

**Figure 1** Model DF400 Control Valve and Actuator

The Model DF400 (Figure 1) is a heavy-duty eccentric plug control valve (sometimes referred to as a rotary globe valve) combined with a powerful spring-and-diaphragm actuator. This valve-actuator combo is used in all kinds of demanding applications, including oil and gas production, chemical process industries and severe service environments.

The self-aligning eccentric plug design and straight through flow pattern of the DF400 control valve provides tight shutoff while also allowing for higher flow capacities than other valves.

The exclusive low-profile actuator provides reduced deadband and hysteresis through a combination of low-friction design with a robust splined shaft connection. These actuators are spring-opposed rolling diaphragm style.

Model DF400 control valve/actuator assemblies are manufactured to a high level of quality ensuring superior performance and customer satisfaction.

## Features

### Sour Service Capability

Available in configurations that comply with NACE MR0175/ISO 15156 and NACE MR0103.

### Compact Design

The smaller, lighter design of the DF400 control valve makes them easier to handle than standard globe valves of the same size, and usually half the weight.

### Field Service Friendly

No special tools are required to inspect or service trim, and the actuator is field reversible without additional parts.

### Versatile Trim Options

Metal and soft seat trim are available in a wide variety of reduced-port trim options.

### Industrial High Quality External Coatings

Our standard industrial high quality external coatings provide long lasting resistance to the harshest environments.

### Emissions Reducing Packing

Standard low-emission packing prevents the loss of process media and helps reduce packing maintenance.

### Blowout Proof Shaft

DF400 shafts are made with a machined shoulder designed to provide exceptional blowout prevention.

## Specifications

### Configurations

The Model DF400 control valve is a high capacity single port, automatic-throttling, eccentric plug rotary valve. Refer to Table 1.

PTFE Seat and Metal Seat Available.

Consult your Dyna-Flo sales office for other available configurations.

### Valve Sizes and Connection Styles (Refer to Table 1)

|             |   |
|-------------|---|
| Model:      | DF400   |
| Size:       | 1" (25 DN), 2" (50 DN), 3" (80 DN), 4" (100 DN) |
| Body:       | Cast with integral bonnet                       |
| Rating:     | ASME 150 / 300 / 600                            |
| Connection: | RF - All Sizes                                  |

### Maximum Inlet Pressures and Temperatures

Flanged valves consistent with ASME Class 150, 300, and 600 rating as per ASME B16.34, unless limited.

### Valve Assembly Temperature Limitations

Refer to Table 2 for process temperature limitations.

Refer to Tables 9 & 10 for limiting factors specific to valve part.

### Ambient Actuator Temperature Limitation

-40°F to 180°F (-40°C to 82°C)

### Characteristic and Flow Direction

Linear - Flow-to-Open or Flow-to-Close

Refer to Figure 3 for Flow Direction.

### Cv Ratio

Standard Trim: >100:1

Reduced Port Trim: 15:1

### Maximum Valve Sizing Coefficients

For maximum coefficients at maximum opening, refer to Table 4.

For all standard coefficients, refer to Tables 12 & 13.

### Allowable Pressure Drops

Refer to Tables 14 and 15.

### Dimensions

Valve and Actuator Outline Dimension Diagram: Refer to Figure 2.

Valve and Actuator Assembly Dimensions: Refer to Tables 6 & 7.

### Materials

Body material options include:

LCC

WCC

CF8M

Refer to Table 9 for valve parts construction materials.

Refer to Tables 10 & 11 for trim selections.

### Approximate Assembly Weights

Refer to Table 5.

### Cross-Section of the Model DF400 Assembly

Refer to Figures 4 to 6.

### Packing Type

The Standard packing is carbon core braided PTFE. Refer to Figures 4 & 6.

### Valve Plug Travel Times and Actuator Size

Refer to Table 3.

### Available Actuator Sizes

Refer to Table 1.

### Actuator Tubing Connection Size

All sizes - 1/4 inch (6.35 mm) NPT.

### Actuator Mounting Orientation

Refer to Figure 3.

**For more information and other options contact your Dyna-Flo sales office.**

Table 1

## Available Valve and Actuator Configurations

| Valve Model | Valve Size      | End Connection           |                |                | Actuator Size       | Stroke              | Operating Range                 |
|-------------|-----------------|--------------------------|----------------|----------------|---------------------|---------------------|---------------------------------|
|             |                 | Raised Face (RF) Flanged |                |                |                     |                     |                                 |
|             |                 | ASME Class 150           | ASME Class 300 | ASME Class 600 |                     |                     |                                 |
| DF400       | 1 inch (25 DN)  | ✓                        | ✓              | ✓              | 4-1/2 inch Diameter | 3-1/2 inch (89 mm)  | 7 - 15 Psi<br>(0.48 - 1.03 Bar) |
|             | 2 inch (50 DN)  | ✓                        | ✓              | ✓              | 4-1/2 inch Diameter | 3-1/2 inch (89 mm)  |                                 |
|             | 3 inch (80 DN)  | ✓                        | ✓              | ✓              | 6 inch Diameter     | 5-3/4 inch (146 mm) |                                 |
|             | 4 inch (100 DN) | ✓                        | ✓              | ✓              | 6 inch Diameter     | 5-3/4 inch (146 mm) |                                 |

Table 2

Standard Shut-Off Classifications (in accordance with ANSI/FCI 70.2)  
Process Temperature and Seat Leakage

| Valve Size    | Body Material  | Seat Material                    | Temperature Range |      |         |     | Maximum Seat Leakage |
|---------------|--|----------------------------------|-------------------|------|---------|-----|----------------------|
|               |  |                                  | Minimum           |      | Maximum |     |                      |
|               |  |                                  | °F                | °C   | °F      | °C  |                      |
| All           | LCC  | Metal <sup>(1)</sup>             | -50               | -50  | 650     | 343 | Class IV Shutoff     |
|               |  | PTFE (Soft) Seat <sup>(1)</sup>  | -50               | -46  | 450     | 232 | Class VI Shutoff     |
|               |  | PCTFE (Soft) Seat <sup>(1)</sup> | -50               | -46  | 450     | 232 | Class VI Shutoff     |
|               | WCC  | Metal <sup>(1)</sup>             | -20               | -29  | 750     | 400 | Class IV Shutoff     |
|               |  | PTFE (Soft) Seat <sup>(1)</sup>  | -20               | -29  | 450     | 232 | Class VI Shutoff     |
|               |  | PCTFE (Soft) Seat <sup>(1)</sup> | -20               | -29  | 450     | 232 | Class VI Shutoff     |
|               | CF8M   | Metal <sup>(1)</sup>             | -320              | -196 | 750     | 400 | Class IV Shutoff     |
|               |  | PTFE (Soft) Seat <sup>(1)</sup>  | -50               | -46  | 450     | 232 | Class VI Shutoff     |
|               |  | PCTFE (Soft) Seat <sup>(1)</sup> | -320              | -196 | 450     | 232 | Class VI Shutoff     |
| <b>Notes:</b> | 1 - For trim combination material options refer to Table 9. Temperature limitations for valves with Slurry Seal option may be determined by the Guide Bushing O-Ring, refer to Tables 9 to 11. |                                  |                   |      |         |     |                      |

Table 3

Standard Actuator Specifications and Stroke Times<sup>(1)</sup>

| Actuator Size Diameter |     | Effective Diaphragm Area                                      |                 | Actuator Stroke |      | Stroke Time (Seconds)        |                              |
|------------------------|-----|---|-----------------|-----------------|------|------------------------------|------------------------------|
| Inch                   | mm  | Sq. in  | cm <sup>2</sup> | Inch            | cm   | Increasing Instrument Signal | Decreasing Instrument Signal |
| 4-1/2                  | 114 | 14  | 90              | 3-1/2           | 8.9  | 1.2                          | 2.4                          |
| 6                      | 152 | 24  | 155             | 5-3/4           | 14.6 | 3                            | 6.3                          |
| <b>Notes:</b>          |     | 1 - Measured with direct positioner at 30 Psi (2 Bar) supply. |                 |                 |      |                              |                              |

