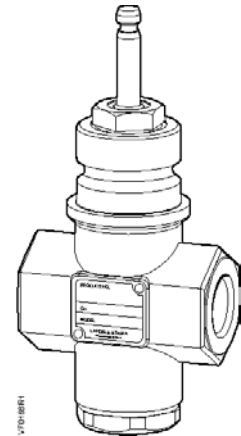


Flowrite™ 599 Series

Two-Way Valves, 1/2 to 2-inch Bronze Body, ANSI 250



| | |
|--|---|
| Description | The Flowrite 599 Series two-way valves are designed to work with either a pneumatic or electronic actuator with a 3/4-inch (20 mm) stroke. They are available in ANSI Class 250 for normally open or normally closed action. |
| Features | <ul style="list-style-type: none"> • ANSI Leakage Class IV (0.01% of Cv) • Cartridge type packing • Choice of brass or stainless steel trim • Direct-coupled universal bonnet • UFxUF connections available • Choice to two flow characteristics |
| Application | Flowrite valves are generally recommended for water, steam, and 50% water-glycol solutions. |
| Product Numbers | See Tables 1 and 2. |
| Ordering a Valve Plus Actuator Assembly | <p>To order a complete valve plus actuator assembly from the factory, combine the actuator prefix code with the suffix of the valve assembly product number. See <i>Flowrite Technical Bulletins</i> (155-772 and 155-776) for complete selection procedure and ordering codes.</p> <p>Valve assemblies can be ordered using the numbers in Tables 1 and 2.</p> |

| | | | | |
|--|-------------------------------|--|---|--|
| Specifications | Line size | 1/2 to 2-inches (15 to 50 mm) | | |
| | Capacity | See Tables 3 through 6 and Figure 3 | | |
| Material | Body style | Globe style control valve with four connection options | | |
| | | See Tables 1 and 2 | | |
| | Seat style | Single seat, metal-to-metal | | |
| | Action | Normally Open (NO) Normally Closed (NC) | | |
| | Stem travel (stroke) | 3/4-inch (20 mm) | | |
| | Valve body rating | ANSI Class 250; see Table 7 | | |
| | Body | UNS CA 844 bronze | | |
| | Body trim | See Tables 1 and 2 | | |
| | Stem | Stainless steel ASTM A582 Type 303 | | |
| | Packing | | | |
| | Normal duty packing | EPDM O-ring | | |
| | Steam packing | Teflon® V-ring | | |
| | Operating | Controlled medium | Saturated steam, water, 50% water-glycol solutions | |
| Medium temperature range | | | | |
| Normal duty packing | | 20°F to 250°F (-7°C to 120°C) | | |
| Steam packing | | 337°F (170°C) maximum | | |
| Maximum inlet pressure | | | | |
| Water | | See Table 7 | | |
| Steam | | 100 psig (690 kPa) | | |
| Maximum recommended differential pressure for modulating service | | | | |
| | | Brass trim | Stainless steel trim | |
| Liquid | | 25 psi (173 kPa) | 50 psi (345 kPa) | |
| Steam | | 15 psi (103 kPa) | 50 psi (345 kPa) | |
| Rangeability | | >100:1 | | |
| Close-off pressures | | See Tables 8, 9 and 10 and Figure 4 | | |
| Close-off ratings | According to ANSI/FCI 70-2 | | | |
| Leakage rate | Class IV (0.01% of Cv) | | | |
| Flow characteristics | See Tables 1 and 2 | | | |
| Mounting location | NEMA 1 (interior only) | | | |
| Miscellaneous | Canadian Registration Numbers | 0H7645.5 0C0838.9 | | |
| | Dimensions | See Tables 11 and 12 and Figure 6 | | |
| | Valve Weight | See Table 14 | | |

Accessories

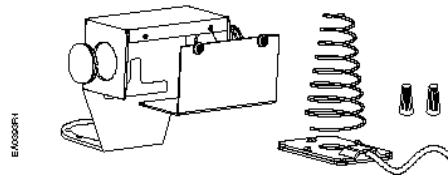


Figure 1. Packing Heating Element For Use with SKD and SQX Actuators.

599-00417 Packing heating element.

The heater allows the stem to move freely in valves that control fluids at temperatures below 32°F (0°C). It reduces ice crystal formation on the stem, which can damage the packing.

| | |
|-------------------|--------|
| Operating Voltage | 24 Vac |
| Heating Output | 20W |

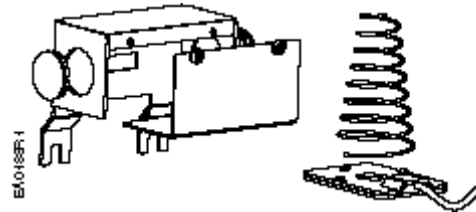


Figure 2. Packing Heating Element For Use with SKB/C and 8-inch Actuators.

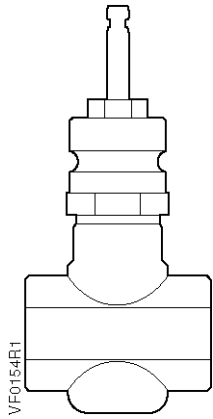
599-00418: Packing heating element.

The element allows the stem to move freely in valves that control fluids at temperatures below 32°F (0°C). It prevents ice crystal formation on the stem, which can damage the packing.

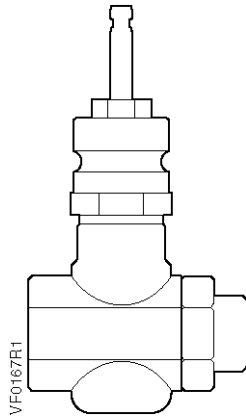
| | |
|-------------------|--------|
| Operating Voltage | 24 Vac |
| Heating Output | 20W |

Service Kits

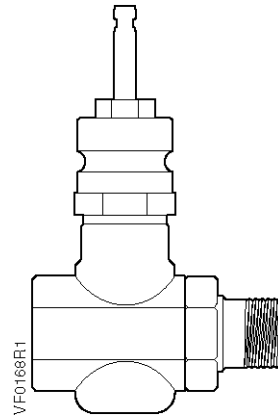
| | |
|---|----------------------|
| Valve packing kit | |
| Normal duty packing | 599-03390 |
| Steam packing | 599-03391 |
| Rebuild/repack kits | See Tables 15 and 16 |
| Sealing rings for union valves (package of 25) | |
| 1/2-inch (15 mm) | 599-03394 |
| 3/4-inch (20 mm) | 599-03395 |
| 1 inch (25 mm) | 599-03396 |
| 1-1/4 inch (32 mm) | 599-03397 |
| 1-1/2 inch (40 mm) | 599-03398 |
| 2 inch (50 mm) | 599-03399 |
| Union Tailpiece kit (one tailpiece, one union nut, one gasket.) | |
| 1/2-inch (15 mm) male | 599-09181 |
| 3/4-inch (20 mm) male | 599-09182 |
| 1 inch (25 mm) male | 599-09183 |
| 1-1/4 inch (32 mm) male | 599-09184 |
| 1/2-inch (40 mm) female | 599-09185 |
| 3/4-inch (20 mm) female | 599-09186 |
| 1 inch (25 mm) female | 599-09187 |
| 1-1/4 inch (32 mm) female | 599-09188 |
| 1-1/2 inch (40 mm) female | 599-09189 |
| 2 inch (50 mm) female | 599-09190 |



