

Model DF270 Control Valves

Technical Sales Bulletin



Figure 1 DF270 Control Valve

The Dyna-Flo Model DF270 Control Valve is a rugged globe style control valve intended for demanding applications in process control. It is suitable for a wide range of applications, especially high pressure and severe service. The compact design makes installation and maintenance more convenient than traditional valve and actuator assemblies while still offering the same functionality. The Model DF270 is designed to accept instrumentation requiring valve stem linkages making it an excellent control valve.

The Model DF270 is available in 1 inch and 2 inch sizes as a globe style valve body with threaded FNPT or flanged connections.

The Dyna-Flo DF270 control valve is manufactured to a high level of quality to ensure superior performance and customer satisfaction.

Features

NACE Service Ready

Standard construction for the DF270 control valve features NACE trim. The valve bonnet and body also conform to NACE MR0175 (National Association of Corrosion Engineers) recommendations.

ASME Class 900/1500

The DF270 is designed and rated for ASME B16.34 Class 150 - 1500 service.

Live Loaded Packing

Packing for the DF270 control valve is designed to provide a quality stem seal and to prevent the loss of hazardous gases or fluids. The live loaded feature provides for reduced maintenance and positive sealing in temperature and pressure cycling conditions.

Field-Reversible Actuator

Field conversion of the DF270 actuator is designed to be quick and easy. Switch the DF270 from a spring-close to spring-open actuator without any additional parts.

Easily Maintained

The hammer union body to bonnet connection allows for easy removal of the bonnet/actuator for access to trim and packing. Trim removal requires no special tools and is quick and simple. The two piece cage seat allows replacement of the seat ring while using the existing cage making port changes and maintenance more economical.

Low Temperature Materials

The DF270 valve body is constructed with materials that are capable of functioning in temperatures of -40°C .

Open Yoke

The DF270 features an open yoke that allows for the mounting of a feedback arm to facilitate positioners and indicators.

Versatile Trim Material Options

Plug and seat ring materials are available in S17400 DH1150 and S31600/Tungsten Carbide.

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SPECIFICATIONS

Port Diameters

1/4", 3/8", 1/2", 3/4", and 1"
Refer to Table 1.

Sizes and Connection Styles

Size: 1 & 2 inch
Rating: ASME 150 / 300 / 600 / 900 / 1500
FNPT: 2,250 Psi (155 bar) CWP
Connections: FNPT / RF / RTJ
Refer to Table 1 for details and Port Diameters.

Maximum Pressure Drops

Refer to Tables 6 & 7.

Standard Shut-off Classifications

Class IV Shut-off in accordance with ASME / FCI 70.2.

Dimensions

Fail Closed Valve Configuration Dimensions

Refer to Figure 4.

Fail Open Valve Configuration Dimensions

Refer to Figure 5.

Flow Characteristics

Equal Percentage.

Flow Direction

Preferred Up (Refer to Tables 6 & 7).

Valve Plug Travel

3/4 inch (19 mm).

Approximate Valve Body and Actuator Weights

Refer to Table 1.

Material Temperature Capabilities

Body Assembly

HNBR O-Rings: -46 to 149°C (-50 to 300°F)

VITON O-Rings: -18 to 204°C (-0 to 400°F)

Actuator Assembly

-40 to 82°C (-40 to 180°F)

Body Style

Available in Globe style.

Bonnet/Body Connection

Threaded Hammer Nut.

Actuator Configuration

The DF270 utilizes a spring and diaphragm actuator suitable for modulating. Fail action is field-reversible.

Maximum Actuator Casing Pressure

50 Psig (3.45 bar).

Effective Actuator Diaphragm Area

69 inches² (452 cm²).

Actuator Pressure Connections

NPS 1/4 inch NPT.

