea 100-705
Phone: +82-2-2274-0748
Fax: +82-2-2274-0720

**KUWAIT**
Dresser Flow Solutions
Middle East Operations
10th Floor, Al Rashed Complex
Fahad Salem Street, P.O. Box 242
Safat, 13003, Kuwait
Phone: +965-9061157
Fax: +965-3987879

**MALAYSIA**
Dresser Flow Solutions
Business Suite, 19A-9-1, Level 9
UOA Centre, No. 19, Jalan Pinang
50450 Kuala Lumpur, West Malaysia
Phone: +60-3-2161-0322
Fax: +60-3-2163-3612

**MEXICO**
Dresser Valve de Mexico, S.A. de C.V.
Henry Ford No. 114, Esq. Fulton
Fraccionamiento Industrial
San Nicolas
54030 Tlalnepantla Estado de Mexico
Phone: 52-5-310-9863
Fax: 52-5-310-5584

**THE NETHERLANDS**
Dresser Valves Europe
Steenhouwerstraat 11
3194 AG Hoogvliet, The Netherlands
Phone: +31-10-438-4122
Fax: +31-10-438-4443

**RUSSIA**
DS Controls
Nekhinskaya Street, 61
Veliky Novgorod
Russia, 173021
Phone: +7-8162-15-7898
Fax: +7-8162-15-7921

Dresser Moscow
Derbenevskaya ulitsa 1
Building 3, Office 17 115114
Moscow, Russia
Phone: +7 495-585-1276
Fax: +7 495-585-1279

**SAUDI ARABIA**
Dresser AL Rushaid
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(Darvico)
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Jubail Industrial City 31961,
Saudi Arabia
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Fax: +966-3-341-7624

**SINGAPORE**
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Singapore 639231
Phone: +65-6-6861-6100
Fax: +65-6-6861-7172

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Fax: 832-590-2529

**SPAIN**
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08830 Sant Boi de Llobregat
Barcelona, Spain
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Fax: +34-93-652-6444

**UNITED ARAB EMIRATES**
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Roundabout 8
Units JA01 & JA02
Jebel Ali Free Zone
Dubai, U. A. E.
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Fax: +971-4-8838-038

**UNITED KINGDOM**
DI U.K. Ltd.
East Gillibrands
Skelmersdale,
Lancashire WN8 9TU, England
Phone: +44-1695-52600
Fax: +44-1695-52601

DI U.K. Ltd.
Unit 4, Suite 1.1, Nobel House
Grand Union Office Park
Packet Boat Lane
Uxbridge, Middlesex UB8 2GH
Phone: +44-1895-454-900
Fax: +44-1895-454-919

**UNITED STATES**
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Fax: 508-427-8971

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Fax: 361-881-8246

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Deer Park, TX 77536
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Fax: 281-884-1010

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Houston, TX 77041
Phone: 832-590-2303
Fax: 832-590-2529

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