**Table 4**

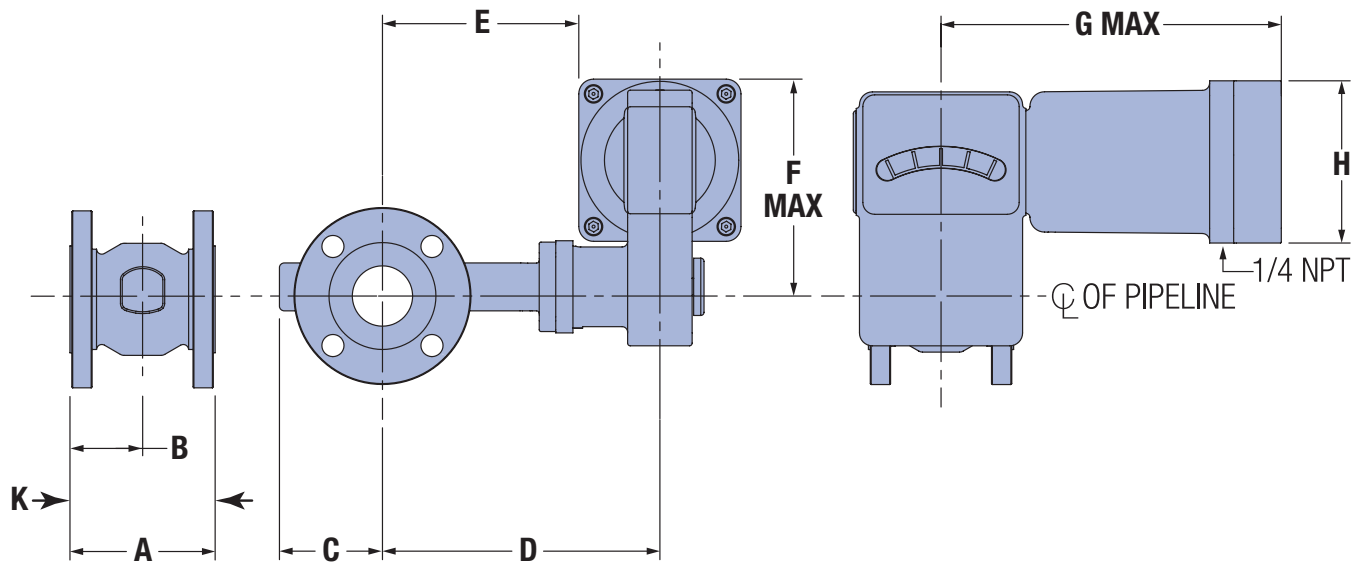
**Maximum Flow Coefficients ( $C_v$ ) and Flow Factors ( $F_L$ ) at 100 Percent Open (50°)**

| Valve Size      | Factor   | Flow-to-Open |       | Flow-to-Close |       |
|-----------------|--|--------------|-------|---------------|-------|
|                 |  | Rated $C_v$  | $F_L$ | Rated $C_v$   | $F_L$ |
| 1 Inch (25 DN)  | 0.036  | 0.50         | 0.98  | 0.50          | 0.86  |
|                 | 0.07   | 1.00         | 0.98  | 1             | 0.86  |
|                 | 0.20   | 2.80         | 0.88  | 3             | 0.70  |
|                 | 0.40   | 5.60         | 0.88  | 6             | 0.70  |
|                 | 0.60   | 8.40         | 0.88  | 9             | 0.70  |
|                 | 1.00   | 14           | 0.85  | 15            | 0.68  |
| 2 Inch (50 DN)  | 0.20   | 10           | 0.88  | 10            | 0.70  |
|                 | 0.40   | 20           | 0.88  | 21.2          | 0.70  |
|                 | 0.60   | 30           | 0.88  | 31.8          | 0.70  |
|                 | 1.00   | 50           | 0.85  | 53.0          | 0.68  |
| 3 Inch (80 DN)  | 0.40   | 54           | 0.88  | 58            | 0.70  |
|                 | 0.60   | 81           | 0.88  | 87            | 0.70  |
|                 | 1.00   | 135          | 0.85  | 145           | 0.68  |
| 4 Inch (100 DN) | 0.40   | 92           | 0.88  | 92            | 0.70  |
|                 | 0.60   | 138          | 0.88  | 138           | 0.70  |
|                 | 1.00   | 230          | 0.85  | 230           | 0.68  |
| <b>Notes:</b>   | Low flow trims (0.036+0.07 factor) requires the use of a positioner.<br>Refer to Tables xx & xx for full $C_v$ list. |              |       |               |       |

**Table 5**

**Approximate Valve/Actuator Assembly Weights**

| Valve Size      | Actuator Size | ASME Class 150 |    | ASME Class 300 |    | ASME Class 600 |    |
|-----------------|---------------|----------------|----|----------------|----|----------------|----|
|                 |               | lbs.           | Kg | lbs.           | Kg | lbs.           | Kg |
| 1 Inch (25 DN)  | 4-1/2 Inch    | 40             | 18 | 44             | 20 | 44             | 20 |
| 2 Inch (50 DN)  | 4-1/2 Inch    | 53             | 24 | 60             | 27 | 62             | 28 |
| 3 Inch (80 DN)  | 6 Inch        | 115            | 52 | 126            | 57 | 130            | 59 |
| 4 Inch (100 DN) | 6 Inch        | 143            | 65 | 161            | 73 | 183            | 83 |



**Figure 2** Typical Valve and Actuator Assembly Dimensional Diagram

**Table 6**

**Valve and Actuator Assembly Dimensions** (Refer to Figure 2)

| Valve Size | Dimensions - Inch |      |      |       |       |      |       |      |
|------------|-------------------|------|------|-------|-------|------|-------|------|
|            | A                 | B    | C    | D     | E     | F    | G     | H    |
| 1 Inch     | 4.00              | 2.01 | 1.50 | 8.00  | 5.30  | 6.60 | 11.90 | 5.50 |
| 2 Inch     | 4.88              | 2.46 | 2.60 | 9.30  | 6.60  | 6.60 | 11.90 | 5.50 |
| 3 Inch     | 6.50              | 3.39 | 3.30 | 12.90 | 9.40  | 9.80 | 17.20 | 6.90 |
| 4 Inch     | 7.62              | 4.17 | 4.30 | 13.70 | 10.30 | 9.80 | 17.20 | 6.90 |
| Valve Size | Dimensions - mm   |      |      |       |       |      |       |      |
|            | A                 | B    | C    | D     | E     | F    | G     | H    |
| 25 DN      | 102               | 51   | 38   | 204   | 134   | 168  | 302   | 140  |
| 50 DN      | 124               | 63   | 65   | 237   | 167   | 168  | 302   | 140  |
| 80 DN      | 165               | 86   | 84   | 327   | 239   | 249  | 436   | 175  |
| 100 DN     | 194               | 106  | 108  | 349   | 262   | 249  | 436   | 175  |