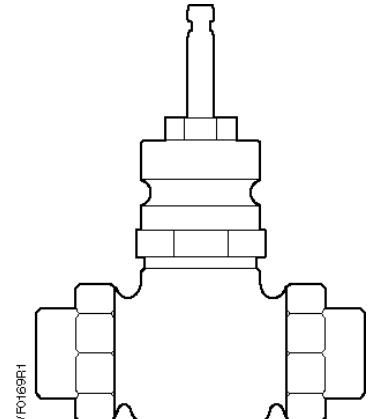
Female NPT x Female NPT FxF



Female NPT x Union Female FxUF



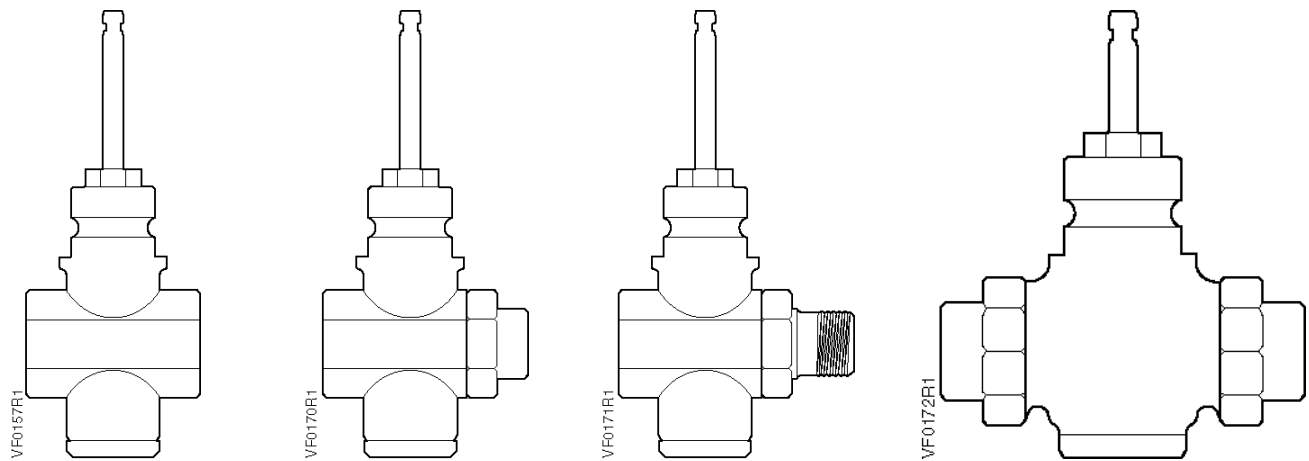
Female NPT x Union Male FxUM



Union Female x Union Female UFxUF

Table 1. Normally Open Valves.

| Flow Rate | | Nominal Line Size | | Connection | Equal Percentage | | Linear | |
|----------------|--------------------|-------------------|------|------------|----------------------|------------|----------------------|---------------|
| | | | | | Stainless Steel Trim | Brass Trim | Stainless Steel Trim | |
| C _v | (K _{vs}) | inch | (mm) | | Normal Duty Packing | | Normal Duty Packing | Steam Packing |
| | | | | | | | | |
| 1 | (0.85) | 1/2 | (15) | FxF | 599-03108 | 599-03162 | 599-03000 | 599-03054 |
| | | | | FxUF | 599-03117 | 599-03171 | 599-03009 | 599-03063 |
| | | | | FxUM | 599-03252 | 599-03270 | 599-03216 | 599-03234 |
| 1.6 | (1.37) | 1/2 | (15) | FxF | 599-03109 | 599-03163 | 599-03001 | 599-03055 |
| | | | | FxUF | 599-03118 | 599-03172 | 599-03010 | 599-03064 |
| | | | | FxUM | 599-03253 | 599-03271 | 599-03217 | 599-03235 |
| 2.5 | (2.15) | 1/2 | (15) | FxF | 599-03110 | 599-03164 | 599-03002 | 599-03056 |
| | | | | FxUF | 599-03119 | 599-03173 | 599-03001 | 599-03065 |
| | | | | FxUM | 599-03254 | 599-03272 | 599-03218 | 599-03236 |
| 4 | (3.44) | 1/2 | (15) | FxF | 599-03111 | 599-03165 | 599-03003 | 599-03057 |
| | | | | FxUF | 599-03120 | 599-03174 | 599-03012 | 599-03066 |
| | | | | FxUM | 599-03255 | 599-03273 | 599-03219 | 599-03237 |
| 6.3 | (5.43) | 3/4 | (20) | FxF | 599-03112 | 599-03166 | 599-03004 | 599-03058 |
| | | | | FxUF | 599-03121 | 599-03175 | 599-03013 | 599-03067 |
| | | | | FxUM | 599-03256 | 599-03274 | 599-03220 | 599-03238 |
| 10 | (8.6) | 1 | (25) | FxF | 599-03113 | 599-03167 | 599-03005 | 599-03059 |
| | | | | FxUF | 599-03122 | 599-03176 | 599-03014 | 599-03068 |
| | | | | FxUM | 599-03257 | 599-03275 | 599-03221 | 599-03239 |
| 16 | (13.8) | 1-1/4 | (32) | FxF | 599-03114 | 599-03168 | 599-03006 | 599-03060 |
| | | | | UFxUF | 599-03123 | 599-03177 | 599-03015 | 599-03069 |
| | | | | FxUM | — | 599-03276 | — | — |
| 25 | (21.5) | 1-1/2 | (40) | FxF | 599-03115 | 599-03169 | 599-03007 | 599-03061 |
| | | | | UFxUF | 599-03124 | 599-03178 | 599-03016 | 599-03070 |
| 40 | (34.4) | 2 | (50) | FxF | 599-03116 | 599-03170 | 599-03008 | 599-03062 |
| | | | | UFxUF | 599-03125 | 599-03179 | 599-03017 | 599-03071 |



Female NPT x Female NPT FxF

Female NPT x Union Female FxUF

Female NPT x Union Male FxUM

Union Female x Union Female UFxUF

Table 2. Normally Closed Valves.

| Flow Rate | | Nominal Line Size | | Connection | Equal Percentage | | Linear | |
|-----------|--------|-------------------|------|------------|---------------------|------------|----------------------|---------------|
| | | | | | Stl. Steel Trim | Brass Trim | Stainless Steel Trim | |
| Cv | (Kvs) | Inch | (mm) | | Normal Duty Packing | | Normal Duty Packing | Steam Packing |
| 1 | (0.85) | 1/2 | (15) | FxF | 599-03126 | 599-03180 | 599-03018 | 599-03072 |
| | | | | FxUF | 599-03135 | 599-03189 | 599-03027 | 599-03081 |
| | | | | FxUM | 599-03261 | 599-03279 | 599-03225 | 599-03243 |
| 1.6 | (1.37) | 1/2 | (15) | FxF | 599-03127 | 599-03181 | 599-03019 | 599-03073 |
| | | | | FxUF | 599-03136 | 599-03190 | 599-03028 | 599-03082 |
| | | | | FxUM | 599-03262 | 599-03280 | 599-03226 | 599-03244 |
| 2.5 | (2.15) | 1/2 | (15) | FxF | 599-03128 | 599-03182 | 599-03020 | 599-03074 |
| | | | | FxUF | 599-03137 | 599-03191 | 599-03029 | 599-03083 |
| | | | | FxUM | 599-03263 | 599-03281 | 599-03227 | 599-03245 |
| 4 | (3.44) | 1/2 | (15) | FxF | 599-03129 | 599-03183 | 599-03021 | 599-03075 |
| | | | | FxUF | 599-03138 | 599-03192 | 599-03030 | 599-03084 |
| | | | | FxUM | 599-03264 | 599-03282 | 599-03228 | 599-03246 |
| 6.3 | (5.43) | 3/4 | (20) | FxF | 599-03130 | 599-03184 | 599-03022 | 599-03076 |
| | | | | FxUF | 599-03139 | 599-03193 | 599-03031 | 599-03085 |
| | | | | FxUM | 599-03265 | 599-03283 | 599-03229 | 599-03247 |
| 10 | (8.6) | 1 | (25) | FxF | 599-03131 | 599-03185 | 599-03023 | 599-03077 |
| | | | | FxUF | 599-03140 | 599-03194 | 599-03032 | 599-03086 |
| | | | | FxUM | 599-03266 | 599-03284 | 599-03230 | 599-03248 |
| 16 | (13.8) | 1-1/4 | (32) | FxF | 599-03132 | 599-03186 | 599-03024 | 599-03078 |
| | | | | UFxUF | 599-03141 | 599-03195 | 599-03033 | 599-03087 |
| 25 | (21.5) | 1-1/2 | (40) | FxF | 599-03133 | 599-03187 | 599-03025 | 599-03079 |
| | | | | UFxUF | 599-03142 | 599-03196 | 599-03034 | 599-03088 |
| 40 | (34.4) | 2 | (50) | FxF | 599-03134 | 599-03188 | 599-03026 | 599-03080 |
| | | | | UFxUF | 599-03143 | 599-03197 | 599-03035 | 599-03089 |