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

| Maximum Pressures and Temperatures ¹ | | |
|---|----------------------|----------------------|
| Valve Size | 200°F (93°C) | 300°F (150°C) |
| NPS 1 inch FNPT | 2,250 Psig (155 bar) | 2,185 Psig (150 bar) |
| NPS 1-2 inch Flanged Class 600 | 1,500 Psig (103 bar) | 1,454 Psig (100 bar) |
| NPS 1-2 inch Flanged Class 900 | 2,250 Psig (155 bar) | 2,185 Psig (157 bar) |
| NPS 2 inch Flanged Class 900/1500 | 3,750 Psig (259 bar) | 3,640 Psig (251 bar) |

1 - The limitations shown are as per ASME B16.34. Refer to the pressure temperature ratings in this standard for all other flange ratings. Do not exceed these ratings.

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Table 1

Available Valve Sizes, Connection Styles and Approximate Weights

| Port Diameter inch (mm) | Connection Style | | | | | | |
|---|---------------------|-------------------------------------|------------------|------------------|-----------------------|--|-----------------------|
| | Threaded lb (kg) | Raised Face (RF) Flanged lb (kg) | | | | Ring Type Joint (RTJ) Flanged lb (kg) | |
| 1 Inch Valve 1/4 (6.40) 3/8 (9.50) 1/2 (12.7) 3/4 (19.1) 1 (25.4) | FNPT | Class 150 | Class 300 | Class 600 | Class 900 | Class 600 | Class 900 |
| | 40 (18) | 44 (20) | 50 (23) | 50 (23) | 79 (32) | 50 (23) | 79 (36) |
| | FNPT | Class 150 | Class 300 | Class 600 | Class 900/1500 | Class 600 | Class 900/1500 |
| | 46 (21) | 50 (23) | 70 (32) | 70 (32) | 110 (32) | 70 (32) | 110 (50) |

Table 2

1 Inch Valve Sizing Coefficients, for Equal Percentage Trim

| Port Size | Co-efficient | Percentage of Valve Travel | | | | | | | | | |
|-----------------------|--------------|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| | | 10% | 20% | 30% | 40% | 50% | 60% | 70% | 80% | 90% | 100% |
| 1/4 Inch (6.40 mm) | C_v | 0.06 | 0.08 | 0.11 | 0.16 | 0.22 | 0.34 | 0.54 | 0.77 | 1.07 | 1.37 |
| | X_T | 0.793 | 0.736 | 0.731 | 0.710 | 0.668 | 0.644 | 0.640 | 0.628 | 0.608 | 0.569 |
| | F_L | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| 3/8 Inch (9.50 mm) | C_v | 0.12 | 0.22 | 0.31 | 0.41 | 0.52 | 0.72 | 1.05 | 1.70 | 2.50 | 3.30 |
| | X_T | 0.706 | 0.689 | 0.685 | 0.652 | 0.648 | 0.624 | 0.616 | 0.608 | 0.596 | 0.584 |
| | F_L | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| 1/2 Inch (12.7 mm) | C_v | 0.21 | 0.34 | 0.51 | 0.80 | 1.22 | 1.71 | 2.40 | 3.30 | 4.43 | 5.50 |
| | X_T | 0.577 | 0.588 | 0.616 | 0.640 | 0.685 | 0.664 | 0.624 | 0.730 | 0.740 | 0.819 |
| | F_L | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| 3/4 Inch (19.1 mm) | C_v | 0.39 | 0.65 | 0.91 | 1.35 | 2.05 | 3.15 | 4.72 | 6.45 | 8.29 | 10.4 |
| | X_T | 0.599 | 0.612 | 0.624 | 0.643 | 0.626 | 0.648 | 0.669 | 0.737 | 0.730 | 0.826 |
| | F_L | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 |
| 1 Inch (25.4 mm) | C_v | 0.70 | 1.10 | 1.80 | 2.20 | 2.70 | 3.70 | 5.80 | 8.10 | 10.5 | 13.0 |
| | X_T | 0.540 | 0.562 | 0.610 | 0.702 | 0.618 | 0.602 | 0.645 | 0.881 | 0.710 | 0.810 |
| | F_L | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 |