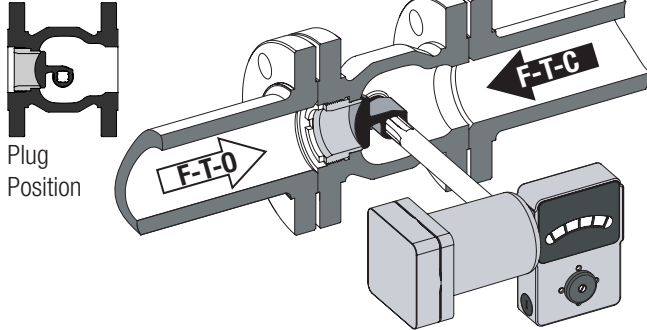
**Table 7**

**Flange Bolt Clearance Dimensions** (Refer to Figure 2)

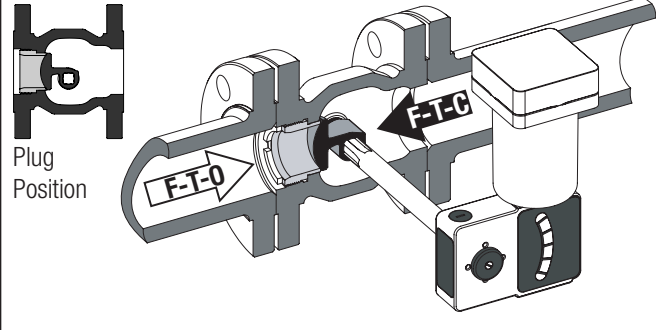
| Valve Size      | K - Inch             |     |                      |     |                      |     |
|-----------------|----------------------|-----|----------------------|-----|----------------------|-----|
|                 | ASME Class 150 PN 10 |     | ASME Class 300 PN 16 |     | ASME Class 600 PN 40 |     |
|                 | Inch                 | mm  | Inch                 | mm  | Inch                 | mm  |
| 1 Inch (25 DN)  | 6.50                 | 205 | 9.00                 | 229 | 9.00                 | 229 |
| 2 Inch (50 DN)  | 10.50                | 267 | 10.50                | 267 | 10.50                | 267 |
| 3 Inch (80 DN)  | 11.80                | 300 | 13.50                | 343 | 14.00                | 356 |
| 4 Inch (100 DN) | 13.00                | 330 | 14.00                | 356 | 16.50                | 406 |