Table 3. Maximum Water Capacity - U.S. Gallons per Minute.

| Valve Size in inches | Pressure Differential - psi | | | | | | | | | | | | | | | |
|----------------------|-----------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| | Cv\1 | 2 | 3 | 4 | 5 | 6 | 8 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 75 |
| 1/2 | 1.0 | 1.4 | 1.7 | 2.0 | 2.2 | 2.5 | 2.8 | 3.2 | 3.9 | 4.5 | 5.0 | 5.5 | 6.3 | 7.1 | 7.8 | 8.7 |
| | 1.6 | 2.3 | 2.8 | 3.2 | 3.6 | 3.9 | 4.5 | 5.1 | 6.2 | 7.2 | 8.0 | 8.8 | 10.1 | 11.3 | 12.4 | 13.9 |
| | 2.5 | 3.5 | 4.3 | 5.0 | 5.6 | 6.1 | 7.1 | 7.9 | 9.7 | 11.2 | 12.5 | 13.7 | 15.8 | 17.7 | 19.4 | 22 |
| | 4 | 5.7 | 7 | 8.0 | 8.9 | 10 | 11.3 | 12.6 | 15.5 | 17.9 | 20.0 | 21.9 | 25 | 28 | 31 | 35 |
| 3/4 | 6 | 8.9 | 10.9 | 12.6 | 14.1 | 15.4 | 17.8 | 20 | 24 | 28 | 32 | 35 | 40 | 45 | 49 | 55 |
| 1 | 10 | 14.1 | 17.3 | 20 | 22 | 24 | 28 | 32 | 39 | 45 | 50 | 55 | 63 | 71 | 77 | 87 |
| 1-1/4 | 16 | 23 | 28 | 32 | 36 | 39 | 45 | 51 | 62 | 72 | 80 | 88 | 101 | 113 | 124 | 139 |
| 1-1/2 | 25 | 35 | 43 | 50 | 56 | 61 | 71 | 79 | 97 | 112 | 125 | 137 | 158 | 177 | 194 | 217 |
| 2 | 40 | 57 | 69 | 80 | 89 | 98 | 113 | 126 | 155 | 179 | 200 | 219 | 253 | 283 | 310 | 346 |

Table 4. Maximum Water Capacity - Cubic Meters per Hour (m³/hr).

| Valve Size inches mm | Pressure Differential - kPa | | | | | | | | | | | | | | |
|----------------------|-----------------------------|------|------|------|------|------|------|------|---------|------|------|------|------|------|--|
| | 1 | 10 | 20 | 30 | 40 | 50 | 60 | 80 | Kvs/100 | 150 | 200 | 300 | 400 | 500 | |
| 15 | 0.09 | 0.3 | 0.4 | 0.5 | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 | 1.0 | 1.2 | 1.5 | 1.7 | 1.9 | |
| | 0.14 | 0.4 | 0.6 | 0.8 | 0.9 | 1.0 | 1.1 | 1.2 | 1.4 | 1.7 | 1.9 | 2.4 | 2.7 | 3.1 | |
| | 0.2 | 0.7 | 1.0 | 1.2 | 1.4 | 1.5 | 1.7 | 1.9 | 2.2 | 2.6 | 3.0 | 3.7 | 4.3 | 4.8 | |
| | 0.3 | 1.1 | 1.5 | 1.9 | 2.2 | 2.4 | 2.7 | 3.1 | 3.4 | 4.2 | 4.9 | 6.0 | 6.9 | 7.7 | |
| 20 | 0.5 | 1.7 | 2.4 | 3.0 | 3.4 | 3.8 | 4.2 | 4.9 | 5.4 | 6.7 | 7.7 | 9.4 | 10.9 | 12.1 | |
| 25 | 0.9 | 2.7 | 3.8 | 4.7 | 5.4 | 6.1 | 6.7 | 7.7 | 8.6 | 10.5 | 12.2 | 14.9 | 17.2 | 19.2 | |
| 32 | 1.4 | 4.4 | 6.2 | 7.6 | 8.7 | 9.8 | 10.7 | 12.3 | 13.8 | 16.9 | 19.5 | 23.9 | 27.6 | 30.9 | |
| 40 | 2.2 | 6.8 | 9.6 | 11.8 | 13.6 | 15.2 | 16.7 | 19.2 | 22 | 26 | 30 | 37 | 43 | 48 | |
| 50 | 3.4 | 10.9 | 15.4 | 18.8 | 22 | 24 | 27 | 31 | 34 | 42 | 49 | 60 | 69 | 77 | |

Table 5. Steam Capacity - Pounds per Hour.

| Line Size inches | Inlet Pressure - psig | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|------------------|-----------------------------|------|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|--|--|--|-----|--|--|--|
| | 2 | | | | 5 | | | | 10 | | | | 5 | | | | 25 | | | | 50 | | | | 75 | | | | 100 | | | |
| | Pressure Differential - psi | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 8 | 10 | 9 | 12 | 15 | 5 | 15 | 20 | 15 | 30 | 32.5 | 20 | 30 | 40 | 45 | 30 | 40 | 50 | 57.5 | | | | | | | |
| 1/2 | 12.0 | 16.6 | 22 | 25 | 28 | 34 | 38 | 42 | 45 | 50 | 54 | 41 | 65 | 72 | 87 | 115 | 118 | 119 | 141 | 157 | 163 | 162 | 183 | 199 | 209 | | | | | | | |
| | 19.1 | 27 | 35 | 40 | 44 | 54 | 61 | 67 | 72 | 80 | 86 | 65 | 104 | 116 | 139 | 183 | 188 | 109 | 225 | 251 | 261 | 260 | 292 | 318 | 334 | | | | | | | |
| | 30 | 42 | 55 | 62 | 69 | 85 | 96 | 104 | 112 | 125 | 135 | 101 | 163 | 181 | 217 | 287 | 294 | 296 | 351 | 392 | 408 | 406 | 457 | 497 | 522 | | | | | | | |
| | 48 | 67 | 88 | 100 | 110 | 136 | 153 | 167 | 179 | 200 | 216 | 162 | 261 | 289 | 348 | 459 | 471 | 474 | 562 | 627 | 653 | 650 | 731 | 796 | 835 | | | | | | | |
| 3/4 | 75 | 105 | 138 | 157 | 174 | 213 | 241 | 263 | 282 | 316 | 341 | 255 | 411 | 455 | 548 | 722 | 742 | 747 | 886 | 988 | 1029 | 1023 | 1152 | 1253 | 1315 | | | | | | | |
| 1 | 120 | 166 | 219 | 250 | 275 | 339 | 382 | 417 | 447 | 501 | 541 | 405 | 653 | 723 | 870 | 1147 | 1178 | 1186 | 1406 | 1568 | 1633 | 1624 | 1828 | 1989 | 2088 | | | | | | | |
| 1-1/4 | 191 | 266 | 351 | 400 | 441 | 542 | 611 | 667 | 716 | 801 | 865 | 648 | 1044 | 1156 | 1392 | 1835 | 1884 | 1897 | 2249 | 2509 | 2612 | 2599 | 2925 | 3182 | 3340 | | | | | | | |
| 1-1/2 | 299 | 416 | 549 | 625 | 689 | 847 | 955 | 1042 | 1118 | 1252 | 1351 | 1013 | 1632 | 1806 | 2175 | 2867 | 2944 | 2964 | 3515 | 3920 | 4081 | 4061 | 4570 | 4972 | 5219 | | | | | | | |
| 2 | 478 | 666 | 878 | 1000 | 1102 | 1356 | 1529 | 1667 | 1789 | 2003 | 2162 | 1620 | 2611 | 2890 | 3480 | 4587 | 4710 | 4743 | 5624 | 6272 | 6530 | 6497 | 7311 | 7956 | 8350 | | | | | | | |