Relationships of Note: $C_1 = 39.76 \sqrt{X_T}$ $C_G = C_v C_1$ $K_M = F_L^2$



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Table 3

2 Inch Valve Sizing Coefficients, for Equal Percentage Trim

| Port Size | Co-efficient | Percentage of Valve Travel | | | | | | | | | |
|-----------------------|----------------|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| | | 10% | 20% | 30% | 40% | 50% | 60% | 70% | 80% | 90% | 100% |
| 1/4 Inch (6.40 mm) | C _v | 0.06 | 0.08 | 0.11 | 0.16 | 0.22 | 0.34 | 0.54 | 0.77 | 1.07 | 1.37 |
| | X _T | 0.793 | 0.736 | 0.731 | 0.710 | 0.668 | 0.644 | 0.640 | 0.628 | 0.608 | 0.569 |
| | F _L | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| 3/8 Inch (9.50 mm) | C _v | 0.12 | 0.22 | 0.31 | 0.41 | 0.52 | 0.72 | 1.05 | 1.70 | 2.50 | 3.30 |
| | X _T | 0.706 | 0.689 | 0.685 | 0.652 | 0.648 | 0.624 | 0.616 | 0.608 | 0.596 | 0.584 |
| | F _L | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| 1/2 Inch (12.7 mm) | C _v | 0.21 | 0.34 | 0.51 | 0.80 | 1.22 | 1.71 | 2.40 | 3.30 | 4.43 | 5.50 |
| | X _T | 0.577 | 0.588 | 0.616 | 0.640 | 0.685 | 0.664 | 0.624 | 0.730 | 0.740 | 0.819 |
| | F _L | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| 3/4 Inch (19.1 mm) | C _v | 0.42 | 0.71 | 0.99 | 1.47 | 2.22 | 3.41 | 5.35 | 7.50 | 9.71 | 12.2 |
| | X _T | 0.655 | 0.582 | 0.654 | 0.662 | 0.653 | 0.622 | 0.685 | 0.615 | 0.748 | 0.880 |
| | F _L | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 | 0.89 |
| 1 Inch (25.4 mm) | C _v | 0.47 | 0.98 | 1.90 | 3.30 | 5.00 | 7.10 | 9.60 | 13.8 | 16.3 | 18.4 |
| | X _T | 0.586 | 0.574 | 0.607 | 0.683 | 0.654 | 0.608 | 0.694 | 0.882 | 0.734 | 0.805 |
| | F _L | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 |