**Air-to-Open Configurations**

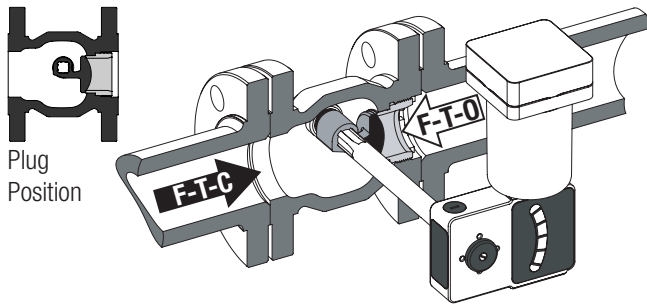
**Actuator Position 2**



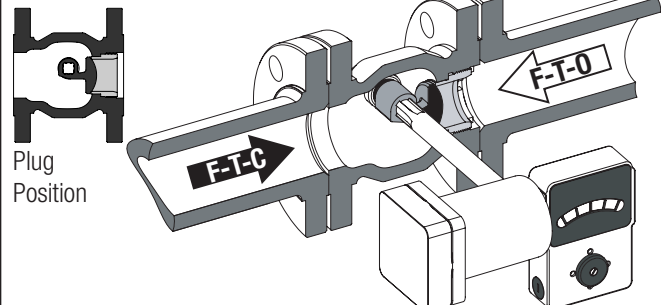
**Actuator Position 4**



**Actuator Position 8**

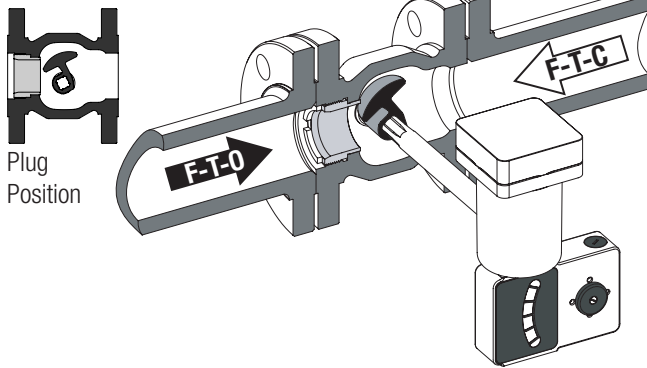


**Actuator Position 6**

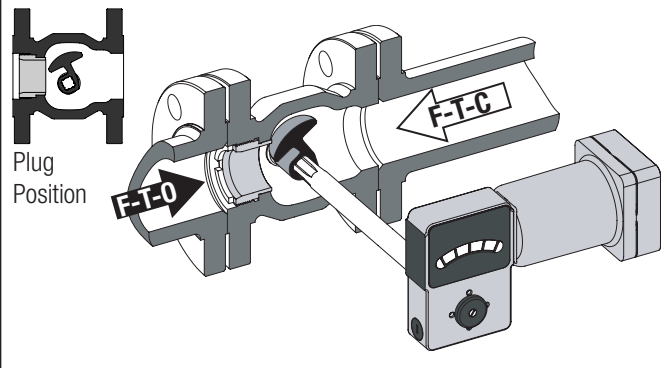


**Air-to-Close Configurations**

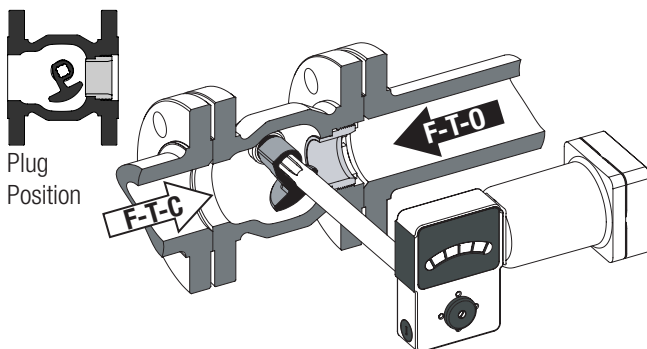
**Actuator Position 3**



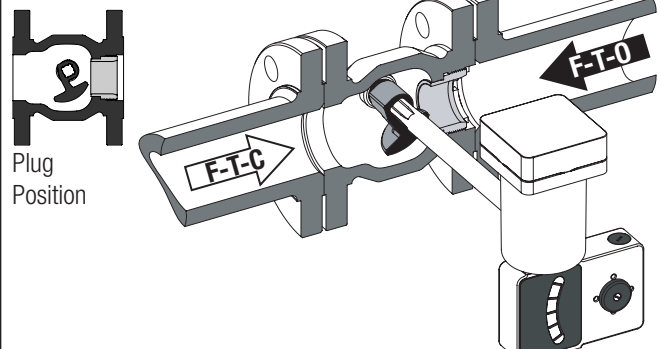
**Actuator Position 1**



**Actuator Position 5**



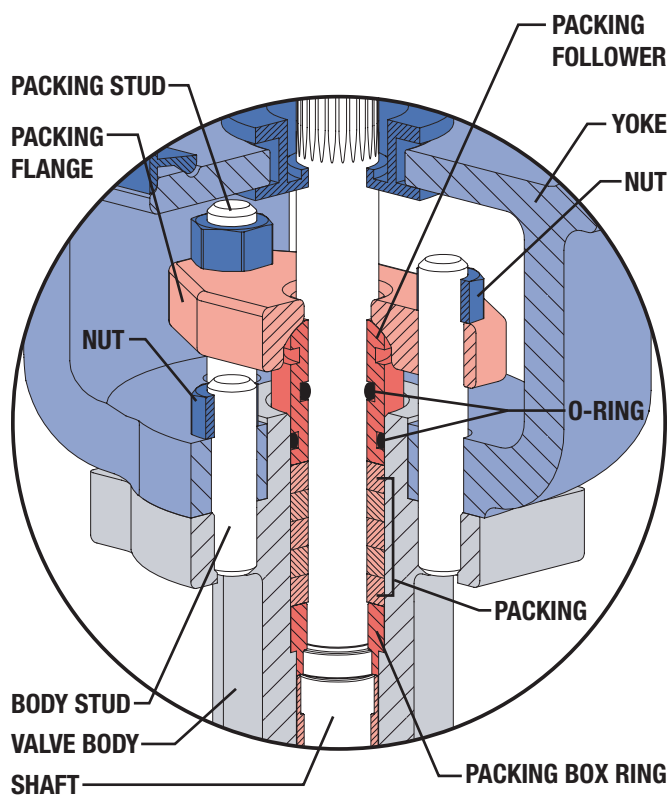
**Actuator Position 7**



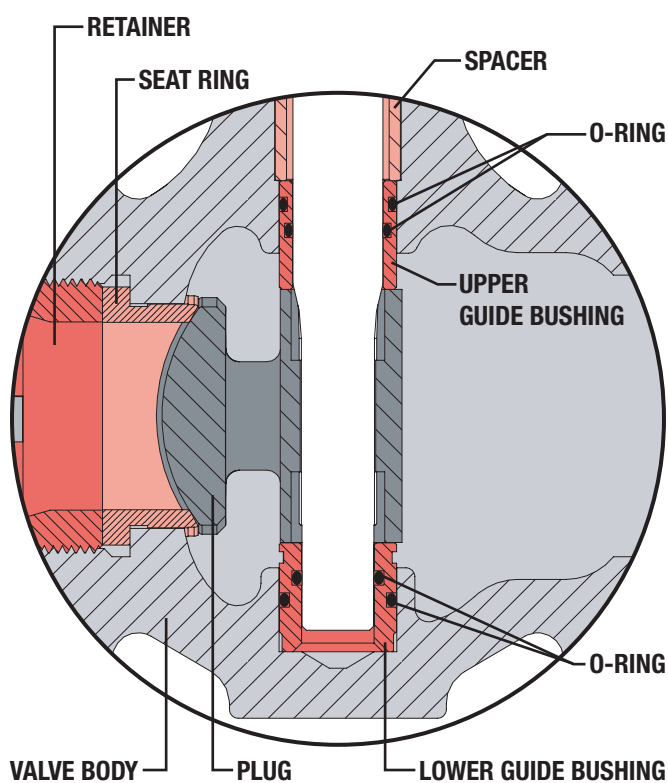
**Figure 3** Actuator Mounting Positions in Relation to Valve Body (Refer to Table 7 on Page 7 for Notes)

**Figure 3 - Actuator Mounting Positions Notes**

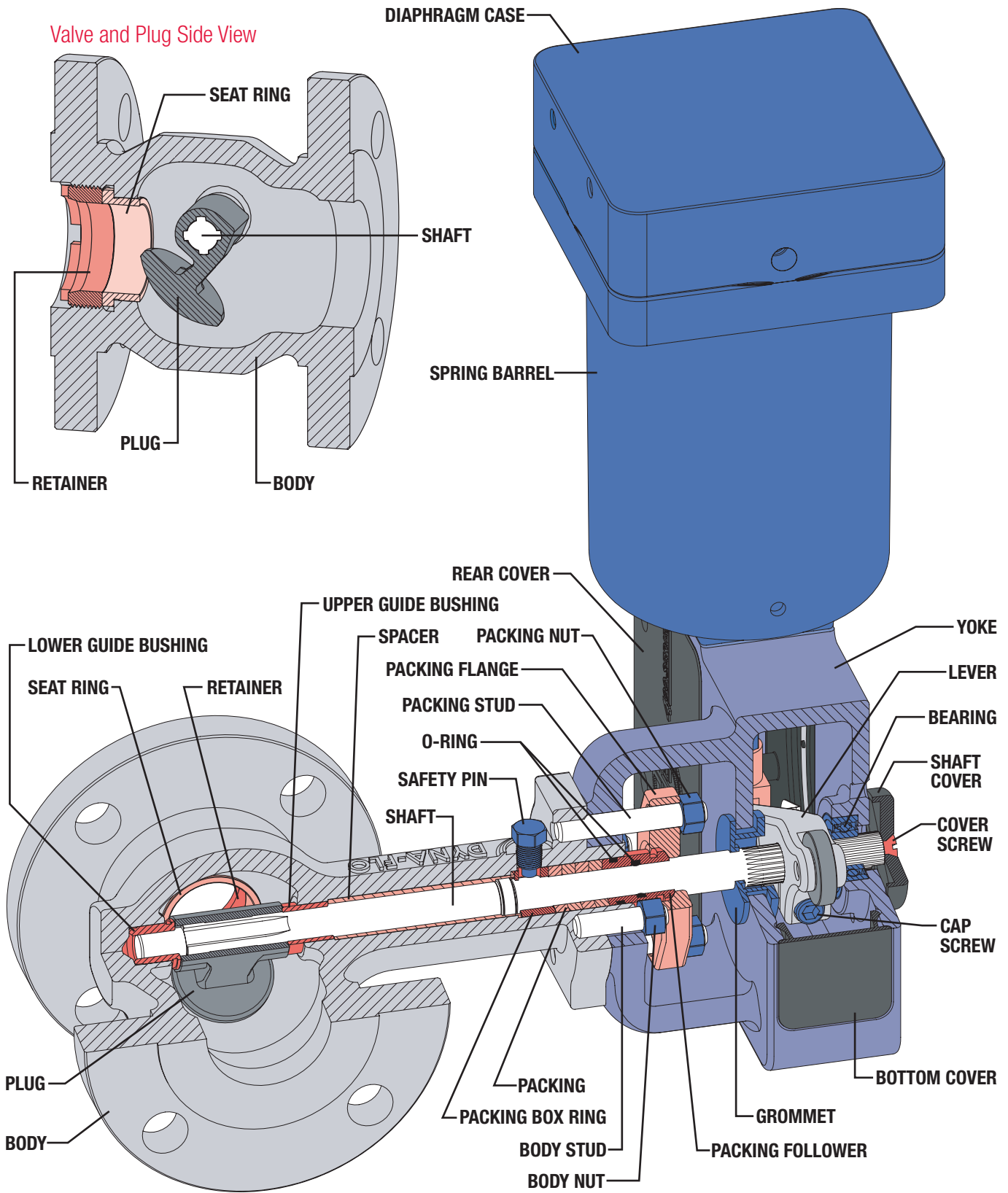
- Grey shaded actuators represent standard actuator mounting positions.
- Black arrows represent the recommended flow direction. F-T-C = Flow-to-Close F-T-O = Flow-to-Open
- Figure 3 does not illustrate all possible valve/actuator configurations. For mounting positions other than the 8 positions shown on Page 6, consult your Dyna-Flo Sales Representative.
- Actuators must always be mounted above the pipeline.
- Installation of valve and actuator is assumed and recommended to be in the horizontal position (parallel to the ground). Consult Dyna-Flo regarding installation of the assembly into positions other than horizontal.
- Valve plug positions are shown in their starting positions (position without air applied to the actuator).
- Operating efficiencies may vary depending on valve/actuator orientation and configuration.