Table 6. Steam Capacity - Kilograms per Hour.

| Line Size mm | Inlet Pressure - kPa | | | | | | | | | | | | | | | |
|--------------|-----------------------------|------|-------|------|------|------|-------|-------|-------|-------|-------|--------|-----|--|--|--|
| | 100 | | | | 150 | | | | 200 | | | | 500 | | | |
| | Pressure Differential - kPa | | | | | | | | | | | | | | | |
| | 10 | 20 | 50 | 15 | 30 | 75 | 20 | 40 | 100 | 50 | 100 | 250 | | | | |
| 15 | 6.04 | 8.54 | 13.50 | 9.07 | 12.8 | 20.2 | 12.11 | 17.13 | 27.08 | 30.3 | 42.9 | 67.8 | | | | |
| | 9.66 | 13.6 | 21.61 | 14.5 | 20.5 | 32.4 | 19.37 | 27.40 | 43.32 | 48.51 | 68.60 | 108.47 | | | | |
| | 15 | 21 | 34 | 23 | 32 | 51 | 30 | 43 | 68 | 76 | 107 | 169 | | | | |
| | 24 | 34 | 54 | 36 | 51 | 81 | 48 | 69 | 108 | 121 | 172 | 271 | | | | |
| 20 | 38 | 54 | 85 | 57 | 81 | 128 | 76 | 108 | 171 | 191 | 270 | 427 | | | | |
| 25 | 60 | 85 | 135 | 91 | 128 | 203 | 121 | 171 | 271 | 303 | 429 | 678 | | | | |
| 32 | 97 | 137 | 216 | 145 | 205 | 325 | 194 | 274 | 433 | 485 | 686 | 1085 | | | | |
| 40 | 151 | 214 | 338 | 227 | 321 | 507 | 303 | 428 | 677 | 758 | 1072 | 1695 | | | | |
| 50 | 242 | 342 | 540 | 363 | 513 | 812 | 484 | 685 | 1083 | 1213 | 1715 | 2712 | | | | |

Table 7. Body Temperature-Pressure Rating.

| Valve Body | Temperature | | Pressure |
|------------|-------------|-------------|------------|
| | °F | °C | psig (kPa) |
| Bronze | -20 to +150 | (-30 to 66) | 400 (2758) |
| | +200 | (93) | 385 (2655) |
| | +250 | (121) | 365 (2586) |
| | +300 | (149) | 335 (2300) |
| | +350 | (177) | 300 (2068) |

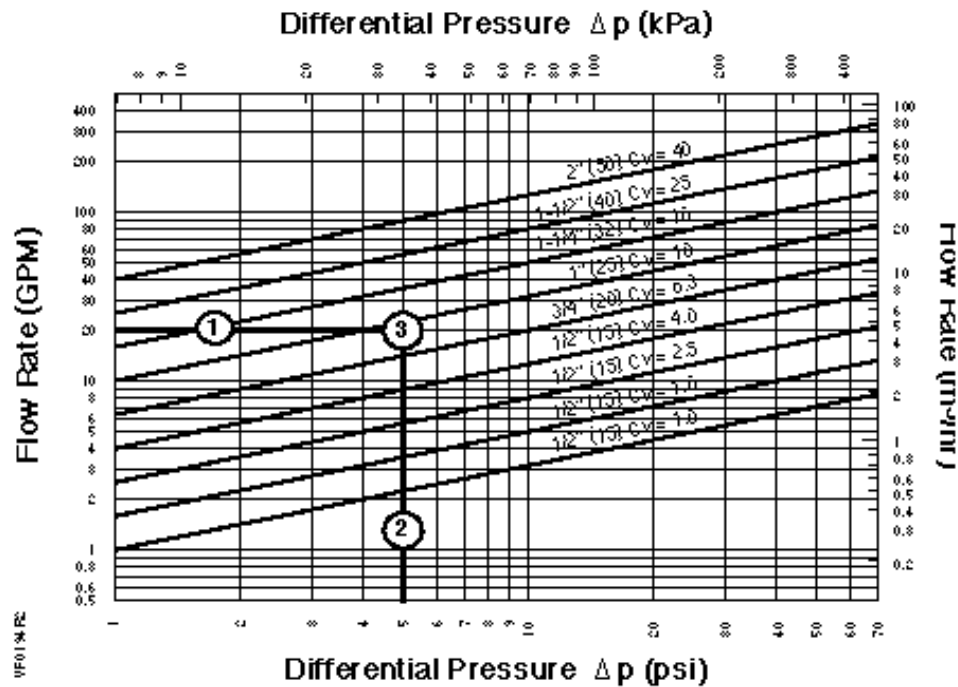


Figure 3. Water Capacity Graph.

Selection Example

Select a valve given:

1. Required flow = 20 gpm.
2. Desired pressure drop = 5 psi.
3. Select a 1-inch (25 mm) valve, Cv 10.

Table 8. Maximum Available Close-off Pressures for Pneumatic Actuators, with Normally Open Valves.

| Action | Valve Size Inch (mm) | Spring Range | | | | | 10 to 15 psi (69 to 103 kPa) | | |
|-----------------|----------------------------|----------------------------|---------------------|---------------------|---------------------|---------------------|------------------------------|--------------------|---------------------|
| | | 3 to 8 psi (21 to 55 kPa) | | | | | 4-Inch Actuator | 8-Inch Actuator | 12-Inch Actuator |
| | | 4-Inch Actuator | 8-Inch Actuator | | 12-Inch Actuator | | | | |
| | | 15 psi (103 kPa) | 15 psi (103 kPa) | 30 psi (207 kPa) | 15 psi (103 kPa) | 30 psi (207 kPa) | 0 psi (0 kPa) | 0 psi (0 kPa) | 0 psi (0 kPa) |
| Normally Open | 1/2 (15) | 142 (979) | 250 (1724) | 250 (1724) | — | — | — | — | — |
| | 3/4 (20) | 80 (552) | 231 (1593) | 250 (1724) | — | — | — | — | — |
| | 1 (25) | 52 (359) | 150 (1034) | 250 (1724) | 250 (1724) | 250 (1724) | — | — | — |
| | 1-1/4 (32) | 32 (221) | 93 (641) | 250 (1724) | 250 (1724) | 250 (1724) | — | — | — |
| | 1-1/2 (40) | 20 (138) | 60 (414) | 198 (1365) | 205(1413) | 250 (1724) | — | — | — |
| | 2 (50) | 12 (83) | 37 (255) | 123 (848) | 130 (896) | 250 (1724) | — | — | — |
| Normally Closed | 1/2 (15) | — | — | — | — | — | 236 (1627) | 250 (1724) | — |
| | 3/4 (20) | — | — | — | — | — | 155 (1069) | 250 (1724) | — |
| | 1 (25) | — | — | — | — | — | 91 (627) | 250 (1724) | 250 (1724) |
| | 1-1/4 (32) | — | — | — | — | — | 52 (359) | 148 (1020) | 250 (1724) |
| | 1-1/2 (40) | — | — | — | — | — | 32 (331) | 92 (634) | 250 (1724) |
| | 2 (50) | — | — | — | — | — | 20 (138) | 55 (379) | 185 (1776) |

Table 9. Close-off Pressures for Electronic Actuators.