Relationships of Note: $C_1 = 39.76 \sqrt{X_T}$ $C_G = C_V C_1$ $K_M = F_L^2$

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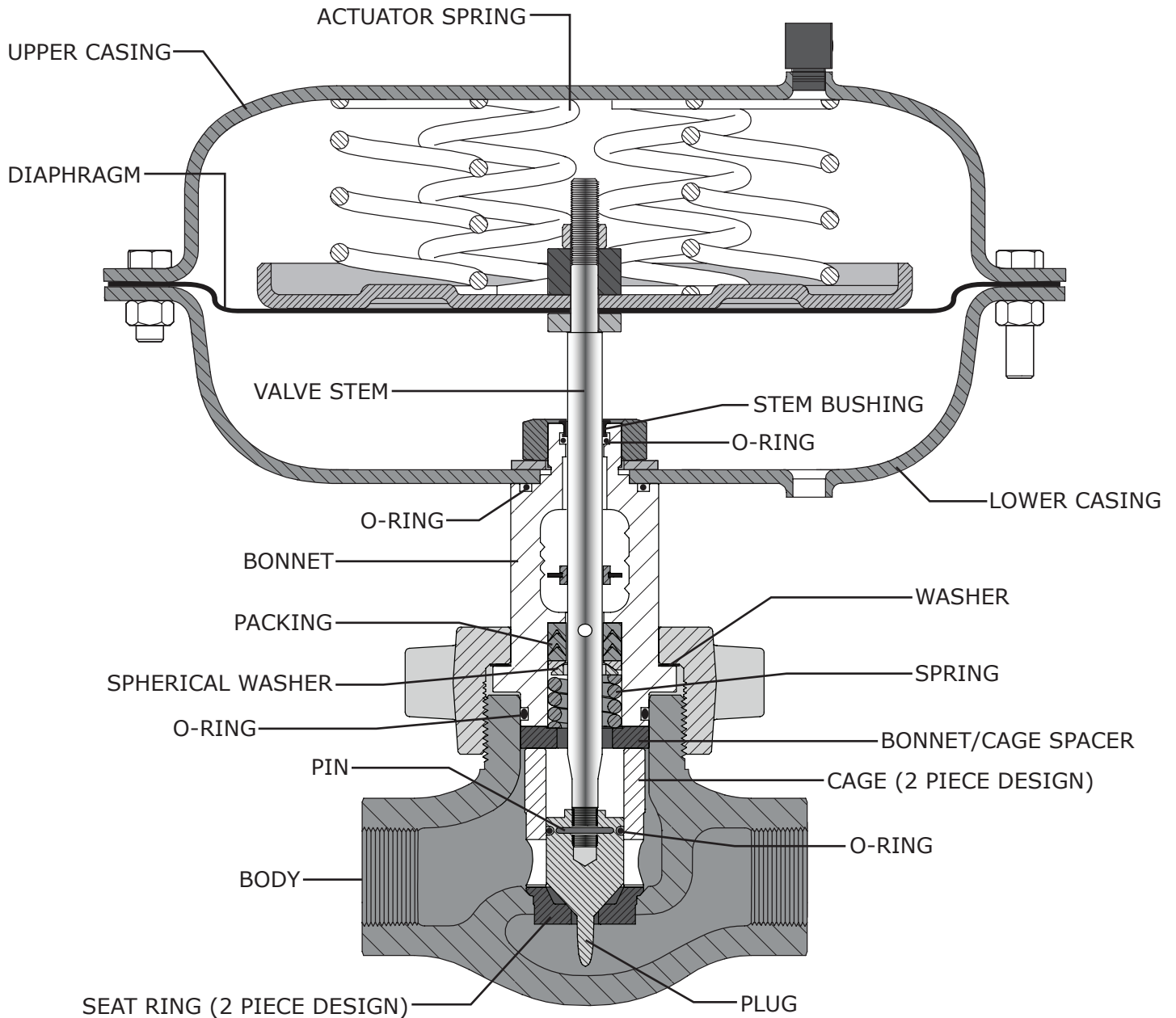


Figure 2 DF270 Fail Closed NPS 1 Inch Valve Cross Section (Discontinued 2 Piece Cage/Seat Ring Design)