**Figure 4** Standard Valve Packing Detail



**Figure 5** Slurry Trim Package Detail



**Figure 6** Model DF400 Valve and Actuator Cross Section



Table 9

## Common Parts Typical Construction Materials and Temperature Limitations

| Part   | Material                 | Temperature Limitations |                    |                    |                    |                    |
|--|--------------------------|-------------------------|--------------------|--------------------|--------------------|--------------------|
|  |                          | Min. °F                 | Max. °F            | Min. °C            | Max. °C            |                    |
| Body Nut   | ASTM A194 Grade 8        | NLF <sup>(1)</sup>      | NLF <sup>(1)</sup> | NLF <sup>(1)</sup> | NLF <sup>(1)</sup> |                    |
| Body Stud  | ASTM A193 B8             | NLF <sup>(1)</sup>      | NLF <sup>(1)</sup> | NLF <sup>(1)</sup> | NLF <sup>(1)</sup> |                    |
| Packing  | Carbon Core Braided PTFE | NLF <sup>(1)</sup>      | NLF <sup>(1)</sup> | NLF <sup>(1)</sup> | NLF <sup>(1)</sup> |                    |
| Packing Box Ring                                   | S31600/S31603 Dual Grade | NLF <sup>(1)</sup>      | NLF <sup>(1)</sup> | NLF <sup>(1)</sup> | NLF <sup>(1)</sup> |                    |
| Packing Flange                                     | Zinc Plated Steel        | NLF <sup>(1)</sup>      | NLF <sup>(1)</sup> | NLF <sup>(1)</sup> | NLF <sup>(1)</sup> |                    |
| Packing Follower                                   | S31600/S31603 Dual Grade | NLF <sup>(1)</sup>      | NLF <sup>(1)</sup> | NLF <sup>(1)</sup> | NLF <sup>(1)</sup> |                    |
| Packing Follower O-Rings                           | Standard                 | VITON                   | NLF <sup>(1)</sup> | 400                | NLF <sup>(1)</sup> | 205                |
|  | NACE                     | KALREZ® 0090            | -5.8               | 482                | -21                | 250                |
| Packing Nuts                                       | ASTM A193 B8             | NLF <sup>(1)</sup>      | NLF <sup>(1)</sup> | NLF <sup>(1)</sup> | NLF <sup>(1)</sup> |                    |
| Packing Studs                                      | ASTM A194 Grade 8        | NLF <sup>(1)</sup>      | NLF <sup>(1)</sup> | NLF <sup>(1)</sup> | NLF <sup>(1)</sup> |                    |
| Plug   | Refer to Table 10        | NLF <sup>(1)</sup>      | NLF <sup>(1)</sup> | NLF <sup>(1)</sup> | NLF <sup>(1)</sup> |                    |
| Plug Retainer                                      | Refer to Table 10        | NLF <sup>(1)</sup>      | NLF <sup>(1)</sup> | NLF <sup>(1)</sup> | NLF <sup>(1)</sup> |                    |
| Safety Pin   | S31600/S31603 Dual Grade | NLF <sup>(1)</sup>      | NLF <sup>(1)</sup> | NLF <sup>(1)</sup> | NLF <sup>(1)</sup> |                    |
| Seat Ring  | Refer to Table 10        | NLF <sup>(1)</sup>      | NLF <sup>(1)</sup> | NLF <sup>(1)</sup> | NLF <sup>(1)</sup> |                    |
| Spacer   | S31600/S31603 Dual Grade | NLF <sup>(1)</sup>      | NLF <sup>(1)</sup> | NLF <sup>(1)</sup> | NLF <sup>(1)</sup> |                    |
| Valve Shaft  | S20910                   | NLF <sup>(1)</sup>      | NLF <sup>(1)</sup> | NLF <sup>(1)</sup> | NLF <sup>(1)</sup> |                    |
| Upper Guide Bushing                                | Standard                 | S44004                  | NLF <sup>(1)</sup> | NLF <sup>(1)</sup> | NLF <sup>(1)</sup> | NLF <sup>(1)</sup> |
|  | NACE                     | R30006                  | NLF <sup>(1)</sup> | NLF <sup>(1)</sup> | NLF <sup>(1)</sup> | NLF <sup>(1)</sup> |
| Lower Guide Bushing                                | Standard                 | S44004                  | NLF <sup>(1)</sup> | NLF <sup>(1)</sup> | NLF <sup>(1)</sup> | NLF <sup>(1)</sup> |
|  | NACE                     | R30006                  | NLF <sup>(1)</sup> | NLF <sup>(1)</sup> | NLF <sup>(1)</sup> | NLF <sup>(1)</sup> |
| Guide Bushing O-Rings<br>(Slurry Seal Option Only) | Standard                 | VITON                   | NLF <sup>(1)</sup> | 400                | NLF <sup>(1)</sup> | 205                |
|  | NACE                     | KALREZ® 4079            | NLF <sup>(1)</sup> | 600                | NLF <sup>(1)</sup> | 316                |
| Actuator Clevis                                    | Zinc Plated Steel        | NLF <sup>(1)</sup>      | NLF <sup>(1)</sup> | NLF <sup>(1)</sup> | NLF <sup>(1)</sup> |                    |
| Actuator Clevis Pin                                | S30400                   | NLF <sup>(1)</sup>      | NLF <sup>(1)</sup> | NLF <sup>(1)</sup> | NLF <sup>(1)</sup> |                    |
| Actuator Diaphragm                                 | Nitrile/Polyester        | NLF <sup>(1)</sup>      | NLF <sup>(1)</sup> | NLF <sup>(1)</sup> | NLF <sup>(1)</sup> |                    |
| Actuator Diaphragm Case                            | Cast Aluminum            | NLF <sup>(1)</sup>      | NLF <sup>(1)</sup> | NLF <sup>(1)</sup> | NLF <sup>(1)</sup> |                    |
| Actuator Lever                                     | Steel                    | NLF <sup>(1)</sup>      | NLF <sup>(1)</sup> | NLF <sup>(1)</sup> | NLF <sup>(1)</sup> |                    |
| Actuator Lever Bearing                             | Steel                    | NLF <sup>(1)</sup>      | NLF <sup>(1)</sup> | NLF <sup>(1)</sup> | NLF <sup>(1)</sup> |                    |
| Actuator Piston                                    | Cast Aluminum            | NLF <sup>(1)</sup>      | NLF <sup>(1)</sup> | NLF <sup>(1)</sup> | NLF <sup>(1)</sup> |                    |
| Actuator Piston Rod                                | S30300                   | NLF <sup>(1)</sup>      | NLF <sup>(1)</sup> | NLF <sup>(1)</sup> | NLF <sup>(1)</sup> |                    |
| Actuator Spring Barrel                             | Cast Aluminum            | NLF <sup>(1)</sup>      | NLF <sup>(1)</sup> | NLF <sup>(1)</sup> | NLF <sup>(1)</sup> |                    |
| Actuator Yoke                                      | Cast Iron                | NLF <sup>(1)</sup>      | NLF <sup>(1)</sup> | NLF <sup>(1)</sup> | NLF <sup>(1)</sup> |                    |
| Actuator Yoke Cover                                | Polycarbonate            | NLF <sup>(1)</sup>      | NLF <sup>(1)</sup> | NLF <sup>(1)</sup> | NLF <sup>(1)</sup> |                    |

**Notes: 1** - NLF - This Material is Not A Limiting Factor. For the standard valve assembly temperature limitations refer to Table 2. For valve trim specific temperature limitations refer to Table 9.