| Action | Valve Size Inches (mm) | SQX psi (kPa) | Rack & Pinion psi (kPa) | SKD psi (kPa) | SKB psi (kPa) |
|-----------------|------------------------------|------------------|-------------------------------|------------------|------------------|
| Normally Open | 1/2 (15) | 250 (1724) | 250 (1724) | 250 (1724) | 250 (1724) |
| | 3/4 (20) | 173 (1193) | 231 (1593) | 250 (1724) | 250 (1724) |
| | 1 (25) | 112 (772) | 149 (1028) | 201 (1386) | 250 (1724) |
| | 1-1/4 (32) | 69 (476) | 92 (634) | 124 (855) | 250 (1724) |
| | 1-1/2(40) | 44 (303) | 59 (407) | 80 (552) | 250 (1724) |
| | 2 (50) | 27 (186) | 36 (248) | 49 (338) | 201 (1386) |
| Normally Closed | 1/2 (15) | 250 (1724) | 250 (1724) | 250 (1724) | 250 (1724) |
| | 3/4 (20) | 221 (1524) | 250 (1724) | 250 (1724) | 250 (1724) |
| | 1 (25) | 130 (896) | 173 (1193) | 203 (1400) | 250 (1724) |
| | 1-1/4 (32) | 75 (517) | 100 (690) | 117 (807) | 250 (1724) |
| | 1-1/2(40) | 46 (317) | 61 (421) | 73 (503) | 208 (1334) |
| | 2 (50) | 28 (193) | 37 (255) | 44 (303) | 126 (869) |

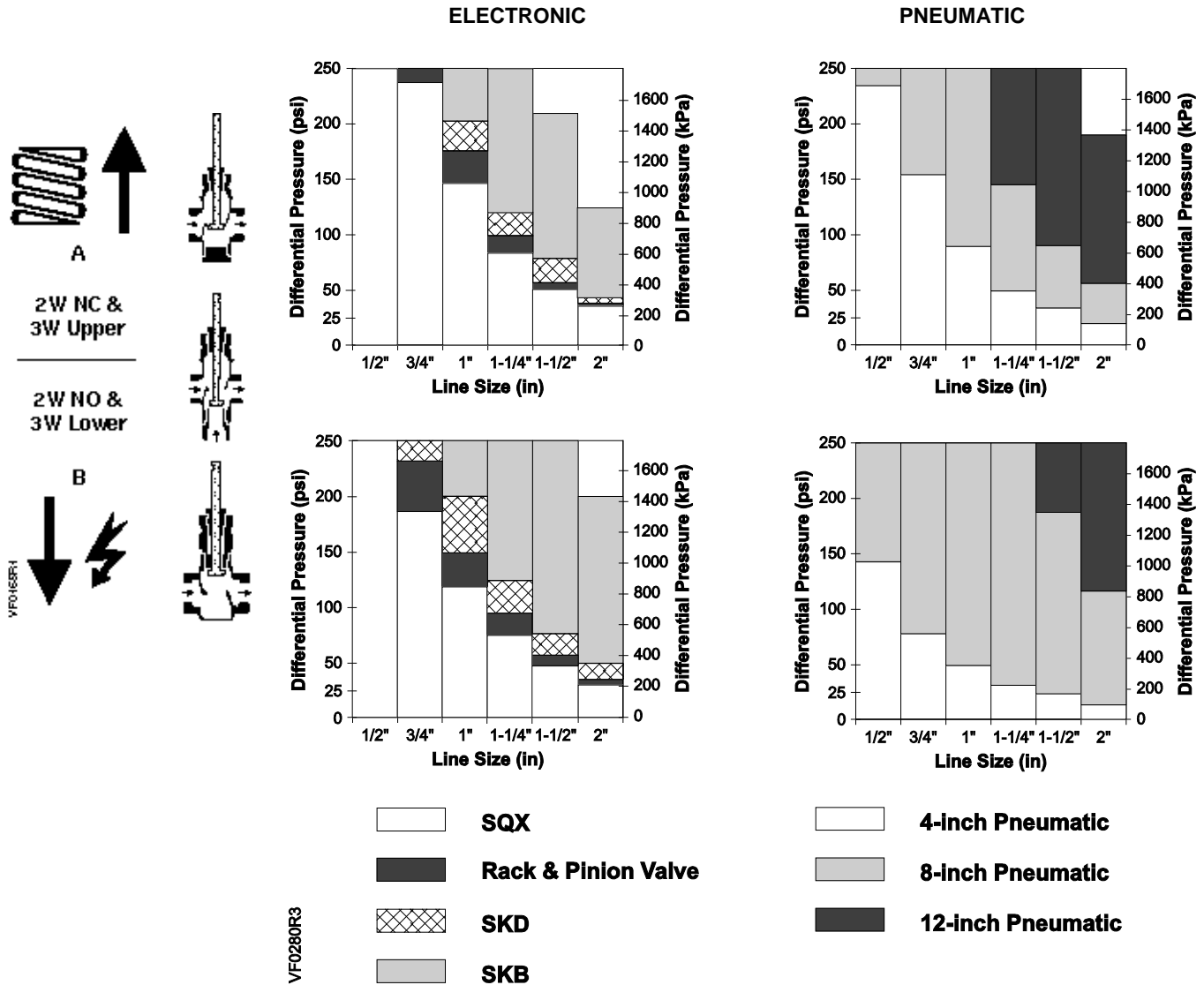


Figure 4. Close-off Pressures.

Operation

Figure 5 shows the normally open valve in the open or full flow position and the normally closed valve in the closed or zero flow position. The actuator spring provides the necessary force to hold the stem in the raised or normal position.

In the event of power failure, a spring return actuator returns the valve to its normal position. Non-spring return actuators will hold the last commanded position. See the *Technical Instructions* of the various actuators for additional information.

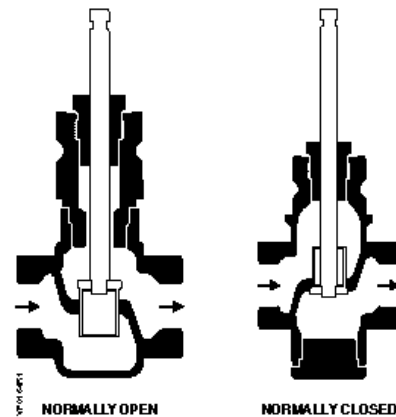


Figure 5.

Sizing

The sizing of a valve is important for correct system operation. An undersized valve will not have sufficient capacity at maximum load. An oversized valve can initiate cycling and the seat and throttling plug can be damaged because of the restricted opening. Correct sizing of the control valve for *actual expected conditions* is considered essential for good control.

The following variables must be determined:

- The medium to be controlled, such as steam, water, etc.
- The maximum inlet temperature and pressure of the medium at the valve.
- The pressure differential that will exist across the valve under maximum load demand.
- The maximum capacity the valve must deliver.
- The maximum line pressure differential the valve actuator must close against.
- See the *Control Valve Selection and Sizing (AB-1) section of HVAC Systems/Controls Reference Data (125-1853)* for further recommendations.
- See Tables 3 through 6 for valve capacities.

Mounting and Installation

- Install the valve so that the flow follows the direction of the arrow indicated on the valve body.
- For best performance, install the valve assembly with the actuator above the valve body. The valve and actuator can be installed in any position between vertical and horizontal. Siemens Building Technologies does not recommend installing the valve assembly so that the actuator is below horizontal or upside down.
- Allow sufficient space for servicing the valve and actuator. See Table 12 for valve body dimensions. See Figure 6 and Table 11 for dimensions of the service envelope recommended around the actuator.

NOTE: Instructions for field mounting an actuator, wiring diagrams, and start-up are covered in the Technical Instructions and Installation Instructions for each actuator.

Dimensions, continued

The letters in Figure 6 refer to actuator and service envelope dimensions in Table 11. See Table 12 for valve body dimensions.

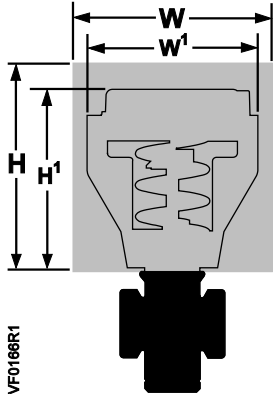


Figure 6.