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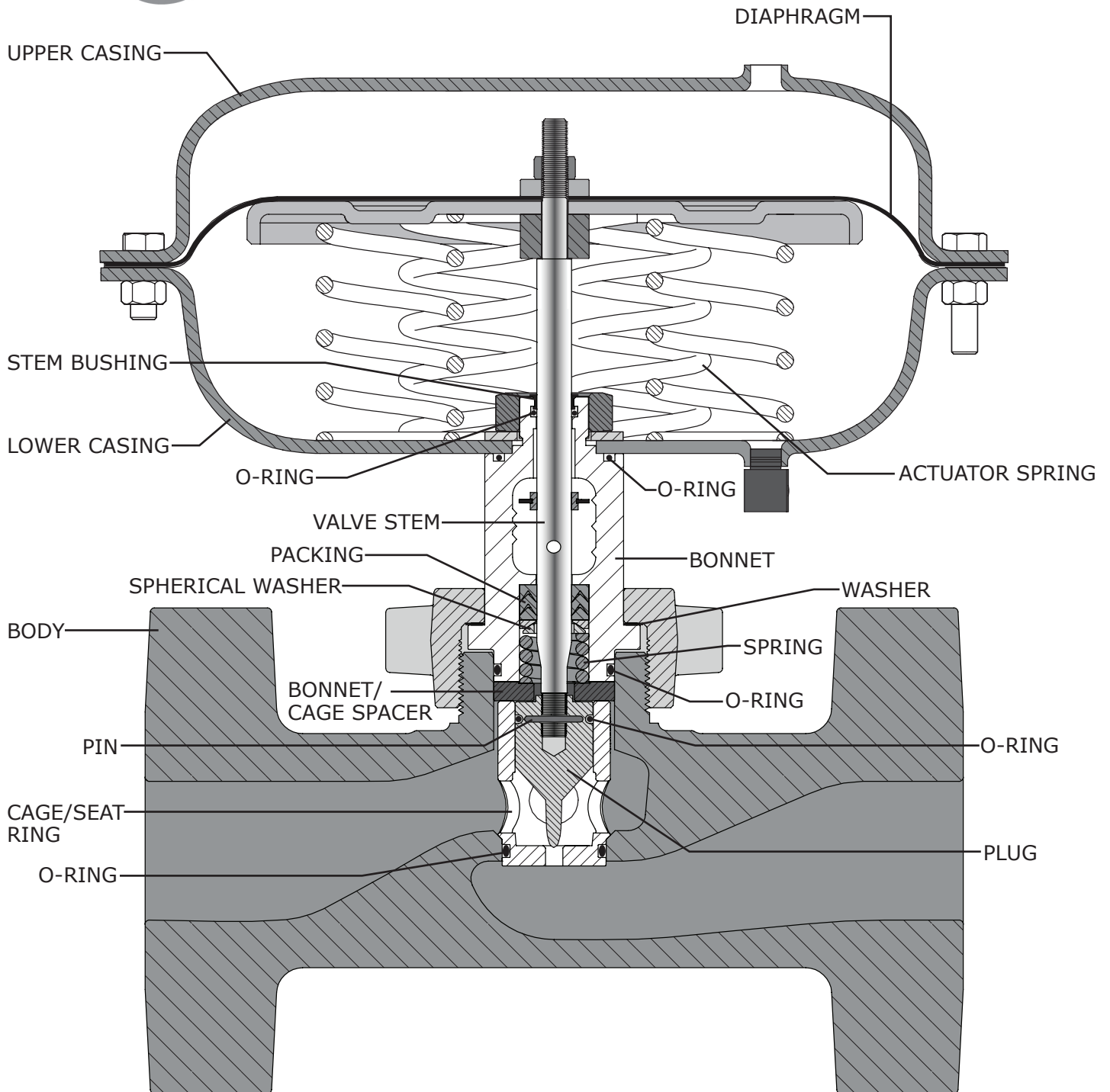


Figure 3 DF270 Fail Open 2 Inch Flanged Valve Cross Section (Standard 1 Piece Cage/Seat Ring Design)

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Table 4

| Standard Construction Materials | |
|--|--|
| Part Description | Standard Construction |
| Valve Body | LCC |
| Bonnet | LCC |
| Valve Plug | S17400 DH1150 (NACE), S31600 ⁽¹⁾ /Tungsten Carbide (optional) |
| Cage/Seat Ring (Standard 1 Piece Design) | S17400 DH1150 (NACE), S17400/Tungsten Carbide (optional) |
| Cage (Discontinued 2 Piece Design) | S17400 DH1150 (NACE), S31600 ⁽¹⁾ /Tungsten Carbide (optional) |
| Seat Ring (Discontinued 2 Piece Design) | S17400 DH1150 (NACE), S31600 ⁽¹⁾ /Tungsten Carbide (optional) |
| Valve Stem | S31600 ⁽¹⁾ |
| O-Ring | HNBR |
| | Viton (Optional) |
| Packing | PTFE/CPTFE |
| Spring | Inconel X750 |
| Valve Stem Bushing | Nylon |
| Actuator Diaphragm | Nitrile/Nylon |
| Actuator Springs | Steel/Zinc |
| Upper Casing | Steel/Zinc |
| Lower Casing | Steel/Zinc |
| Washer | S30200 |
| Pin | S31600 ⁽¹⁾ |
| Bonnet/Cage Spacer | S17400 DH1150 (NACE) |
| Spherical Washer | S31600 ⁽¹⁾ |
| NOTES: | 1 - All S31600 barstock is dual grade S31600/S31603 (316/316L) |