**Table 10**

**Standard Valve Trim Options and Temperature Limitations<sup>(3)</sup>**

| Trim Designation | Plug   | Seat Ring  | Retainer                     | Temperature Limitation |                    |                    |                    |
|------------------|--|--|------------------------------|------------------------|--------------------|--------------------|--------------------|
|                  |  |  |                              | Min. °F                | Max. °F            | Min. °C            | Max. °C            |
| A                | R30006   | S31600/S31603 <sup>(1)</sup>                     | S31600/S31603 <sup>(1)</sup> | NLF <sup>(2)</sup>     | NLF <sup>(2)</sup> | NLF <sup>(2)</sup> | NLF <sup>(2)</sup> |
| B                | R30006   | R30006   | S31600/S31603 <sup>(1)</sup> | NLF <sup>(2)</sup>     | NLF <sup>(2)</sup> | NLF <sup>(2)</sup> | NLF <sup>(2)</sup> |
| C                | R30006   | S31600 <sup>(1)</sup> /PTFE                      | S31600/S31603 <sup>(1)</sup> | -50                    | 450                | -46                | 232                |
| D                | R30006   | S31600 <sup>(1)</sup> /PCTFE                     | S31600/S31603 <sup>(1)</sup> | NLF <sup>(2)</sup>     | 450                | NLF <sup>(2)</sup> | 232                |
| E                | S31603/CoCr-A<br>Hard Faced Seat   | S31600/S31603 <sup>(1)</sup>                     | S31600/S31603 <sup>(1)</sup> | NLF <sup>(2)</sup>     | NLF <sup>(2)</sup> | NLF <sup>(2)</sup> | NLF <sup>(2)</sup> |
| F                | S31603/CoCr-A<br>Hard Faced Seat   | S31600 <sup>(1)</sup> /CoCr-A<br>Hard Faced Seat | S31600/S31603 <sup>(1)</sup> | NLF <sup>(2)</sup>     | NLF <sup>(2)</sup> | NLF <sup>(2)</sup> | NLF <sup>(2)</sup> |
| G                | S31603/CoCr-A<br>Hard Faced Seat   | S31600 <sup>(1)</sup> /PTFE                      | S31600/S31603 <sup>(1)</sup> | -50                    | 450                | -46                | 232                |
| H                | S31603/CoCr-A<br>Hard Faced Seat   | S31600 <sup>(1)</sup> /PCTFE                     | S31600/S31603 <sup>(1)</sup> | NLF <sup>(2)</sup>     | 450                | NLF <sup>(2)</sup> | 232                |
| <b>Notes:</b>    | <b>1</b> - All S31600 barstock is dual grade S31600/S31603 (316/316L). <sup>(1)</sup>  |  |                              |                        |                    |                    |                    |
|                  | <b>2</b> - NLF - This Material is Not A Limiting Factor. Refer to Table 2 and Table 9 for other limiting factors.                      |  |                              |                        |                    |                    |                    |
|                  | <b>3</b> - Temperature limitations for valves with Slurry Seal option may be determined by the Guide Bushing O-Ring, refer to Table 9. |  |                              |                        |                    |                    |                    |

**Table 11**

**Available Valve Size and Trim Combinations**

| Valve Size         | Factor | Available Trim Set |
|--------------------|--------|--------------------|
| 1 Inch<br>(25 DN)  | 0.036  | A, B               |
|                    | 0.07   |                    |
|                    | 0.20   | A, B               |
|                    | 0.40   | A, B, C, D         |
|                    | 0.60   |                    |
| 1                  |        |                    |
| 2 Inch<br>(50 DN)  | 0.20   | A, B               |
|                    | 0.40   | A, B, C, D         |
|                    | 0.60   |                    |
|                    | 1.00   |                    |
| 3 Inch<br>(80 DN)  | 0.40   | B, E, F, G, H      |
|                    | 0.60   |                    |
|                    | 1.00   |                    |
| 4 Inch<br>(100 DN) | 0.40   | B, E, F, G, H      |
|                    | 0.60   |                    |
|                    | 1.00   |                    |

**Table 12**

**Flow Coefficients ( $C_v$ ) and Flow Factors ( $F_L$ ) and Travel Relation (Flow-to-Open)**

| Percentage of Plug Rotation          |               |      |                      |     | 10                                      | 20   | 30   | 40   | 50   | 60   | 70   | 80   | 90   | 100  |
|--------------------------------------|---------------|------|----------------------|-----|---|------|------|------|------|------|------|------|------|------|
| $F_L$ Full Area                      |               |      |                      |     | 0.96                                    | 0.93 | 0.91 | 0.89 | 0.88 | 0.87 | 0.87 | 0.86 | 0.86 | 0.85 |
| $F_L$ Reduced Area (0.2 , 0.4 , 0.6) |               |      |                      |     | 0.96                                    | 0.93 | 0.91 | 0.89 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 |
| Valve Size                           | Port Diameter |      | Actuator Stem Travel |     | Rated CV at Percentage of Plug Rotation |      |      |      |      |      |      |      |      |      |
|                                      | Inch          | mm   | Inch                 | mm  | 10                                      | 20   | 30   | 40   | 50   | 60   | 70   | 80   | 90   | 100  |
| 1 Inch<br>(25 DN)                    | 0.321         | 8.2  | 3.50                 | 89  | 0.4                                     | 0.8  | 1.1  | 1.4  | 1.7  | 2.0  | 2.3  | 2.5  | 2.7  | 2.8  |
|                                      | 0.500         | 12.7 | 3.50                 | 89  | 0.5                                     | 0.9  | 1.4  | 2.0  | 2.7  | 3.5  | 4.2  | 4.8  | 5.2  | 5.6  |
|                                      | 0.579         | 14.7 | 3.50                 | 89  | 0.6                                     | 1.3  | 2.2  | 3.1  | 4.2  | 5.3  | 6.4  | 7.2  | 7.9  | 8.4  |
|                                      | 0.718         | 18.2 | 3.50                 | 89  | 0.9                                     | 2.1  | 3.7  | 5.7  | 7.8  | 9.6  | 11.1 | 12.4 | 13.3 | 14   |
| 2 Inch<br>(50 DN)                    | 1.000         | 25.4 | 3.50                 | 89  | 1.6                                     | 3.2  | 5.0  | 7.2  | 9.8  | 12.6 | 15.0 | 17.0 | 18.7 | 20   |
|                                      | 1.159         | 29.4 | 3.50                 | 89  | 2.1                                     | 4.8  | 7.7  | 11.2 | 15.1 | 19.1 | 22.7 | 25.8 | 28.2 | 30   |
|                                      | 1.437         | 36.5 | 3.50                 | 89  | 3.1                                     | 7.5  | 13.3 | 20.5 | 28.0 | 34.2 | 39.8 | 44.2 | 47.5 | 50   |
| 3 Inch<br>(80 DN)                    | 1.500         | 38.1 | 5.75                 | 146 | 4.9                                     | 9.4  | 14.1 | 20.0 | 26.5 | 33.5 | 39.8 | 45.4 | 50.2 | 54   |
|                                      | 1.874         | 47.6 | 5.75                 | 146 | 5.7                                     | 12.1 | 19.6 | 27.6 | 37.5 | 47.9 | 58.4 | 68.0 | 75.9 | 81   |
|                                      | 2.324         | 59.0 | 5.75                 | 146 | 8.8                                     | 17.7 | 29.8 | 44.5 | 60.7 | 78.3 | 96.2 | 113  | 127  | 135  |
| 4 Inch<br>(100 DN)                   | 2.000         | 50.8 | 5.75                 | 146 | 8.4                                     | 16.1 | 24.0 | 34.1 | 45.1 | 57.1 | 67.8 | 77.4 | 85.6 | 92   |
|                                      | 2.419         | 61.4 | 5.75                 | 146 | 9.7                                     | 20.7 | 33.4 | 47.0 | 63.8 | 81.6 | 99.4 | 116  | 129  | 138  |
|                                      | 3.000         | 76.2 | 5.75                 | 146 | 15.0                                    | 30.2 | 50.8 | 75.8 | 104  | 133  | 164  | 193  | 216  | 230  |