Table 10. Dimensions of the Actuator and Recommended Service Envelope. Dimensions in Inches (Millimeters).

| Actuator | Actuator Prefix Code | Actual Height of Actuator H1 | Service Height H | Actual Width or Diameter of Actuator W1 | Service Width W |
|-------------------|----------------------|------------------------------|------------------|--|-----------------|
| 4-inch Pneumatic | 268, 269 270 | 5-3/4 (146) | 14 (350) | 5-1/2 (137) diameter | 18 (450) |
| 8-inch Pneumatic | 277, 278 283, 284 | 14-1/8 (359) | 26 (660) | 8-3/4 (222) diameter | 21 (533) |
| 12-inch Pneumatic | 279, 285 | 17-7/8 (454) | 30 (762) | 15-1/8 (384) diameter | 27 (686) |
| SQX | 271, 272 273 | 8-7/8 (226) | 17 (430) | 5-17/32 (140) Width 4-3/8 (111) Depth | 13-1/2 (340) |
| Rack and Pinion | 298, 299 | 14-1/2 (368) | 24-1/2 (622) | 5 (127) Width* 5-1/8 (131) Depth | 13 (331) |
| SKD | 274, 275 276 | 11-13/16 (300) | 19-3/4 (500) | 5 (127) Width 6-5/8 (169) Depth | 14-1/2 (360) |
| SKB | 289, 291, 290 | 14-3/4 (375) | 22-3/4 (578) | 7 (178) Width x 8-15/16 (226) Depth | 25 (635) |

**Dimensions,
 Continued**

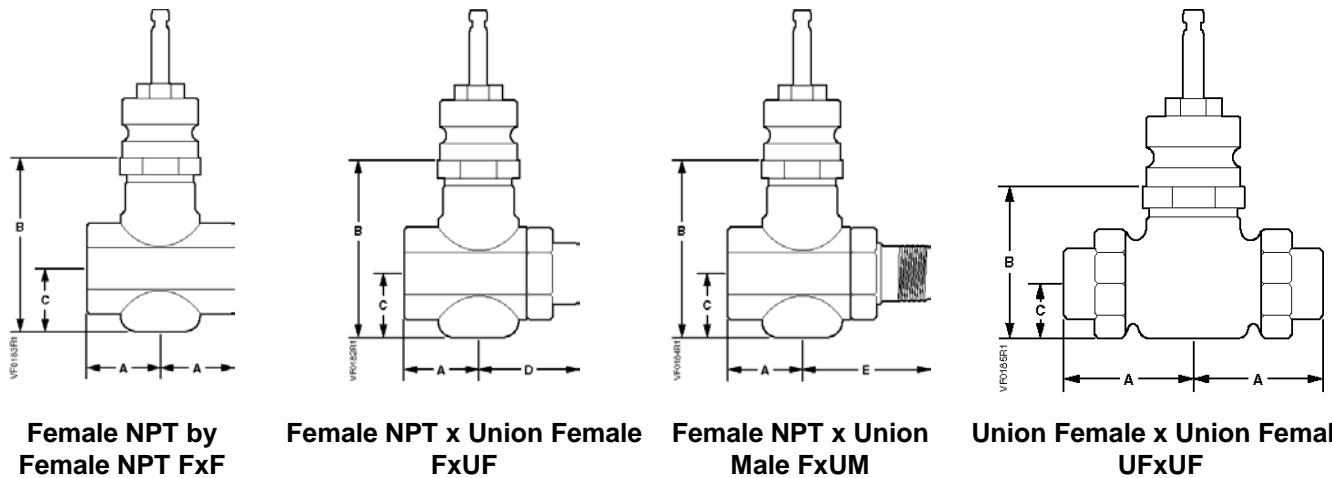


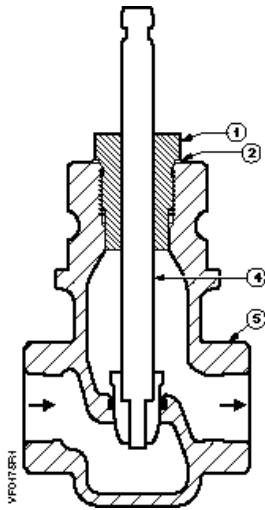
Table 11. 2-Way Valve Dimensions in Inches (Millimeters).

| Valve Action | Valve Size | A | | B | C | D FxUF | E FxUM |
|-----------------|------------|---------------------|--------------|------------------|----------------|-------------|-------------|
| | | FxF, FxUF, and FxUM | UFxUF | | | | |
| Normally Open | 1/2 (15) | 1-7/16 (36) | — | 2-15/16 (74) | 1-1/4 (31) | 2-5/16 (59) | 2-7/8 (73) |
| | 3/4 (20) | 1-11/16 (43) | — | 3-15/16 (99) | 1-7/16 (36) | 2-5/8 (67) | 3-3/16 (81) |
| | 1 (25) | 2 (50) | — | 3-3/4 (96) | 1-1/4 (32) | 3 (76) | 3-1/2 (89) |
| | 1-1/4 (32) | 2-1/2* (62)* | 3-3/4 (95) | 4-1/4** (108)** | 2** (51)** | — | 4-3/8 (111) |
| | 1-1/2 (40) | 2-9/16* (65)* | 3-15/16 (99) | 4-1/4** (108)** | 2** (51)** | — | — |
| | 2 (50) | 3-1/8* (79)* | 4-9/16 (115) | 4-9/16** (116)** | 2-1/4** (57)** | — | — |
| Normally Closed | 1/2 (15) | 1-7/16 (36) | — | 3-13/16 (97) | 2-3/16 (55) | 2-5/16 (59) | 2-7/8 (73) |
| | 3/4 (20) | 1-11/16 (43) | — | 3-13/16 (97) | 2-3/16 (55) | 2-5/8 (67) | 3-3/16 (81) |
| | 1 (25) | 2 (50) | — | 3-13/16 (97) | 2-3/16 (55) | 3 (76) | 3-1/2 (89) |
| | 1-1/4 (32) | 2-1/2* (62)* | 3-3/4 (95) | 3-13/16 (97) | 2-3/16 (55) | — | — |
| | 1-1/2 (40) | 2-9/16* (65)* | 3-15/16 (99) | 3-7/8 (99) | 2-1/4 (58) | — | — |
| | 2 (50) | 3-1/8* (79)* | 4-9/16 (115) | 4-1/2 (114) | 2-9/16 (65) | — | — |

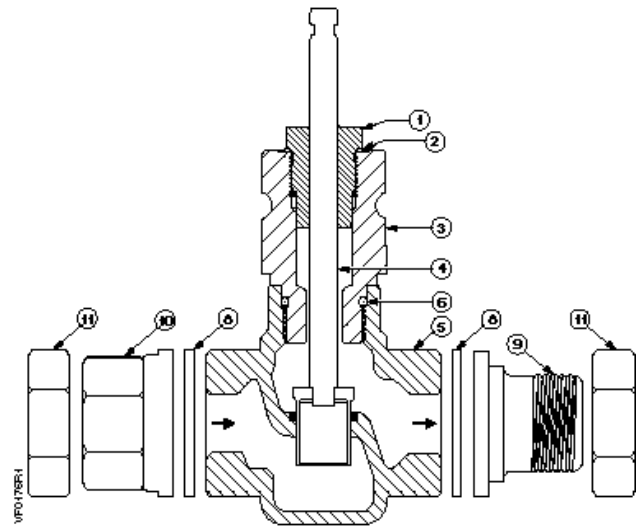
* FxUF is not available as standard in 1-1/4, 1-1/2, and 2-inch valves.

FxUM is not available as standard in 1-1/2, and 2-inch-valves.

** This dimension is determined by the union nut.



1/2-inch (15 mm) Valve Size.



3/4-inch to 2-inch (20 to 50 mm) Valve Size.

Figure 7. Normally Open.