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| Table 5 | | | |
|--|-------------------------|-------------|------------|
| NPT, RF, and RTJ Valve Dimensions Inches (mm) | | | |
| Valve Size | Connection Style | A | B |
| 1" | FNPT | 6.25 (159) | 3.13 (80) |
| | ASME 150 RF | 7.25 (184) | 3.63 (92) |
| | ASME 300 RF | 7.75 (197) | 3.88 (99) |
| | ASME 600 RF | 8.25 (210) | 4.13 (105) |
| | ASME 900 RF | 9.38 (238) | 4.69 (119) |
| | ASME 600 RTJ | 8.25 (210) | 4.13 (105) |
| | ASME 900 RTJ | 9.38 (238) | 4.69 (119) |
| 2" | FNPT | 7.50 (191) | 3.75 (95) |
| | ASME 150 RF | 10.00 (254) | 5.00 (127) |
| | ASME 300 RF | 10.50 (267) | 5.25 (134) |
| | ASME 600 RF | 11.25 (286) | 5.63 (143) |
| | ASME 900/1500 RF | 13.38 (340) | 6.69 (170) |
| | ASME 600 RTJ | 11.38 (289) | 5.69 (145) |
| | ASME 900/1500 RTJ | 13.50 (343) | 6.75 (172) |

NOTE: Refer to Figures 4 & 5

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Figure 4 DF270 1 inch Control Valve Dimensions inch (mm)

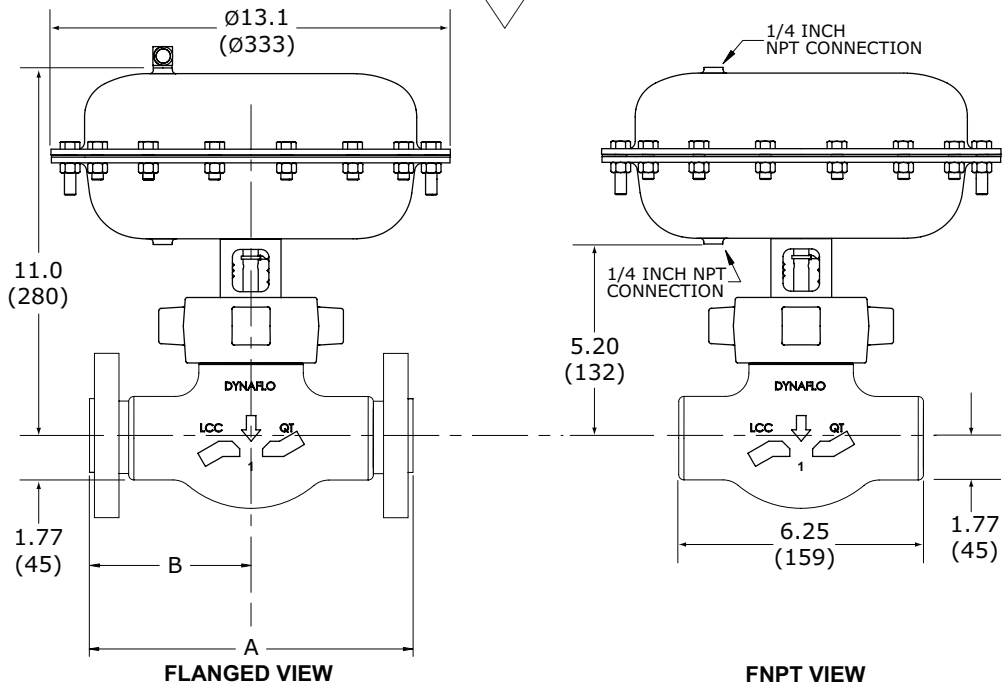
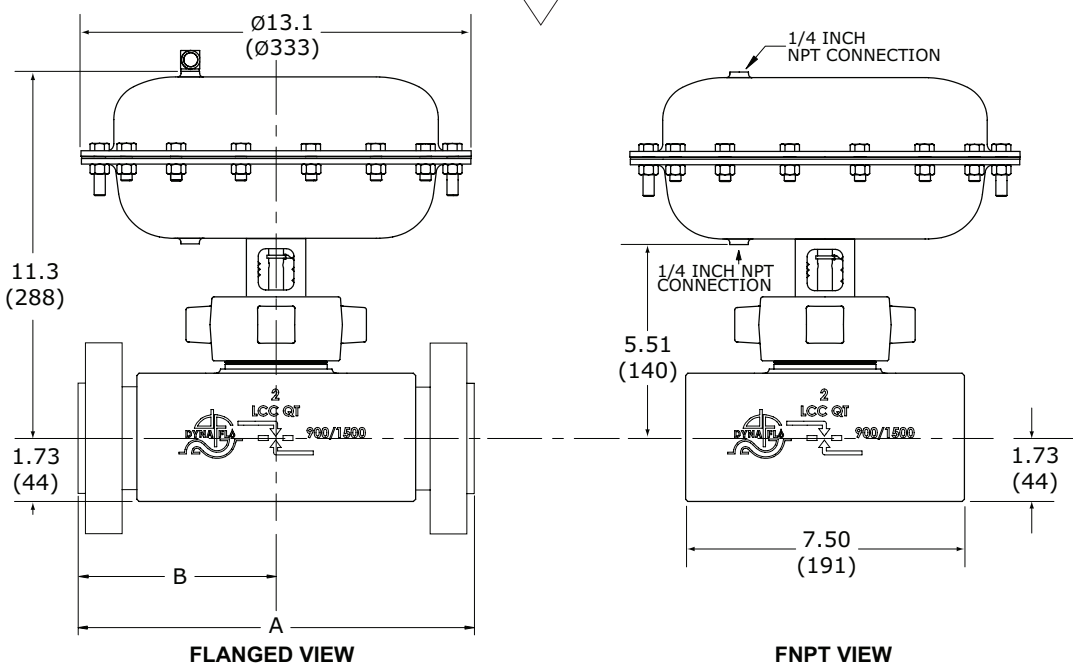