**Table 13**

**Flow Coefficients ( $C_v$ ) and Flow Factors ( $F_L$ ) and Travel Relation (Flow-to-Close)**

| Percentage of Plug Rotation          |               |      |                      |     | 10                                      | 20   | 30   | 40   | 50   | 60   | 70   | 80   | 90   | 100  |
|--------------------------------------|---------------|------|----------------------|-----|---|------|------|------|------|------|------|------|------|------|
| $F_L$ Full Area                      |               |      |                      |     | 0.94                                    | 0.91 | 0.88 | 0.83 | 0.80 | 0.77 | 0.74 | 0.72 | 0.70 | 0.68 |
| $F_L$ Reduced Area (0.2 , 0.4 , 0.6) |               |      |                      |     | 0.94                                    | 0.91 | 0.88 | 0.83 | 0.80 | 0.77 | 0.74 | 0.72 | 0.70 | 0.70 |
| Valve Size                           | Port Diameter |      | Actuator Stem Travel |     | Rated CV at Percentage of Plug Rotation |      |      |      |      |      |      |      |      |      |
|                                      | Inch          | mm   | Inch                 | mm  | 10                                      | 20   | 30   | 40   | 50   | 60   | 70   | 80   | 90   | 100  |
| 1 Inch<br>(25 DN)                    | 0.321         | 8.2  | 3.50                 | 89  | 0.4                                     | 0.9  | 1.2  | 1.5  | 1.8  | 2.1  | 2.5  | 2.7  | 2.9  | 3.0  |
|                                      | 0.500         | 12.7 | 3.50                 | 89  | 0.5                                     | 1.0  | 1.5  | 2.1  | 2.9  | 3.8  | 4.5  | 5.1  | 5.6  | 6.0  |
|                                      | 0.579         | 14.7 | 3.50                 | 89  | 0.6                                     | 1.4  | 2.4  | 3.3  | 4.5  | 5.7  | 6.9  | 7.7  | 8.5  | 9.0  |
|                                      | 0.718         | 18.2 | 3.50                 | 89  | 1.0                                     | 2.3  | 4.0  | 6.1  | 8.4  | 10.3 | 11.9 | 13.3 | 14.3 | 15.0 |
| 2 Inch<br>(50 DN)                    | 1.000         | 25.4 | 3.50                 | 89  | 1.7                                     | 3.4  | 5.3  | 7.6  | 10.4 | 13.4 | 15.9 | 18.0 | 19.8 | 21.2 |
|                                      | 1.159         | 29.4 | 3.50                 | 89  | 2.2                                     | 5.1  | 8.2  | 11.9 | 16.0 | 20.2 | 24.1 | 27.3 | 29.9 | 31.8 |
|                                      | 1.437         | 36.5 | 3.50                 | 89  | 3.3                                     | 8.0  | 14.1 | 21.7 | 29.7 | 36.3 | 42.2 | 46.9 | 50.4 | 53.0 |
| 3 Inch<br>(80 DN)                    | 1.500         | 38.1 | 5.75                 | 146 | 5.3                                     | 10.1 | 15.1 | 21.5 | 28.5 | 36.0 | 42.7 | 48.8 | 53.9 | 58.0 |
|                                      | 1.874         | 47.6 | 5.75                 | 146 | 6.1                                     | 13.0 | 21.1 | 29.6 | 40.3 | 51.4 | 62.7 | 73.0 | 81.5 | 87.0 |
|                                      | 2.324         | 59.0 | 5.75                 | 146 | 9.5                                     | 19.0 | 32.0 | 47.8 | 65.2 | 84.1 | 103  | 121  | 136  | 145  |
| 4 Inch<br>(100 DN)                   | 2.000         | 50.8 | 5.75                 | 146 | 8.4                                     | 16.1 | 24.0 | 34.1 | 45.1 | 57.1 | 67.8 | 77.4 | 85.6 | 92.0 |
|                                      | 2.419         | 61.4 | 5.75                 | 146 | 9.7                                     | 20.7 | 33.4 | 47.0 | 63.8 | 81.6 | 99.4 | 116  | 129  | 138  |
|                                      | 3.000         | 76.2 | 5.75                 | 146 | 15.0                                    | 30.2 | 50.8 | 75.8 | 104  | 133  | 164  | 193  | 216  | 230  |

Table 14

**Allowable Pressure Drops - Metal Seat - Actuator Operating Range 7-15 Psi (0.48-1.03 Bar)**

| Valve Size         | C <sub>v</sub> | Air-to-Close<br>Flow-to-Close |      | Air-to-Open<br>Flow-to-Open |      | Air-to-Close / Flow-to-Open & Air-to-Open / Flow-to-Close<br>Supply Pressure - Psi (Bar) |                       |                       |                       |                       |                       |
|--------------------|----------------|-------------------------------|------|-----------------------------|------|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
|                    |                | Psi                           | Bar  | Psi                         | Bar  | 20 Psig<br>(1.38 Bar)  | 25 Psig<br>(1.72 Bar) | 30 Psig<br>(2.07 Bar) | 35 Psig<br>(2.41 Bar) | 40 Psig<br>(2.76 Bar) | 45 Psig<br>(3.10 Bar) |
| 1 Inch<br>(25 DN)  | 14             | 1,000                         | 69.0 | 1,000                       | 69.0 | 1,000<br>(69.0)  | ---                   | ---                   | ---                   | ---                   | ---                   |
|                    | 8.4            | 1,450                         | 100  | 1,450                       | 100  | 1,450<br>(100)   | ---                   | ---                   | ---                   | ---                   | ---                   |
|                    | 5.6            | 1,450                         | 100  | 1,450                       | 100  | 1,450<br>(100)   | ---                   | ---                   | ---                   | ---                   | ---                   |
|                    | 2.8            | 1,450                         | 100  | 1,450                       | 100  | 1,450<br>(100)   | ---                   | ---                   | ---                   | ---                   | ---                   |
| 2 Inch<br>(50 DN)  | 50             | 270                           | 18.6 | 360                         | 24.8 | 230<br>(15.9)  | 500<br>(34.5)         | 600<br>(41.4)         | ---                   | ---                   | ---                   |
|                    | 30             | 410                           | 28.3 | 560                         | 38.6 | 350<br>(24.1)  | 760<br>(52.4)         | 1,000<br>(69.0)       | ---                   | ---                   | ---                   |
|                    | 20             | 540                           | 37.2 | 740                         | 51.0 | 470<br>(32.4)  | 1,000<br>(69.0)       | 1,000<br>(69.0)       | ---                   | ---                   | ---                   |
|                    | 10             | 540                           | 37.2 | 740                         | 51.0 | 470<br>(32.4)  | 1,000<br>(69.0)       | 1,000<br>(69.0)       | ---                   | ---                   | ---                   |
| 3 Inch<br>(80 DN)  | 135            | 200                           | 13.8 | 280                         | 19.3 | 180<br>(12.4)  | 380<br>(26.2)         | 600<br>(41.4)         | ---                   | ---                   | ---                   |
|                    | 81             | 320                           | 22.1 | 420                         | 29.0 | 270<br>(18.6)  | 580<br>(40.0)         | 930<br>(64.1)         | ---                   | ---                   | ---                   |
|                    | 54             | 460                           | 31.7 | 640                         | 44.1 | 400<br>(27.6)  | 870<br>(60.0)         | 1,000<br>(69.0)       | ---                   | ---                   | ---                   |
| 4 Inch<br>(100 DN) | 230            | 100                           | 6.90 | 140                         | 9.65 | 90<br>(6.21)   | 200<br>(13.8)         | 320<br>(22.1)         | 440<br>(30.3)         | 560<br>(38.6)         | 600<br>(41.4)         |
|                    | 138            | 160                           | 11.0 | 220                         | 15.2 | 140<br>(9.65)  | 300<br>(20.7)         | 490<br>(33.8)         | 670<br>(46.2)         | 860<br>(59.3)         | 1,000<br>(69.0)       |
|                    | 92             | 230                           | 15.9 | 310                         | 21.4 | 200<br>(13.8)  | 430<br>(29.7)         | 700<br>(48.3)         | 970<br>(66.9)         | 1,000<br>(69.0)       | 1,000<br>(69.0)       |