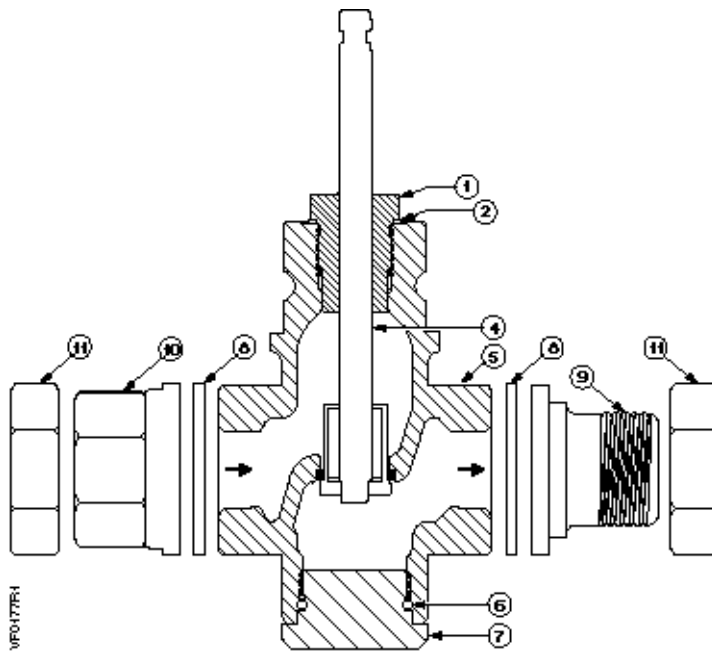


Figure 8. Normally Closed
1/2-inch to 2-inch (15 to 50 mm) Valve Size.

Parts List

Table 12. Parts List for 2-Way Bronze Valves. See Figures 7 and 8.

| Item | Part Name | Part Number | Quantity | | | | Material |
|------|---|-------------------------|----------|------|------|-------|---------------------------|
| | | | FxF | FxUF | FxUM | UFxUF | |
| 1 | Packing Cartridge Assembly | — | 1 | 1 | 1 | 1 | — |
| 2 | Gasket | — | 1 | 1 | | 1 | Copper |
| 3 | Normally Open 3/4-inch to 2-inch Bonnet | — | 1 | 1 | 1 | 1 | Brass |
| 4 | Stem and Plug Assembly | — | 1 | 1 | 1 | 1 | Bronze or Stainless Steel |
| 5 | Valve Body | — | 1 | 1 | 1 | 1 | Bronze |
| 6 | O-ring | | 1 | 1 | 1 | 1 | EPDM |
| 7 | Normally closed Cap | — | 1 | 1 | 1 | 1 | Brass |
| 8 | Gasket | — | — | 1 | 1 | 2 | Fiber |
| 9 | NPT Male union tail piece | — | — | — | 1 | — | Brass |
| 10 | Female tail piece | — | — | 1 | — | 2 | Brass |
| 11 | Union Nut | — | — | 1 | 1 | 2 | Brass |
| — | Packing Kit Normal Duty Service Steam Service | 599-03390 599-03391 | — | — | — | — | Items 1 and 2 |
| — | Rebuild/Repack Kit Normally Closed | See Tables 15 and 16 | — | — | — | — | Items 1, 2, 4, and 6 |
| — | Rebuild/Repack Kit Normally Open | See Tables 15 and 16 | — | — | — | — | Items 1, 2, 4, and 6 |

**Valve Assembly
 Weight**

Table 13. Weight in Pounds (Kilograms).

| Valve Size | Normally Closed | | | | Normally Open | | | |
|--------------|-----------------|------------|------------|-------------|---------------|------------|------------|-------------|
| | FxF | FxUF | FxUM | UFxUF | FxF | FxUF | FxUM | UFxUF |
| .50 (15) | 3 (1.4) | 4 (1.8) | 4 (1.8) | — — | 3 (1.4) | 3 (1.4) | 3 (1.4) | — — |
| .75 (20) | 4 (1.8) | 4 (1.8) | 5 (2.3) | — — | 4 (1.8) | 4 (1.8) | 5 (2.3) | — — |
| 1.0 (25) | 5 (2.3) | 5 (2.3) | 5 (2.3) | — — | 5 (2.3) | 6 (2.7) | 6 (2.7) | — — |
| 1.25 (32) | 7 (3.2) | — — | — — | 9 (4.1) | 7 (3.2) | — — | 8 (3.6) | 9 (4.1) |
| 1.50 (40) | 8 (3.6) | — — | — — | 11 (5) | 9 (4.1) | — — | — — | 11 (5) |
| 2.0 (50) | 16 (7.3) | — — | — — | 16 (7.3) | 13 (5.9) | — — | — — | 16 (7.3) |

Service Kit NOTE: To select the service kit, know your valve body assembly number, model number and the type of connection. Read down the *Connection* column until you find the valve body assembly number and then read to the far right to identify the correct kit. The valve body assembly number and model number are stamped on the tag on the valve body.

Table 14. Rebuild/Repack Service Kits Part Numbers. See Table 13 for Items in Kit.

| Flow | Action | Valve Size | Connection | | | | Valve Description | Model 1 Kit No. | Model 2 Kit No. |
|------------|-----------------|------------|------------|-----------|-----------------------|------------------------|-------------------------------|-----------------|-----------------|
| | | | FxF | FxUF | UFxUF | FxUM | | | |
| Linear | Normally Open | 1/2 Inch | 599-03000 | 599-03009 | — | 599-03216 | Stainless steel 1.0 Cv O-ring | 599-03300 | — |
| | | | 599-03001 | 599-03010 | — | 599-03217 | Stainless steel 1.6 Cv O-ring | 599-03301 | — |
| | | | 599-03002 | 599-03011 | — | 599-03218 | Stainless steel 2.5 Cv O-ring | 599-03302 | — |
| | | | 599-03003 | 599-03012 | — | 599-03219 | Stainless steel 4.0 Cv O-ring | 599-03303 | — |
| | | 3/4-Inch | 599-03004 | 599-03013 | — | 599-03220 | Stainless steel O-ring | 599-03304 | — |
| | | 1-Inch | 599-03005 | 599-03014 | — | 599-03221 | Stainless steel O-ring | 599-03305 | — |
| | | 1-1/4 Inch | 599-03006 | — | 599-03015 | — | Stainless steel O-ring | 599-03306 | 599-09201 |
| | | 1-1/2-Inch | 599-03007 | — | 599-03016 | — | Stainless steel O-ring | 599-03307 | 599-09202 |
| | 2-Inch | 599-03008 | — | 599-03017 | — | Stainless steel O-ring | 599-03308 | 599-09203 | |
| | Normally Closed | 1/2-Inch | 599-03018 | 599-03027 | — | 599-03225 | Stainless steel 1.0 Cv O-ring | 599-03309 | — |
| | | | 599-03019 | 599-03028 | — | 599-03226 | Stainless steel 1.6 Cv O-ring | 599-03310 | — |
| | | | 599-03020 | 599-03029 | — | 599-03227 | Stainless steel 2.5 Cv O-ring | 599-03311 | — |
| | | | 599-03021 | 599-03030 | — | 599-03228 | Stainless steel 4.0 Cv O-ring | 599-03312 | — |
| | | 3/4-Inch | 599-03022 | 599-03031 | — | 599-03229 | Stainless steel O-ring | 599-03313 | — |
| | | 1-Inch | 599-03023 | 599-03032 | — | 599-03230 | Stainless steel O-ring | 599-03314 | — |
| | | 1-1/4 Inch | 599-03024 | — | 599-03033 | — | Stainless steel O-ring | 599-03315 | 599-09213 |
| | | 1-1/2-Inch | 599-03025 | — | 599-03034 | — | Stainless steel O-ring | 599-03316 | 599-09214 |
| | 2-Inch | 599-03026 | — | 599-03035 | — | Stainless steel O-ring | 599-03317 | 599-09215 | |
| | Normally Open | 1/2-Inch | 599-03054 | 599-03063 | — | 599-03234 | Stainless steel 1.0 Cv Steam | 599-03318 | — |
| | | | 599-03055 | 599-03064 | — | 599-03235 | Stainless steel 1.6 Cv Steam | 599-03319 | — |
| | | | 599-03056 | 599-03065 | — | 599-03236 | Stainless steel 2.5 Cv Steam | 599-03320 | — |
| | | | 599-03057 | 599-03066 | — | 599-03237 | Stainless steel 4.0 Cv Steam | 599-03321 | — |
| | | 3/4-Inch | 599-03058 | 599-03067 | — | 599-03238 | Stainless steel Steam | 599-03322 | — |
| | | 1-Inch | 599-03059 | 599-03068 | — | 599-03239 | Stainless steel Steam | 599-03323 | — |
| | | 1-1/4 Inch | 599-03060 | — | 599-03069 | — | Stainless steel Steam | 599-03324 | 599-09204 |
| | | 1-1/2-Inch | 599-03061 | — | 599-03070 | — | Stainless steel Steam | 599-03325 | 599-09205 |
| | 2-Inch | 599-03062 | — | 599-03071 | — | Stainless steel Steam | 599-03326 | 599-09206 | |
| | Normally Closed | 1/2-Inch | 599-03072 | 599-03081 | — | 599-03243 | Stainless steel 1.0 Cv Steam | 599-03327 | — |
| | | | 599-03073 | 599-03082 | — | 599-03244 | Stainless steel 1.6 Cv Steam | 599-03328 | — |
| | | | 599-03074 | 599-03083 | — | 599-03245 | Stainless steel 2.5 Cv Steam | 599-03329 | — |
| | | | 599-03075 | 599-03084 | — | 599-03246 | Stainless steel 4.0 Cv Steam | 599-03330 | — |
| | | 3/4-Inch | 599-03076 | 599-03085 | — | 599-03247 | Stainless steel Steam | 599-03331 | — |
| 1-Inch | | 599-03077 | 599-03086 | — | 599-03248 | Stainless steel Steam | 599-03332 | — | |
| 1-1/4 Inch | | 599-03078 | — | 599-03087 | — | Stainless steel Steam | 599-03333 | 599-09216 | |
| 1-1/2-Inch | | 599-03079 | — | 599-03088 | — | Stainless steel Steam | 599-03334 | 599-09217 | |
| 2-Inch | 599-03080 | — | 599-03089 | — | Stainless steel Steam | 599-03335 | 599-09218 | | |