Figure 5 DF270 2 inch Control Valve Dimensions inch (mm)



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Table 6

FAIL CLOSED
Maximum Shut-off Pressure Drops⁽¹⁾ (Flow Up)

| Port Diameter inch (mm) | Input Signal 0 - 20 Psig (0 - 1.38 bar) 3 Springs | Input Signal 0 - 35 Psig (0 - 2.41 bar) 6 Springs | Input Signal 3 - 15 Psig (0.21 - 1.03 bar) 3 Springs | Input Signal 6 - 30 Psig (0.41 - 2.07 bar) 6 Springs |
|----------------------------|---|--|---|---|
| 1/4 (6.40) | 3,750 (259) | 3,750 (259) | 3,750 (259) | 3,750 (259) |
| 3/8 (9.50) | 3,750 (259) | 3,750 (259) | 1,979 (136) | 3,750 (259) |
| 1/2 (12.7) | 2,007 (139) | 3,750 (259) | 1,033 (71) | 2,386 (165) |
| 3/4 (19.1) | 803 (55) | 1,873 (123) | 388 (27) | 989 (68) |
| 1 (25.4) | 402 (28) | 1,004 (69) | 178 (12) | 516 (36) |
| NOTES: | 1 - Do not exceed the Pressure Temperature Limitations as per ASME B16.34. | | | |