**Table 15**

**Allowable Pressure Drops - PTFE (Soft) Seat - Actuator Operating Range 7-15 Psi (0.48-1.03 Bar)**

| Valve Size         | C <sub>v</sub> | Air-to-Open<br>Flow-to-Open |      | Air-to-Close / Flow-to-Open & Air-to-Open / Flow-to-Close<br>Supply Pressure - Psi (Bar) |                       |                       |                       |                       |                       |
|--------------------|----------------|-----------------------------|------|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
|                    |                | Psi                         | Bar  | 20 Psig<br>(1.38 Bar)  | 25 Psig<br>(1.72 Bar) | 30 Psig<br>(2.07 Bar) | 35 Psig<br>(2.41 Bar) | 40 Psig<br>(2.76 Bar) | 45 Psig<br>(3.10 Bar) |
| 1 Inch<br>(25 DN)  | 14             | 800                         | 55.2 | 800<br>(55.2)  | ---                   | ---                   | ---                   | ---                   | ---                   |
|                    | 8.4            | 1,000                       | 69.0 | 1,000<br>(69.0)  | ---                   | ---                   | ---                   | ---                   | ---                   |
|                    | 5.6            | 1,000                       | 69.0 | 1,000<br>(69.0)  | ---                   | ---                   | ---                   | ---                   | ---                   |
| 2 Inch<br>(50 DN)  | 50             | 250                         | 17.2 | 95<br>(6.55)   | 370<br>(25.5)         | 600<br>(41.4)         | ---                   | ---                   | ---                   |
|                    | 30             | 530                         | 36.5 | 140<br>(9.65)  | 530<br>(36.5)         | 940<br>(64.8)         | ---                   | ---                   | ---                   |
|                    | 20             | 520                         | 35.9 | 230<br>(15.9)  | 750<br>(51.7)         | 1,000<br>(69.0)       | ---                   | ---                   | ---                   |
| 3 Inch<br>(80 DN)  | 135            | 200                         | 13.8 | 90<br>(6.21)   | 300<br>(20.7)         | 500<br>(34.5)         | ---                   | ---                   | ---                   |
|                    | 81             | 420                         | 29.0 | 130<br>(8.96)  | 420<br>(29.0)         | 740<br>(51.0)         | ---                   | ---                   | ---                   |
|                    | 54             | 480                         | 33.1 | 230<br>(15.9)  | 680<br>(46.9)         | 800<br>(55.2)         | ---                   | ---                   | ---                   |
| 4 Inch<br>(100 DN) | 230            | 100                         | 6.89 | 35<br>(2.41)   | 150<br>(10.3)         | 260<br>(17.9)         | 370<br>(25.5)         | 480<br>(33.1)         | 500<br>(34.5)         |
|                    | 138            | 210                         | 14.5 | 50<br>(3.45)   | 210<br>(14.5)         | 380<br>(26.2)         | 540<br>(37.2)         | 710<br>(49.0)         | 800<br>(55.2)         |
|                    | 92             | 230                         | 15.6 | 100<br>(6.89)  | 330<br>(22.8)         | 570<br>(39.3)         | 800<br>(55.2)         | 800<br>(55.2)         | 800<br>(55.2)         |



**MODEL NUMBERING SYSTEM**

**SAMPLE PART NUMBER: 400-1AFL-AC-C1-N2**

| VALVE SIZE                     |  |   |            |   |   | 1 |   |                     |
|--------------------------------|--|---|------------|---|---|---|---|---------------------|
| 1                              | 1 INCH                                   | 5 | 1-1/2 INCH | 2 | 2 INCH  |   | 3 | 3 INCH              |
| 4                              | 4 INCH                                   |   |            |   |   |   |   |                     |
| ASME RATING                    |  |   |            |   |   | A |   |                     |
| A                              | 150                                      | B | 300        | C | 600   |   |   |                     |
|                                |  |   |            |   |   |   |   |                     |
| END CONNECTION                 |  |   |            |   |   | F |   |                     |
| F                              | RF                                       |   |            |   |   |   |   |                     |
|                                |  |   |            |   |   |   |   |                     |
| BODY MATERIAL                  |  |   |            |   |   | L |   |                     |
| L                              | LCC                                      | W | WCC        | M | CF8M  |   |   |                     |
|                                |  |   |            |   |   |   |   |                     |
| TRIM                           |  |   |            |   |   | A |   |                     |
| A                              | TRIM STYLE A                             |   |            | B | TRIM STYLE B  |   |   |                     |
| C                              | TRIM STYLE C                             |   |            | D | TRIM STYLE D  |   |   |                     |
| E                              | TRIM STYLE E                             |   |            | F | TRIM STYLE F  |   |   |                     |
| G                              | TRIM STYLE G                             |   |            | H | TRIM STYLE H  |   |   |                     |
| GUIDE BUSHING                  |  |   |            |   |   | C |   |                     |
| A                              | R30006                                   | C | S44004     | R | R3006 WITH O-RINGS                                      |   | S | S44004 WITH O-RINGS |
|                                |  |   |            |   |   |   |   |                     |
| O-RING MATERIAL                |  |   |            |   |   | - |   |                     |
| -                              | VITON                                    | K | KALREZ®    |   |   |   |   |                     |
|                                |  |   |            |   |   |   |   |                     |
| FLOW DIRECTION & FAIL POSITION |  |   |            |   |   | C |   |                     |
| B                              | FAIL CLOSED (AIR-TO-OPEN) / FLOW-TO-OPEN |   |            | C | FAIL CLOSED (AIR-TO-OPEN) / FLOW-TO-CLOSE (RECOMMENDED) |   |   |                     |
| F                              | FAIL OPEN (AIR-TO-CLOSE) / FLOW-TO-CLOSE |   |            | O | FAIL OPEN (AIR-TO-CLOSE) / FLOW-TO-OPEN (RECOMMENDED)   |   |   |                     |
| CV FACTOR                      |  |   |            |   |   | 1 |   |                     |
| 6                              | 0.036                                    | 5 | 0.07       | 4 | 0.20  |   | 3 | 0.40                |
| 2                              | 0.60                                     | 1 | 1.00       |   |   |   |   |                     |
| PAINT                          |  |   |            |   |   | - |   |                     |
| -                              | DFPS-01 (STANDARD)                       |   |            | 2 | DFPS-02 (SEVERE SERVICE)                                |   |   |                     |
| 3                              | DFPS-03 (HIGH TEMPERATURE)               |   |            |   |   |   |   |                     |
| HANDWHEEL                      |  |   |            |   |   | N |   |                     |
| N                              | NONE                                     |   |            |   |   |   |   |                     |
|                                |  |   |            |   |   |   |   |                     |
| MOUNTING POSITION              |  |   |            |   |   | 2 |   |                     |
| 1                              | POSITION 1                               | 2 | POSITION 2 | 3 | POSITION 3  |   | 4 | POSITION 4          |
| 5                              | POSITION 5                               | 6 | POSITION 6 | 7 | POSITION 7  |   | 8 | POSITION 8          |

**400 - - - - -**

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