Service Kits, Continued

Table 15. Rebuild/Repack Service Kits Part Numbers Continued. See Table 13 for Items in Kit.

| Flow | Action | Valve Size | Connection | | | | Valve Description | Model 1 Kit No. | Model 2 Kit No. |
|------------------|-----------------|------------|------------|-----------|-----------|-----------|-------------------------------|-----------------|-----------------|
| | | | FxF | FxUF | UFxUF | FxUM | | | |
| Equal Percentage | Normally Open | 1/2 Inch | 599-03108 | 599-03117 | — | 599-03252 | Stainless steel 1.0 Cv O-ring | 599-03336 | — |
| | | | 599-03109 | 599-03118 | — | 599-03253 | Stainless steel 1.6 Cv O-ring | 599-03337 | — |
| | | | 599-03110 | 599-03119 | — | 599-03254 | Stainless steel 2.5 Cv O-ring | 599-03338 | — |
| | | | 599-03111 | 599-03120 | — | 599-03255 | Stainless steel 4.0 Cv O-ring | 599-03339 | — |
| | | 3/4-Inch | 599-03112 | 599-03121 | — | 599-03256 | Stainless steel O-ring | 599-03340 | — |
| | | 1-Inch | 599-03113 | 599-03122 | — | 599-03257 | Stainless steel O-ring | 599-03341 | — |
| | | 1-1/4-Inch | 599-03114 | — | 599-03123 | — | Stainless steel O-ring | 599-03342 | 599-09207 |
| | | 1-1/2-Inch | 599-03115 | — | 599-03124 | — | Stainless steel O-ring | 599-03343 | 599-09208 |
| | | 2-Inch | 599-03116 | — | 599-03125 | — | Stainless steel O-ring | 599-03344 | 599-09209 |
| | Normally Closed | 1/2-Inch | 599-03126 | 599-03135 | — | 599-03261 | Stainless steel 1.0 Cv O-ring | 599-03345 | — |
| | | | 599-03127 | 599-03136 | — | 599-03262 | Stainless steel 1.6 Cv O-ring | 599-03346 | — |
| | | | 599-03128 | 599-03137 | — | 599-03263 | Stainless steel 2.5 Cv O-ring | 599-03347 | — |
| | | | 599-03129 | 599-03138 | — | 599-03264 | Stainless steel 4.0 Cv O-ring | 599-03348 | — |
| | | 3/4-Inch | 599-03130 | 599-03139 | — | 599-03265 | Stainless steel O-ring | 599-03349 | — |
| | | 1-inch | 599-03131 | 599-03140 | — | 599-03266 | Stainless steel O-ring | 599-03350 | — |
| | | 1-1/4 Inch | 599-03132 | — | 599-03141 | — | Stainless steel O-ring | 599-03351 | 599-09219 |
| | | 1-1/2-Inch | 599-03133 | — | 599-03142 | — | Stainless steel O-ring | 599-03352 | 599-09220 |
| | | 2-Inch | 599-03134 | — | 599-03143 | — | Stainless steel O-ring | 599-03353 | 599-09221 |
| | Normally Open | 1/2-Inch | 599-03162 | 599-03171 | — | 599-03270 | Bronze 1.0 Cv O-ring | 599-03354 | — |
| | | | 599-03163 | 599-03172 | — | 599-03271 | Bronze 1.6 Cv O-ring | 599-03355 | — |
| | | | 599-03164 | 599-03173 | — | 599-03272 | Bronze 2.5 Cv O-ring | 599-03356 | — |
| | | | 599-03165 | 599-03174 | — | 599-03273 | Bronze 4.0 Cv O-ring | 599-03357 | — |
| | | 3/4-Inch | 599-03166 | 599-03175 | — | 599-03274 | Bronze O-ring | 599-03358 | — |
| | | 1-Inch | 599-03167 | 599-03176 | — | 599-03275 | Bronze O-ring | 599-03359 | — |
| | | 1-1/4-Inch | 599-03168 | — | 599-03177 | 599-03276 | Bronze O-ring | 599-03360 | 599-09210 |
| | | 1-1/2-Inch | 599-03169 | — | 599-03178 | — | Bronze O-ring | 599-03361 | 599-09211 |
| | | 2-Inch | 599-03170 | — | 599-03179 | — | Bronze O-ring | 599-03362 | 599-09212 |
| | Normally Closed | 1/2-Inch | 599-03180 | 599-03189 | — | 599-03279 | Bronze 1.0 Cv O-ring | 599-03363 | — |
| | | | 599-03181 | 599-03190 | — | 599-03280 | Bronze 1.6 Cv O-ring | 599-03364 | — |
| | | | 599-03182 | 599-03191 | — | 599-03281 | Bronze 2.5 Cv O-ring | 599-03365 | — |
| | | | 599-03183 | 599-03192 | — | 599-03282 | Bronze 4.0 Cv O-ring | 599-03366 | — |
| | | 3/4-Inch | 599-03184 | 599-03193 | — | 599-03283 | Bronze O-ring | 599-03367 | — |
| | | 1-Inch | 599-03185 | 599-03194 | — | 599-03284 | Bronze O-ring | 599-03368 | — |
| | | 1-1/4-Inch | 599-03186 | — | 599-03195 | — | Bronze O-ring | 599-03369 | 599-09222 |
| | | 1-1/2-Inch | 599-03187 | — | 599-03196 | — | Bronze O-ring | 599-03370 | 599-09223 |
| | | 2-Inch | 599-03188 | — | 599-03197 | — | Bronze O-ring | 599-03371 | 599-09224 |

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