Table 7

FAIL OPEN
Maximum Shut-off Pressure Drops⁽¹⁾ (Flow Up)

| Port Diameter inch (mm) | Input Signal 0 - 20 Psig (0 - 1.38 bar) 3 Springs | Input Signal 0 - 35 Psig (0 - 2.41 bar) 3 Springs | Input Signal ⁽²⁾ 3 - 15 Psig (0.21 - 1.03 bar) 3 Springs | Input Signal ⁽²⁾ 6 - 30 Psig (0.41 - 2.07 bar) 3 Springs |
|----------------------------|---|--|--|--|
| 1/4 (6.40) | 3,750 (259) | 3,750 (259) | N/A | N/A |
| 3/8 (9.50) | 3,750 (259) | 3,750 (259) | N/A | N/A |
| 1/2 (12.7) | 3,750 (259) | 3,750 (259) | N/A | N/A |
| 3/4 (19.1) | 1,412 (97) | 3,720 (256) | N/A | N/A |
| 1 (25.4) | 744 (51) | 2,062 (142) | N/A | N/A |
| NOTES: | 1 - Do not exceed the Pressure Temperature Limitations as per ASME B16.34. | | | |
| | 2 - Using a DF270 with an I/P having an output signal of 3-15 or 6-30, fail open is not recommended. The constant signal (3 or 6 Psig) to the actuator is higher than the initial set for both 3 or 6 spring configurations. This prevents the actuator from being able to fully open resulting in reduced flow rates, and possible trim damage. | | | |

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MODEL NUMBERING SYSTEM

SAMPLE PART NUMBER: DF270-1GC3-6BN-14S

| | | | | | | | | |
|-----------------------------------|---|-----------|-------------|-----------|--|----------|-----------|--------------------|
| VALVE SIZE | | | | 1 | | | | |
| 1 | 1 INCH | 2 | 2 INCH | | | | | |
| BODY STYLE | | | | G | | | | |
| G | GLOBE STYLE | | | | | | | |
| ACTUATOR STYLE | | | | C | | | | |
| C | FAIL CLOSED | O | FAIL OPENED | | | | | |
| SPRING RANGE⁽¹⁾ | | | | 3 | | | | |
| 3 | SIZE 69 ACTUATOR WITH 0-20 PSIG (0-1.38 BAR) OPERATING SIGNAL | | 6 | | SIZE 69 ACTUATOR WITH 0-35 PSIG (0-2.41 BAR) OPERATING SIGNAL | | | |
| 2 | SIZE 69 ACTUATOR WITH 3-15 PSIG (0.21-1.03 BAR) OPERATING SIGNAL | | 5 | | SIZE 69 ACTUATOR WITH 6-30 PSIG (0.41-2.07 BAR) OPERATING SIGNAL | | | |
| | | | | | | | | |
| NUMBER OF SPRINGS | | | | 6 | | | | |
| 3 | 3 SPRINGS | 6 | 6 SPRINGS | | | | | |
| ASME RATING | | | | B | | | | |
| A | 150 | B | 300 | | C | 600 | D | 900 ⁽²⁾ |
| F | 900 FNPT | | | | | | | |
| CONNECTION STYLE | | | | N | | | | |
| N | FNPT | F | RF | | J | RTJ | | |
| O-RING | | | | - | | | | |
| - | HNBR (STANDARD) [-46 to 149°C (-50 to 300°F)] | | 2 | | VITON [-18 to 204°C (-0 to 400°F)] | | | |
| TRIM SIZE | | | | 14 | | | | |
| 14 | 1/4 INCH | 38 | 3/8 INCH | | 12 | 1/2 INCH | 34 | 3/4 INCH |
| 10 | 1 INCH | | | | | | | |
| TRIM MATERIAL | | | | S | | | | |
| S | S17400 DH 1150 | | T | | TUNGSTEN CARBIDE | | | |
| NOTES | | | | | | | | |
| 1 | Using a DF270 with an I/P having an output signal of 3-15 or 6-30 PSI (0.21-1.03 or 0.41-2.07 bar), fail open is not recommended. The constant signal (3 or 6 Psig) to the actuator is higher than the initial set for both 3 or 6 spring configurations. This prevents the actuator from being able to fully open resulting in reduced flow rates, and possible trim damage. | | | | | | | |
| 2 | 2 inch flanged bodies are class 900/1500. | | | | | | | |

DF270 - - - - -